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Effect of timing of umbilical cord clamping and other strategies to influence placental transfusion at preterm birth on maternal and infant outcomes (Review)

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Cochrane Database of Systematic Reviews 2019, Issue 9. Art. No.: CD003248.

DOI: [10.1002/14651858.CD003248.pub4](https://doi.org/10.1002/14651858.CD003248.pub4).

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[Intervention Review]

Effect of timing of umbilical cord clamping and other strategies to influence placental transfusion at preterm birth on maternal and infant outcomes

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ABSTRACT

Background

Infants born preterm (before 37 weeks' gestation) have poorer outcomes than infants at term, particularly if born before 32 weeks. Early cord clamping has been standard practice over many years, and enables quick transfer of the infant to neonatal care. Delayed clamping allows blood flow between the placenta, umbilical cord and baby to continue, and may aid transition. Keeping baby at the mother's side enables neonatal care with the cord intact and this, along with delayed clamping, may improve outcomes. Umbilical cord milking (UCM) is proposed for increasing placental transfusion when immediate care for the preterm baby is needed. This Cochrane Review is a further update of a review first published in 2004 and updated in 2012.

Objectives

To assess the effects on infants born at less than 37 weeks' gestation, and their mothers of: 1) delayed cord clamping (DCC) compared with early cord clamping (ECC) both with immediate neonatal care after cord clamping; 2) DCC with immediate neonatal care with cord intact compared with ECC with immediate neonatal care after cord clamping; 3) DCC with immediate neonatal care after cord clamping compared with UCM; 4) UCM compared with ECC with immediate neonatal care after cord clamping.

Search methods

We searched the Cochrane Pregnancy and Childbirth Group Trials Register, [ClinicalTrials.gov](https://clinicaltrials.gov), the WHO International Clinical Trials Registry Platform (ICTRP) (10 November 2017), and reference lists of retrieved studies. We updated the search in November 2018 and added nine new trial reports to the awaiting classification section to be assessed at the next update.

Selection criteria

Randomised controlled trials (RCTs) comparing delayed with early clamping of the umbilical cord (with immediate neonatal care after cord clamping or with cord intact) and UCM for births before 37 weeks' gestation. Quasi-RCTs were excluded.

Data collection and analysis

Two review authors independently assessed trials for inclusion and risk of bias, extracted data and checked them for accuracy. Random-effects are used in all meta-analyses. Review authors assessed the certainty of the evidence using the GRADE approach.

Main results

This update includes forty-eight studies, involving 5721 babies and their mothers, with data available from 40 studies involving 4884 babies and their mothers. Babies were between 24 and 36⁺⁶ weeks' gestation at birth and multiple births were included. The data are mostly from high-income countries. Delayed clamping ranged between 30 to 180 seconds, with most studies delaying for 30 to 60 seconds. Early clamping was less than 30 seconds and often immediate. UCM was mostly before cord clamping but some were milked after cord clamping. We undertook subgroup analysis by gestation and type of intervention, and sensitivity analyses by low risk of selection and attrition bias.

All studies were high risk for performance bias and many were unclear for other aspects of risk of bias. Certainty of the evidence using GRADE was mostly low, mainly due to imprecision and unclear risk of bias.

Delayed cord clamping (DCC) versus early cord clamping (ECC) both with immediate neonatal care after cord clamping (25 studies, 3100 babies and their mothers)

DCC probably reduces the number of babies who die before discharge compared with ECC (average risk ratio (aRR) 0.73, 95% confidence interval (CI) 0.54 to 0.98, 20 studies, 2680 babies (moderate certainty)).

No studies reported on 'Death or neurodevelopmental impairment' in the early years'.

DCC may make little or no difference to the number of babies with severe intraventricular haemorrhage (IVH grades 3 and 4) (aRR 0.94, 95% CI 0.63 to 1.39, 10 studies, 2058 babies, low certainty) but slightly reduces the number of babies with any grade IVH (aRR 0.83, 95% CI 0.70 to 0.99, 15 studies, 2333 babies, high certainty).

DCC has little or no effect on chronic lung disease (CLD) (aRR 1.04, 95% CI 0.94 to 1.14, 6 studies, 1644 babies, high certainty).

Due to insufficient data, we were unable to form conclusions regarding periventricular leukomalacia (PVL) (aRR 0.58, 95% CI 0.26 to 1.30, 4 studies, 1544 babies, low certainty) or maternal blood loss of 500 mL or greater (aRR 1.14, 95% CI 0.07 to 17.63, 2 studies, 180 women, very low certainty).

We identified no important heterogeneity in subgroup or sensitivity analyses.

Delayed cord clamping (DCC) with immediate neonatal care with cord intact versus early cord clamping (ECC) (one study, 276 babies and their mothers)

There are insufficient data to be confident in our findings, but DCC with immediate neonatal care with cord intact may reduce the number of babies who die before discharge, although the data are also compatible with a slight increase in mortality, compared with ECC (aRR 0.47, 95% CI 0.20 to 1.11, 1 study, 270 babies, low certainty). DCC may also reduce the number of babies who die or have neurodevelopmental impairment in early years (aRR 0.61, 95% CI 0.39 to 0.96, 1 study, 218 babies, low certainty). There may be little or no difference in: severe IVH; all grades IVH; PVL; CLD; maternal blood loss \geq 500 mL, assessed as low certainty mainly due to serious imprecision.

Delayed cord clamping (DCC) with immediate neonatal care after cord clamping versus umbilical cord milking (UCM) (three studies, 322 babies and their mothers) and UCM versus early cord clamping (ECC) (11 studies, 1183 babies and their mothers)

There are insufficient data for reliable conclusions about the comparative effects of UCM compared with delayed or early clamping (mostly low or very low certainty).

Authors' conclusions

Delayed, rather than early, cord clamping may reduce the risk of death before discharge for babies born preterm. There is insufficient evidence to show what duration of delay is best, one or several minutes, and therefore the optimum time to clamp the umbilical cord remains unclear. Whilst the current evidence supports not clamping the cord before 30 seconds at preterm births, future trials could compare different lengths of delay. Immediate neonatal care with the cord intact requires further study, and there are insufficient data on UCM.

The nine new reports awaiting further classification may alter the conclusions of the review once assessed.

PLAIN LANGUAGE SUMMARY

Does delaying cord clamping or using cord milking at birth improve the health of babies born too early?

What is the issue?

In this Cochrane Review, we set out to determine if delayed cord clamping or umbilical cord milking improves the health outcomes for babies born before 37 weeks' gestation. These interventions were compared with early cord clamping.

Why is it important?

Babies born before 37 weeks, or preterm, have poorer health outcomes than babies born at term, particularly if they are born before 32 weeks. Babies born preterm can experience problems with the functioning of many of their major organs including their lungs, gut and hearts. They have a greater risk of dying or having long-term problems such as cerebral palsy. After birth, the babies may need blood transfusions and drugs to strengthen their heart contractions (inotropes) and to raise their blood pressure. It is important to try to find ways of improving the health of these tiny babies.

Early clamping of the umbilical cord has been standard practice over many years. It allows the baby to be transferred quickly to care from a specialised team of doctors either at the side of the room or in another room. Yet, delayed clamping for half to three or more minutes allows continuing blood flow between the mother and her baby, and this may help the baby to adjust to breathing air. Squeezing blood along the umbilical cord towards the baby (milking the cord), can boost the baby's blood volume, and this may improve the baby's health. We wanted to see if there are any benefits or harms from either waiting to clamp or milking the cord.

What evidence did we find?

We collected and analysed all relevant studies to answer this question (date of search: November 2017). Our updated review included 40 studies which provided data on 4884 babies and their mothers. Studies were undertaken across the world, but mostly in high-income countries. Births were in hospitals which practiced early clamping. For many outcomes there were insufficient data to be really confident of our findings.

- 1) For delayed cord clamping (with immediate care of the baby after cord clamping) compared with early cord clamping, we found it likely that fewer babies died before discharge (20 studies, 2680 babies). Also, fewer babies may have had any bleeding in the brain (15 studies, 2333 babies), but there was probably no difference in the numbers of babies with very serious brain bleeds (10 studies, 2058 babies).
- 2) Only one study of 276 babies and their mothers provided data on delayed cord clamping with immediate care of the baby beside the mother with cord intact compared with early cord clamping. This study was small and did not identify any marked differences in health outcomes.
- 3) For delayed cord clamping (with immediate care of the baby after cord clamping) versus cord milking, there were insufficient data (three studies, 322 babies) to make comparisons between outcomes.
- 4) For cord milking versus early cord clamping, we found 11 studies providing data with 1183 babies and their mothers. Again, there were insufficient data to make clear comparisons on outcomes.

What does this mean?

Delayed cord clamping probably reduced the risk of death for babies born preterm. Early cord clamping probably causes harm. No studies showed what length of delay was best, and only a few studies followed babies for health outcomes in early childhood. There is insufficient evidence for reliable conclusions on providing immediate care for the baby beside the mother with the cord intact. Similarly, there is insufficient evidence for reliable conclusions on cord milking. Further studies are in progress.

SUMMARY OF FINDINGS

Summary of findings for the main comparison. DCC with immediate neonatal care after cord clamping compared to ECC (subgroup analysis by gestation) for health problem or population

DCC with immediate neonatal care after cord clamping compared to ECC (subgroup analysis by gestation) for health problem or population

Patient or population: babies born preterm, and their mothers

Setting: hospital births mostly in high-income countries

Intervention: delayed cord clamping (DCC) with immediate neonatal care after cord clamping

Comparison: early cord clamping (ECC)

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	N° of participants (studies)	Certainty of the evidence (GRADE)	Comments
	Risk with ECC (subgroup analysis by gestation)	Risk with DCC with immediate neonatal care after cord clamping				
Death of baby (up to discharge)	Study population		RR 0.73 (0.54 to 0.98)	2680 (20 RCTs)	⊕⊕⊕⊖ MODERATE ^{1 2}	
	74 per 1000	54 per 1000 (40 to 72)				
Death or neurodevelopmental impairment in early years	Study population		-	(0 studies)	-	
	see comment	see comment				
Severe intraventricular haemorrhage (IVH grades 3, 4)	Study population		RR 0.94 (0.63 to 1.39)	2058 (10 RCTs)	⊕⊕⊖⊖ LOW ^{3 4}	
	48 per 1000	45 per 1000 (30 to 66)				
Intraventricular haemorrhage (IVH, all grades)	Study population		RR 0.83 (0.70 to 0.99)	2333 (15 RCTs)	⊕⊕⊕⊕ HIGH ^{5 6}	
	187 per 1000	155 per 1000 (131 to 185)				
Periventricular leukomalacia (PVL)	Study population		RR 0.58 (0.26 to 1.30)	1544 (4 RCTs)	⊕⊕⊖⊖ LOW ⁷	
	22 per 1000	13 per 1000 (6 to 28)				
	Study population		RR 1.04 (0.94 to 1.14)	1644 (6 RCTs)	⊕⊕⊕⊕ HIGH ⁸	

Chronic lung disease (CLD) - oxygen supplement at 36 weeks (corrected for gestation)	494 per 1000	514 per 1000 (464 to 563)			
Maternal blood loss of 500 mL or greater	Study population		RR 1.14 (0.07 to 17.63)	180 (2 RCTs)	⊕○○○ VERY LOW ^{9 10}
	11 per 1000	12 per 1000 (1 to 188)			

***The risk in the intervention group** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: Confidence interval; **RR:** Risk ratio

GRADE Working Group grades of evidence

High certainty: We are very confident that the true effect lies close to that of the estimate of the effect

Moderate certainty: We are moderately confident in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different

Low certainty: Our confidence in the effect estimate is limited: The true effect may be substantially different from the estimate of the effect

Very low certainty: We have very little confidence in the effect estimate: The true effect is likely to be substantially different from the estimate of effect

¹ Although many of the included studies have unclear risk of bias, the large trial which provided 80% of the data is low risk of bias. No downgrade.

² Number of participants = 2680 and OIS > 11,000 (ref [Tarnow-Mordi 2017](#)); number of events 171 less than the 300 calculated for confidence in findings; upper confidence interval close to the line of no difference. Downgrade 1.

³ 25% of data comes from studies where the risk of bias is unclear or high, however, the large study which provides 70% of data are low risk of bias. No downgrade.

⁴ Number of participants 2083; number of events 86 (< 300 generally required); CI crosses line of no difference. Downgrade 2.

⁵ 78% of data coming from studies of low risk of bias including the large study which is of low risk of bias. No downgrade.

⁶ Number of participants 2333; number of events 409. No downgrade.

⁷ Number of participants 1544 and number of events 26 (well below generally required 300). Downgrade 2.

⁸ 98% of data comes from trials of low risk of selection bias, including 1 large well-conducted trial. No downgrade.

⁹ Although Selection bias is low risk of bias, incomplete outcome data is high risk of bias. Downgrade 1.

¹⁰ Only 180 women and 2 events. Downgrade 2.

Summary of findings 2. DCC with immediate neonatal care with cord intact compared to ECC in babies born preterm

DCC with immediate neonatal care with cord intact compared to ECC in babies born preterm

Patient or population: babies born preterm, and their mothers

Setting: hospital births in UK

Intervention: delayed cord clamping (DCC) with immediate neonatal care with cord intact

Comparison: early cord clamping (ECC)

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	N° of participants (studies)	Certainty of the evidence (GRADE)	Comments
	Risk with ECC (sub-group analysis by gestation)	Risk with DCC with immediate neonatal care with cord intact				
Death of baby (up to discharge)	Study population		RR 0.47 (0.20 to 1.11)	270 (1 RCT)	⊕⊕⊕⊕ LOW ¹	
	111 per 1000	52 per 1000 (22 to 123)				
Death or neurodevelopmental impairment at age 2 to 3 years	Study population		RR 0.61 (0.39 to 0.96)	218 (1 RCT)	⊕⊕⊕⊕ LOW ²	
	340 per 1000	207 per 1000 (133 to 326)				
Severe intraventricular haemorrhage (IVH grades 3, 4)	Study population		RR 0.84 (0.29 to 2.45)	266 (1 RCT)	⊕⊕⊕⊕ LOW ³	
	53 per 1000	45 per 1000 (15 to 130)				
Intraventricular haemorrhage (IVH, all grades)	Study population		RR 0.90 (0.64 to 1.26)	266 (1 RCT)	⊕⊕⊕⊕ LOW ⁴	
	356 per 1000	320 per 1000 (228 to 449)				
Periventricular leukomalacia (PVL)	Study population		RR 0.86 (0.32 to 2.31)	266 (1 RCT)	⊕⊕⊕⊕ LOW ⁵	
	61 per 1000	52 per 1000 (19 to 140)				
Chronic lung disease (CLD) - oxygen supplement at 36 weeks (corrected for gestation)	Study population		RR 0.95 (0.66 to 1.37)	249 (1 RCT)	⊕⊕⊕⊕ LOW ⁶	
	325 per 1000	309 per 1000 (215 to 445)				
Maternal blood loss of 500 mL or greater	Study population		RR 0.94 (0.72 to 1.22)	254 (1 RCT)	⊕⊕⊕⊕ LOW ^{7 8}	
	476 per 1000	447 per 1000 (343 to 580)				

*The risk in the intervention group (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: Confidence interval; RR: Risk ratio

GRADE Working Group grades of evidence

High certainty: We are very confident that the true effect lies close to that of the estimate of the effect

Moderate certainty: We are moderately confident in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different

Low certainty: Our confidence in the effect estimate is limited: The true effect may be substantially different from the estimate of the effect

Very low certainty: We have very little confidence in the effect estimate: The true effect is likely to be substantially different from the estimate of effect

- 1 Only one small study (N = 270); wide CI crossing line of no effect and very few events (n = 22). Downgrade 2.
- 2 Only one small study (N = 218); wide CI crossing line of no effect and very few events (n = 59). Downgrade 2.
- 3 Only one small study (N = 266); wide CI crossing line of no effect and very few events (n = 13). Downgrade 2.
- 4 Only one small study (N = 266); wide CI crossing line of no effect and few events (n = 90). Downgrade 2.
- 5 Only one small study (N = 266); wide CI crossing line of no effect and very few events (n = 15). Downgrade 2.
- 6 Only one small study (N = 249); wide CI crossing line of no effect and few events (n = 79). Downgrade 2.
- 7 High risk of bias through not being able to blind clinicians or women and this outcome. Downgrade 1.
- 8 Only one small study (N = 254); wide CI crossing line of no effect and few events (n = 117). Downgrade 1.

Summary of findings 3. DCC with immediate neonatal care after cord clamping compared to UCM in babes born preterm

DCC with immediate neonatal care after cord clamping compared to UCM in babies born preterm

Patient or population: babies born preterm, and their mothers

Setting: hospital births mostly in high-income countries

Intervention: delayed cord clamping (DCC) with immediate neonatal care after cord clamping

Comparison: umbilical cord milking (UCM).

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	N° of participants (studies)	Certainty of the evidence (GRADE)	Comments
	Risk with UCM (sub-group analysis by gestation)	Risk with DCC with immediate neonatal care after cord clamping				
Death of baby (up to discharge)	Study population		RR 2.14 (0.93 to 4.93)	322 (3 RCTs)	⊕⊕○○ LOW ^{1 2}	
	44 per 1000	94 per 1000 (41 to 216)				
Death or neurodevelopmental impairment at age 2 to 3 years	Study population		RR 1.67 (0.78 to 3.57)	195 (2 RCTs)	⊕○○○ VERY LOW ^{3 4}	
	162 per 1000	270 per 1000 (126 to 577)				

Severe intraventricular haemorrhage (IVH grades 3, 4)	Study population	RR 2.63 (0.11 to 61.88)	58 (1 RCT)	⊕⊕○○ LOW ^{5 6}
	0 per 1000 0 per 1000 (0 to 0)			
Intraventricular haemorrhage (IVH, all grades)	Study population	RR 1.32 (0.55 to 3.17)	125 (2 RCTs)	⊕○○○ VERY LOW ^{7 8}
	129 per 1000 170 per 1000 (71 to 409)			
Periventricular leukomalacia (PVL)	Study population	not estimable	58 (1 RCT)	⊕⊕○○ LOW ^{9 10}
	0 per 1000 0 per 1000 (0 to 0)			
Chronic lung disease (CLD) - oxygen supplement at 36 weeks (corrected for gestation)	Study population	RR 1.53 (0.43 to 5.48)	125 (2 RCTs)	⊕⊕○○ LOW ^{11 12}
	48 per 1000 74 per 1000 (21 to 265)			
Maternal blood loss of 500 mL or greater	Study population	-	(0 studies)	-
	see comment see comment			

***The risk in the intervention group** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: Confidence interval; **RR:** Risk ratio

GRADE Working Group grades of evidence

High certainty: We are very confident that the true effect lies close to that of the estimate of the effect

Moderate certainty: We are moderately confident in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different

Low certainty: Our confidence in the effect estimate is limited: The true effect may be substantially different from the estimate of the effect

Very low certainty: We have very little confidence in the effect estimate: The true effect is likely to be substantially different from the estimate of effect

1 Risk of bias: two out of three studies were low risk of bias for sequence generation, allocation concealment and incomplete outcome data and provided over 90% of data. No downgrade.

2 Imprecision: small number of participants (N = 322); very few events (n = 24) and wide 95% CI crossing line of no difference. Downgrade 2.

3 One study providing over 70% of data was high risk of attrition bias and selective outcome reporting bias. Downgrade 1.

4 Wide CI crossing line of no difference, small number of participants (N = 195) and few events (n = 41). Downgrade 2.

5 One small study - low risk of bias. No downgrade.

6 Small sample size (N = 58), only 1 event and wide 95% CI crossing line of no difference. Downgrade 2.

- 7 One study providing over 50% of data was unclear for selection bias. Downgrade 1.
 8 Small sample size (N = 125), few events (n = 19) and wide 95% CI crossing line of no difference. Downgrade 2.
 9 Risk of bias: low for sequence generation, allocation concealment and incomplete outcome data. No downgrade.
 10 Imprecision: small sample size (N = 58) and no events. Downgrade 2.
 11 One study provided 82% of the data were assessed as low risk of bias. No downgrade.
 12 Small sample size (N = 125), very few events (n = 9) and wide 95% CI crossing line of no difference. Downgrade 2.

Summary of findings 4. UCM compared to ECC in babies born preterm

UCM compared to ECC in babies born preterm

Patient or population: babies born preterm, and their mothers.

Setting: hospital births mostly in high-income countries.

Intervention: umbilical cord milking(UCM)

Comparison: early cord clamping (ECC).

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	Nº of participants (studies)	Certainty of the evidence (GRADE)	Comments
	Risk with ECC (sub-group analysis by gestation)	Risk with UCM				
Death of baby (up to discharge)	Study population		RR 0.81 (0.47 to 1.41)	931 (9 RCTs)	⊕⊕⊕⊖ LOW 12	
	60 per 1000	48 per 1000 (28 to 84)				
Death or neurodevelopmental impairment at age 2 to 3 years	Study population		-	(0 studies)	-	
	see comment	see comment				
Severe intraventricular haemorrhage (IVH grades 3, 4)	Study population		RR 0.75 (0.39 to 1.45)	618 (6 RCTs)	⊕⊕⊕⊖ LOW 3 4	
	64 per 1000	48 per 1000 (25 to 93)				
Intraventricular haemorrhage (IVH, all grades)	Study population		RR 0.85 (0.62 to 1.18)	716 (8 RCTs)	⊕⊕⊕⊖ MODERATE 5 6	
	270 per 1000	230 per 1000 (168 to 319)				
Periventricular leukomalacia (PVL)	Study population		RR 0.63 (0.15 to 2.63)	315 (3 RCTs)	⊕⊕⊕⊖ LOW 7 8	

	31 per 1000	20 per 1000 (5 to 82)			
Chronic lung disease (CLD) - oxygen supplement at 36 weeks (corrected for gestation)	Study population		RR 1.03 (0.64 to 1.66)	682 (7 RCTs)	⊕⊕○○ LOW ^{9 10 11}
	198 per 1000	204 per 1000 (127 to 329)			
Maternal blood loss of 500 mL or greater	Study population		not estimable	200 (1 RCT)	⊕⊕○○ LOW ^{12 13}
	0 per 1000	0 per 1000 (0 to 0)			

***The risk in the intervention group** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: Confidence interval; **RR:** Risk ratio

GRADE Working Group grades of evidence

High certainty: We are very confident that the true effect lies close to that of the estimate of the effect

Moderate certainty: We are moderately confident in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different

Low certainty: Our confidence in the effect estimate is limited: The true effect may be substantially different from the estimate of the effect

Very low certainty: We have very little confidence in the effect estimate: The true effect is likely to be substantially different from the estimate of effect

- 1 Five out of nine studies were low risk of selection bias and provided over 50% of data. No downgrade.
- 2 Not many events (n = 50) out of 931 babies, and wide 95% CI crossing line of no difference. Downgraded 2
- 3 Three out of six studies were low risk of selection bias and provided over 50% of data. No downgrade
- 4 Not a large sample size (N = 618), few events (n = 36) and wide 95% CI crossing line of no difference. Downgrade 2.
- 5 Four out of eight studies were low risk of selection bias and contributed over 50% of data. No downgrade
- 6 Wide CI crossing line of no difference. Not a large sample size (N = 716). 181 events. Downgrade 1.
- 7 Two out of three studies were low risk of selection bias and provided over 60% of data. No downgrade.
- 8 Small sample size (N = 315), very few events (n = 8) and wide 95% CI crossing line of no difference. Downgrade 2.
- 9 Four out of seven studies were low risk of selection bias and provided over 60% of data. No downgrade.
- 10 Heterogeneity I² = 50%. Downgrade 1.
- 11 Wide CI crossing line of no difference. Not a large sample size (N = 682). 141 events. Downgrade 1.
- 12 Risk of bias: low for sequence generation, allocation concealment and incomplete outcome data. No downgrade.
- 13 Imprecision: small sample size (N = 200) and no events. Downgrade 2.

BACKGROUND

Being born too early (preterm birth) has a major impact on survival and quality of life for the child, on psychosocial and emotional stress on the family, and on costs for health services and society (Bhutta 2002; Saigal 2008; Zeitlin 2008). Infants born very preterm, before 32 weeks' gestation, have the highest risk. For example, in the UK infant mortality (deaths in the first year of life) for babies born very preterm is 144 deaths per 1000 live births, compared to 1.8 deaths per 1000 live births at term (Mosser 2007). Although only 1.4% of live births in the UK are very preterm, these babies account for 51% of infant deaths (Mosser 2007).

The costs of neonatal care for infants born very preterm are also high, and these babies are often in neonatal intensive care units for many weeks and sometimes months. In the UK, for example, duration of hospital stay for infants born before 28 weeks is 85 times that for term births, and hospital inpatient costs are £15,000 (\$21,000) higher; for those born at 28 to 31 weeks, it is 16 times and £12,000 (\$17,000), respectively (Petrou 2003). Having a baby born very preterm is a difficult and distressing time for the parents (Sawyer 2013).

Amongst children born very preterm who survive, morbidity is also high compared to those born at term (Zeitlin 2008) as around 5% develop cerebral palsy, and those without severe disability have a two-fold or greater increased risk for developmental, cognitive, and behavioural difficulties (Bhutta 2002; Saigal 2008). These impairments may persist into adolescence and early adulthood (Aarnoudse-Moens 2009; Anderson 2003).

Description of the condition

Physiology

At birth, if the umbilical cord is not clamped, blood flow between the baby and placenta may continue for several minutes (Boere 2015; Dawes 1968; Farrar 2011; Vijayaseelvi 2015). This umbilical flow is part of the physiological transition from the fetal to the neonatal circulation, and for very preterm infants may improve resilience during this transition (Bhatt 2013; Committee 2012; Gunther 1957). 'Placental transfusion' refers to the net transfer of blood to the baby between birth and cord clamping.

For term births, umbilical blood flow is usually complete by two minutes, but may continue for up to five minutes (Boere 2015; Farrar 2011). This gives a term infant, on average, an additional 80 mL to 100 mL of blood and can contribute a third to a quarter of the neonatal blood volume at birth (Dawes 1968; Farrar 2011). The additional plasma from placental transfusion is quickly lost to the circulation, leaving a high red cell mass which is broken down and the iron stored. For term births, delayed (or deferred) cord clamping improves iron stores at age six to 12 months (Chaparro 2006; McDonald 2013). Although the physiology of placental transfusion at preterm birth is less well understood, the relative contribution to blood volume and red cell mass of delayed cord clamping may be greater than for those born at term, as a higher proportion of the intrauterine blood volume (blood in the baby, cord and placenta) is sequestered in the placenta. At 30 weeks' gestation, for example, about half the intrauterine blood is in the baby and half is in the cord and placenta; by term, this rises to two-thirds being in the baby. Nevertheless, at preterm birth placental transfusion may take longer than at term (Aladangady 2006; Saigal 1972).

Transition at birth from intra-uterine to extra-uterine life

At birth, the infant must move from fetal circulation to his/her own independent circulation. Therefore, as the baby is born the umbilical circulation slows and pulmonary vascular resistance falls, rapidly increasing pulmonary blood flow. Continued flow in the umbilical vein and arteries at birth may be part of the physiological mechanisms assisting the baby as it makes this transition to the neonatal circulation, potentially helping to stabilise blood pressure and support cardiovascular changes (Duley 2015; Gunther 1957; Mercer 2002). For preterm infants, the mechanisms for these circulatory changes may not be fully developed and so they may take longer. Immediate cord clamping may restrict the infant's ability to deal with the transition to the neonatal circulation. Whilst most healthy babies at term may adapt without major consequences, for those born preterm, or with their cardio-respiratory circulation already impaired, there may be an impact on clinical outcome.

A common complication of being born preterm is fluctuating and low blood pressure during the first days of life, which contributes to the risk of bleeding into the brain (intraventricular haemorrhage); if severe, this can be life threatening or lead to long-term problems. Delaying cord clamping was first suggested for babies born very preterm based on the hypothesis that it might reduce hypotension and stabilise blood pressure, thereby reducing the risk of intraventricular haemorrhage and its consequences (Hofmeyr 1988). Thus, if the preterm babies blood pressure is stable and in the normal range for their age, their adaptation to extra-uterine life should be easier to achieve.

Lessons learned from animal studies

Recent work with preterm lambs born by caesarean section supports the hypothesis that delaying cord clamping until the neonatal circulation is established may benefit cardiovascular function (Bhatt 2013). Starting ventilation at birth and waiting until respiration was established before clamping the cord improved cardiovascular function compared with immediate clamping and then ventilating the lambs (Bhatt 2013). Ventilation with deferred cord clamping was associated with improved pulmonary blood flow, and less variability in carotid artery pressure, carotid artery blood flow and heart rate. This suggests the mechanisms for improvement in cardiorespiratory function may be a more stable haemodynamic transition, rather than increased neonatal blood volumes. Improved understanding of the physiology of placental transfusion and neonatal transition is leading to calls for a more physiological approach to umbilical cord clamping, based on whether the infant has aerated lungs and established respiration, rather than any specific timing for cord clamping (Hooper 2015).

Description of the intervention

Standard approach to the third stage of labour: active management

The third stage of labour is the time between birth of the baby and complete delivery of the placenta. Due to the separation of the placenta, the mother will experience some degree of blood loss after the birth of the baby. If the uterus does not contract well after birth, heavy blood loss may occur and this can endanger the life of the mother. Immediate cord clamping was widely implemented in the 1960s, as part of a package of care known as 'active management of the third stage of labour' (Begley 2019; Prendiville

1989). To clamp the cord, two clamps are placed close together on the cord, and the cord is cut between them. This stops flow in the umbilical vein towards the baby, and in the two umbilical arteries towards the placenta. Arterial pulsation is muscular, and not related to blood flow. The aim of active management of third stage was to reduce maternal blood loss after the birth, in particular postpartum haemorrhage (blood loss of 500 mL or more) (Begley 2019).

The traditional components of active management are a prophylactic uterotonic drug, immediate cord clamping and controlled cord traction (Prendiville 1989). Immediate cord clamping and controlled cord traction were included due to the concerns that the administration of the uterotonic drug might lead to 'over transfusion' of the baby, and that the placenta might become trapped in the contracted uterus. Concern that delaying cord clamping might lead to 'over-transfusion' of the baby is understandable, as ergometrine was used at that time. With the modern use of less potent drugs, such as syntocinon, the concern is much less, but is still apparent (Oddie 2014), and becomes irrelevant if administration of the uterotonic drug is after the cord is clamped.

More recently, re-evaluation of the individual components of active management has made clear that, whilst uterotonic drugs do indeed reduce the risk of postpartum haemorrhage (Gallos 2018; Salati 2019), controlled cord traction does not offer significant additional benefit (Hofmeyr 2015). Similarly, timing of cord clamping at term births does not appear to have any substantive effect on the risk of postpartum haemorrhage, and delaying cord clamping may be beneficial for the infant (McDonald 2013).

The introduction of active management of the third stage of labour coincided with the advent of neonatal medicine (Aflaifel 2012). Hence, for preterm births, it became standard practice that once the cord was cut the baby was handed to the neonatal team, who transferred the infant to the resuscitation equipment either at the side of the delivery room, or in an adjacent room (O'Donnell 2017). Mother and baby were, therefore, separated at birth and, as the baby was quickly taken to the neonatal unit, often mothers did not see or touch their baby until much later (Arnold 2013).

Alternative approaches for timing of cord clamping

Delayed (deferred) cord clamping

There is no consensus about the definition of early or immediate cord clamping, nor of delayed or deferred clamping for preterm birth. As discussed above, a specific timing may not be ideal, and a physiologic approach may be more appropriate. Previously, immediate clamping for preterm birth was generally defined as within 15 to 20 seconds, but more recently up to 30 seconds (NICE 2015), or 60 seconds (WHO 2014) have become more widely accepted. For delayed cord clamping, particularly between 30 and 45 seconds has often been used as the definition for delayed cord clamping for very preterm births, at up to three minutes for late preterm births (Rabe 2012). However, timing of cord clamping for very preterm infants was often determined by neonatal guidance to provide prompt ventilation support (Perلمان 2010).

After birth whilst the cord is intact, umbilical flow will be 'physiological' if the infant is either level with the mother's bed (i.e. level with the placenta) or level with her abdomen. For term births, lowering the baby by 20 cm appears to increase the volume

of placental transfusion (Yao 1969). However, for preterm lambs although raising or lowering the lamb caused small transient effect on umbilical (both vein and arteries) and cerebral flow, this was not associated in any net change in the volume of placental transfusion (Hooper 2017). A recent randomised trial has also reported that for term births, whether the infant was level with the mother's vagina or abdomen did not influence birthweight, and so did not appear to influence placental transfusion (Vain 2014).

Umbilical cord milking (UCM)

Umbilical cord 'milking' or 'stripping' is when the cord is pinched between the thumb and forefingers, and then gently squeezed to push cord blood towards the baby. The cord is then released and the 'milking repeated' (typically, a 20 cm length of cord is 'milked' between two and four times, each done for about two seconds, before clamping) (Hosono 2008; Rabe 2011). Sometimes the cord is milked after the cord is cut (Kumar 2015). This technique is sometimes used as an alternative to delaying cord clamping when the baby requires immediate stabilisation and resuscitation at birth (Al-Wassia 2015).

Immediate neonatal care with cord intact

Recently, strategies to care for the infant without clamping the cord have been developed (Batey 2017; Hutchon 2008; Katheria 2017a; Knol 2018; Weeks 2015). Providing initial neonatal care and stabilisation with the umbilical cord intact allows cord clamping to be delayed for longer, even for infants requiring immediate resuscitation (CORD Pilot 2018).

An adjustable mobile trolley specially designed to allow neonatal care to be provided beside the mother and with the cord intact is available. This has a platform on which the baby is placed that can reach close to the mother's perineum at vaginal births or can be draped to allow access at caesarean section (Katheria 2017a; Weeks 2013). However, the usual resuscitation equipment can easily be adapted to provide the same care with cord intact at both vaginal and caesarean births (Batey 2017; Schoonakker 2013). They also allow the baby to be cared for at birth beside the mother, which is valued by parents and appears to be acceptable to clinicians (Sawyer 2015; Thomas 2014; Yoxall 2015). Providing neonatal care with the cord intact requires training and a multidisciplinary team approach (Batey 2017).

How the intervention might work

Delayed (deferred) cord clamping

For healthy term births the benefits of delaying umbilical cord clamping are largely related to an increase in neonatal blood volume (placental transfusion) (McDonald 2013). For preterm births, the physiology is more complex, and allowing longer for transition to the neonatal circulation may be as important as any placental transfusion (Hooper 2015; Kluckow 2015). Potential benefits for delayed, rather than immediate, cord clamping at preterm birth will depend on the gestation at birth but may include a reduction in the risk of intraventricular haemorrhage (Hofmeyr 1988), blood transfusion, respiratory distress (Linderkamp 1978), and respiratory support (Holland 1991; Hudson 1990; Kinmond 1993).

Potential side effects such as the baby getting cold (hypothermia) and delay in providing stabilisation and resuscitation, when needed, are not directly related to the timing of cord clamping per

se, and can potentially be overcome by changing neonatal practice and providing neonatal care at birth beside the mother and, if needed, with the cord intact. As well as comparing the benefits and risks during the first few days and weeks of life for alternative policies for timing of cord clamping for preterm births, it is also important to assess whether any short-term effects are reflected in long-term outcomes (Tarnow-Mordi 2014).

Umbilical cord milking (UCM)

The rationale for UCM is that it enables blood to be directed into the baby more quickly at birth than waiting for this to happen physiologically (Hosono 2008; Rabe 2011; Tarnow-Mordi 2014). Cord milking is, therefore, proposed as an alternative to delayed cord clamping, allowing rapid transfer of blood from the placenta to the baby and earlier access for thermal and respiratory support. This is based on the assumption that an increase in placental transfusion is the main benefit of delayed cord clamping, which can be used by the baby to fill their lung circulation, whereas it has been hypothesised that the circulatory disruption following cord milking may be similar to that following immediate cord clamping (Blank 2018).

Immediate neonatal care with cord intact

Immediate cord clamping for preterm infants, particularly those very preterm, is often to allow rapid access to the baby for clinical assessment and/or resuscitation. The timing of delayed clamping has usually been a balance between allowing some placental transfusion and the need to transfer the baby for neonatal care. An alternative strategy is to change neonatal practice and provide neonatal care beside the mother and, if needed, with the cord intact (Batey 2017; CORD Pilot 2018; Katheria 2017a; Knol 2018). Studies assessing delayed cord clamping with immediate neonatal care available with the cord intact are able to recruit higher-risk babies requiring immediate resuscitation at birth, a group excluded from previous research (CORD Pilot 2018; Manley 2017).

Why it is important to do this review

There remains huge uncertainty in this area of care. The comparative benefits and harms of delayed rather than early clamping of the umbilical cord for the preterm infant (less than 37 weeks' gestation) has been the subject of much debate, and the optimal timing for clamping the cord remains unclear and requires further research (Poscencheg 2015). Leaving the cord unclamped for longer at preterm births, to allow the cardio-respiratory changes associated with transition to the neonatal circulation to be supported by umbilical flow, may conflict with a perceived need for immediate resuscitation, which usually takes place away from the mother. UCM is a possible alternative approach but also requires assessment of the current evidence (Katheria 2017b; Poscencheg 2015).

For low-income settings, where the availability of specialist neonatal care is often limited, the balance of benefits and harms associated with alternative policies for timing of cord clamping may be different (Manley 2017).

As the potential benefits and harms of alternative policies for timing of cord clamping are different at term compared with preterm, term births are covered by a separate Cochrane Review (McDonald 2013).

This review will be of interest to obstetricians, midwives, neonatologists as well as pregnant women and their partners. This Cochrane Review is a further update of a review first published in 2004 and updated in 2012.

OBJECTIVES

To assess the effects on infants born at less than 37 weeks' gestation, and their mothers of: 1) delayed cord clamping compared with early cord clamping both with immediate neonatal care after cord clamping; 2) delayed cord clamping with immediate neonatal care with cord intact compared with early cord clamping with immediate neonatal care after cord clamping; 3) delayed cord clamping with immediate neonatal care after cord clamping compared with umbilical cord milking (UCM); 4) UCM compared with early cord clamping with immediate neonatal care after cord clamping.

METHODS

Criteria for considering studies for this review

Types of studies

Randomised controlled trials. Cluster-randomised trials were eligible for inclusion but none were identified. Quasi-randomised trials were not included.

Types of participants

Preterm infants born before 37 completed weeks' gestation and their mothers.

Types of interventions

Delayed umbilical cord clamping (DCC - after 30 seconds or more) versus early umbilical cord clamping (ECC - less than 30 seconds). This could be with or without oxytocin, with or without the baby held above or below the level of the placenta, and with or without milking of the cord towards the infant. In this update of the review we have also considered studies examining umbilical cord milking (UCM) and delayed cord clamping with immediate neonatal care with the cord intact.

For this review comparisons will include:

1. delayed cord clamping with immediate neonatal care after cord clamping versus early cord clamping;
2. delayed cord clamping with immediate neonatal care with cord intact versus early cord clamping;
3. delayed cord clamping with immediate neonatal care after cord clamping versus umbilical cord milking;
4. umbilical cord milking versus early cord clamping.

Comparisons of different lengths of delay in cord clamping will be included at a future update.

Types of outcome measures

We searched the COMET database (<http://www.comet-initiative.org/>) to see if a core outcome set (COS) had been developed for outcomes in preterm birth. We only found reference to COS for preventing preterm birth in the CROWN Initiative (<http://www.crown-initiative.org/tag/preterm-birth/>) and also in a further publication on prevention of preterm birth (Meher 2014). We have,

therefore, in discussion amongst co-authors chosen the primary and secondary outcomes below.

Primary outcomes

For the baby

1. Death of the baby: at or before discharge from hospital
2. Death or neurodevelopmental impairment in early childhood (around two to three years)
3. Severe intraventricular haemorrhage (IVH) - ultrasound diagnosis grades three and four
4. IVH - all grades
5. Periventricular leukomalacia (PVL)
6. Chronic lung disease (CLD) - or chronic pulmonary disease (CPD) - assessed by oxygen supplementation at 36 weeks (corrected for gestation)

For the mother

1. Postpartum haemorrhage (blood loss of 500 mL or greater)

Secondary outcomes

For the baby

Condition at birth

1. Low Apgar score as defined by trialists (generally < eight at five minutes)
2. Temperature < 36⁰ within one hour of birth

Respiratory

1. Respiratory distress syndrome (RDS)
2. Respiratory support (ventilator or continuous positive airway pressure (CPAP))
3. Duration of respiratory support - continuous data
4. Surfactant treatment - for severe RDS
5. Home oxygen

Cardiovascular

1. Treatment for patent ductus arteriosus (medical and/or surgical)
2. Inotropic support for hypotension during the first 24 hours of life
3. Mean arterial blood pressure in early hours after birth

Central nervous system

1. IVH grades one and two
2. Hydrocephalus
3. Neurodevelopmental impairment in early childhood (around two to three years)
4. Cerebral palsy

Gastrointestinal

1. Necrotising enterocolitis (NEC) confirmed by X-ray or laparotomy

Haematological

1. Blood transfusion in infant
2. Volume of blood transfused - continuous data
3. Haemoglobin (Hb) within first 24 hours - continuous data
4. Hyperbilirubinaemia (treated by phototherapy)

Other

1. Late sepsis (after three days or as defined by trialists)
2. Treatment for retinopathy of prematurity (RoP)
3. Severe visual impairment
4. Length of infant stay in neonatal intensive care unit (NICU)

For the mother

1. Prolonged third stage (> 30 minutes) (denominator = vaginal births)
2. Manual removal of the placenta (denominator = vaginal births)
3. Blood transfusion
4. Postpartum infection
5. Rhesus-isoimmunisation
6. Psychological well-being
7. Bonding with the infant
8. Breastfeeding initiation
9. Fully breastfed or mixed feeding at infant discharge
10. Mothers' anxieties
11. Mothers' views

For the father

1. Psychological well-being
2. Bonding with the infant
3. Fathers' anxieties
4. Fathers' views

Search methods for identification of studies

The following methods section of this review is based on a standard template used by Cochrane Pregnancy and Childbirth.

Electronic searches

For this update, we searched Cochrane Pregnancy and Childbirth's Trials Register by contacting their Information Specialist (10 November 2017). We updated this search in November 2018. The results of the updated search have not yet been fully incorporated (see: [Results of the search](#) for full details).

The Trials Register is a database containing over 25,000 reports of controlled trials in the field of pregnancy and childbirth. It represents over 30 years of searching. For full current search methods used to populate Pregnancy and Childbirth's Trials Register including the detailed search strategies for CENTRAL, MEDLINE, Embase and CINAHL; the list of handsearched journals and conference proceedings, and the list of journals reviewed via the current awareness service, please follow this [link](#).

Briefly, Cochrane Pregnancy and Childbirth's Trials Register is maintained by their Information Specialist and contains trials identified from:

1. monthly searches of the Cochrane Central Register of Controlled Trials (CENTRAL);
2. weekly searches of MEDLINE (Ovid);
3. weekly searches of Embase (Ovid);
4. monthly searches of CINAHL (EBSCO);
5. handsearches of 30 journals and the proceedings of major conferences;

6. weekly current awareness alerts for a further 44 journals plus monthly BioMed Central email alerts.

Search results are screened by two people and the full text of all relevant trial reports identified through the searching activities described above is reviewed. Based on the intervention described, each trial report is assigned a number that corresponds to a specific Pregnancy and Childbirth review topic (or topics), and is then added to the Register. The Information Specialist searches the Register for each review using this topic number rather than keywords. This results in a more specific search set that has been fully accounted for in the relevant review sections ([Included studies](#); [Excluded studies](#); [Studies awaiting classification](#); [Ongoing studies](#)).

In addition, we searched [ClinicalTrials.gov](#) and the WHO International Clinical Trials Registry Platform (ICTRP) for unpublished, planned and ongoing trial reports (8 November 2018) using the search methods detailed in [Appendix 1](#).

Searching other resources

We searched the reference lists of retrieved studies.

We did not apply any language or date restrictions.

Data collection and analysis

For methods used in the previous version of this review, see [Elbourne 1995](#); [Rabe 2004](#); [Rabe 2012](#).

For this update, the following methods were used for assessing the reports that were identified as a result of the updated search and we went back over the trial reports in the 2012 publication to allocate to the appropriate comparison and subgroup and to update their risk of bias.

Selection of studies

Two review authors independently assessed for inclusion all the potential studies we identified as a result of the search strategy. We resolved any disagreement through discussion or, if required, we consulted the third review author.

Data extraction and management

We designed an updated form to extract data. For eligible studies, two review authors extracted the data using the agreed form. We resolved discrepancies through discussion or, if required, we consulted the third review author. We entered data into Review Manager software ([RevMan 2014](#)) and checked for accuracy.

When information regarding any of the above was unclear, we attempted to contact authors of the original reports to provide further details.

Assessment of risk of bias in included studies

Two review authors independently assessed risk of bias for each study using the criteria outlined in the *Cochrane Handbook for Systematic Reviews of Interventions* ([Higgins 2011](#)). We resolved any disagreement by discussion, or by involving a third assessor.

(1) Random sequence generation (checking for possible selection bias)

We have described for each included study the method used to generate the allocation sequence in sufficient detail to allow an assessment of whether it should produce comparable groups.

We assessed the method as:

- low risk of bias (any truly random process, e.g. random number table; computer random number generator);
- high risk of bias (any non-random process, e.g. odd or even date of birth; hospital or clinic record number);
- unclear risk of bias.

(2) Allocation concealment (checking for possible selection bias)

We have described for each included study the method used to conceal allocation to interventions prior to assignment and have assessed whether intervention allocation could have been foreseen in advance of, or during recruitment, or changed after assignment.

We assessed the methods as:

- low risk of bias (e.g. telephone or central randomisation; consecutively numbered sealed opaque envelopes);
- high risk of bias (open random allocation; unsealed or non-opaque envelopes, alternation; date of birth);
- unclear risk of bias (we considered a study to be unclear for risk of bias for allocation concealment if the study was unclear on sequence generation).

(3.1) Blinding of participants and personnel (checking for possible performance)

Blinding participants and staff to the types of interventions considered in this review may not be feasible, but it may be possible to blind outcome assessors for at least some of the outcomes reported. We have described for each included study the methods used, if any, to achieve blinding. We considered studies to be at low risk of bias if they were blinded, or if we judged that the lack of blinding would be unlikely to affect results.

We assessed the methods as:

- low risk of bias for participants and personnel;
- high risk of bias for participants and personnel;
- unclear risk of bias for participants and personnel.

(3.2) Blinding of outcome assessment (checking for possible detection bias)

We described for each included study the methods used, if any, to blind outcome assessors from knowledge of which intervention a participant received. We assessed blinding separately for different outcomes or classes of outcomes.

We have assessed methods used to blind outcome assessment as:

- low risk of bias for outcome assessors;
- high risk of bias for outcome assessors;
- unclear risk of bias for outcome assessors.

(4) Incomplete outcome data (checking for possible attrition bias due to the amount, nature and handling of incomplete outcome data)

We have described for each included study, and for each outcome or class of outcomes, the completeness of data including attrition and exclusions from the analysis. We have stated whether attrition and exclusions were reported and the numbers included in the analysis at each stage (compared with the total randomised participants), reasons for attrition or exclusion where reported, and whether missing data were balanced across groups or were related to outcomes. Where sufficient information was reported, or was supplied by the trial authors, we re-included missing data in the analyses which we undertook.

We assessed methods as:

- low risk of bias (e.g. no missing outcome data; missing outcome data balanced across groups);
- high risk of bias (e.g. numbers or reasons for missing data imbalanced across groups; 'as treated' analysis done with substantial departure of intervention received from that assigned at randomisation);
- unclear risk of bias.

(5) Selective reporting (checking for reporting bias)

We have described for each included study how we investigated the possibility of selective outcome reporting bias and what we found.

We assessed the methods as:

- low risk of bias (where it is clear that all of the study's pre-specified outcomes and all expected outcomes of interest to the review have been reported);
- high risk of bias (where not all the study's pre-specified outcomes have been reported; one or more reported primary outcomes were not pre-specified; outcomes of interest are reported incompletely and so could not be used; study fails to include results of a key outcome that would have been expected to have been reported);
- unclear risk of bias.

(6) Other bias (checking for bias due to problems not covered by (1) to (5) above)

We have described for each included study any important concerns we have about other possible sources of bias.

We assessed whether each study was free of other problems that could put it at risk of bias:

- low risk of other bias;
- high risk of other bias;
- unclear whether there is risk of other bias.

(7) Overall risk of bias

We have made explicit judgements about whether studies are at high risk of bias, according to the criteria given in the *Handbook* (Higgins 2011). With reference to (1) to (6) above, we assessed the likely magnitude and direction of the bias and whether we considered it was likely to impact on the findings. We explored the

impact of the level of bias through undertaking sensitivity analyses - see [Sensitivity analysis](#).

In addition, we have collected data on funding source for the individual studies and whether there was a declaration of interest by the individual authors.

Assessing the certainty of the evidence using GRADE

For this update the certainty of the evidence was assessed using the GRADE approach as outlined in the [GRADE handbook](#) in order to assess the certainty of the body of evidence relating to the following outcomes for the main comparisons.

1. Delayed cord clamping with immediate neonatal care after cord clamping versus early cord clamping
2. Delayed cord clamping with immediate neonatal care with cord intact versus early cord clamping
3. Delayed cord clamping with immediate neonatal care after cord clamping versus umbilical cord milking
4. Umbilical cord milking versus early cord clamping

Outcomes

1. Death of the baby: at or before discharge from hospital
2. Death or neurosensory disability in early childhood (around two to three years)
3. Severe IVH - ultrasound diagnosis grade three and four
4. IVH - all grades
5. PVL
6. CPD - or CLD - assessed by oxygen supplementation at 36 weeks (corrected for gestation)
7. Maternal postpartum haemorrhage (blood loss of 500 mL or greater)

We used [GradePro 2015](#) Guideline Development Tool to import data from Review Manager 5.3 ([RevMan 2014](#)) in order to create 'Summary of findings' tables. A summary of the intervention effect and a measure of quality or certainty for each of the above outcomes were produced using the GRADE approach. The GRADE approach uses five considerations (study limitations, consistency of effect, indirectness, imprecision and publication bias) to assess the certainty of the body of evidence for each outcome. The evidence was downgraded from 'high quality' by one level for serious (or by two levels for very serious) limitations, depending on assessments for risk of bias, indirectness of evidence, serious inconsistency, imprecision of effect estimates or potential publication bias.

Measures of treatment effect

Dichotomous data

For dichotomous data, we have presented results as summary risk ratio with 95% confidence intervals.

Continuous data

For continuous data, we used the mean difference if outcomes were measured in the same way between trials. We used the standardised mean difference to combine trials that measured the same outcome, but used different methods.

Unit of analysis issues

Cluster-randomised trials

Had we found any, we would have included cluster-randomised trials in the analyses along with individually-randomised trials. If in future updates we do include cluster-randomised trials, we will adjust their sample sizes using the methods described in the *Handbook* (Higgins 2011) using an estimate of the intracluster correlation co-efficient (ICC) derived from the trial (if possible), from a similar trial or from a study of a similar population. If we use ICCs from other sources, we will report this and conduct sensitivity analyses to investigate the effect of variation in the ICC. If we identify both cluster-randomised trials and individually-randomised trials, we plan to synthesise the relevant information. We will consider it reasonable to combine the results from both if there was little heterogeneity between the study designs and the interaction between the effect of intervention and the choice of randomisation unit is considered to be unlikely. We will also acknowledge heterogeneity in the randomisation unit and perform a sensitivity analysis to investigate the effects of the randomisation unit.

Cross-over trials

Due to the nature of the studied interventions cross-over designs are not possible.

Other unit of analysis issues

Other unit of analysis issues could include, e.g. multiple pregnancies or more than two treatment groups, which need specialist statistical analysis. However, these type of trials have, so far, not been reported for cord clamping interventions.

Dealing with missing data

For included studies, we noted levels of attrition. We had planned to explore the impact of including studies with high levels of missing data in the overall assessment of treatment effect by using sensitivity analysis but we felt there were insufficient data to assess this.

For all outcomes, we carried out analyses, as far as possible, on an intention-to-treat basis, i.e. we attempted to include all participants randomised to each group in the analyses, and all participants were analysed in the group to which they were allocated, regardless of whether or not they received the allocated intervention. The denominator for each outcome in each trial was the number of women or babies randomised minus any participants whose outcomes were known to be missing. However, where babies who died after randomisation have been excluded by trial authors, we have, where possible, re-included them in the numerators and denominations for the outcome of 'Death', if appropriate and the data were available.

Assessment of heterogeneity

We assessed statistical heterogeneity in each meta-analysis using the Tau^2 , I^2 and Chi^2 statistics. We regarded heterogeneity as substantial if a Tau^2 was greater than zero and either an I^2 was greater than 30% or there was a low P value (less than 0.10) in the Chi^2 test for heterogeneity.

Assessment of reporting biases

Where there were 10 or more studies in the meta-analysis, we investigated reporting biases (such as publication bias) using funnel plots for primary outcomes only. We assessed funnel plot asymmetry visually. If asymmetry was suggested by a visual assessment, we planned to perform exploratory analyses to investigate it. For most outcomes in this review too few studies contributed data to carry out these planned analyses.

For all meta-analyses we ordered studies according to weight so that we would be able to identify any obvious differences in effect associated with smaller studies.

Data synthesis

We carried out statistical analysis using the Review Manager software (RevMan 2014). We used random-effect meta-analysis for combining data as we considered it was reasonable to assume that there was clinical heterogeneity due to the large variation in the timing of delayed cord clamping between the included studies and where the baby was placed during this time (whether gravity could affect movement of blood to the baby). There was also variation in how umbilical cord milking was undertaken, either before or after cutting the cord. These variations led us to consider that the underlying treatment effects would differ between trials.

Subgroup analysis and investigation of heterogeneity

For this update, the subgroup analyses from the previous version of the review (position of the baby relative to the level of the placenta before cord clamping; whether the woman was given oxytocin as a uterotonic drug before cord clamping; milking of the cord: vaginal birth or caesareans section; gestational age at birth) were replaced because there were insufficient data available to provide appropriate information. Instead we assessed the following subgroups in this update.

1. By gestational age at birth: 1) < 32 to 34 weeks; 2) > 32 to 34 weeks; 3) mixed gestation or not reported.
2. By type of delay intervention: 1) DCC at < one minute with baby level with uterus and placenta; 2) DCC at < one minute with baby low (+ gravity); 3) DCC at one to two minutes with baby level with uterus and placenta; 4) DCC at one to two minutes with baby low (+ gravity); 5) DCC at > two minutes with baby level with uterus and placenta; 6) DCC at > two minutes with baby low (+ gravity); 7) unclear or mixed interventions.
3. By type of milking intervention: 1) cord intact during UCM; 2) cord cut before UCM; 3) unclear or not reported.

We planned to undertake subgroup analyses on all outcomes.

We assessed differences between subgroups by inspection of the subgroups' confidence intervals with non-overlapping confidence intervals suggesting a statistically significant difference in treatment effect between the subgroups. Where sufficient data were available, we carried out more formal statistical tests to assess differences between subgroups by applying the interaction tests available in RevMan 2014.

Sensitivity analysis

The previous review (Rabe 2012) used adequate allocation concealment as a criterion for sensitivity analysis, however in this update, we felt the other aspects of risk of bias were equally

important. Hence, we undertook sensitivity analysis by excluding studies at unclear or high risk of bias based on selection bias (sequence generation and allocation concealment) and attrition bias (incomplete outcome data), including only studies at low risk of bias for these domains. We carried out this analysis for primary outcomes only.

RESULTS

Description of studies

Results of the search

See: [Figure 1](#)

Figure 1. Study flow diagram.

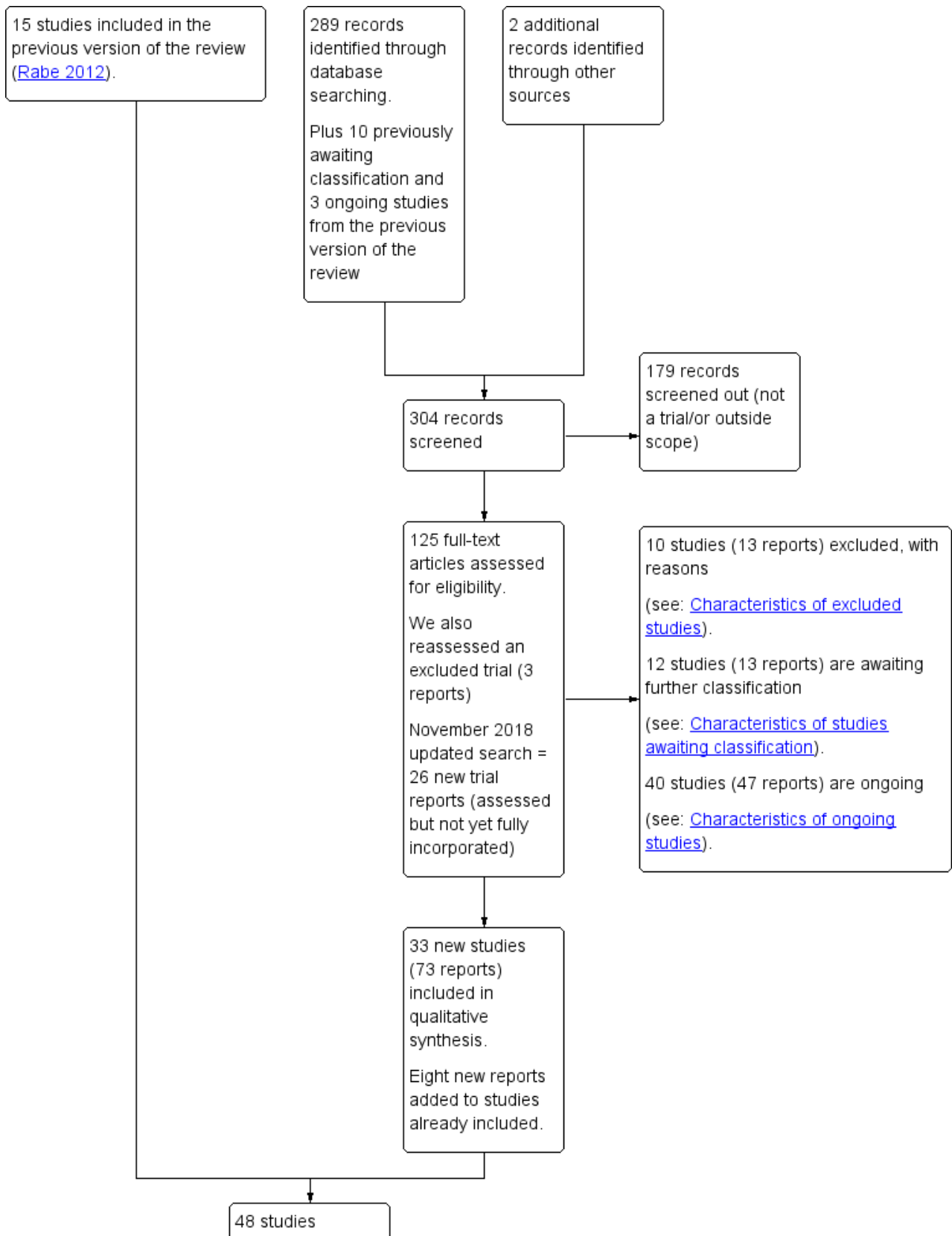


Figure 1. (Continued)

48 studies included in quantitative synthesis (meta-analysis)

For this update, we retrieved 291 new citations from the search conducted in November 2017 and also reassessed the 10 awaiting classification and three ongoing trials from the previous version of the review (Rabe 2012). We also reassessed one previously excluded study (three reports). We included 33 new studies (73 reports) and added six new reports to previously included studies. We excluded 10 new studies (13 reports). We added three studies (four reports) to [Studies awaiting classification](#) and 29 to [Ongoing studies](#) (32 reports).

We updated the search in November 2018 and retrieved 26 new trial reports. Two of these were additional reports of included studies with no new data so the references have been added under the main study (Katheria 2015; Tarnow-Mordi 2017). Six are new studies to be fully assessed at the next update (Kazemi 2017; Leal 2018; Li 2018; Ram Mothan 2018; Song 2017; Weeks 2018). Three are additional reports of included studies and the new data will be added at the next update (Das 2018a; El-Naggar 2018; Wang 2018). The remaining 15 reports refer to 11 ongoing studies and have been added to [Ongoing studies](#) (Aghai 2018; Allam 2018; Gupta 2018; Hao 2018; Jomjak 2018; Katheria 2018; Liu 2018; Mirzaeian 2018; Nour 2018a; Nour 2018b; Shahgheibi 2018).

This update now includes 48 studies ([Characteristics of included studies](#)), with 20 studies excluded ([Characteristics of excluded studies](#)), 12 studies awaiting classification ([Characteristics of studies awaiting classification](#)), and 40 ongoing studies ([Characteristics of ongoing studies](#)).

Included studies

We now include 48 studies (involving 5721 babies and their mothers) in this update, see [Characteristics of included studies](#) for more detail of participants and interventions, gestational age, mode of birth, positioning of the infant and type of intervention. There were no usable data in eight of the included studies (Aladangady 2006; Das 2018; Dhaliwal 2014; Malik 2013; Nelle 1998; Pongmee 2010; Rana 2017; Sekhavat 2008). Thus 40 studies provided data on 4884 babies and their mothers (Alan 2014; Armanian 2017; Backes 2016; Baenziger 2007; Chu 2011; CORD Pilot 2018; Dai 2014; Datta 2017; Dipak 2017; Dong 2016; Elimian 2014; El-Naggar 2016; Gokmen 2011; Hofmeyr 1988; Hofmeyr 1993; Hosono 2008; Hosono 2015; Josephsen 2014; Katheria 2014; Katheria 2015; Kilicdag 2016; Kinmond 1993; Krueger 2015; Kugelman 2007; Kumar 2015; March 2013; McDonnell 1997; Mercer 2003; Mercer 2006; Mercer 2016; Oh 2011; Rabe 2000; Rabe 2011; Ranjit 2015; Salae 2016; Shi 2017; Strauss 2008; Tarnow-Mordi 2017; Tiemersma 2015; Ultee 2008).

The studies either enrolled women giving birth preterm and their babies, or they enrolled babies born preterm, so between 24 and 36⁺⁶ weeks' gestation. We included studies with singleton and multiple pregnancies and those with babies being born vaginally

and by caesarean. For some studies, the unit of randomisation was the baby, but for most mother-infant pairs were randomised. There was some inconsistency in both the intervention and the control procedures between studies, and wide variation in outcome measures reported.

Ten studies included multiple births (Alan 2014; CORD Pilot 2018; El-Naggar 2016; Gokmen 2011; Katheria 2014; Katheria 2015; Kinmond 1993; Kugelman 2007; McDonnell 1997; Tarnow-Mordi 2017). Three studies probably included twins as they reported excluding twin-twin transfusion, or monochorionic/amniotic, (Pongmee 2010; Ranjit 2015; Shi 2017). Nine studies were unclear as to whether they included multiple births or not (Chu 2011; Dhaliwal 2014; Hofmeyr 1988; Hofmeyr 1993; Kilicdag 2016; Malik 2013; Nelle 1998; Sekhavat 2008; Strauss 2008). The remainder of studies were restricted to singleton births.

Studies were conducted between 1988 and 2017. Some studies did not report the dates when they were undertaken, and these tended to be older studies. For 18 studies recruitment began between 2011 and 2015; between 2006 and 2010 for seven studies; between 2000 and 2005 for four studies, and between 1988 and 1999 for four studies ([Characteristics of included studies](#)).

The 48 studies were undertaken in 19 countries covering high-, middle- and low-income countries:

1. 13 in USA (Backes 2016; Elimian 2014; Josephsen 2014; Katheria 2014; Katheria 2015; Krueger 2015; March 2013; Mercer 2003; Mercer 2006; Mercer 2016; Oh 2011; Strauss 2008; Tarnow-Mordi 2017);
2. seven in India (Das 2018; Dhaliwal 2014; Datta 2017; Dipak 2017; Kumar 2015; Rana 2017; Ranjit 2015);
3. four in the UK (Aladangady 2006; CORD Pilot 2018; Kinmond 1993; Rabe 2011);
4. three in Canada (Chu 2011; El-Naggar 2016; Tarnow-Mordi 2017);
5. three in China (Dai 2014; Dong 2016; Shi 2017);
6. three in South Africa (Hofmeyr 1988; Hofmeyr 1993; Tiemersma 2015);
7. three in Turkey (Alan 2014; Gokmen 2011; Kilicdag 2016);
8. two in Australia (McDonnell 1997; Tarnow-Mordi 2017);
9. two in Germany (Nelle 1998; Rabe 2000);
10. two in Iran (Armanian 2017; Sekhavat 2008);
11. two in Japan (Hosono 2008; Hosono 2015);
12. two in Pakistan (Malik 2013; Tarnow-Mordi 2017);
13. two in Thailand (Pongmee 2010; Salae 2016);
14. one study involved France (Tarnow-Mordi 2017);
15. one in Israel (Kugelman 2007);
16. one in the Netherlands (Ultee 2008);
17. one study involved Northern Ireland (Tarnow-Mordi 2017);

18. one study involved New Zealand ([Tarnow-Mordi 2017](#));
 19. one in Switzerland ([Baenziger 2007](#)).

The largest in the review was undertaken across seven countries: Australia, Canada, France, New Zealand, Northern Ireland, Pakistan and USA ([Tarnow-Mordi 2017](#)).

Sources of trial funding

Sources of funding were reported in 23 studies, but in 25 studies there was nothing reported regarding funding. See [Characteristics of included studies](#).

Trialists declaration of interest

Declarations of interest were reported as "none" in 21 studies. One study reported association for a number of authors with the development of a small mobile resuscitation trolley, which was later marketed as Life-Start, but those involved had no further relationship with the manufacturer ([CORD Pilot 2018](#)). One study reported the declarations of interest were with the journal and we have not described these ([Tarnow-Mordi 2017](#)). Twenty-five studies did not report on declarations of interest of trialists. See [Characteristics of included studies](#).

Interventions compared

A. Delayed cord clamping (DCC) with immediate neonatal care after cord clamping versus early cord clamping (ECC) (Comparisons 1 and 2)

Thirty studies involving 3651 babies and their mothers addressed this question. Five studies provided no data for the outcomes in this review ([Dhaliwal 2014](#); [Malik 2013](#); [Nelle 1998](#); [Rana 2017](#); [Sekhavat 2008](#)). This left 25 studies, involving 3100 babies and their mothers, which contributed data to this comparison ([Armanian 2017](#); [Backes 2016](#); [Baenziger 2007](#); [Chu 2011](#); [Dai 2014](#); [Datta 2017](#); [Dipak 2017](#); [Dong 2016](#); [Gokmen 2011](#); [Hofmeyr 1988](#); [Hofmeyr 1993](#); [Kinmond 1993](#); [Kugelman 2007](#); [McDonnell 1997](#); [Mercer 2003](#); [Mercer 2006](#); [Oh 2011](#); [Rabe 2000](#); [Ranjit 2015](#); [Salae 2016](#); [Shi 2017](#); [Strauss 2008](#); [Tarnow-Mordi 2017](#); [Tiemersma 2015](#); [Ultee 2008](#)).

The studies were undertaken in the following countries: Australia ([McDonnell 1997](#); [Tarnow-Mordi 2017](#)); Canada ([Chu 2011](#); [Tarnow-Mordi 2017](#)); France ([Tarnow-Mordi 2017](#)); Germany ([Nelle 1998](#); [Rabe 2000](#)); India ([Dhaliwal 2014](#); [Datta 2017](#); [Dipak 2017](#); [Malik 2013](#); [Rana 2017](#); [Ranjit 2015](#)); Iran ([Armanian 2017](#); [Sekhavat 2008](#)); Israel ([Kugelman 2007](#)); the Netherlands ([Ultee 2008](#)); New Zealand ([Tarnow-Mordi 2017](#)); Northern Ireland ([Tarnow-Mordi 2017](#)); Pakistan ([Malik 2013](#); [Tarnow-Mordi 2017](#)); South Africa ([Hofmeyr 1988](#); [Hofmeyr 1993](#); [Tiemersma 2015](#)); Switzerland ([Baenziger 2007](#)), Thailand ([Salae 2016](#)), Turkey ([Gokmen 2011](#)); USA ([Backes 2016](#); [Mercer 2003](#); [Mercer 2006](#); [Oh 2011](#); [Strauss 2008](#); [Tarnow-Mordi 2017](#)); and UK ([Kinmond 1993](#)).

Of the studies providing data, 16 studies recruited births before 32 to 34 weeks' gestation ([Armanian 2017](#); [Backes 2016](#); [Baenziger 2007](#); [Chu 2011](#); [Dipak 2017](#); [Dong 2016](#); [Gokmen 2011](#); [Hofmeyr 1988](#); [Kinmond 1993](#); [Kugelman 2007](#); [McDonnell 1997](#); [Mercer 2003](#); [Mercer 2006](#); [Oh 2011](#); [Rabe 2000](#); [Tarnow-Mordi 2017](#)). Three studies recruited births after 32 to 34 weeks' gestation ([Datta 2017](#); [Salae 2016](#); [Ultee 2008](#)). Six studies recruited births at mixed gestation or the gestation was unclear ([Dai 2014](#); [Hofmeyr 1993](#); [Ranjit 2015](#); [Shi 2017](#); [Strauss 2008](#); [Tiemersma 2015](#)).

Of the studies providing data, two studies examined DCC for less than one minute whilst keeping the baby level with the placenta ([Datta 2017](#); [McDonnell 1997](#)). Eight studies examined DCC for less than one minute and held the baby low during this time ([Backes 2016](#); [Dong 2016](#); [Kinmond 1993](#); [Kugelman 2007](#); [Mercer 2003](#); [Mercer 2006](#); [Oh 2011](#); [Rabe 2000](#)). Two studies examined DCC for between one and two minutes holding the baby level with the placenta during this time ([Hofmeyr 1993](#); [Salae 2016](#)). Four studies examined DCC for between one and two minutes whilst holding the baby low ([Baenziger 2007](#); [Dipak 2017](#); [Strauss 2008](#); [Tarnow-Mordi 2017](#)). Three studies examined DCC by more than two minutes whilst holding the baby level with the placenta ([Ranjit 2015](#); [Tiemersma 2015](#); [Ultee 2008](#)). There were no studies which examined DCC for more than two minutes whilst holding the baby low. Six studies included mixed interventions for DCC ([Armanian 2017](#); [Chu 2011](#); [Dai 2014](#); [Gokmen 2011](#); [Hofmeyr 1988](#); [Shi 2017](#)).

B. Delayed cord clamping (DCC) with immediate neonatal care with cord intact versus early cord clamping (ECC) (Comparisons 3 and 4)

Two studies involving 322 babies and their mothers addressed this question ([Aladangady 2006](#); [CORD Pilot 2018](#)) both were undertaken in the UK, but only one study involving 276 babies and 261 mothers (twin pregnancies were included) provided data ([CORD Pilot 2018](#)).

In this one study ([CORD Pilot 2018](#)), women were randomised if they were expected to give birth before 32 weeks' gestation. The study compared cord clamping after at least two minutes with clamping within 20 seconds. In the DCC group, immediate neonatal care was provided by the mother's side with the cord intact and this enabled babies requiring immediate resuscitation at birth to be included. For the ECC group, immediate neonatal care was after cord clamping. Babies were placed at the level of the mother's abdomen for vaginal births or the anterior thigh for caesarean sections ([Characteristics of included studies](#)).

C. Delayed cord clamping (DCC) with immediate neonatal care after cord clamping versus umbilical cord milking (UCM) (Comparisons 5 and 6)

Three studies involving 325 babies and their mothers addressed this question ([Katheria 2015](#); [Krueger 2015](#); [Rabe 2011](#)) and all provided data for this review.

The studies were undertaken in the following countries: two studies in the USA ([Katheria 2015](#); [Krueger 2015](#)), and one in the UK ([Rabe 2011](#)).

All three studies included babies born before 32 to 34 weeks' gestation.

Two studies looked at delaying cord clamping for 30 seconds ([Krueger 2015](#); [Rabe 2011](#)) whilst holding the baby low. One study carried out DCC for 45 seconds or more with the baby held low ([Katheria 2015](#)).

D. Umbilical cord milking (UCM) versus early cord clamping (ECC) (Comparisons 7 and 8)

Thirteen studies involving 1423 babies and their mothers addressed this question. Two studies did not provide data on outcomes in this review ([Das 2018](#); [Pongmee 2010](#)). So 11 studies involving 1183 babies and their mothers provided data ([Alan 2014](#); [Elimian 2014](#); [El-Naggar 2016](#); [Hosono 2008](#); [Hosono 2015](#);

Josephsen 2014; Katheria 2014; Kilicdag 2016; Kumar 2015; March 2013; Mercer 2016).

The studies were undertaken in the following countries: the USA (Elimian 2014; Josephsen 2014; Katheria 2014; Kilicdag 2016; March 2013; Mercer 2016); India (Das 2018; Kumar 2015); Japan (Hosono 2008; Hosono 2015); Canada (El-Naggar 2016); Thailand (Pongmee 2010) and Turkey (Alan 2014).

Ten studies providing data included babies expected or born at less than 32 to 34 weeks' gestation (Alan 2014; Elimian 2014; El-Naggar 2016; Hosono 2008; Hosono 2015; Josephsen 2014; Katheria 2014; Kilicdag 2016; March 2013; Mercer 2016). One study providing data included babies born after 32 to 34 weeks' gestation (Kumar 2015).

Eight studies providing data undertook UCM with the cord intact (Alan 2014; Elimian 2014; El-Naggar 2016; Hosono 2008; Katheria 2014; Kilicdag 2016; March 2013; Mercer 2016). Two studies

providing data undertook UCM after the cord had been clamped and cut (Hosono 2015; Kumar 2015). In one study, it was unclear when cord milking took place relative to clamping (Josephsen 2014).

Excluded studies

In this update, we excluded 20 studies because of a number of reasons including: studies were on babies born at term; studies were not randomised or were quasi-randomised controlled trials; the definitions of delay and early did not fit our criteria (Characteristics of excluded studies).

Risk of bias in included studies

Overall, summaries of assessments of bias in included studies are set out in Figure 2 and Figure 3, and details of the assessments made on risk of bias are reported under Characteristics of included studies are briefly described below.

Figure 2. 'Risk of bias' graph: review authors' judgements about each risk of bias item presented as percentages across all included studies.

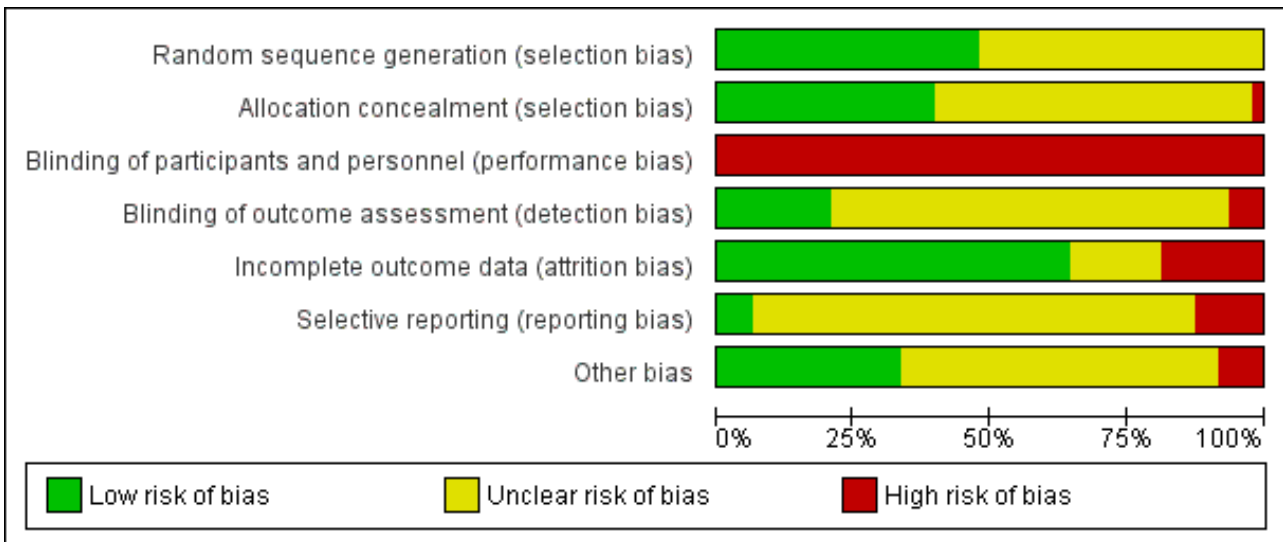


Figure 3. 'Risk of bias' summary: review authors' judgements about each risk of bias item for each included study.

	Random sequence generation (selection bias)	Allocation concealment (selection bias)	Blinding of participants and personnel (performance bias)	Blinding of outcome assessment (detection bias)	Incomplete outcome data (attrition bias)	Selective reporting (reporting bias)	Other bias
Aladangady 2006	?	?	-	?	+	-	?
Alan 2014	?	?	-	?	-	+	?
Armanian 2017	+	+	-	?	-	?	?
Backes 2016	+	+	-	+	+	?	+
Baenziger 2007	?	?	-	?	-	-	-
Chu 2011	?	?	-	?	+	?	?
CORD Pilot 2018	+	+	-	+	+	?	+
Dai 2014	+	?	-	?	+	?	?
Das 2018	+	+	-	?	?	-	?
Datta 2017	?	?	-	?	+	?	?
Dhaliwal 2014	?	?	-	?	?	?	?
Dipak 2017	+	+	-	?	+	?	?
Dong 2016	?	?	-	?	+	?	?
Elimian 2014	+	+	-	?	+	?	+
El-Naggar 2016	+	+	-	+	+	-	?
Gokmen 2011	?	?	-	+	+	?	?
Hofmeyr 1988	?	?	-	?	+	+	?
Hofmeyr 1993	?	?	-	+	+	?	+
Hosono 2008	?	?	-	?	+	?	+
Hosono 2015	?	?	-	?	-	-	-

Figure 3. (Continued)

Hosono 2015	?	?	-	?	-	-	-
Josephsen 2014	?	?	-	?	?	?	?
Katheria 2014	+	+	-	?	+	?	+
Katheria 2015	+	+	-	+	-	-	?
Kilicdag 2016	?	?	-	?	+	?	+
Kinmond 1993	?	?	-	?	+	?	?
Krueger 2015	?	?	-	+	+	?	?
Kugelman 2007	?	?	-	?	+	?	+
Kumar 2015	+	+	-	?	+	?	+
Malik 2013	+	?	-	+	+	?	?
March 2013	+	+	-	-	?	?	+
McDonnell 1997	?	?	-	?	-	?	?
Mercer 2003	?	?	-	?	+	?	+
Mercer 2006	+	+	-	?	+	?	+
Mercer 2016	?	?	-	+	+	?	?
Nelle 1998	?	?	-	?	?	?	?
Oh 2011	?	?	-	?	?	?	+
Pongmee 2010	?	?	-	?	+	?	?
Rabe 2000	+	+	-	?	+	?	+
Rabe 2011	+	+	-	?	+	?	?
Rana 2017	+	+	-	?	?	?	?
Ranjit 2015	+	+	-	?	-	?	?
Salae 2016	+	+	-	+	+	?	?
Sekhavat 2008	?	?	-	?	?	?	?
Shi 2017	+	?	-	?	+	?	+
Strauss 2008	+	?	-	?	-	?	-
Tarnow-Mordi 2017	+	+	-	-	+	+	+
Tiemersma 2015	+	+	-	?	-	?	?
Ultee 2008	?	-	-	-	+	?	-

Allocation

The method used to generate the randomisation sequence in the included studies was generally not well described, with only 23 out of 48 studies meeting the criteria for low risk of bias. Similarly with

allocation concealment, only 19 out of 48 studies met the criteria for low risk of bias. In addition, only 19 out of 48 studies met the criteria for low risk of selection bias (both sequence generation and

allocation concealment). The remaining studies were unclear with one at high risk of bias from allocation concealment. See [Figure 3](#).

Blinding

Performance bias

For this type of intervention the blinding of staff present at the birth to group allocation is not possible, and so this is considered high risk of bias across all studies. [Figure 3](#); [Characteristics of included studies](#).

Detection bias

We considered 10 studies were at low risk of detection bias as researchers blinded clinicians to the assessments of the clinical outcomes. Three studies were assessed as high risk of detection bias as authors said they had not been able to blind these assessments. The remaining studies were unclear. [Figure 3](#); [Characteristics of included studies](#).

Incomplete outcome data

For the data in the included studies collected soon after the birth, loss to follow-up was generally not a problem. Thirty-one studies were assessed as low risk of attrition bias, nine were considered high risk and the remaining eight studies were unclear. The post randomisation exclusions in a number of the included studies mean that some results are difficult to interpret. [Figure 3](#); [Characteristics of included studies](#).

Selective reporting

For most of the included studies only published data were available to us, and we did not have access to trial registration reports or study protocols. Under these circumstances, we were not able to assess whether authors had omitted to report findings for all of their pre-specified outcomes. We did identify six studies where we assessed reporting bias to be high risk. [Figure 3](#); [Characteristics of included studies](#).

Other potential sources of bias

In most of the included studies, it was unclear whether there were other biases or not, and most studies reported similar baseline risks in the two groups. We assessed 16 studies as low risk of bias for other aspects of the studies and four studies were assessed as high risk - mainly due to uneven denominators in the groups, post randomisation exclusions due to low Apgar scores, babies needing resuscitation, protocol violations and trial stopped early because of interim analysis (less than 50% of planned recruitment) [Figure 3](#); [Characteristics of included studies](#).

Effects of interventions

See: [Summary of findings for the main comparison DCC with immediate neonatal care after cord clamping compared to ECC \(subgroup analysis by gestation\) for health problem or population](#); [Summary of findings 2 DCC with immediate neonatal care with cord intact compared to ECC in babies born preterm](#); [Summary of](#)

[findings 3 DCC with immediate neonatal care after cord clamping compared to UCM in babes born preterm](#); [Summary of findings 4 UCM compared to ECC in babies born preterm](#)

This update includes 48 studies involving 5721 babies and their mothers. However, eight studies provided no data for our analyses and so the update has 40 studies which provided data involving 4884 babies and their mothers ([Characteristics of included studies](#)). We have four main comparisons with two subgroup analyses for each covering gestation and types of interventions.

We used random-effect meta-analysis for combining data for all analyses. We considered it was reasonable to assume that there was clinical heterogeneity due to the large variation in the timing of DCC between the included studies and where the baby was placed during this time (whether gravity could affect movement of blood to the baby). There was also variation in how umbilical cord milking (UCM) was undertaken, either before or after cutting the cord. These variations led us to consider that the underlying treatment effects would differ between trials.

A. Delayed cord clamping (DCC) with immediate neonatal care after cord clamping versus early cord clamping (ECC) (Comparisons 1 - subgroup analysis by gestation: Comparison 2 - subgroup analysis by type of intervention)

We identified 30 studies for this comparison, although five provided no data ([Dhaliwal 2014](#); [Malik 2013](#); [Nelle 1998](#); [Rana 2017](#); [Sekhavat 2008](#)). Twenty-five studies, involving 3100 babies and their mothers, contributed data ([Armanian 2017](#); [Backes 2016](#); [Baenziger 2007](#); [Chu 2011](#); [Dai 2014](#); [Datta 2017](#); [Dipak 2017](#); [Dong 2016](#); [Gokmen 2011](#); [Hofmeyr 1988](#); [Hofmeyr 1993](#); [Kinmond 1993](#); [Kugelman 2007](#); [McDonnell 1997](#); [Mercer 2003](#); [Mercer 2006](#); [Oh 2011](#); [Rabe 2000](#); [Ranjit 2015](#); [Salae 2016](#); [Shi 2017](#); [Strauss 2008](#); [Tarnow-Mordi 2017](#); [Tiemersma 2015](#); [Ultee 2008](#)). Studies were undertaken in a range of countries and most studies included babies less than 32 to 34 weeks' gestation. The studies covered a variety of timings of cord clamping and where the baby was held ([Characteristics of included studies](#)).

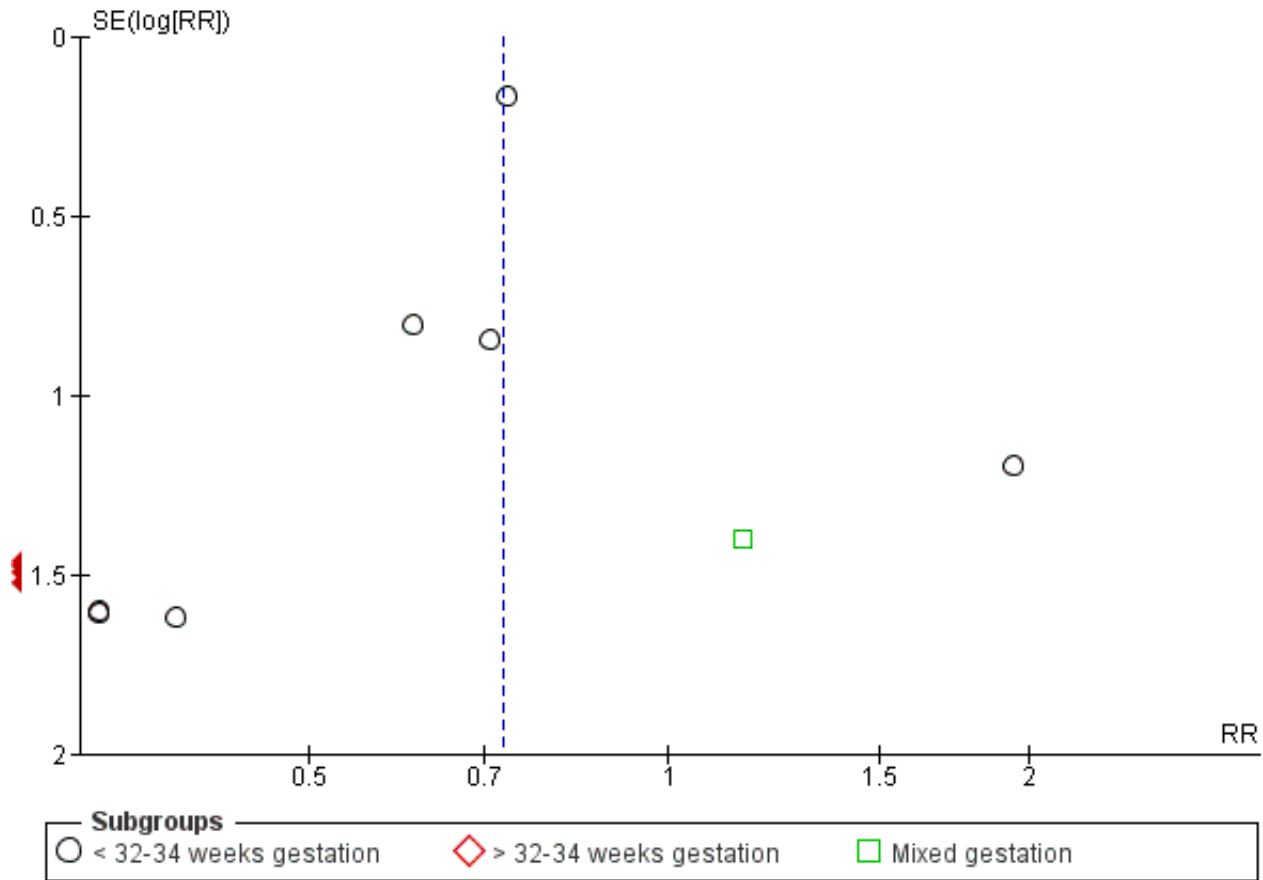
Main outcomes

1. Death of baby (up to discharge)

DCC with immediate neonatal care provided after cord clamping probably reduces the risk of the baby dying before discharge compared with ECC, (average risk ratio (RR) 0.73, 95% confidence interval (CI) 0.54 to 0.98, 20 studies, 2680 babies, random-effects models; [Analysis 1.1](#); [Analysis 2.1](#)). However, the CI is wide. The certainty of the evidence was assessed as 'moderate', downgraded due to imprecision ([Summary of findings for the main comparison](#)).

There was no evidence of overall heterogeneity ($\text{Tau}^2 = 0$, $\text{Chi}^2 P = 0.67$, $I^2 = 0\%$) nor of differences between the subgroups by gestation or by types of intervention ([Analysis 1.1](#); [Analysis 2.1](#)). We found no evidence of missing studies according to visual assessment of the funnel plot ([Figure 4](#)).

Figure 4. Funnel plot of comparison: 1 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by gestation), outcome: 1.1 Death of baby (up to discharge).



2. Death or neurodevelopmental impairment in early years

No studies assessed this composite outcome (Analysis 1.2; Analysis 2.2).

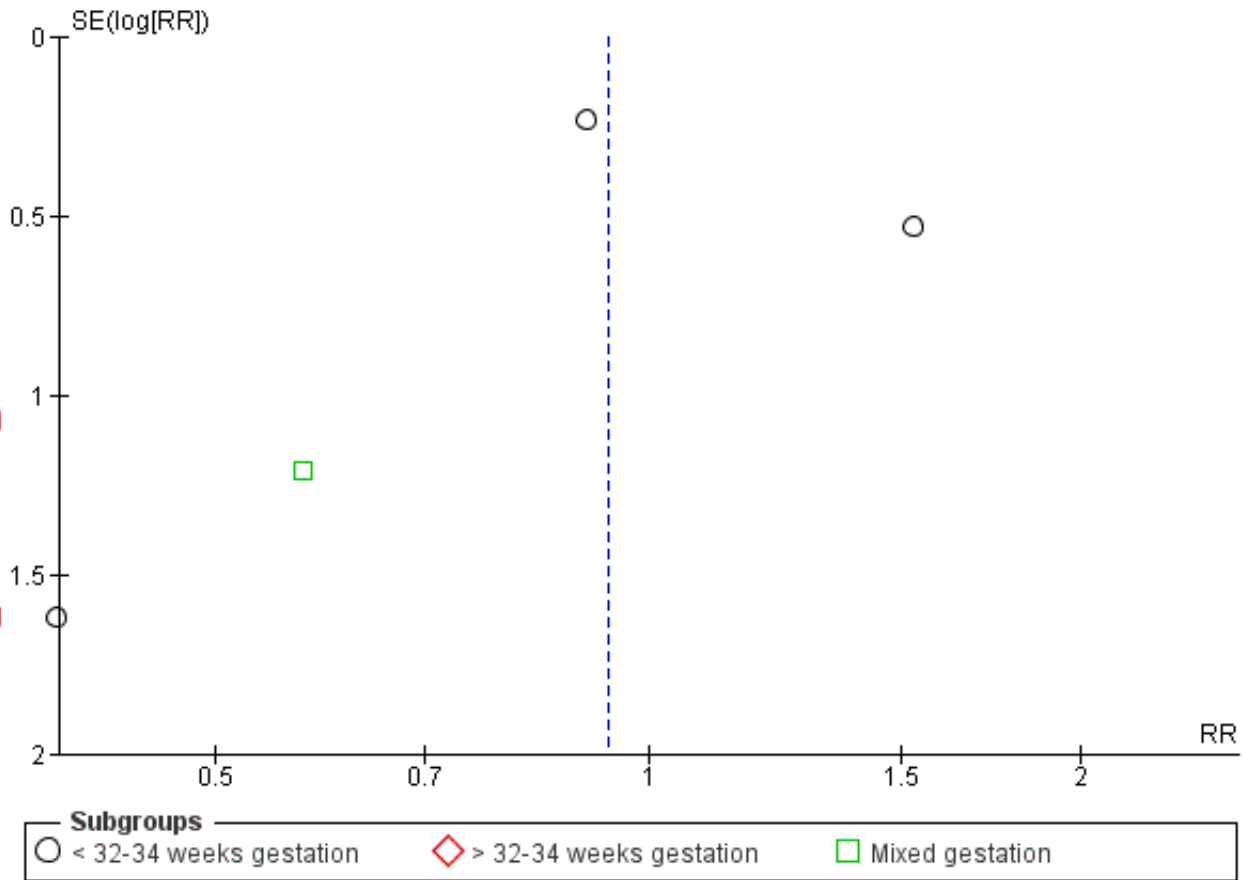
3. Severe intraventricular haemorrhage (IVH grades 3, 4)

We found insufficient evidence for reliable conclusions about the effect on the risk of severe IVH between the two interventions in this comparison (average RR 0.94, 95% CI 0.63 to 1.39, 10 studies, 2058 babies, random-effects model; Analysis 1.3; Analysis 2.3).

The certainty of the evidence was assessed as 'low', downgraded due to serious imprecision (Summary of findings for the main comparison).

There was no evidence of overall heterogeneity ($\tau^2 = 0$, $\text{Chi}^2 P = 0.78$, $I^2 = 0\%$) nor of differences between the subgroups by gestation or by types of intervention (Analysis 1.3; Analysis 2.3). We found no evidence of missing studies according to visual assessment of the funnel plot (Figure 5).

Figure 5. Funnel plot of comparison: 1 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by gestation), outcome: 1.3 Severe intraventricular haemorrhage (IVH grades 3, 4).



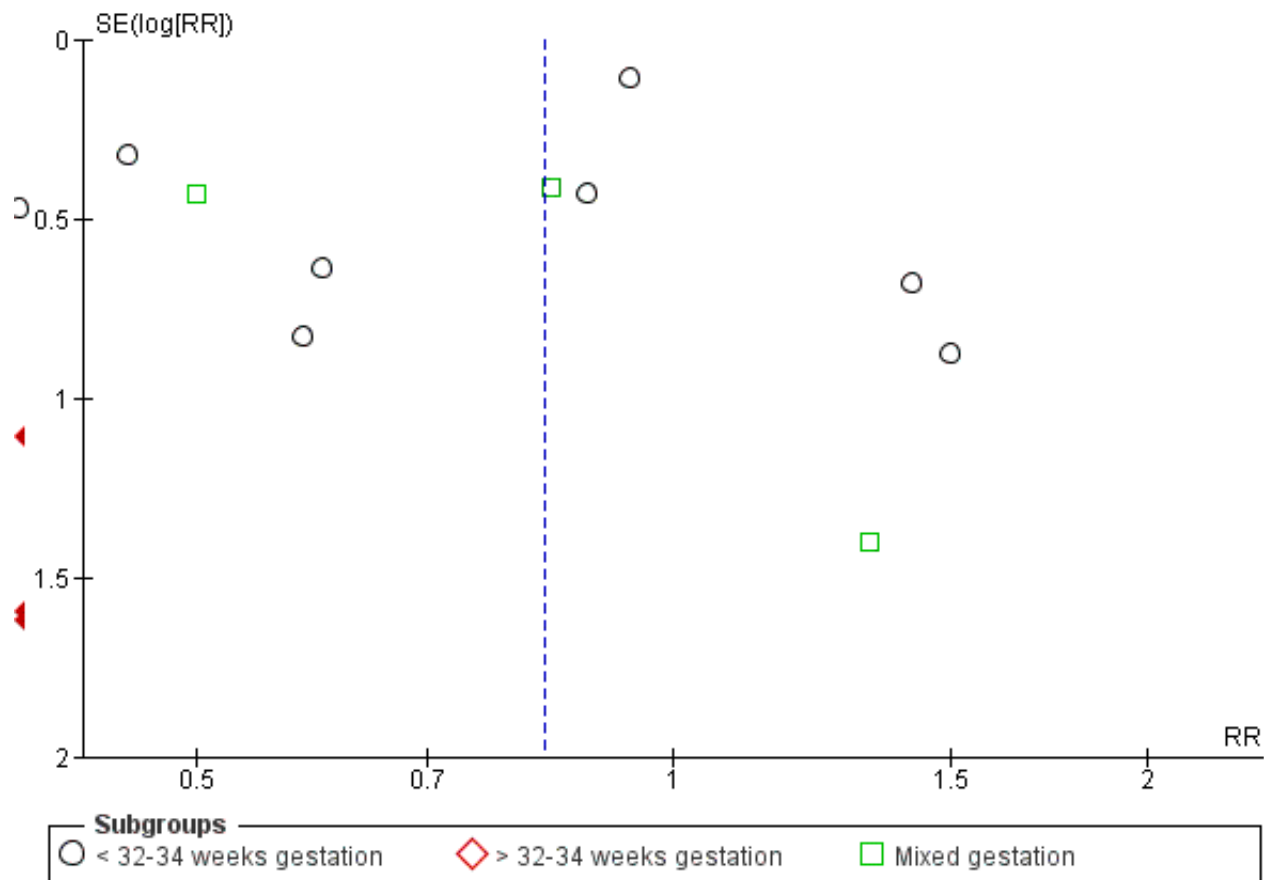
4. Intraventricular haemorrhage (IVH, all grades)

DCC is associated with a modest reduction in risk of any IVH (all grades) compared with ECC (average RR 0.83, 95% CI 0.70 to 0.99, 15 studies, 2333 babies, random-effects model; [Analysis 1.4](#); [Analysis 2.4](#)). The certainty of the evidence was assessed as 'high'. However, the large Australian trial ([Tarnow-Mordi 2017](#)), which contributes 68% of the data showed no difference in this outcome, so it is

likely the reduction comes from small studies of unclear risk of bias ([Summary of findings for the main comparison](#)).

There was no evidence of overall heterogeneity ($\tau^2 = 0$, $\text{Chi}^2 P = 0.46$, $I^2 = 0\%$) nor of differences between the subgroups by gestation or by types of intervention ([Analysis 1.4](#); [Analysis 2.4](#)). We found no evidence of missing studies according to visual assessment of the funnel plot ([Figure 6](#)).

Figure 6. Funnel plot of comparison: 1 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by gestation), outcome: 1.4 Intraventricular haemorrhage (IVH, all grades).



5. Periventricular leukomalacia (PVL)

There was insufficient evidence for reliable conclusions about the effect on the risk of PVL associated with DCC compared with ECC (average RR 0.58, 95% CI 0.26 to 1.30, 4 studies, 1544 babies, random-effects model; Analysis 1.5; Analysis 2.5). The certainty of the evidence was assessed as 'low', downgraded due to serious imprecision (Summary of findings for the main comparison).

There was no evidence of overall heterogeneity (Tau² = 0, Chi²P = 0.40, I² = 0%) (Analysis 1.5; Analysis 2.5). Subgroup analysis by gestation was not possible because all three trials included babies of less than 32 to 34 weeks' gestation (Analysis 1.5). There was no evidence of differences in the subgroups by types of intervention (Analysis 2.5).

6. Chronic lung disease (CLD) - oxygen supplement at 36 weeks (corrected for gestation)

There was little or no difference identified between delayed clamping (with immediate neonatal care after cord clamping) and ECC (average RR 1.04, 95% CI 0.94 to 1.14, 6 studies, 1644 babies, random-effects model; Analysis 1.6; Analysis 2.6). The certainty of the evidence was assessed as 'high' (Summary of findings for the main comparison).

There was no heterogeneity identified (Tau² = 0; Chi² P = 0.57, I² = 0%) (Analysis 1.6; Analysis 2.6). Subgroup analysis by gestation was not possible because all six trials included babies of less than 32 to 34 weeks' gestation (Analysis 1.6). There was no evidence of differences in the subgroups by types of intervention (Analysis 2.6).

7. Maternal blood loss of 500 mL or greater

Most studies did not report outcome data for the mother. There was insufficient evidence for reliable conclusions about the comparative effects of DCC compared with ECC (average RR 1.14, 95% CI 0.07 to 17.63, 2 studies, 180 women, random-effects model; Analysis 1.7; Analysis 2.7). The certainty of the evidence was assessed as 'very low', downgraded due to risk of bias and serious imprecision (Summary of findings for the main comparison).

We found no heterogeneity and were unable to undertake subgroup analysis due to insufficient data (Analysis 1.7; Analysis 2.7).

Other important outcomes for the baby

For the following outcomes, unless stated otherwise below, we found no evidence of heterogeneity. Similarly, unless stated otherwise, where there are more than 10 studies, we found no evidence of missing studies according to visual assessments of funnel plots.

Condition at birth

There is probably little or no difference between DCC (with immediate neonatal care after cord clamping) compared with ECC on the following outcomes assessing the baby's condition at birth.

- Low Apgar score (generally < eight at five minutes): (average RR 1.07, 95% CI 0.70 to 1.63, 4 studies, 1721 babies, random-effects model) ([Analysis 1.18](#); [Analysis 2.18](#)), (very low-certainty evidence, downgraded due to unclear risk of bias and serious imprecision).
- Temperature below 36°C within an hour of birth: there were no babies who had a temperature below 36°C in the one study of 86 babies which reported this outcome ([Analysis 1.23](#); [Analysis 2.23](#)).

Respiratory

It is uncertain whether there is any clinically important difference between DCC (with immediate neonatal care after cord clamping) compared with ECC on the following outcomes assessing the baby's respiratory function.

- Respiratory distress syndrome (RDS): (average RR 1.09, 95% CI 0.86 to 1.38, 7 studies, 457 babies, random-effects model) ([Analysis 1.10](#); [Analysis 2.10](#)), (very low-certainty evidence, downgraded due to unclear risk of bias and severe imprecision).
- Respiratory support: (average RR 0.95, 95% CI 0.77 to 1.16, 6 studies, 325 babies, random-effects model) ([Analysis 1.11](#); [Analysis 2.11](#)), (moderate-certainty evidence, downgraded due to imprecision).
- Duration of respiratory support (in days): (mean difference (MD) -0.60, 95% CI -3.04 to 1.84, 1 study, 42 babies) ([Analysis 1.12](#); [Analysis 2.12](#)), (very low-certainty evidence, downgraded due to unclear risk of bias and severe imprecision).
- Surfactant treatment for severe RDS: (average RR 0.80, 95% CI 0.50 to 1.28, 3 studies, 145 babies, random-effects model) ([Analysis 1.13](#); [Analysis 2.13](#)), (very low-certainty evidence, downgraded due to unclear risk of bias and severe imprecision).
- Home oxygen: (RR 0.47, 95% CI 0.06 to 3.72, 2 studies, 101 babies) ([Analysis 1.27](#); [Analysis 2.27](#)), (very low-certainty evidence, downgraded due to unclear risk of bias and severe imprecision).

Cardiovascular

DCC (with immediate neonatal care after cord clamping) may slightly improve a baby's arterial blood pressure compared with ECC.

- Mean arterial blood pressure in the early hours after birth (in mm Hg): (average MD 2.87, 95% CI 1.09 to 4.64, 4 studies, 208 babies, random-effects model) ([Analysis 1.25](#); [Analysis 2.25](#)), (low-certainty evidence, downgraded due to serious imprecision).

There is probably no difference between DCC (with immediate neonatal care after cord clamping) compared with ECC for:

- Treatment for patent ductus arteriosis (PDA) (medical and/or surgical): average RR 1.12, 95% CI 0.99 to 1.26, 10 studies, 2046 babies, random-effects model) ([Analysis 1.14](#); [Analysis 2.14](#)), (moderate-certainty evidence, downgraded because some trials seem to be missing according to visual assessment of the funnel plot, with potential for publication bias).

It is uncertain whether DCC (with immediate neonatal care after cord clamping) reduces the use of inotropes or not, compared with ECC.

- Inotropics for low blood pressure during first 24 hours of life: (RR 0.37, 95% CI 0.17 to 0.81, 5 studies, 250 babies, random-effects model) ([Analysis 1.17](#); [Analysis 2.17](#)), (very low-certainty evidence, downgraded due to unclear risk of bias and serious imprecision), ([Analysis 1.17](#); [Analysis 2.17](#)).

Central nervous system

DCC (with immediate neonatal care after cord clamping) may reduce the number of babies with IVH grades one and two compared with ECC, or there may be no difference.

- IVH (grades one and two): (average RR 0.72, 95% CI 0.51 to 1.02, 9 studies, 1968 babies, random-effects model) ([Analysis 1.8](#); [Analysis 2.8](#)), (high-certainty evidence).

Neurodevelopmental impairment at around two to three years was not assessed in any of the studies. We expect some of these studies will systematically gather the data on this outcome when the babies in their trials reach the appropriate age. We will report these data when they become available.

Gastrointestinal

DCC (with immediate neonatal care after cord clamping) probably makes little difference to the incidence of necrotising enterocolitis (NEC) compared with ECC.

- NEC (confirmed by X-ray or laparotomy): (average RR 0.91, 95% CI 0.64 to 1.28, 11 studies, 2010 babies, random-effects model) ([Analysis 1.9](#); [Analysis 2.9](#)), (moderate-certainty evidence, downgraded for imprecision).

Haematological

DCC (with immediate neonatal care after cord clamping) makes little or no difference to the following haematological outcomes.

- Hyperbilirubinemia (treated by phototherapy): (average RR 1.05, 95% CI 0.95 to 1.16, 8 studies, 495 babies, random-effects model) ([Analysis 1.16](#); [Analysis 2.16](#)), (high-certainty evidence).
- Volume of blood transfused (in mL): (MD -6.00, 95% CI -26.11 to 14.11, 1 study, 72 babies) ([Analysis 1.20](#); [Analysis 2.20](#)), (low-certainty evidence, downgraded for serious imprecision).
- Haemoglobin (Hb) within first 24 hours of birth (in g/dL): (MD 0.80, 95% CI -0.02 to 1.62, 1 study, 42 babies) ([Analysis 1.24](#); [Analysis 2.24](#)), (very low-certainty evidence, downgraded for unclear risk of bias and serious imprecision).

DCC (with immediate neonatal care after cord clamping) probably reduces the need for blood transfusion in the infant compared with ECC.

- Blood transfusion in infant: (average RR 0.66, 95% CI 0.50 to 0.86, 11 studies, 2280 babies, random-effects model). There was some evidence of heterogeneity ($\text{Tau}^2 = 0.06$, $\text{Chi}^2 P = 0.10$, $I^2 = 39\%$) ([Analysis 1.19](#); [Analysis 2.19](#)), (moderate-certainty evidence, downgraded as some studies seemed to be missing, suggesting potential publication bias).

Additional outcomes

DCC (with immediate neonatal care after cord clamping) probably makes little or no difference to the following additional outcomes.

- Treatment for retinopathy of prematurity: (average RR 0.83, 95% CI 0.62 to 1.12, 8 studies, 1827 babies, random-effects model), ([Analysis 1.15](#); [Analysis 2.15](#)), (moderate-certainty evidence, downgraded for imprecision).
- Late sepsis (after three days or as defined by trialists): (average RR 0.79, 95% CI 0.56 to 1.10, 10 studies, 2017 babies, random-effects model). There was some evidence of heterogeneity ($\tau^2 = 0.11$, $\text{Chi}^2 P = 0.06$, $I^2 = 44\%$) but we found no strong evidence of publication bias. ([Analysis 1.21](#); [Analysis 2.21](#)), (low-certainty evidence, downgraded for heterogeneity and imprecision).
- Fully breastfed or mixed feeding at infant discharge: (average RR 1.11, 95% CI 1.00 to 1.23, 1 study, 94 babies), ([Analysis 1.39](#); [Analysis 2.39](#)), (very low-certainty evidence, downgraded for risk of bias and serious imprecision).

There were no data on severe visual impairment.

Other important outcomes for the mother

DCC (with immediate neonatal care after cord clamping) may make little or no difference to the number of mothers having blood transfusions following the birth (RR 0.67, 95% CI 0.36 to 1.24, 1 study, 1176 mothers), (low-certainty evidence, downgraded for serious imprecision) ([Analysis 1.33](#); [Analysis 2.33](#)).

We found no included studies reporting other data on our secondary outcomes for mothers.

Other important outcomes for the father

None of the included studies reported results for any of our secondary outcomes for fathers (psychological well-being, bonding with the infant, anxiety, and fathers' views).

Sensitivity analysis (Comparison 9)

We undertook sensitivity analyses on primary outcomes only with the five studies assessed as low risk of bias for selection bias and incomplete outcome data ([Backes 2016](#); [Mercer 2006](#); [Rabe 2000](#); [Salae 2016](#); [Tarnow-Mordi 2017](#)). We found no real differences in the overall findings.

B. Delayed cord clamping (DCC) with immediate neonatal care with cord intact versus early cord clamping (ECC) (Comparison 3 - subgroup analysis by gestation: comparison 4 - subgroup by type of intervention)

We found two studies addressing this comparison ([Aladangady 2006](#); [CORD Pilot 2018](#)) but only one study involving 276 babies and 261 mothers (twin pregnancies were included) provided data ([CORD Pilot 2018](#)). This study was undertaken in eight maternity units in the UK, and women were included if they were expected to give birth at less than 32 weeks' gestation.

The intervention of DCC was to wait for at least two minutes, with the baby held level. Immediate neonatal care was provided at the mother's side so that care could be given with the cord intact. This was compared with ECC, namely, before 20 seconds after birth. Immediate neonatal care was given in this group after the cord was cut. Six women and babies were excluded after randomisation

because they gave birth after 36 weeks' gestation. One mother whose baby died withdrew consent so data are provided on infant death only and on no other outcomes.

With only one study it was not possible to assess heterogeneity nor to undertake subgroup analyses.

Main outcomes

1. Death of baby (up to discharge)

Although the point estimate suggests DCC (with immediate neonatal care with cord intact) may reduce baby deaths up to discharge compared with ECC (with immediate neonatal care after cord clamping) (RR 0.47, 95% CI 0.20 to 1.11, 1 study, 270 babies) ([Analysis 3.1](#); [Analysis 4.1](#)), the CI includes the possibility of a small increase in mortality. Low-certainty evidence, downgraded due to serious imprecision ([Summary of findings 2](#)).

2. Death or neurodevelopmental impairment at age two to three years

DCC (with immediate neonatal care with cord intact) may reduce the composite outcome of 'death or neurodevelopmental impairment at two to three years' compared with ECC (with immediate neonatal care after cord clamping): (RR 0.61, 95% CI 0.39 to 0.96, 1 study, 218 babies) ([Analysis 3.2](#); [Analysis 4.2](#)). However, the CI is wide and so the clinical certainty of any such reduction is uncertain. Low-certainty evidence, downgraded due to serious imprecision ([Summary of findings 2](#)).

3. Severe intraventricular haemorrhage (IVH grades 3, 4)

DCC (with immediate neonatal care with cord intact) may make little or no difference to the number of babies with severe IVH compared with early cord clamping (with immediate neonatal care after cord clamping): (RR 0.84, 95% CI 0.29 to 2.45, 1 study, 266 babies) ([Analysis 3.3](#); [Analysis 4.3](#)). Low-certainty evidence, downgraded due to serious imprecision ([Summary of findings 2](#)).

4. Intraventricular haemorrhage (IVH, all grades)

DCC (with immediate neonatal care with cord intact) may make little or no difference to the number of babies with any grade of IVH compared with early cord clamping (with immediate neonatal care after cord clamping) (RR 0.90, 95% CI 0.64 to 1.26, 1 study, 266 babies). Low-certainty evidence, downgraded due to serious imprecision ([Analysis 3.4](#); [Analysis 4.4](#)) ([Summary of findings 2](#)).

5. Periventricular leukomalacia (PVL)

DCC (with immediate neonatal care with cord intact) may make little or no difference to the number of babies with PVL compared with early cord clamping (with immediate neonatal care after cord clamping) (RR 0.86, 95% CI 0.32 to 2.31, 1 study, 266 babies) ([Analysis 3.5](#); [Analysis 4.5](#)). Low-certainty evidence, downgraded due to serious imprecision ([Summary of findings 2](#)).

6. Chronic lung disease (CLD) - oxygen supplement at 36 weeks (corrected for gestation)

DCC (with immediate neonatal care with cord intact) may make little or no difference to the number of babies with CLD compared with early cord clamping (with immediate neonatal care after cord clamping) (RR 0.95, 95% CI 0.66 to 1.37, 1 study, 249 babies) ([Analysis 3.6](#); [Analysis 4.6](#)). Low-certainty evidence, downgraded due to serious imprecision ([Summary of findings 2](#)).

7. Maternal blood loss of 500 mL or greater

DCC (with immediate neonatal care with cord intact) may make little or no difference to the number of mothers with blood loss of 500 mL or greater compared with early cord clamping (with immediate neonatal care after cord clamping) (RR 0.94, 95% CI 0.72 to 1.22, 1 study, 254 women) ([Analysis 3.7](#); [Analysis 4.7](#)). Low-certainty evidence, downgraded due to risk of bias and imprecision ([Summary of findings 2](#)).

Other important outcomes for the baby

There is insufficient evidence for any reliable conclusions about the comparative effects of DCC (with immediate neonatal care with cord intact) and ECC (with immediate neonatal care after cord clamping) on the following outcomes.

Condition at birth

- Temperature < 36.0°C within one hour of birth: (RR 1.20, 95% CI 0.61 to 2.33, 1 study, 266 babies) ([Analysis 3.23](#); [Analysis 4.23](#)), (low-certainty evidence, downgraded for serious imprecision).

There were no data on low Apgar scores.

Respiratory

- Respiratory support (ventilator or continuous positive airway pressure (CPAP)): (RR 0.96, 95% CI 0.84 to 1.09, 1 study, 266 babies) ([Analysis 3.11](#); [Analysis 4.11](#)), (moderate-certainty evidence, downgraded for imprecision).

There were no data on: RDS, duration of respiratory support, surfactant treatment and home oxygen.

Cardiovascular

- Treatment for patent ductus arteriosus: (RR 0.99, 95% CI 0.56 to 1.74, 1 study, 266 babies) ([Analysis 3.14](#); [Analysis 4.14](#)), (low-certainty evidence, downgraded for serious imprecision).

There were no data on: inotropic support for hypotension nor mean arterial blood pressure.

Central nervous system

- IVH (grades 1 and 2): (RR 0.91, 95% CI 0.63 to 1.33, 1 study, 266 babies) ([Analysis 3.8](#); [Analysis 4.8](#)), (low-certainty evidence, downgraded for serious imprecision).
- Hydrocephalus: (RR 0.99, 95% CI 0.14 to 6.89, 1 study, 266 babies) ([Analysis 3.22](#); [Analysis 4.22](#)), (low-certainty evidence, downgraded for serious imprecision).
- Neurodevelopmental impairment at two to three years: (RR 0.75, 95% CI 0.41 to 1.39, 1 study, 218 babies) ([Analysis 3.28](#); [Analysis 4.28](#)), (low-certainty evidence, downgraded for serious imprecision).

There were no data on: cerebral palsy (CP).

Gastrointestinal

- NEC (confirmed by X-ray or laparotomy): (RR 1.58, 95% CI 0.53 to 4.69, 1 study, 266 babies) ([Analysis 3.9](#); [Analysis 4.9](#)), (low-certainty evidence, downgraded for serious imprecision).

Haematological

- Blood transfusion in infant: (RR 0.91, 95% CI 0.71 to 1.17, 1 study, 266 babies) ([Analysis 3.19](#); [Analysis 4.19](#)), (moderate-certainty evidence, downgraded for imprecision).
- Hyperbilirubinemia (treated by phototherapy): (RR 1.01, 95% CI 0.94 to 1.09, 1 study, 266 babies) ([Analysis 3.16](#); [Analysis 4.16](#)), (moderate-certainty evidence, downgraded for imprecision).

There were no data on: volume of blood transfused to baby nor Hb within the first 24 hours.

Other infant outcomes

- Treatment for retinopathy of prematurity (RoP): (RR 0.93, 95% CI 0.28 to 3.13, 1 study, 249 babies) ([Analysis 3.15](#); [Analysis 4.15](#)), (low-certainty evidence, downgraded for serious imprecision).
- Late sepsis (after three days or as defined by trialists): (RR 0.89, 95% CI 0.72 to 1.09, 1 study, 266 babies) ([Analysis 3.21](#); [Analysis 4.21](#)), (moderate-certainty evidence, downgraded for imprecision).
- Fully breastfed or mixed feeding at infant discharge: (RR 0.98, 95% CI 0.79 to 1.22, 1 study, 248 babies) ([Analysis 3.39](#); [Analysis 4.39](#)), (moderate-certainty evidence, downgraded for imprecision).

There were no data on: severe visual impairment nor length of infant stay in neonatal intensive care units (NICUs).

Other important outcomes for the mother

- Manual removal of placenta (denominator = vaginal births): (RR 0.99, 95% CI 0.32 to 3.04, 1 study, 105 women) ([Analysis 3.31](#); [Analysis 4.31](#)), (low-certainty evidence, downgraded for serious imprecision).
- Prolonged third stage (> 30 minutes) (denominator = vaginal births): (RR 0.79, 95% CI 0.24 to 2.64, 1 study, 105 women) ([Analysis 3.32](#); [Analysis 4.32](#)), (low-certainty evidence, downgraded for serious imprecision).
- Blood transfusion for mother: (RR 1.59, 95% CI 0.39 to 6.51, 1 study, 254 women) ([Analysis 3.33](#); [Analysis 4.33](#)), (low-certainty evidence, downgraded for serious imprecision).
- Postpartum infection in mother: (RR 1.12, 95% CI 0.73 to 1.72, 1 study, 254 women) ([Analysis 3.34](#); [Analysis 4.34](#)), (low-certainty evidence, downgraded for serious imprecision).

There were no data on: Rhesus-isoimmunisation; psychological well-being, bonding with the infant, breastfeeding initiation, fully breastfed or mixed feeding at discharge, mothers' anxieties not mothers' views.

Other important outcomes for the father

None of the included studies reported results for any of our secondary outcomes for fathers (psychological well-being, bonding with the infant, anxiety, and fathers' views).

Sensitivity analysis (Comparison 10)

We were unable to undertake a sensitivity analysis as there was only one study providing data for this comparison. This study ([CORD Pilot 2018](#)) was assessed as low risk of bias for selection bias and incomplete outcome data.

C. Delayed cord clamping (DCC) with immediate neonatal care after cord clamping versus Umbilical cord milking (UCM) (Comparison 5 - subgroup analysis by gestation: Comparison 6 - subgroup analysis by type of intervention)

Three studies involving 322 babies and their mothers contributed data to this comparison (Katheria 2015; Krueger 2015; Rabe 2011). Studies were undertaken in the USA and UK. All included babies expected to be born before 32 to 34 weeks' gestation. DCC was for 30 or 45 seconds, all with the baby held low. There were insufficient data to undertake subgroup analyses.

Main outcomes

Unless otherwise stated, we found no evidence on heterogeneity. Subgroup analyses by gestation or by type of intervention were not possible as the three studies included babies of the same gestation (at less than 32 to 34 weeks) and the same type of intervention (DCC of less than one minute with the baby held low).

We found insufficient evidence of a difference between DCC (with immediate neonatal care after cord clamping) compared with UCM for the main outcomes.

1. Death of baby (up to discharge)

DCC (with immediate neonatal care after cord clamping) may make little or no difference compared with UCM in the number of babies who died before discharge (average RR 2.14, 95% CI 0.93 to 4.93, 3 studies, 322 babies, random-effects model) (Analysis 5.1; Analysis 6.1). Low-certainty evidence, downgraded due to serious imprecision (Summary of findings 3).

2. Death or neurodevelopmental impairment at age two to three years

It is uncertain whether DCC (with immediate neonatal care after cord clamping) reduces the number of babies with death or neurodevelopmental impairment at two years compared with UCM (RR 1.67, 95% CI 0.78 to 3.57, 2 studies, 195 babies) (Analysis 5.2; Analysis 6.2). Very low-certainty evidence, downgraded for risk of bias and serious imprecision (Summary of findings 3).

3. Severe intraventricular haemorrhage (IVH grades 3, 4)

DCC (with immediate neonatal care after cord clamping) may make little or no difference compared with UCM (RR 2.63, 95% CI 0.11 to 61.88, 1 study, 58 babies) (Analysis 5.3; Analysis 6.3). Low-certainty evidence, downgraded for serious imprecision (Summary of findings 3).

4. Intraventricular haemorrhage (IVH, all grades)

DCC (with immediate neonatal care after cord clamping) makes little or no difference compared with UCM for all grades of IVH (average RR 1.32, 95% CI 0.55 to 3.17, 2 studies, 125 babies, random-effects model) (Analysis 5.4; Analysis 6.4). Very low-certainty evidence, downgraded for risk of bias and serious imprecision (Summary of findings 3).

5. Periventricular leukomalacia (PVL)

We identified one study involving 58 babies and none of the babies was identified with periventricular leukomalacia (Analysis 5.5; Analysis 6.5). Low-certainty evidence, downgraded for serious imprecision (Summary of findings 3).

6. Chronic lung disease (CLD) - oxygen supplement at 36 weeks (corrected for gestation)

DCC (with immediate neonatal care after cord clamping) may make little or no difference to the incidence of chronic lung disease compared with UCM (average RR 1.53, 95% CI 0.43 to 5.48, 2 studies, 125 babies, random-effects model) (Analysis 5.6; Analysis 6.6). Low-certainty evidence, downgraded for serious imprecision (Summary of findings 3).

7. Maternal blood loss of 500 mL or greater

No studies assessed this outcome (Analysis 5.7; Analysis 6.7).

Other important outcomes for the baby

DCC (with immediate neonatal care after cord clamping) may make little or no difference to the following outcomes compared with UCM.

Condition at birth

There were no data on: low Apgar score; temperature < 36⁰ within one hour of birth.

Respiratory

- Duration of respiratory support (in days): (MD 1.80, 95% CI -2.01 to 5.61, 1 study, 67 babies) (Analysis 5.12; Analysis 6.12), (very low-certainty evidence, downgraded for unclear risk of bias and serious imprecision).
- Surfactant treatment (for severe RDS): (RR 1.19, 95% CI 0.66 to 2.13, 1 study, 58 babies) (Analysis 5.13; Analysis 6.13), (low-certainty evidence, downgraded for serious imprecision).
- Home oxygen: (RR 0.29, 95% CI 0.01 to 6.88, 1 study, 58 babies) (Analysis 5.27; Analysis 6.27), (low-certainty evidence, downgraded for serious imprecision).

There were no data on: RDS; respiratory support (ventilator or CPAP).

Cardiovascular

There were no data on: treatment for patent ductus arteriosus (PDA); Inotropic support for hypotension; mean arterial blood pressure in early hours after birth.

Central nervous system

- IVH (grades 1 and 2): (average RR 1.74 (95% CI 0.48 to 6.30, 1 study, 58 babies, random-effects) (Analysis 5.8; Analysis 6.8), (low-certainty evidence, downgraded for serious imprecision).
- Hydrocephalus: one study involving 58 babies looked at this outcome and there were no babies in either group with hydrocephalus (Analysis 5.22; Analysis 6.22).
- Neurodevelopmental impairment at age two to three years: (average RR 1.18, 95% CI 0.04 to 32.88, 2 studies, 174 infants, random-effects model) (Analysis 5.28; Analysis 6.28), (very low-certainty evidence, downgraded for unclear risk of bias and serious imprecision).
- Cerebral palsy: one study involving 39 infants assessed this outcome and found no cases of cerebral palsy amongst the 39 infants (Analysis 5.30; Analysis 6.30).

Gastrointestinal

- NEC confirmed by X-ray or laparotomy: (RR 3.48 95% CI 0.41 to 29.31, 1 study, 58 babies) ([Analysis 5.9](#); [Analysis 6.9](#)), (low-certainty evidence, downgraded for serious imprecision).

Haematological

- Blood transfusion in infant: (RR 0.77, 95% CI 0.48 to 1.22, 1 study, 58 babies) ([Analysis 5.19](#); [Analysis 6.19](#)), (low-certainty evidence, downgraded for serious imprecision).
- Hb within first 24 hours of birth (in g/dL): (MD -0.20, 95% CI -1.57 to 1.17, 1 study, 58 babies) ([Analysis 5.24](#); [Analysis 6.24](#)), (low-certainty evidence, downgraded for serious imprecision).

There were no data on: volume of blood transfused; hyperbilirubinaemia (treated by phototherapy).

Other outcomes

- Treatment for retinopathy of prematurity (RoP): (RR 0.73, 95% CI 0.23 to 2.35, 1 study, 67 babies) ([Analysis 5.15](#); [Analysis 6.15](#)), (very low-certainty evidence, downgraded for risk of bias and serious imprecision).
- Late sepsis (after three days or as defined by trialists): (RR 0.87, 95% CI 0.06 to 13.27, 1 study, 58 babies) ([Analysis 5.21](#); [Analysis 6.21](#)), (low-certainty evidence, downgraded for serious imprecision).
- Severe visual impairment: one study involving 39 babies assessed this outcome but found no cases of visual impairment amongst the 39 babies ([Analysis 5.29](#); [Analysis 6.29](#)).

There were no data on: length of infant stay in NICU.

Other important outcomes for the mother

None of the included studies reported on any of our secondary outcomes for mothers.

Other important outcomes for the father

None of the included studies reported results for any of our secondary outcomes for fathers (psychological well-being, bonding with the infant, anxiety, and fathers' views).

Sensitivity analysis (Comparison 11)

We undertook sensitivity analyses on primary outcomes only with the one study assessed as low risk of bias for selection bias and incomplete outcome data ([Rabe 2011](#)). We found no real differences in the overall findings.

D. Umbilical cord milking (UCM) versus early cord clamping (ECC) (Comparison 7 - subgroup analysis by gestation; Comparison 8 - subgroup analysis by type of intervention)

We identified 13 studies addressing this question. Two studies provided no data ([Das 2018](#); [Pongmee 2010](#)) leaving 11 studies involving 1183 babies and their mothers providing data for this comparison ([Alan 2014](#); [Elimian 2014](#); [El-Naggar 2016](#); [Hosono 2008](#); [Hosono 2015](#); [Josephsen 2014](#); [Katheria 2014](#); [Kilicdag 2016](#); [Kumar 2015](#); [March 2013](#); [Mercer 2016](#)).

There was a range of countries involved in the studies which provided data; five studies were undertaken in the USA ([Elimian 2014](#); [Josephsen 2014](#); [Katheria 2014](#); [March 2013](#); [Mercer 2016](#));

two in Japan ([Hosono 2008](#); [Hosono 2015](#)); two in Turkey ([Alan 2014](#); [Kilicdag 2016](#)); one in Canada ([El-Naggar 2016](#)); one in India ([Kumar 2015](#)) and one in Thailand ([Pongmee 2010](#)).

Most studies included babies being born at less than 32 to 34 weeks' gestation and in most studies the cord was milked whilst still intact.

There were insufficient data to assess if there were any differences in the subgroups, either by gestation or by type of intervention.

Main outcomes

1. Death of baby (up to discharge)

UCM compared with ECC may make little or no difference to the number of babies who died before discharge (average RR 0.81, 95% CI 0.47 to 1.41, 9 studies, 931 babies, random-effects model) ([Analysis 7.1](#); [Analysis 8.1](#)). Low-certainty evidence, downgraded for serious imprecision ([Summary of findings 4](#)).

There was no evidence of overall heterogeneity ($\text{Tau}^2 = 0$, $\text{Chi}^2 P = 0.96$, $I^2 = 0\%$). ([Analysis 7.1](#); [Analysis 8.1](#)).

2. Death or neurodevelopmental impairment at age two to three years

No studies assessed this composite outcome ([Analysis 7.2](#); [Analysis 8.2](#)).

3. Severe intraventricular haemorrhage (IVH grades 3, 4)

UCM compared with ECC may make little or no difference to the incidence of severe IVH (average RR 0.75, 95% CI 0.39 to 1.45, 6 studies, 618 babies) ([Analysis 7.3](#); [Analysis 8.3](#)). Low-certainty evidence, downgraded for serious imprecision ([Summary of findings 4](#)).

There was no evidence of overall heterogeneity ($\text{Tau}^2 = 0$, $\text{Chi}^2 P = 0.65$, $I^2 = 0\%$) ([Analysis 7.3](#); [Analysis 8.3](#)).

4. Intraventricular haemorrhage (IVH, all grades)

UCM probably makes little or no difference to the incidence of all grades of IVH compared with ECC (average RR 0.85, 95% CI 0.62 to 1.18, 8 studies, 716 babies, random-effects model) ([Analysis 7.4](#); [Analysis 8.4](#)). Moderate-certainty evidence, downgraded for imprecision ([Summary of findings 4](#)).

There was some evidence of heterogeneity ($\text{Tau}^2 = 0.06$, $\text{Chi}^2 P = 0.19$, $I^2 = 30\%$) ([Analysis 7.4](#); [Analysis 8.4](#)).

5. Periventricular leukomalacia (PVL)

UCM compared with ECC may make little or no difference to the incidence of PVL (average RR 0.63, 95% CI 0.15 to 2.63, 3 studies, 315 babies, random-effects model) ([Analysis 7.5](#); [Analysis 8.5](#)). Low-certainty evidence, downgraded for serious imprecision ([Summary of findings 4](#)).

There was no evidence of overall heterogeneity ($\text{Tau}^2 = 0$, $\text{Chi}^2 P = 54$, $I^2 = 0\%$) ([Analysis 7.5](#); [Analysis 8.5](#)).

6. Chronic lung disease (CLD) - oxygen supplement at 36 weeks (corrected for gestation)

UCM compared with ECC may make little or no difference to the incidence of CLD (RR 1.03, 95% CI 0.64 to 1.66, 7 studies,

682 babies, random-effects model) ([Analysis 7.6](#); [Analysis 8.6](#)). Low-certainty evidence, downgraded due to heterogeneity and imprecision ([Summary of findings 4](#)).

There was some evidence of heterogeneity ($\text{Tau}^2 = 0.18$, $\text{Chi}^2 P = 0.06$, $I^2 = 50\%$) ([Analysis 7.6](#); [Analysis 8.6](#)).

7. Maternal blood loss of 500 mL or greater

We identified one study, with 200 women, relevant to this outcome. There were no women who had a blood loss of 500 mL or greater ([Analysis 7.7](#); [Analysis 8.7](#)). Low-certainty evidence, downgraded for serious imprecision ([Summary of findings 4](#)).

Other important outcomes for the baby

Condition at birth

There was no evidence of a difference for:

- low Apgar as defined by trialists (generally < eight at five minutes): (average RR 1.03, 95% CI 0.67 to 1.60, 2 studies, 398 babies, random-effects model) ([Analysis 7.18](#); [Analysis 8.18](#)), (low-certainty evidence, downgraded for serious imprecision).

No studies assessed temperature < 36°C at 24 hours.

Respiratory

We found no evidence of a difference in the following respiratory outcomes.

- RDS: (average RR 1.05, 95% CI 0.83 to 1.32, 4 studies, 515 babies, random-effects model). There is some evidence of heterogeneity ($\text{Tau}^2 = 0.03$, $\text{Chi}^2 P = 0.10$, $I^2 = 53\%$) ([Analysis 7.10](#); [Analysis 8.10](#)), (low-certainty evidence, downgraded for heterogeneity and imprecision).
- Respiratory support (ventilator or CPAP): (average RR 1.04, 95% CI 0.74 to 1.47, 2 studies, 129 babies, random-effects model). There is some evidence of heterogeneity ($\text{Tau}^2 = 0.04$, $\text{Chi}^2 P = 0.14$, $I^2 = 54\%$) ([Analysis 7.11](#); [Analysis 8.11](#)), (moderate-certainty evidence, downgraded for heterogeneity and imprecision).
- Duration of respiratory support (in days): (MD 2.80, 95% CI -9.78 to 15.38, 1 study, 199 babies) ([Analysis 7.12](#); [Analysis 8.12](#)), (very low-certainty evidence, downgraded for risk of bias and serious imprecision).
- Surfactant treatment (for severe RDS): (average RR 1.13, 95% CI 0.81 to 1.58, 5 studies, 433 babies, random-effects model). There is some evidence of heterogeneity ($\text{Tau}^2 = 0.10$, $\text{Chi}^2 P = 0.0004$, $I^2 = 81\%$) ([Analysis 7.13](#); [Analysis 8.13](#)), (low-certainty evidence, downgraded for heterogeneity and imprecision).
- Home oxygen: (RR 0.89, 95% CI 0.38 to 2.10, 1 study, 199 babies) ([Analysis 7.27](#); [Analysis 8.27](#)), (very low-certainty evidence, downgraded for risk of bias and serious imprecision).

Cardiovascular

We found no evidence of a difference for the following cardiovascular outcomes.

- Treatment for patent ductus arteriosus (PDA) (medical and/or surgical): (average RR 1.00, 95% CI 0.73 to 1.38, 5 studies, 411 babies) and there was no evidence of heterogeneity ([Analysis 7.14](#); [Analysis 8.14](#)), (moderate-certainty evidence, downgraded for imprecision).

- Inotropics for low blood pressure in first 24 hours: (average RR 0.61, 95% CI 0.36 to 1.04, 3 studies, 300 babies, random-effects model). There is some evidence of heterogeneity ($\text{Tau}^2 = 0.09$, $\text{Chi}^2 P = 0.19$, $I^2 = 41\%$) ([Analysis 7.17](#); [Analysis 8.17](#)), (very low-certainty evidence, downgraded for heterogeneity and serious imprecision).
- Mean arterial blood pressure: (average MD 0.38, 95% CI -1.33 to 2.09, 2 studies, 408 babies, random-effects model), and there was no evidence of heterogeneity ([Analysis 7.25](#); [Analysis 8.25](#)), (low-certainty evidence, downgraded for risk of bias and imprecision).

Central nervous system

We found no evidence of a difference for the following central nervous system outcomes.

- IVH (grades one and two): (average RR 0.74, 95% CI 0.44 to 1.25, 6 studies, 618 babies, random-effects model). There is some evidence of heterogeneity ($\text{Tau}^2 = 0.15$, $\text{Chi}^2 P = 0.14$, $I^2 = 40\%$) ([Analysis 7.8](#); [Analysis 8.8](#)), (low-certainty evidence, downgraded for heterogeneity and imprecision).
- Neurodevelopmental impairment at age two to three years: (average RR 1.25, 95% CI 0.49 to 3.17, 2 studies, 187 infants). Heterogeneity was unclear ($\text{Tau}^2 = 0.06$, $\text{Chi}^2 P = 0.28$, $I^2 = 14\%$) ([Analysis 7.28](#); [Analysis 8.28](#)), (very low certainty evidence, downgraded for risk of bias and serious imprecision).
- Cerebral palsy: (average RR 0.70, 95% CI 0.05 to 10.63, 2 studies, 286 infants, random-effects model). There is clear evidence of heterogeneity ($\text{Tau}^2 = 3.43$, $\text{Chi}^2 P = 0.003$, $I^2 = 89\%$) ([Analysis 7.30](#); [Analysis 8.30](#)), (very low-certainty evidence, downgraded for risk of bias, heterogeneity and serious imprecision).

There were no data on hydrocephalus.

Gastrointestinal

We found no evidence of a difference for the following.

- NEC confirmed by X-ray or laparotomy: (average RR 0.75, 95% CI 0.41 to 1.38, 6 studies, 616 babies, random-effects model) (low-certainty evidence, downgraded for serious imprecision), ([Analysis 7.9](#); [Analysis 8.9](#)).

Haematological

We found a possible benefit for UCM over ECC for:

- blood transfusion in infant: (average RR 0.71, 95% CI 0.57 to 0.89, 6 studies, 567 babies, random-effects model). There is some evidence of heterogeneity ($\text{Tau}^2 = 0.03$, $\text{Chi}^2 P = 0.13$, $I^2 = 41$) ([Analysis 7.19](#); [Analysis 8.19](#)), (very low-certainty evidence, downgraded for risk of bias, heterogeneity and imprecision).

We found no evidence for a difference for the following haematological outcomes.

- Hyperbilirubinaemia (treated by phototherapy): (average RR 1.39, 95% CI 0.73 to 2.63, 3 studies, 475 babies, random-effects model). There is clear evidence of heterogeneity ($\text{Tau}^2 = 0.28$, $\text{Chi}^2 P < 0.00001$, $I^2 = 94$) ([Analysis 7.16](#); [Analysis 8.16](#)), (very low-certainty evidence, downgraded for high heterogeneity and imprecision).

- Volume of blood transfused (in mL): (MD -19.00, 95% CI -39.61 to 1.61, 1 study, 199 babies), (very low-certainty evidence, downgraded for risk of bias and serious imprecision) ([Analysis 7.20](#); [Analysis 8.20](#)).
- Hb within first 24 hours of birth (in g/dL): (average MD 0.84, 95% CI 0.54 to 1.14, 7 studies, 905 babies, random-effects model). There was no evidence of heterogeneity ([Analysis 7.24](#); [Analysis 8.24](#)), (moderate-certainty evidence, downgraded for risk of bias).

Other outcomes

We found no evidence of a difference for the following.

- Treatment for retinopathy of prematurity (RoP): (average RR 0.95, 95% CI 0.76 to 1.19, 5 studies, 274 babies, random-effects model). There was no evidence of heterogeneity ([Analysis 7.15](#); [Analysis 8.15](#)), (low-certainty evidence, downgraded for serious imprecision).
- Late sepsis (after three days or as defined by trialists): (average RR 0.87, 95% CI 0.64 to 1.19, 4 studies, 385 babies, random-effects model). There was no evidence of heterogeneity ([Analysis 7.21](#); [Analysis 8.21](#)), (very low-certainty evidence, downgraded for risk of bias and serious imprecision).
- Length of infant stay in NICU (in weeks): (MD 5.30, 95% CI -5.49 to 16.09, 1 study, 199 babies), ([Analysis 7.26](#); [Analysis 8.26](#)), (low-certainty evidence, downgraded for risk of bias and imprecision).
- Severe visual impairment: we found one study involving 125 infants and there were no infants with severe visual impairment ([Analysis 7.29](#); [Analysis 8.29](#)).

Other important outcomes for the mother

None of the included studies reported on any of the secondary outcomes for mothers.

Other important outcomes for the father

None of the included studies reported results for any of our secondary outcomes for fathers.

Sensitivity analysis (Comparison 12)

We undertook sensitivity analyses on primary outcomes only with the four studies assessed as low risk of bias for selection bias and incomplete outcome data ([Elimian 2014](#); [El-Naggar 2016](#); [Katheria 2014](#); [Kumar 2015](#)). We found no real differences in the overall findings.

DISCUSSION

Summary of main results

This updated review now includes 48 studies, with data from 40 studies involving 4884 babies and their mothers. Studies were conducted mostly in high-income countries but with some from low- and middle-income countries. Nevertheless, for almost all the studies there appeared to be access to a neonatal intensive care unit (although this was not always specified in the trial reports). Largely, the babies in this review were born before 32 to 34 weeks' gestation. Multiple births were included in some of the studies. Few studies report outcomes for the mother.

For this update, we have separated the different interventions for influencing umbilical flow and placental transfusion, as the impact on the physiology of neonatal transition and placental transfusion may be different ([Blank 2018](#); [Hooper 2017](#); [Manley 2017](#)). Studies evaluating alternative policies for timing of cord clamping and those evaluating umbilical cord milking are separated, as are those where immediate neonatal care, if required, is given with the cord intact during delayed clamping. For delayed clamping, the timing of clamping has often been determined by the balance between allowing some delay and the imperative to cut the cord to allow transfer of the baby for neonatal care. When immediate neonatal care is available with the cord intact, however, babies requiring resuscitation at birth can be recruited. These babies at high risk are often excluded from trials where neonatal care is after cord clamping, or if they are recruited they do not receive the intervention.

Delayed cord clamping with immediate neonatal care after clamping versus early cord clamping

This comparison now includes data from 25 studies involving 3100 babies and their mothers. In these studies, delayed clamping was between 30 seconds and three minutes, with some studies waiting until pulsation ceased. Below 32 weeks' gestation, clamping was largely between 30 seconds and 60 seconds, however. The trials where they waited until pulsation ceased also included term babies, and gestation of the preterm births is unclear. Early clamping in these studies was before 30 seconds and most studies specified immediate or within 10 seconds. The largest trial contributing over half the data in this comparison was a well-conducted study co-ordinated from Australia involving 25 centres across seven countries, and including 1634 babies and their mothers ([Tarnow-Mordi 2017](#)). This study recruited babies born before 30 weeks' gestation.

Delayed cord clamping with immediate neonatal care after clamping, probably reduces the relative risk of a baby dying before discharge by 27% (95% confidence interval (CI) 2% to 46%) and a probable 2% reduction in absolute risk (95% CI 1% reduction to 3% reduction) compared with early clamping (moderate-certainty evidence). No studies reported death or neurosensory disability in early childhood. There were insufficient data for reliable conclusions about comparative effects on severe intraventricular haemorrhage (IVH) (grades 3-4) (low-certainty evidence). However, delayed clamping was associated with a 17% reduction in the relative risk of any IVH (grades 1-4) (95% CI 1% reduction to 30% reduction) and a 3% reduction in absolute risk (95% CI 1% reduction to 7% reduction) (high-certainty evidence). Delayed cord clamping has little or no effect on chronic lung disease (CLD) (high-certainty evidence). There was insufficient evidence for reliable conclusions about the comparative effects on periventricular leukomalacia (PVL) and maternal blood loss of 500 mL or greater.

For our secondary outcomes, delayed cord clamping with immediate neonatal care after clamping was associated with a 28% reduction in the relative risk of IVH (grade 1-2) (95% CI 2% increase to 49% reduction). The relative risk of having inotropes as treatment for low blood pressure was also lower when cord clamping was delayed rather than early, although few trials reported this outcome. The relative risk of having a blood transfusion was reduced by 34% (95% CI 14% reduction to 50% reduction; absolute risk 9% reduction, 95% CI 3% to 16% reduction). Mean arterial blood pressure shortly after birth was

higher for babies allocated delayed clamping, although data are only reported for 208 babies. We found insufficient evidence to be able to draw meaningful conclusions on the other secondary outcome measures we assessed.

Delayed cord clamping with immediate neonatal care, if needed, with cord intact versus early cord clamping

This comparison included one study that provided data involving 276 babies and their mothers. The study was conducted at eight centres in the UK. Recruitment was of women expected to give birth before 32 weeks' gestation.

We found insufficient data for identifying possible differences between the allocated groups for any of the primary outcomes of this review, namely: baby death before discharge; death or neurodevelopmental impairment in the early years; severe IVH (grade 3-4); any IVH (grade 1-4); PVL; CLD or maternal blood loss of 500 mL or greater. However, this study was a feasibility study and so not powered to assess effectiveness. For baby deaths before discharge, the point estimate for the relative risk favours delayed cord clamping with immediate neonatal care, if needed, with cord intact, being a 53% reduction with 95% CI ranging from an 11% increase to an 80% reduction. Promising evidence, but requiring confirmation in larger trials. For secondary outcomes, we again found insufficient data for reliable conclusions.

Delayed cord clamping with immediate neonatal care after clamping versus umbilical cord milking

This comparison included three studies (undertaken in the USA and UK) involving 322 babies. We found no meaningful conclusions could be drawn on possible differences between the allocated groups for any of the primary outcomes in this review namely: baby death before discharge; death or neurodevelopmental impairment in the early years; severe IVH (grade 3-4); any IVH (grade 1-4); PVL; CLD or maternal blood loss of 500 mL or greater. However, for baby deaths before discharge, the point estimate for the relative risk favours umbilical cord milking, being a two-fold increase in death for DCC with 95% CI a 7% reduction to a nearly five-fold increase but of low-certainty evidence, requiring confirmation in larger trials. All babies were born before 32 to 34 weeks' gestation. There are insufficient data for reliable conclusions about any secondary outcomes.

Umbilical cord milking versus early cord clamping

This comparison included 11 studies providing data involving 1183 babies. The studies were undertaken in a range of countries, and all but one recruited babies born before 32 weeks' gestation. We found insufficient evidence to draw meaningful conclusions between the allocated groups for any of the primary outcomes in this review namely: baby death before discharge; death or neurodevelopmental impairment in the early years; severe IVH (grade 3-4); any IVH (grade 1-4); PVL; CLD or maternal blood loss of 500 mL or greater. There may possibly be fewer babies having blood transfusions but this is very low-certainty evidence, other secondary outcomes did not identify any other differences.

Overall

There is some consistency in our findings in that early cord clamping, whether compared against delayed cord clamping with immediate neonatal care after cord clamping or against delayed cord clamping with immediate neonatal care with cord intact,

or against umbilical cord milking, appears to lead to more baby deaths. Although more data are needed, early clamping appears overall to be harmful.

Further studies are needed to find the optimum care for preterm neonates.

Overall completeness and applicability of evidence

There are many gaps in the data for this review. This is due to a variety of factors. For example, many trials reported laboratory data rather than clinical outcomes; not all report the same outcomes or measured the same outcome in different ways; a number of studies excluded babies who died after randomisation, both neonatal deaths and babies stillborn who were alive at randomisation; one study reported outcomes for caesarean births, despite recruiting caesarean and vaginal births (Katheria 2015), and another only reported outcomes for babies admitted to neonatal intensive care unit (Armanian 2017). Also, there are few long-term follow-up data on outcomes in early childhood, not enough for meaningful conclusions. This should improve as the large multicentre Australian trial is conducting follow-up (Tarnow-Mordi 2017).

Many trials in this review explicitly excluded babies requiring immediate resuscitation at birth. If babies allocated delayed clamping were considered to need immediate resuscitation at birth, often they did not receive the intervention and sometimes were excluded from the analysis of outcome. Only one trial provided data from a more generalisable population of babies, as immediate neonatal care, if needed, was provided with the cord intact (CORD Pilot 2018). Hence, results from this review should be applied with caution to babies requiring resuscitation. Guidelines for newborn life support often recommend early cord clamping if resuscitation is required (Wyllie 2015). Recently, a delay of 30 to 45 seconds, or umbilical cord milking have been proposed as an alternative (Sweet 2017).

One difficulty in understanding applicability of the evidence for clinical practice is that there is little consistency in the interventions. For example, the studies use different definitions for delayed cord clamping, ranging from 30 seconds to three minutes (and a few were until pulsation ceases). The outcome may differ for different interventions, and for the same intervention at different gestational ages. Similarly, there is variation in the definition of umbilical cord milking.

Although there is insufficient evidence as to whether providing immediate neonatal care beside the mother with the cord intact impacts on outcomes, evidence from qualitative interviews with parents suggest they appreciate neonatal care being provided beside the mother (Sawyer 2015). Providing neonatal care beside the mother, irrespective of whether with cord intact, appears to be acceptable to clinicians (Thomas 2014; Yoxall 2015), but requires training and a multidisciplinary approach (Batey 2017). Further research should assess the benefits and adverse effects of neonatal care beside the mother, irrespective of whether care is provided with cord intact.

As the evidence in this review comes primarily from high-income countries, and appears to be all from settings with access to neonatal intensive care, the results may not be generalisable to settings without such access, particularly in low-income countries.

Delaying cord clamping may be associated with greater benefit in settings without access to expert neonatal care in the delivery room or a neonatal intensive care unit after birth. Further research in such settings should therefore be a priority.

There are insufficient data for reliable conclusions about the comparative effects of umbilical cord milking compared with any policy for timing of cord clamping. However, as the evidence is now suggesting benefit for delayed cord clamping, the priority is to compare cord milking with delayed clamping.

In order to determine the optimal policy for influencing umbilical cord flow and placental transfusion at preterm birth, we need to understand more about the underlying physiology. Work with lambs has suggested that a more physiological approach based on the onset of respiration may be preferable to any arbitrary fixed timing for cord clamping (Bhatt 2013; Kluckow 2015; Te Pas 2018), and that umbilical cord milking causes haemodynamic disturbance and does not provide an increase in placental transfusion (Blank 2018).

Quality of the evidence

Most of the studies were small and only reported a few clinical outcomes. No studies could blind the clinicians to the allocated intervention, as this was unrealistic because the nature of the intervention of supporting placental transition for the preterm baby, and only a few studies reported if outcome assessment was blind to the allocation. For baby death, blinding of the allocation is probably not critical, unless babies considered to be stillborn were excluded as potential for bias would be if knowledge of the allocation influenced the decision as to whether the baby had shown any signs of life at birth.

Overall, the risk of bias for trials in this review was unclear for selection bias (sequence generation and allocation concealment) and attrition bias (incomplete outcome data), with only 12 of the 48 studies being assessed as low risk of bias for these parameters (see Figure 2; Figure 3) (Backes 2016; CORD Pilot 2018; Dipak 2017; Elimian 2014; El-Naggar 2016; Katheria 2014; Kumar 2015; Mercer 2006; Rabe 2000; Rabe 2011; Salae 2016; Tarnow-Mordi 2017). However, the large trials were at lower risk of bias.

We used GRADEPro software to assess the certainty, or quality, of the evidence (CoE or QoE) for each primary and secondary outcome, but reported 'Summary of findings' tables for the main four comparisons for the seven primary outcomes.

1. For delayed cord clamping with immediate neonatal care after cord clamping versus early cord clamping, we assessed death as moderate-certainty evidence; severe IVH and PVL as low-certainty evidence; any IVH and CLD as high-certainty evidence and maternal haemorrhage as very low-certainty evidence (Summary of findings for the main comparison). Reasons for downgrading included limitations in study design and imprecision.
2. For delayed cord clamping and immediate neonatal care with cord intact compared with early cord clamping, we assessed all the primary outcomes as low-certainty evidence (Summary of findings 2). Reasons for downgrading included mainly limitations in terms of imprecision - the evidence was from a single small study with few events and wide CIs crossing the line of no effect.

3. For delayed cord clamping versus umbilical cord milking, we assessed death, severe IVH and CLD as low-certainty evidence; death or neurodevelopmental impairment in early years and all IVH as very low-certainty evidence (Summary of findings 3). PVL was not estimable, but assessed as low certainty, and there were no data on maternal haemorrhage. Reasons for downgrading included limitations in study design and imprecision.
4. For umbilical cord milking versus early cord clamping, we assessed death, severe IVH, PVL, CLD and maternal blood loss as low-certainty evidence and all IVH at moderate-certainty evidence (Summary of findings 4). There were no data on death or neurodevelopmental impairment in early years nor on maternal haemorrhage. Reasons for downgrading included limitations in study design, inconsistency and imprecision.

Potential biases in the review process

We are aware of potential biases in the reviewing process; and we took some steps to minimise bias (such as data extraction which was carried out by two review authors independently). We also acknowledge that we would have been better to have published an updated protocol prior to undertaking this update. Nevertheless, changes to the protocol were agreed by the review team prior to commencing the update. Three of the review authors (HR; GG; LD) were also trial authors on three of the included studies (CORD Pilot 2018; Rabe 2000; Rabe 2011). HR and LD did not assess or extract data on their own studies and GG did not assess or extract data on the study on which she was a co-applicant.

Agreements and disagreements with other studies or reviews

A recent systematic review and meta-analysis compares delayed versus early cord clamping for preterm birth, and is similar to our Comparison 1 and has similar findings (Fogarty 2018). However, there are some differences. We used random-effects models for our meta-analyses as we considered the variation in the study designs sufficient to believe the relative risks might vary between studies; we have a separate comparison for studies where immediate neonatal care is given, if needed, with the cord intact; we have found and were able to obtain slightly different studies in our searches. Although, both reviews used the Cochrane methodology, we vary in our assessments of risk of bias with Fogarty 2018 assessing risk of bias as lower for most of the studies. Our reasoning on risk of bias are explained in the Characteristics of included studies. Also, where we assessed the certainty of the evidence using GRADE as mostly low to moderate (due mainly to imprecision), Fogarty and colleagues assessed the certainty of the evidence as high. Our reasoning for our assessments is explained in the Notes in Summary of findings for the main comparison. As Fogarty 2018 included studies of delayed cord clamping, pooling those where immediate neonatal care was after cord clamping or with the cord intact, they have a larger cohort of babies. In our Cochrane Review, we separated studies where immediate neonatal care was after cord clamping from studies where immediate neonatal care was with the cord intact, as they may have different benefits and harms, which may be relevant to informing future guidance for clinical practice.

An earlier systematic review (Backes 2014) compared delayed cord clamping or umbilical cord milking with early cord clamping for babies less than 32 weeks' gestation. This review reported a reduction in mortality, fewer blood transfusions and less IVH (all

grades) for babies allocated delayed cord clamping or umbilical cord milking, rather than early clamping. As discussed above, we consider delayed cord clamping and umbilical cord milking to be interventions with different potential benefits and harms. Hence, we did not combine them in our analysis, instead advocating head-to-head comparison of delayed clamping and cord milking to compare their effects.

Similarly, the systematic review [Ghavam 2014](#) also included delayed cord clamping or umbilical cord milking in the same comparison arm. The objective of this review was to compare long-term neurodevelopment (at age 18 to 24 months). However, there were insufficient data for reliable conclusions about neurodevelopment. Short-term outcomes reported included: better blood pressure control and haemoglobin levels, fewer babies having blood transfusions, fewer babies with IVH (all grades), and fewer babies with late sepsis for babies with either delayed cord clamping or umbilical cord milking.

The review [Rabe 2008](#) undertook a systematic review of babies less than 37 weeks' gestation comparing a brief delay in cord clamping (> 30 seconds) compared with early cord clamping (< 30 seconds). This review was superseded by the previous version of this Cochrane Review ([Rabe 2012](#)).

Finally, one systematic review ([Al-Wassia 2015](#)) included trials of umbilical cord milking for both term and preterm births and combined early and delayed clamping for the control group. As the benefits and harms of early and delayed clamping may be different, we consider it inappropriate to combine data for these interventions.

AUTHORS' CONCLUSIONS

Implications for practice

Delaying cord clamping appears to be beneficial at premature births. The mechanism of the probable reduced infant deaths before discharge is not known, but the demonstrated effects on blood transfusions and blood pressure stability seem to suggest that the benefits are haemodynamic.

The evidence of a probable reduction in infant death before discharge with delayed cord clamping compared with early clamping comes from a substantial body of evidence, 20 studies involving 2680 babies, seems to be consistent ($I^2 = 0\%$), and indicating a 27% reduction in infant death. These data include one large multicentre trial from Australia involving 1634 babies and their mothers ([Tarnow-Mordi 2017](#)). Across the review, there is a consistent favouring of delayed cord clamping being beneficial and immediate clamping tending to cause harm, however, the optimal time for delaying cord clamping is not known.

The use of bedside resuscitation to allow a longer delay in cord clamping whilst not delaying immediate care is an attractive option. Whilst the one study that provided data on this technique was underpowered ([CORD Pilot 2018](#)), their results are consistent with those of delayed cord clamping with immediate neonatal care after clamping.

There are insufficient data on umbilical cord milking either compared with early cord clamping or compared with delayed cord clamping.

There are, as yet, insufficient data for reliable conclusions on long-term follow-up and neurological development in early childhood. These data are important, not only to demonstrate whether any benefit in short-term outcome is reflected in subsequent neurodevelopment, but also to provide adequate reassurance about safety ([Marlow 2015](#)).

The nine new reports awaiting further classification may alter the conclusions of the review once assessed ([Das 2018a](#); [El-Naggar 2018](#); [Kazemi 2017](#); [Leal 2018](#); [Li 2018](#); [Ram Mothan 2018](#); [Song 2017](#); [Wang 2018](#); [Weeks 2018](#)).

Implications for research

Whilst the current evidence supports not clamping the cord before 30 seconds at preterm births, the optimum time to clamp the umbilical cord remains unclear. Thus, trials could compare clamping at 30 to 60 seconds with a longer delay. At preterm birth, time for the cardiovascular and respiratory changes may be more important than placental transfusion. Therefore, the priority could be to evaluate an adequate delay in cord clamping, and to provide immediate neonatal care, if needed, with the cord intact. This will allow recruitment of babies requiring immediate resuscitation at birth, a group largely excluded from the current evidence. Further research to improve understanding of the physiology of neonatal transition, and how it varies with gestation, would help determine the optimal policy for delayed clamping to evaluate in future trials.

Trials should no longer compare umbilical cord milking with cord clamping before 30 seconds at preterm births. Cord milking should be compared with delayed cord clamping, and ideally such studies should await assessment of the optimal policy for delayed clamping. The mode of umbilical cord milking with the cord intact should be well defined in future studies.

Future trials should be high quality, and report the methods they used in sufficient detail to allow assessment of the risk of bias. They should all report clinically important outcomes, particularly the primary outcomes and main secondary outcomes listed in this review. This should include reporting outcomes for the mother, and outcomes in early childhood for the babies. Trials should be powered on clinical outcomes rather than laboratory measures. As the benefits and hazards of alternative policies for timing of cord clamping may be different in low- and middle-income settings with no access to neonatal intensive care, where mortality and morbidity is highest, trials in these settings are a particular priority.

Understanding parents' and clinicians' views and experiences of delayed cord clamping and providing immediate neonatal care with the cord intact is also important, and should include follow-up sometime after the birth.

The number of new trials being conducted to compare alternative policies for cord clamping and umbilical cord milking at preterm birth (see [Characteristics of ongoing studies](#)) is growing fast, with over 20 registered in the two years 2016-2017. These trials are largely small and being undertaken with little standardisation of the interventions being compared or the outcomes being collected. Results from this updated Cochrane Review should guide the choice of promising interventions for future evaluation. Meta-analysis using individual participant data from each trial maximises statistical power and enables reliable subgroup analyses to be undertaken. Trialists for many of the planned and recently

published studies have agreed to share their data for a prospective meta-analysis (Duley 2014).

ACKNOWLEDGEMENTS

Diane Elbourne who undertook the first Cochrane Review on this topic (Elbourne 1995).

Therese Dowswell who provided considerable input into the 2012 publication (Rabe 2012).

Graham Reynolds for his editorial and clinical contributions to previous versions of this review.

W Oh, M McDonnell, M Nelle, S Kinmond, J Mercer, N Aladangady A Katheria and H Rabe who kindly provided additional information regarding their studies. The information about randomisation for the trials by W Oh and M Nelle was directly obtained from the authors. The review authors thank the authors for supplying the information.

Jon Dorling, Donna Winterbank-Scott, Lambert Felix, Anna Cuthbert all provided help with data extraction of information from the studies. Aidan Tan provided very helpful translations of the three Chinese papers.

As part of the pre-publication editorial process, this review has been commented on by five peers (an editor and four referees who are external to the editorial team) and the Group's Statistical Adviser. The authors are grateful to the following peer reviewers for their time and comments: Prof NJ Shaw, Liverpool Women's Hospital; Andrew D Weeks, University of Liverpool; Jamie B Warren MD MPH, Oregon Health & Science University; Serena Xodo MD, Clinic of Obstetrics and Gynecology, Academic Hospital of Udine, Udine (Italy).

This project was supported by the National Institute for Health Research, via Cochrane Infrastructure funding to Cochrane Pregnancy and Childbirth. The views and opinions expressed therein are those of the authors and do not necessarily reflect those of the Systematic Reviews Programme, NIHR, NHS or the Department of Health.

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* Indicates the major publication for the study

CHARACTERISTICS OF STUDIES

Characteristics of included studies [ordered by study ID]

Aladangady 2006

Methods	Randomised controlled trial, stratified randomisation list for gestational age group (24-26, 27-29, 30-32 weeks) and mode of birth (vaginal/caesarean).
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Mother-infant pairs at 24 weeks to 32 weeks' gestation • Singletons • Both vaginal birth and CS • N = 46 babies randomised <p>Exclusion criteria</p> <ul style="list-style-type: none"> • Known major malformation, haemolytic disease, intrauterine transfusion.
Interventions	<p>Intervention: DCC</p> <ul style="list-style-type: none"> • Cord clamping time 30-90 secs • Infant held as low as the cord length allowed • If CS, mother received 5 IU syntocinon intravenously at delivery of presenting part • Resuscitation with cord intact • N = 23 babies <p>Comparator: ECC</p> <ul style="list-style-type: none"> • Cord clamping immediately after birth • N = 23 babies <p>Additional information</p> <ul style="list-style-type: none"> • Gestational subgroup: < 32-34 weeks • Resuscitation with cord intact: yes - available • Access to NICU: yes • Length of delay: 30-90 secs • Baby placed: low • Uterotonic: before cord clamping (with delivery of presenting part at CS) but no mention of when at vaginal births and it may not have been given • UCM: n/a <p>Comparison 3</p> <p>DCC with neonatal resuscitation with cord intact (subgroup by gestation)</p> <p><u>Subgroup 1:</u> < 32-34 weeks' gestation</p> <p>Comparison 4</p> <p>DCC with neonatal resuscitation with cord intact (subgroup by type of intervention)</p> <p><u>Subgroup 7:</u> mixed intervention</p>
Outcomes	<p>Primary outcome</p> <ul style="list-style-type: none"> • Red cell volume measured at 4 hrs of age. <p>Other outcomes</p>

Aladangady 2006 (Continued)

- Hct

Notes

Setting: Tertiary Perinatal Centre, Queen Mother's Hospital, Glasgow, UK

Dates: not reported

Declaration of interest: not reported

Trial funding source: quote: "Well Being," a research grant from the Royal College of Obstetricians and Gynaecologists, for invaluable financial assistance."

Further information:

- **No data for this review.**
- Same protocol for a multicentre trial as [Baenziger 2007](#). There is no overlap in the data reported, as this paper reports results for a different centre. Scotland.
- DCC: 2 infants required assisted ventilation with an endotracheal tube, 7 infants received facemask ventilation and 14 facial oxygen before clamping of the cord.
- Infant blood volume after birth was reported as DCC 74.4 (SD 11.5) and ECC 62.7 (SD 7.8), but this is not one of the review's pre-specified outcomes.
- N Aladangady kindly provided additional information regarding this study.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote: "Randomisation was performed by a stratified randomisation list, just before delivery". For stratification gestational age and type of birth "were taken account of". It was not clear how this sequence was generated.
Allocation concealment (selection bias)	Unclear risk	Randomisation occurred quote: "just before delivery". There is no information about whether allocation was concealed.
Blinding of participants and personnel (performance bias) All outcomes	High risk	For this type of intervention blinding participants and the staff present at the birth to the group allocation is not possible. Staff providing care may have modified their behaviour according to randomisation group.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	It is not stated whether assessment of outcome was blinded but the outcomes reported (mean fetal blood volume and Hct levels) are objective.
Incomplete outcome data (attrition bias) All outcomes	Low risk	46 mother-infant pairs were randomised and all infants appeared to be accounted for in the analysis. Although 3/23 allocated to delayed clamping actually had early clamping (1 due to short cord, 2 asked for by neonatologist) there was an ITT analysis.
Selective reporting (reporting bias)	High risk	No clinical outcomes were reported. It was stated that quote: "clinical outcomes were not analyzed", implying they were collected. For Baenziger 2007 , which was a subset of the same multicentre study the reported outcomes were quote "blood volume, need for red cell transfusion, and respiratory and neurological complications".
Other bias	Unclear risk	The study was stratified to reduce baseline imbalance.

Alan 2014

Methods	Randomised controlled trial
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> Babies with gestational age \leq 32 weeks and estimated BW \leq 1500 g assessed by the obstetrics team. Multiple births included. 5 in each group. N = 48 babies randomised. Exclusions after randomisation left 44 and then 38 babies in the analyses (see below). <p>Exclusion criteria</p> <ul style="list-style-type: none"> Suspected twin-to-twin transfusion syndrome or discordant twins; major congenital anomalies or chromosomal anomalies; vaginal bleeding due to placenta previa or abruption or placental tear; haemolytic disease of the fetus and newborn like Rhesus sensitisation; IUGR; maternal gestational diabetes treated with insulin; hydrops fetalis; and refused parental consent.
Interventions	<p>Intervention: UCM</p> <ul style="list-style-type: none"> Infants were placed at the level of placenta in caesarean deliveries and below the level of placenta in vaginal deliveries in UCM group (group 1). The umbilical cord was held at 25 to 30 cm distance from the baby and milked vigorously toward the umbilicus for 3 times at a speed of approximately 5 cm/sec by the attending neonatologist before clamping N = 24 babies randomised but 2 were excluded because inappropriate milking – leaving N = 22. A further 3 babies were excluded in days 2-7 for death or major bleeding. <p>Comparator: ECC</p> <ul style="list-style-type: none"> Infants in the control group (group 2) had immediate cord clamping (< 10 secs). N = 24 babies randomised but 2 excluded because: 1) tracheal bleeding during resuscitation in a preterm infant with 23 weeks of gestation, 2) 24 weeks' gestation infant who did not respond to resuscitation) leaving N = 22. A further 3 babies were excluded on days 2-7 for death or major bleeding. <p>Additional information</p> <ul style="list-style-type: none"> Gestational subgroup: < 32-34 weeks' gestation Resuscitation with cord intact: not available Access to NICU: yes Length of delay: n/a Baby placed: at the level of placenta at caesareans and below the placenta in vaginal births in UCM group Uterotonic: - no information UCM: 3 x milking 25-30 cm, cord intact at 5 cm <p>Comparison 7</p> <p>UCM vs ECC (subgroup by gestation)</p> <p><u>Subgroup 1:</u> < 32-34 weeks' gestation</p> <p>Comparison 8</p> <p>UCM vs ECC (subgroup by type of intervention)</p> <p><u>Subgroup 1:</u> cord intact during UCM</p>
Outcomes	<p>Primary</p> <ul style="list-style-type: none"> Number and volume of PRBC transfusions received by the infant during the first 35 days of life. <p>Secondary</p>

Alan 2014 (Continued)

- Hemodynamic variables during the first 24 hrs of life
- Number of infants undergoing PRBC transfusion within the first 3 days and the first 5 weeks of life, total volume of transfusions, and total phlebotomy losses during the first 5 weeks
- Haemodynamic parameters such as heart rate, respiratory rate, mean blood pressure on admission to the NICU, and at 6th, 12th, and 24th hour of hospitalisation, urine output, need for volume expanders (10 mL/kg normal saline), and inotrope drugs (dopamine, dobutamine, and adrenaline) during the first 24 hrs
- Haematological parameters such as Hb, Hct, white blood cell count, and
- Platelet counts at the first and 24th hour, day 7, and weekly thereafter; and
- Clinical outcomes such as percentage of nosocomial sepsis during the first 35 days of life, surfactant requirement for RDS, (PDA; without any treatment/with medical or surgical treatment), IVH (staging according to Papile¹³), NEC (NEC; staging according to Bell and colleagues ¹⁴), bronchopulmonary dysplasia (BPD; was defined by need for supplemental oxygen at 36 weeks postconceptional age), retinopathy of prematurity (RoP; was defined according to the International Classification¹⁵), hospital stay, and death. In addition, serum potassium, total bilirubin, blood urea nitrogen (BUN), creatinine, albumin, and total protein levels at 24th hour after birth and maximum serum total bilirubin and potassium levels within the first week of life were recorded for safety measures.

Notes

Setting: Ankara, Turkey

Dates: April 2011 to February 2013

Declaration of interest: not reported

Trial funding source: not reported

Further information:

- Twins: in case of twin pregnancies, the first one was randomised and the second one was automatically assigned to the opposite arm without randomisation.
- Many outcomes were unable to be included in this review because they were reported as medians.
- Late sepsis chose data for 35 days. Data seems to have a high incidence in both groups.
- S Alan kindly provided further data (Tables 3,4,5) on the outcome measures in email of 14 April 2016, in particular the specific numerators and denominators for the various outcomes, including infant death which we report as UCM 2/22 vs ECC 3/24 (including the death on delivery suite).

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Just reports 'randomly assigned'.
Allocation concealment (selection bias)	Unclear risk	Quote: "... <i>Sequentially numbered sealed nontransparent envelopes...</i> ", however, it is not possible to have concealment of allocation if sequence generation is unclear.
Blinding of participants and personnel (performance bias) All outcomes	High risk	Quote: " <i>The intervention was unmasked for the attending neonatal and obstetric teams in the delivery room.</i> "
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	There is no mention of whether the authors tried to blind outcome assessment.
Incomplete outcome data (attrition bias) All outcomes	High risk	48 randomised to 24 each group.

Alan 2014 (Continued)

UCM: 2 excluded in delivery room for inappropriate milking and 3 excluded later because of death or major bleeding. So N = 19 for analysis – loss of 5/24 = 21%

ECC: 2 excluded in delivery room because of death or major bleeding and 3 excluded later because of death or major bleeding. So N = 19 for analysis - loss of 5/24 = 21%

Selective reporting (reporting bias)	Low risk	Very comprehensive outcome measures listed in the methods section.
Other bias	Unclear risk	Baseline demographics were similar. Trial was small for assessing clinical outcomes, no other biases apparent.

Armanian 2017

Methods	Randomised controlled trial
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Infants born with a gestational age of ≤ 34 weeks and admitted to the tertiary referral NICU. • N = 63 babies included <p>Exclusion criteria</p> <ul style="list-style-type: none"> • Infants born with a gestational age of ≤ 34 weeks NOT admitted to the tertiary referral NICU. • Twin pregnancies, attending not compliant with protocol, birth asphyxia, major congenital anomalies.
Interventions	<p>Intervention: DCC</p> <ul style="list-style-type: none"> • Cord clamping at 30 - 45 secs. No information as to where baby held during delay • N = 32 babies but 2 lost to follow-up so, 30 babies providing data <p>Comparator: ECC</p> <ul style="list-style-type: none"> • Cord clamping at 5 - 10 secs • N = 31 babies but 1 lost to follow-up so 30 babies providing data
Outcomes	<p>Primary</p> <ul style="list-style-type: none"> • Time of umbilical cord clamping <p>Secondary</p> <ul style="list-style-type: none"> • 1 and 5 mins Apgar score • Hct • Blood transfusion • IVH • PDA • Mortality • Sepsis • Resuscitation <p>Comparison 1</p> <p>DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by gestation)</p>

Armanian 2017 (Continued)

Subgroup 1: < 32-34 weeks' gestation

Comparison 2

DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by type of intervention)

Subgroup 7: type of intervention unclear

Notes

Setting: Iran

Dates: July 2014 to Feb 2015

Funding source: not reported. Quote: "This paper is derived from a research project no. 292270 in the Isfahan University of Medical Sciences."

Declaration of interest: not reported

Further information:

- Trial Registration: IRCT2015013010026NS
- Contact details: Amir-Mohammad Armanian, Email: armanian@med.mui.ac.ir and Hataf Ghasemi Tehrani, Email: tehrani@med.mui.ac.ir
- We report the number of babies who died relative to the number randomised.
- We have included the data on sepsis, although the publication does not report if this was late sepsis or not.
- Dr Armanian kindly provided clarification on baby deaths as in the publication Table 2 and the CONSORT diagram do not agree. Dr Armanian informed us that Table 2 is incorrect and the deaths were 2 in DCC and 1 in ECC. Dr Armanian also provided some information on risk of bias assessments on 18 January 2018.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "...table of random numbers..."
Allocation concealment (selection bias)	Low risk	Quote: "Central allocation with telephone." Personal communication from Amir Armanian.
Blinding of participants and personnel (performance bias) All outcomes	High risk	Cannot blind clinicians (confirmed by trial registration form) and it is unclear if women knew or not.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No information.
Incomplete outcome data (attrition bias) All outcomes	High risk	<p>Although Figure 2 reports no loss to follow-up, the Figure reports:</p> <ul style="list-style-type: none"> • 22 babies were excluded for non-admission to NICU; • 13 babies excluded for non-compliance with study protocol. <p>These exclusions will necessarily have come after randomisation and after cord clamping, so were post-randomisation exclusions $35/74 + 35 = 35/109 = 32\%$. We are checking this with A. Armanian</p>

Armanian 2017 (Continued)

Selective reporting (reporting bias)	Unclear risk	All outcomes listed in trial registration were reported on, but there were additional outcomes reported that were not listed in the trial registration form (NEC; RoP). We have not assessed the trial protocol.
Other bias	Unclear risk	Very little information on trial methods.

Backes 2016

Methods	Randomised controlled trial
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Pregnant women 22.5 to 27.6 weeks' gestation. • Singleton pregnancies • N = 40 babies include <p>Exclusion criteria</p> <ul style="list-style-type: none"> • Women whose pregnancies were complicated by placental abruption, placental previa, multiple gestations, chromosomal abnormalities (including trisomy 21), known major congenital malformations, attending obstetrician refusal to participate or intent to withhold care.
Interventions	<p>Intervention: DCC</p> <ul style="list-style-type: none"> • Cord clamping at 30-45 secs • The obstetrician clamped the umbilical cord 30 to 45 secs following delivery of the infant. • During the delay, the infant was held in a sterile towel approximately 10 to 15 inches below the mother's introitus at vaginal delivery or below the level of the incision at CS. • A member of the research team notified the delivering physician regarding time elapsed in 5-sec intervals. • Following clamping of the umbilical cord, the infant was handed to the neonatology team for routine infant care • N = 18 babies <p>Comparator: ECC</p> <ul style="list-style-type: none"> • Clamping at less than 10 secs • The obstetrician clamped the umbilical cord immediately following delivery of the infant. • N = 22 babies <p>Additional information</p> <ul style="list-style-type: none"> • Gestational subgroup: < 32-34 weeks' gestation • Resuscitation with cord intact: not available • Access to NICU: yes • Length of delay: 30-45 secs • Baby placed: low • Uterotonic: no information • UCM: n/a <p>Comparison 1</p> <p>DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by gestation)</p> <p><u>Subgroup 1:</u> < 32-34 weeks' gestation</p> <p>Comparison 2</p>

Backes 2016 (Continued)

DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by type of intervention)

Subgroup 2: DCC at < 1 min with baby low (+ gravity)

Outcomes	Circulating progenitor cell types in postnatal days 1-30; IVH grades 3 and 4; Infant mortality; infant Hct.
Notes	<p>Setting: nationwide Children's Hospital, Ohio State University Wexner Medical Center, Ohio, USA</p> <p>Dates: August 2009 to December 2013</p> <p>Declaration of interest: quote: "The authors declare no conflict of interest."</p> <p>Trial funding source: quote: "The present work is supported in part by a grant from the American Heart Association (# 10CRP3730033, CHB) and by internal funding provided by Nationwide Children's Hospital Research Institute."</p> <p>Further information</p> <ul style="list-style-type: none"> Huang 2016 reports no difference in Baileys at 6-9 months nor at 12-18 months. In entering data, we have re-included, in deaths and in the denominators, the 3 babies who died on delivery suite, 1 in DCC and 2 in ICC, so the denominators are 18 and 22 babies. We have written to Professor Backes regarding clarification on the data on surfactant for severe RDS and we are awaiting a reply.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "A random number system was generated by a statistician not involved in the study."
Allocation concealment (selection bias)	Low risk	Quote: "Laminated cards for randomization were maintained in sealed, opaque envelopes. Study personnel provided contact information to labor and delivery staff to notify them of potential study participants or the impending delivery of previously enrolled subjects. When called for a subject's impending delivery, the team member opened the next randomization card..."
Blinding of participants and personnel (performance bias) All outcomes	High risk	Cannot blind clinicians to intervention, and no information as to whether women knew or not.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Quote: "None of the study members present at the time of randomization or aware of group assignment participated in the daily clinical care of study patients."
Incomplete outcome data (attrition bias) All outcomes	Low risk	40 infants enrolled and no losses, although authors did exclude babies who died on delivery suite from their denominator data but we will include these babies in our denominator data as normal.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Low risk	Baseline characteristics similar (gestational age; gender; small for gestational age; birthweight. No infants assigned to DCC received ECC to expedite resuscitation. No other biases apparent.

Baenziger 2007

Methods	Randomised controlled trial, stratified randomisation list for gestational age group (24-26, 27-29, 30-32 weeks) and mode of birth (vaginal/caesarean).
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Mother-infant pairs at 24 weeks to 32 weeks' gestation. • Singletons • N = 39 babies <p>Exclusion criteria</p> <ul style="list-style-type: none"> • Known major malformation, haemolytic disease, intrauterine transfusion, multiple births; children with perinatal asphyxia.
Interventions	<p>Intervention: DCC</p> <ul style="list-style-type: none"> • Cord clamping time 60-90 secs, with infant held as low as possible for vaginal births, and 15 cm below the placenta at CS. • All mothers received syntocinon intravenously. • N = 15 babies <p>Comparator: ECC</p> <ul style="list-style-type: none"> • Cord clamping immediately after birth (< 20 secs). • N = 24 babies <p>Additional information</p> <ul style="list-style-type: none"> • Gestational subgroup: < 32 weeks • Resuscitation with cord intact: not available • Access to NICU: yes • Length of delay: 60-90 secs • Baby placed: low • Uterotonic: no information • UCM: n/a <p>Comparison 1</p> <p>DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by gestation)</p> <p><u>Subgroup 1:</u> < 32-34 weeks' gestation</p> <p>Comparison 2</p> <p>DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by type intervention)</p> <p><u>Subgroup 4:</u> DCC at 1-2 mins with baby low (+ gravity)</p>
Outcomes	Outcomes: cerebral oxygenation evaluated by NIRS at 4, 24 and 72 hrs of age, mechanical ventilation, death before discharge from hospital.
Notes	<p>Setting: Zurich, Switzerland</p> <p>Dates: September 1996 to July 1997</p> <p>Declaration of interest: quote: "The authors have indicated they have no financial relationships relevant to this article to disclose."</p> <p>Trial funding source: not reported</p>

Baenziger 2007 (Continued)

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Part of the same multicentre study as Aladangady 2006 . Described as 'selected randomly and assigned to an experimental group or a control group by a central study co-ordinator'. The uneven group size (15 vs 24) is discussed as being due to central randomisation for a larger study, and the primary outcome for the larger study was not tissue oxygenation (the primary outcome for this report). This suggests that there may have been post randomisation exclusions of babies who did not have tissue oxygenation measured.
Allocation concealment (selection bias)	Unclear risk	Part of the same multicentre study as Aladangady 2006 . Described as 'selected randomly and assigned to an experimental group or a control group by a central study co-ordinator'.
Blinding of participants and personnel (performance bias) All outcomes	High risk	For this type of intervention blinding participants and the staff present at delivery to group allocation is not possible. Staff providing care may have modified their behaviour according to randomisation group.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Obstetricians were informed of the study allocation, and it was stated that the neonatologist was not aware of the timing of cord clamping. It is not clear whether outcome assessment was blinded.
Incomplete outcome data (attrition bias) All outcomes	High risk	There were missing data for some outcomes.
Selective reporting (reporting bias)	High risk	This study was part of a larger multicentre study. The outcome of tissue oxygenation reported here was collected just for this subset, and the text implies have been post randomisation exclusions of infants who did not have tissue oxygenation measured. The outcomes in the main study were quote:"blood volume, need for red cell transfusion, and respiratory and neurological complications", but these data are not reported.
Other bias	High risk	Uneven group size although the characteristics of the groups appeared similar.

Chu 2011

Methods	Randomised controlled trial
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Pregnant women giving birth preterm – 24 to 32 weeks' gestation • No information as to whether included multiple births or not. • N = 38 babies <p>Exclusion criteria</p>
Interventions	<p>Intervention: DCC</p> <ul style="list-style-type: none"> • Clamping at 30 - 45 secs • Mean clamping time 39.7 secs • N = 19 babies

Chu 2011 (Continued)

Comparator: ECC

- Immediate clamping
- Mean clamping time 5.4 secs
- N = 19 babies

Additional information

- Gestational subgroup: < 32-34 weeks' gestation
- Resuscitation with cord intact: not available
- Access to NICU: yes
- Length of delay: 30-45 secs
- Baby placed: no information assume level with uterus and placenta
- When uterotonic given; no information
- UCM: n/a

Comparison 1

DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by gestation)

Subgroup 1: < 32-34 weeks' gestation

Comparison 2

DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by type intervention)

Subgroup 1: DCC at < 1 min with baby level with uterus and placenta

Outcomes	IVH, sepsis, anaemia, and hyperbilirubinaemia
Notes	<p>Setting: Toronto, Canada</p> <p>Dates: not reported</p> <p>Trial funding source: not reported</p> <p>Declaration of interest: not reported</p> <p>Further information:</p> <ul style="list-style-type: none"> • Conference abstract only.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	No information
Allocation concealment (selection bias)	Unclear risk	No information
Blinding of participants and personnel (performance bias) All outcomes	High risk	No information. Clinicians at birth likely to be unblinded.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No information

Chu 2011 (Continued)

Incomplete outcome data (attrition bias) All outcomes	Low risk	No losses reported
Selective reporting (reporting bias)	Unclear risk	We did not assess trial protocol
Other bias	Unclear risk	Compliance: 1 protocol violation - not told which group. No other information. Conference abstract only.

CORD Pilot 2018

Methods	Multicentre randomised controlled trial (8 UK maternity units). Stratified by centre with balanced blocks of varying size.
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Women expected to give birth to a live birth before 32 weeks' gestation, regardless of mode of birth or whether cephalic or breech presentation. Dichorionic twins included. • N = 261 women and 276 babies (15 twins included) <p>Exclusion criteria</p> <ul style="list-style-type: none"> • Monochorionic twins (from an ultrasound scan) or clinical evidence of twin-twin transfusion syndrome, triplets or higher order multiple pregnancy, or known major congenital malformation. • Women who gave birth after 35⁺⁶ weeks were excluded as these babies were considered different from those born preterm.
Interventions	<p>Intervention: DCC with immediate neonatal care with intact cord (DCC-ICCI)</p> <ul style="list-style-type: none"> • Umbilical cord clamped after at least 2 mins and immediate neonatal care (and if required, resuscitation) beside the mother with the cord intact. • Babies were placed onto a firm surface with easy access to resuscitation equipment; either the usual resuscitator moved alongside the woman's bed or a smaller trolley designed for this purpose. • For caesarean births the resuscitator was covered with sterile drapes, and the neonatologist scrubbed and gowned. • After cord clamping, neonatal care continued either beside the mother or at the usual location, at the discretion of the local clinicians. • 6 sites used their usual resuscitator (153 women recruited) and 2 the trolley (108 women recruited). • Until cord clamping, the baby was kept at the level of the mothers' abdomen, or anterior thigh if a caesarean birth. • 132 women and 137 babies were randomised to this group. 2 women (2 babies) were excluded as birth was > 35⁺⁶ weeks' gestation leaving N = 130 women and 135 babies <p>Comparator: ECC</p> <ul style="list-style-type: none"> • Clamping within 20 secs with resuscitation after cord clamping was based on current UK practice,²⁶ and previous trials. • Babies were dried and/or wrapped, with all other neonatal care after cord clamping. • 129 women and 139 babies were randomised to this group. 5 women (5 babies) were excluded as birth was after 35⁺⁶ weeks' gestation, leaving N = 124 women and 134 babies • 1 mother whose baby died withdrew so data are available only for baby mortality. <p>Both groups</p>

CORD Pilot 2018 (Continued)

- After cord clamping neonatal care was either beside the mother or at the usual location (side of the room or separate room), at the discretion of the local clinicians.
- All other aspects of care, including administration of a prophylactic uterotonic drug, were at the discretion of the attending clinicians. Neonatal care was based on local unit policy and consistent with newborn life support guidelines.
- Standard equipment was used according to local practice, including plastic sheets or bags, towels and hats, warming mattresses or overhead heaters, and saturation monitors.

Additional information

- Gestational subgroup: < 32-34 weeks' gestation
- Stabilisation and resuscitation with intact cord.
- Access to NICU: yes
- Length of delay: at least 2 mins
- Baby placed: level
- Uterotonic: 98% of women had uterotonic with timing at clinicians discretion
- UCM: n/a

Comparison 3

DCC with immediate neonatal care with intact cord (subgroup by gestation)

Subgroup 1: < 32-34 weeks' gestation

Comparison 4

DCC with immediate neonatal with intact cord (subgroup by type of intervention)

Subgroup 5: DCC at > 2 mins with baby level with uterus and placenta

Outcomes

Primary

- Death before hospital discharge
- IVH (all grades)

Secondary

Baby

- Severe IVH, PVL, blood transfusion, hypothermia (< 36°C, < 35°C), chronic lung disease (supplemental oxygen or ventilation at 36 weeks postmenstrual age), ventilation, NEC (grade 2 or higher), clinical sepsis, treatment for jaundice, treatment for PDA, treatment for RoP, duration of hospital stay, and breastfeeding.
- Cranial ultrasound scan reports were reviewed by a single assessor blind to the allocated group. Independent adjudication of the ultrasound scans was by 8 trained neonatologists or radiologists, blind to allocation. If the adjudication disagreed with the scan report review, a second independent adjudicator assessed the scan images. Remaining discrepancies were resolved by discussion.

Mother

- Postpartum haemorrhage (≥ 500 mL or ≥ 1000 mL), postpartum infection, and for vaginal births manual removal of placenta and third stage of labour longer than 30 mins. Data were collected after hospital discharge by the research midwife or neonatal nurse at each site.

Father

- Psychological well-being, bonding with the infant, fathers' anxieties and father's views.

Notes

Setting: 8 tertiary maternity units in UK, all with NICUs

Dates: March 2013 to February 2015

CORD Pilot 2018 (Continued)

Further information on data included

- Death before discharge: 1 of the babies in the early cord clamping group died of a congenital malformation which was undiagnosed at trial entry and this baby should have been excluded from the study.
- Death or neurodevelopmental impairment: the data were also reported with adjustment for missing data, imputed RR 0.69 (95% CI 0.44 to 1.09).

Declaration of interest: all authors declare no support from any organisation for the submitted work other than the NIHR programme grant; no financial relationships with any organisations that might have an interest in the submitted work in the previous 3 years; the grant funded research included development of a neonatal resuscitation trolley now marketed as 'LifeStart' and purchased by 2 sites for use in this trial, several authors were involved in development of the trolley but have no further relationship with the manufacturer; no other relationships or activities that could appear to have influenced the submitted work.

Trial funding source: this trial is independent research funded by the National Institute for Health Research (NIHR) under its Programme Grants for Applied Research funding scheme (RPPG-0609-10107). The views expressed are those of the authors and not necessarily those of the NHS, the NIHR or the Department of Health. The funder had no role in study design, conduct, analysis or reporting. Trial coordination was at the Nottingham Clinical Trials Unit (NCTU).

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "Sequence generation was by computer, stratified by centre with balanced blocks of randomly varying size, created by NCTU."
Allocation concealment (selection bias)	Low risk	Quote: "...sealed consecutively numbered opaque envelope ... On the envelope was a label to record the date, time, woman's initials, her date of birth and gestation. Once this label was completed she was considered randomized, even if the envelope was not opened."
Blinding of participants and personnel (performance bias) All outcomes	High risk	Attending clinicians could not be blinded and there is no information about whether the mother knew or not.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	For the primary outcomes, death is an objective outcome. Cranial ultrasound scan reports were reviewed by a single assessor blind to the allocated group. Independent adjudication of the ultrasound scans was by 8 trained neonatologists or radiologists, blind to allocation.
Incomplete outcome data (attrition bias) All outcomes	Low risk	6 women gave birth after 35 ⁺⁶ weeks' gestation and were excluded. 1 woman withdrew consent and outcome data are only reported for 'death before discharge'.
Selective reporting (reporting bias)	Unclear risk	The trial protocol was for a feasibility study and clinical outcomes are unclear.
Other bias	Low risk	No other biases apparent.

Dai 2014

Methods	Randomised controlled trial
Participants	Inclusion criteria

Effect of timing of umbilical cord clamping and other strategies to influence placental transfusion at preterm birth on maternal and infant outcomes (Review)

66

Dai 2014 (Continued)

- Term and preterm babies
- Mothers without any medical conditions
- Mothers who were aware of the trial with 2 different methods of ligation and informed consent to enrol
- Singleton pregnancies
- Preterm babies N = 52 (term babies N = 508)

Exclusion criteria

- Gestational diabetes
- Gestational hypertension/pre-eclampsia
- Severe anaemia
- Maternal-neonate blood incompatibility
- Lack of informed consent

Interventions
Intervention: DCC

- Late ligation: done after umbilical cord stops pulsations
- Baby is treated as per usual procedure in terms of respiratory suctioning, using sterile towels to dry and wrap the child
- Baby is placed between the mother's legs
- When umbilical cord stops pulsations, ligation is done and time of ligation is recorded
- N = 21 preterm babies (term = 219 babies)

Comparator: ECC

- Early ligation of umbilical cord: done within 5-10 secs of birth
- N = 31 preterm babies (term 289 babies)

Additional information

- Gestational subgroup: < 32-34 weeks' gestation
- Stabilisation and resuscitation with intact cord: no
- Access to NICU: probably
- Length of delay: until cord pulsation ceases
- Baby placed: level
- Uterotonic:
- UCM: n/a

Comparison 1

DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by gestation)

Subgroup 3: mixed gestation

Comparison 2

DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by type of intervention)

Subgroup 7: DCC at < 1 min with timing of delay unclear

Outcomes

- Neonate red blood cell count (72-96 hrs after birth)
- Anaemia defined as Hb \leq 145 g/L after 2 weeks
- Clinically significant pathological polycythaemia defined as RBC count \geq $6-7 \times 10^{12}/L$, Hb \geq 180-220 g/L, capillary RBC \geq 0.7-0.75
- White blood cell count (taken 72 – 96 hrs after birth)
- Fetal bilirubin level using a forehead meter daily from birth to day 5 (jaundice was defined as 1) jaundice within 24 hrs of birth, 2) > 12.9 mg/dL bilirubin for term or > 15 for preterm; or daily increase > 5 mg/dL, 3) jaundice persisting more than 2 weeks for term, or 4 weeks for preterm, 4) improved but relapsed jaundice, 5) conjugated bilirubin > 2 mg/dL)

Dai 2014 (Continued)

- Apgar (1 min, 5 mins)
- Respiratory distress defined as 1min Apgar \leq 7
- Rectal temperature 5 mins after birth
- Neonate well being 1 month after birth (telephone survey) for: jaundice progress, neonate umbilical region situation
- Neonatal umbilical inflammation defined as: umbilicus or stump red, swollen, or with pus with smell

Notes

Setting: China

Dates: not reported

Declaration of interest: not reported

Funding source: Zhejiang Province Science and Technology Bureau of Science and Technology Research Project (Y20120237)

Further information:

- Due to limited expertise in Chinese translations, this information has been extracted by 1 person.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Random number table
Allocation concealment (selection bias)	Unclear risk	The only information is 'Randomisation was done for the participating mothers using a random number table'.
Blinding of participants and personnel (performance bias) All outcomes	High risk	There is no mention of blinding though the clinicians at the birth cannot be blinded to the intervention but it unclear if women were blinded or not.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No mention of blinding.
Incomplete outcome data (attrition bias) All outcomes	Low risk	All women who were enrolled completed the study and their data were analysed.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol although all outcomes stated in the methodology in the paper were reported.
Other bias	Unclear risk	Generally seems fine. Values were reported without blanket P value statements. However, since information on methodology is limited in the paper and the number of babies in each preterm group are not similar (1 and 31), so we assessed it is unclear on this item.

Das 2018

Methods Randomised controlled trial - subgroup

Participants **Inclusion criteria**

Das 2018 (Continued)

- Preterm neonates 30-33 weeks' gestation
- Singleton pregnancies
- N = 197 babies but still a subgroup if larger trial - aiming for 434 babies

Exclusion criteria

- Multiple pregnancies, suspected or proven major congenital malformation in the fetus, and antenatally diagnosed hydrops fetalis

Interventions

Intervention: UCM

- Cord clamped at 60 secs with baby held below introitus
- Cord clamped and cut and then milked
- N = 107 (had serum ferritin measured at discharge)

Comparator: ECC

- Cord clamped at less than 10 secs
- N = 90 (had serum ferritin measured at discharge)

Additional information

- Gestational subgroup: < 32-34 weeks' gestation
- Resuscitation with cord intact: not available
- Access to NICU: yes
- Length of delay: 60 secs
- Baby placed: low
- Uterotonic: no information
- UCM: after cord clamping

Comparison 7

UCM vs ECC (subgroup by gestation)

Subgroup 1: < 32-34 weeks' gestation

Comparison 2

UCM vs ECC (subgroup by type intervention)

Subgroup 2: after cord clamping

Outcomes

Primary

- Composite outcome measure of all cause mortality and/or abnormal neurological examination at 40 weeks postnatal age

Secondary - Incidence of following at 40 weeks postnatal age:

- All cause mortality
- IVH
- Bronchopulmonary dysplasia
- NEC
- RoP
- Hct, number of blood transfusions
- Significant hyperbilirubinaemia
- Serum ferritin levels at discharge and 3 months postnatal age

Notes

Setting: tertiary care hospital and the neonatal unit in Northern India

Dates: November 2012 to December 2013

Das 2018 (Continued)

Declaration of interest: nothing to disclose

Trial funding source: no funding required. Primary sponsor: PGIMER Chandigarh-160012 (Trial registration form)

Other information

- **No usable data**
- Draft paper sent to Indian Journal of Pediatrics for publication. Also Conference abstract and trial registration.
- The authors report this to be a subgroup of a randomised controlled trial on placental transfusion so we cannot include data from this trial in the review until we have received clarification from the authors on this and the number of women randomised.
- Dr Venkateshan Sundaram kindly sent us the draft paper which had been accepted for publication in Indian Journal of Pediatrics and confirmed that this and the conference abstract relate to a subgroup of the trial: CTRI/2014/02/00441

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "...Random sequence was generated using a secure web based randomization algorithm (http://randomization.com) within two strata separately (30-31 weeks and 32-33 weeks) in blocks of variable sizes..."
Allocation concealment (selection bias)	Low risk	Quote: "...Allocation was kept concealed by placing the sequence in serially numbered, sealed and opaque envelopes..."
Blinding of participants and personnel (performance bias) All outcomes	High risk	Open label
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Quote: "... laboratory person who analyzed the serum ferritin levels was blinded to group allocation..." but it is unclear regarding the clinical outcomes
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Data on ferritin seem to be complete. Unclear on clinical outcomes.
Selective reporting (reporting bias)	High risk	This is a subgroup of the main trial and also the registration document states many clinical outcomes which are not reported here.
Other bias	Unclear risk	No other biases apparent but this is only a subgroup of main trial.

Datta 2017

Methods	Randomised controlled trial - open label
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Late preterm neonates (34-36⁺⁶ weeks) • Vaginal births and CSs; cephalic presentations and singletons • N = 120 babies <p>Exclusion criteria</p>

Datta 2017 (Continued)

- Gross congenital anomalies, hydrops and Rh negative status with features of isoimmunisation

Interventions
Intervention: DCC

- Cord clamped between 30-60 secs
- N = 60 randomised but 4 excluded (2 did not receive intervention and 2 lost to follow-up) so = 56

Comparator: ECC

- Cord clamped within 20 secs
- N = 60 randomised but 2 excluded (1 did not receive the intervention and 1 lost to follow-up) so 58

Additional information

- Gestational subgroup: > 32-34 weeks' gestation
- Resuscitation with cord intact: not available
- Access to NICU: Study from India - we assumed access to NICU.
- Length of delay: 30-60 secs
- Baby placed: no information
- Uterotonic: no information
- UCM: n/a

Comparison 1: but no usable data

DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by gestation)

Subgroup 2: > 32-34 weeks' gestation

Comparison 2: but no usable data

DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by type intervention)

Subgroup 7: mixed intervention or **unclear**

Outcomes
Primary

- Short-term neurobehavioral assessment at 37 weeks PC A using NAPI score.
- Death (recorded in Consort Flow Diagram)

Notes

Setting: Neonatal Units, Department of Paediatrics and Department of Obstetrics and Gynaecology at Lady Hardinge Medical College, New Delhi, India

Dates: November 2011 to April 2013

Declaration of interest: not reported

Trial funding source: not reported

Further information

- Previously reported as Kumar 2014, but Datta 2017 is not considered the main publication.

Risk of bias
Bias
Authors' judgement
Support for judgement

Random sequence generation (selection bias)

Unclear risk

Quote: "The randomization sequence was generated and implemented by an independent physician into a block size of six patients."

Datta 2017 (Continued)

Allocation concealment (selection bias)	Unclear risk	Quote: "Allocation concealment was done using sequentially labelled opaque sealed envelopes.". however, it is not possible to have concealment of allocation if sequence generation is unclear.
Blinding of participants and personnel (performance bias) All outcomes	High risk	Open-label trial
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No information to suggest they tried to blind outcome assessment - though no data available for the review
Incomplete outcome data (attrition bias) All outcomes	Low risk	Excluded 6/120 babies, = 5%
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Unclear risk	Unclear on other biases.

Dhaliwal 2014

Methods	Randomised controlled trial
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Women in preterm labour at 34-37 weeks' gestation • No information as to whether multiple births were included or not. • N = 300 babies <p>Exclusion criteria</p>
Interventions	<p>Intervention: DCC</p> <ul style="list-style-type: none"> • Delay of about 60 secs • N = 156 babies <p>Comparator: ECC</p> <ul style="list-style-type: none"> • Clamping < 10 secs • N = 144 babies <p>Additional information</p> <ul style="list-style-type: none"> • Gestational subgroup: > 32-34 weeks' gestation • Resuscitation with cord intact: not available • Access to NICU: yes • Length of delay: about 60 secs • Baby placed: no information • Uterotonic: no information • UCM: n/a <p>Comparison 1</p> <p>DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by gestation)</p>

Dhaliwal 2014 (Continued)

Subgroup 2: > 32-34 weeks' gestation

Comparison 2

DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by type intervention)

Subgroup 7: mixed intervention or unclear

Outcomes	<p>Primary</p> <p>Death and abnormal neurological exam till 40 weeks' gestation</p> <p>Secondary for the baby</p> <p>Neonatal anaemia; blood transfusion; late sepsis; NEC; hyperbilirubinaemia; need for phototherapy; Hct</p> <p>Secondary for the mother</p> <p>PPH; therapeutic uterotonics; MRP; Hb at 48 hrs; ferritin 48 hrs</p>
Notes	<p>Setting: Chandigarh, India</p> <p>Dates: not reported</p> <p>Declaration of interest: not reported</p> <p>Trial funding source: not reported</p> <p>Other information</p> <ul style="list-style-type: none"> • No usable data • Conference abstract • No data reported in this conference abstract - only that there was no difference between the groups. • Will write to authors to request data and information on methodology used.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	No information
Allocation concealment (selection bias)	Unclear risk	No information
Blinding of participants and personnel (performance bias) All outcomes	High risk	It is not possible to blind the clinicians at the birth. It is not clear if women knew or not.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No information
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	No information
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol

Dhaliwal 2014 (Continued)

Other bias	Unclear risk	Only a conference abstract, so very little information on the methodology
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Dipak 2017

Methods	Randomised controlled trial using variable blocks of 3 and 6
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Mothers at 27 to 31^{6/7} weeks' gestation • Singleton pregnancies • N = 78 women and babies <p>Exclusion criteria</p> <ul style="list-style-type: none"> • Births > 32 weeks' gestation; multiple births, Rh-ve status, placenta previa or abruption-placenta, and those having fetus with major congenital anomalies, hydrops, fetal growth restriction with abnormal Doppler waveforms, or evidence of fetal distress.
Interventions	<p>Intervention 1: DCC</p> <ul style="list-style-type: none"> • Cord clamped at 60 secs • Neonates were held in a pre-warmed towel approximately 10-15 inches below the introitus at vaginal delivery/below the level of placental incision in caesarean delivery. • N = 26 babies <p>Intervention 2: DCC + IM ergometrine to mother</p> <ul style="list-style-type: none"> • Cord clamped at 60 secs • Neonates were held 10-15 inches below the introitus at vaginal birth/below the level of placental incision in CS. • Injection ergometrine 500 µg intramuscular (IM) was administered to the mother. • N = 25 babies <p>We pooled data from Interventions 1 and 2.</p> <p>Comparator: ECC</p> <ul style="list-style-type: none"> • Cord clamped within 10 secs • Baby was held supine at level of introitus/placental incision. • N = 27 babies <p>Additional information</p> <ul style="list-style-type: none"> • Gestational subgroup: < 32-34 weeks' gestation • Resuscitation with cord intact: not available • Access to NICU: yes • Length of delay: about 60 secs • Baby placed: no information • Uterotonic: no information • UCM: n/a <p>Comparison 1</p> <p>DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by gestation)</p> <p><u>Subgroup 1:</u> < 32-34 weeks' gestation</p> <p>Comparison 4</p>

Dipak 2017 (Continued)

DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by type intervention)

Subgroup 4: DCC at 1-2 mins with baby low (+ gravity)

Outcomes	Primary outcome <ul style="list-style-type: none"> Hct at 4 hrs of age Secondary outcomes <ul style="list-style-type: none"> Temperature on admission Heart rate NIBP at 12 hrs Urinary output for initial 72 hrs Number of red cell transfusions Total serum bilirubin (TSB) at 72 hrs Peak serum bilirubin (PSB) Evidence of RoP, IVH LOS, N NEC stage 2 or more 	
Notes	Setting: tertiary care hospital, Mumbai, India Dates: October 2012 to September 2013 Declaration of interest: no competing interests reported Trial funding source: Quote: "None".	
Risk of bias		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "...random number sequence with variable block size of 3 or 6 using a 'Random Allocation Software' program... The random allocation sequence was generated by a statistician who was not a part of the study."
Allocation concealment (selection bias)	Low risk	Quote: "The sequence was concealed in serially numbered, opaque, sealed and identical envelopes."
Blinding of participants and personnel (performance bias) All outcomes	High risk	It was not possible to blind clinicians.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	There is no information regarding blinding of outcome assessments. The laboratory data could have been blinded but it is unclear about clinical outcomes.
Incomplete outcome data (attrition bias) All outcomes	Low risk	Data reported as complete
Selective reporting (reporting bias)	Unclear risk	We did not assess trial protocol
Other bias	Unclear risk	No other biases apparent but not really clear.

Dong 2016

Methods	Randomised controlled trial
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Preterm infants < 32 weeks' gestation born vaginally • Singleton pregnancy with no major developmental malformations • N = 90 babies <p>Exclusion criteria</p> <ul style="list-style-type: none"> • Neonates that require immediate resuscitation; placenta previa; placenta abruptio
Interventions	<p>Intervention: DCC</p> <ul style="list-style-type: none"> • Delayed clamping with the baby 10~20 cm lower than the placenta, with warmth preservation done. • Clamping was after an assistant finished counting manually to 45 secs. • Clamping site was 1 cm from the umbilicus coil, with sterile cutting of the cord. • N = 46 babies <p>Comparator: ECC</p> <ul style="list-style-type: none"> • Clamping was done within 10 secs of birth • N = 44 babies <p>Additional information</p> <ul style="list-style-type: none"> • Gestational subgroup: < 32-34 weeks' gestation • Resuscitation with cord intact: not available • Access to NICU: yes • Length of delay: 45 secs • Baby placed: 10-20 cm lower than placenta • Uterotonic: no information • UCM: n/a <p>Comparison 1</p> <p>DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by gestation)</p> <p><u>Subgroup 1:</u> < 32-34 weeks' gestation</p> <p>Comparison 2</p> <p>DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by type intervention)</p> <p><u>Subgroup 2:</u> DCC 45 secs with baby low (+ gravity)</p>
Outcomes	<p>Primary</p> <ul style="list-style-type: none"> • Severe IVH - grades 3 and 4 <p>Secondary</p> <ul style="list-style-type: none"> • NEC; sepsis; low Apgar; RoP; Hb; blood transfusions; rectal temperature; weight
Notes	<p>Setting: China</p> <p>Dates: January to December 2015</p> <p>Declaration of interest: not reported</p>

Dong 2016 (Continued)

Trial funding source: Nanjing Medical University Research Funding funded project 2013NJMU134

Further information

- Paper in Chinese - Abstract in English.
- Due to limited expertise in Chinese translations, this information from the body of the paper has been extracted by 1 person. 2 people assessed the abstract.
- We have written to Professor Han SP for some additional information to ask about whether the RoP was treated and have not included this data as yet. Also to ask in what units the blood transfusion was assessed.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	No description of randomisation given; simply a broad statement saying quote: "participants were randomized into the two groups"
Allocation concealment (selection bias)	Unclear risk	No description or statement given.
Blinding of participants and personnel (performance bias) All outcomes	High risk	No description or statement given but not possible to blind clinicians, and unclear if women knew.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No description or statement given.
Incomplete outcome data (attrition bias) All outcomes	Low risk	All were followed up.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol though all stated outcomes within the methodology in the paper were reported, either in text or tables.
Other bias	Unclear risk	Generally seems fine. Values were reported without blanket P value statements. However, since important information on methodology is missing in the paper we assessed it is unclear on other biases.

El-Naggar 2016

Methods	Randomised controlled trial
Participants	Inclusion criteria <ul style="list-style-type: none"> • Preterm infants < 31 weeks' gestation (24-31 weeks) if their mothers fulfil the following inclusion criteria. • Admitted to the hospital for at least 2 hrs before delivery in preterm labour (cervical dilatation > 2 cm or having premature rupture of membranes) or if a decision to induce labour has been made by treating physician for a maternal or fetal indications). • At 24 + 0 weeks - 30+6/7 weeks' gestation (by best estimate based on date of last menstrual period or early ultrasound) • No information as to whether dichorionic twins were included or not. • N = 73 babies

El-Naggar 2016 (Continued)

Exclusion criteria

- Monochorionic twin or any higher order multiple pregnancy; major fetal congenital or chromosomal anomalies; significant placental abruption; fetal anaemia/transfusion; Rh isoimmunisation; intent to withhold or withdraw treatment of the infant

Interventions

Intervention: UCM

- Infants in the cord-milked group will be placed at or below the level of the placenta, and about 20 cm of the umbilical cord (or the length of cord that is accessible if less than 20 cm) will be vigorously milked towards the umbilicus 3 times before clamping the cord.
- N = 37 babies

Comparator: ECC

- Immediate cord clamping without milking as per standard practice
- N = 36 babies

Additional information

- Gestational subgroup: < 32-34 weeks' gestation
- Resuscitation with cord intact: not available
- Access to NICU: yes
- Length of delay: n/a
- Baby placed: no information
- Uterotonic: no information
- UCM: 3 times prior to clamping

Comparison 7

UCM vs ECC (subgroup by gestation)

Subgroup 1: < 32-34 weeks' gestation

Comparison 8

UCM vs ECC (subgroup by type of intervention)

Subgroup 1: cord intact during UCM

Outcomes

Primary

- Systemic blood flow as reflected by mean SVC flow measured by echocardiographic study at 4-6 hrs after birth

Secondary

- Low SVC flow (< 40 mL/kg/min), as assessed by echocardiography at 4-6 and 10-12 hrs of age.
- Hypotension (defined as mean blood pressure < corresponding gestational age number for > 30 mins) during the first 48 hrs of life.
- Hyperbilirubinemia and peak bilirubin level recorded during the first 2 weeks of age
- Hyperbilirubinemia requiring phototherapy during the first 2 weeks of age.
- Systemic blood flow as reflected by mean SVC flow measured by echocardiographic study at 10-12 hrs after birth.
- Number of blood transfusions during hospital stay at 40 weeks of corrected gestational age.
- IVH during first 2 weeks and IVH as diagnosed by standard-practice cranial ultrasounds.
- Neurodevelopmental outcome

Not mentioned in trial registration but in the conference abstracts reporting findings.

- NEC; BPD; sepsis; RoP; PDA; mortality

El-Naggar 2016 (Continued)

Notes

Setting: Canada

Dates: November 2011 - 2014

Declaration of interest: not reported

Trial funding source: not reported

Further information

- NCT01487187
- 3 conference abstracts - no full paper as yet
- We included the data on sepsis although it is not clear if it is late sepsis or not. We will write to clarify this. Also to ask if Hb on admission is admission to NICU. Check sepsis - not reported as late but Jose included and included in RevMan.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Trial registration reports: quote: "...a randomization table"
Allocation concealment (selection bias)	Low risk	Trial registration reports: quote: "Randomization will be done in variable block sizes and will be concealed by using opaque envelopes prepared ahead of time from a randomization table. Envelopes will be opened before the time of delivery."
Blinding of participants and personnel (performance bias) All outcomes	High risk	Clinicians at birth cannot be blinded and trial registration form says quote: "Single blinded (outcome assessor)".
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Clinicians at birth cannot be blinded and trial registration form says quote: "Single blinded (outcome assessor)".
Incomplete outcome data (attrition bias) All outcomes	Low risk	All participants reported on though for some outcome denominators are less.
Selective reporting (reporting bias)	High risk	Authors reported more outcomes in the 2 conference abstracts than they said they would in the Trial protocol registration form, and it is unclear if other outcomes have been assessed but not reported. We did not assess the full trial protocol.
Other bias	Unclear risk	2 conference abstracts with very little information on methodology.

Elimian 2014

Methods

Randomised controlled trial

Participants

Inclusion criteria

- Singleton pregnancies, between 24 weeks 0 days and 34 weeks 0 days of gestation who were deemed to be at risk of giving birth prematurely
- Singleton pregnancies

Elimian 2014 (Continued)

- N = 200 babies

Exclusion criteria

- Pregnant women carrying fetuses with known major fetal structural or chromosomal abnormalities, multiple gestations, diabetes, IUGR, or non reassuring fetal heart tracings.

Interventions

Intervention: UCM

- 3-4 passes of milking of the umbilical cord toward the neonate
- Cord clamped after 30 secs
- Oxytocin after placental delivery
- Care also included warming mattress, bulb suction and stimulation as appropriate
- N = 99 babies

Comparator: ECC

- Cord clamped within 5 secs
- Oxytocin after placental delivery
- N = 101 babies

Additional information

- Gestational subgroup: < 32-34 weeks' gestation
- Resuscitation with cord intact: not available
- Access to NICU: yes
- Length of delay: UCM + delay 30 secs
- Baby placed: no information so assume level with uterus or placenta
- Uterotonic: after cord clamping (actually after birth)
- UCM: 3-4 times with DCC

Comparison 7

UCM vs ECC (subgroup by gestation)

Subgroup 1: < 32-34 weeks' gestation

Comparison 8

UCM vs ECC (subgroup by type of intervention)

Subgroup 1: cord intact during UCM

Outcomes

Primary

- Need for blood transfusion as determined by neonatologists who in general initiated red blood cell transfusion when the Hb was below 10 g/dL (Hct 30%) or anaemia was symptomatic.

Secondary

- Initial Hb and Hct (Hct and Hb were determined on venous blood drawn within the first 4 hrs of life)
- IVH. Each preterm neonate had transfontanellar cranial ultrasound scans within the first 3 days of life and on day 7. Neurosonograms were evaluated by skilled radiologists not aware of the assigned group with regard to cord clamping. IVH was graded as described by Papile et al.8
- Periventricular leukomalacia was diagnosed by the presence of persistent echogenicity or echolucent areas in the periventricular region on sagittal and coronal views
- Requirement for resuscitation
- Apgar scores at 5 mins and 10 mins
- Hypothermia during first hour of life
- Death

Elimian 2014 (Continued)

- RDS (assessed by clinical signs, oxygen requirement, respiratory support, chest radiograph) during first 36 hrs of life.
- Use of exogenous surfactant.
- Days of ventilation.
- Days of oxygen dependency.
- Oxygen dependency at 28 days after birth.
- Oxygen dependency at equivalent of 36 completed weeks of gestational age.
- Chronic lung disease (Northway stage 2, 3, or 4).
- Number and volume of blood transfusions
- Volume (colloid, sodium chloride 0.9%, blood transfusion) administration for hypotension during the first 24 hrs of life, inotropic support for hypotension during the first 24 hrs of life, and
- Treatment for PDA
- Rate of anaemia of prematurity (defined as Hb less than 10 g/dL or Hct less than 30%)
- Treatment for hyperbilirubinaemia with phototherapy
- Treatment for hyperbilirubinaemia with blood exchange transfusion
- IVH grades 3 and 4
- Periventricular leukomalacia
- NEC
- Maternal outcome evaluated included postpartum haemorrhage, retained placenta, uterine inversion, and maternal mortality

Notes

Setting: Teaching and Research Center of Konya, University of Baskent, Turkey.

Dates: September 2008 – April 2009

Declaration of interest: the authors reported no potential conflicts of interest.

Trial funding source: sponsor was University of Oklahoma

Further information:

- Dr A Elimian kindly provided additional information (24.02.2016) regarding this study. In particular, the babies in the intervention group received UCM before the cord was clamped and cut at after 30 secs. We have chosen to regard the intervention, therefore, as UCM.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "Allocation sequence was generated by a computer"
Allocation concealment (selection bias)	Low risk	Quote: "The allocation sequence was concealed by using sequentially numbered, opaque, sealed envelopes kept in a central location on labor and delivery."
Blinding of participants and personnel (performance bias) All outcomes	High risk	Open label
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	The only blinding was the neuroradiologists who interpreted the cranial ultrasound scans so IVH and PVL are low risk of bias.
Incomplete outcome data (attrition bias)	Low risk	No losses after randomisation.

Elimian 2014 (Continued)

All outcomes

Selective reporting (reporting bias)	Unclear risk	We checked the publication against the trial registration form, but the form did not list the outcomes to be measured. Requirement for resuscitation was the only unreported outcome. Some outcomes reported in categorical way when continuous data were suggested in methods and could easily have been given.
Other bias	Low risk	Used ITT. No difference at baseline for maternal age, height and weight, ethnicity, and selected maternal outcome variables. No other biases apparent.

Gokmen 2011

Methods	Randomised controlled trial
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> All women admitted between 24 and 31.6 weeks' gestation with preterm labour. For multiple-birth pregnancies, there was a single assignment for all fetuses. N = 46 births, but 4 were excluded (1 due to significant IUGR; 1 due to placental abruption and 2 died in first 12 hrs of life) leaving 42 analysed. <p>Exclusion criteria</p> <ul style="list-style-type: none"> Vaginal bleeding due to placental abruption or placental tear; suspected major fetal anomalies; severe IUGR (IUGR, -3rd percentile); suspected twin-twin transfusion syndrome or discordant twin growth; maternal drug abuse.
Interventions	<p>Intervention: DCC</p> <ul style="list-style-type: none"> Cord clamping deferred for 30-45 secs N = 21 babies <p>Comparator: ECC</p> <ul style="list-style-type: none"> Immediate cord clamping N = 21 babies <p>Additional information</p> <ul style="list-style-type: none"> Gestational subgroup: < 32-34 weeks' gestation Resuscitation with cord intact: not available Access to NICU: yes Length of delay: 30-45 secs Baby placed: no information so assume level with uterus or placenta When uterotonic given: no uterotonics were given before cord clamping UCM: n/a <p>Comparison 1</p> <p>DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by gestation)</p> <p><u>Subgroup 1:</u> < 32-34 weeks' gestation</p> <p>Comparison 2</p> <p>DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by type intervention)</p>

Gokmen 2011 (Continued)

Subgroup 1: DCC at < 1 min with baby level with uterus and placenta

Outcomes	<p>Primary</p> <ul style="list-style-type: none"> Peripheral blood haemopoietic progenitor cells (HPCs) before any blood product was administered <p>Secondary</p> <ul style="list-style-type: none"> Mean blood pressure taken over the first day, days on ventilation or oxygen; NEC; early- and/or late-onset sepsis; IVH; RoP; PDA; maximal serum bilirubin level; number of red blood cell transfusions; complete blood cell counts of infants on the 1st, 3rd and 7th days.
Notes	<p>Setting: Teaching and Research Center of Konya, University of Baskent, Turkey.</p> <p>Dates: September 2008 – April 2009</p> <p>Declaration of interest: quote: "The authors stated that there are no conflicts of interest regarding the publication of this article."</p> <p>Trial funding source: not reported</p> <p>Further information</p> <ul style="list-style-type: none"> Reported sepsis and not late sepsis but we have included these data. We have written to ask to which arms the 2 babies who died were randomised. We are awaiting a response.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Randomisation occurred when birth was imminent, with no mention of the random sequence generation.
Allocation concealment (selection bias)	Unclear risk	No information
Blinding of participants and personnel (performance bias) All outcomes	High risk	Quote:'It was not possible to mask the trial assignment to the neonatal or obstetric team in the delivery room...The subsequent clinical management of the infant was left to the discretion of the attending neonatologist in the NICU.'
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Quote:"However, the neonatal staff was asked not to record the time in the chart (only randomization code number), and this information was not available to the staff in the NICU... The subsequent clinical management of the infant was left to the discretion of the attending neonatologist in the NICU."
Incomplete outcome data (attrition bias) All outcomes	Low risk	4 babies (9%) were excluded and these were not reported by group. Quote:"One infant had significant IUGR, one case was due to placental abruption, and two infants of 24 weeks' gestation died in the first 12 hours of life."
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Unclear risk	Baseline characteristics for mother (age; antenatal steroids; PROM; reasons for preterm birth) and baby (birthweight; gestational age; male/female ratio; Apgar scores at 1 and 5 mins) were reported similar. However, pre-eclampsia occurred in 8 women in ECC and 4 women in DCC arms. There is very little reporting of the methodology on the RCT.

Hofmeyr 1988

Methods	Randomised controlled trial, randomisation cards, stratified by birthweight < 1500 g.
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Mother-infant pairs, judged to be < 35 weeks' gestation and in advanced labour. • Singleton pregnancies • N = 38 babies <p>Exclusion criteria</p> <ul style="list-style-type: none"> • Multiple pregnancies
Interventions	<p>Intervention: DCC</p> <ul style="list-style-type: none"> • 1) Cord clamping delayed for 60 secs • 2) Cord clamping delayed for 60 secs and ergometrine given at delivery • N = 24 babies <p>Comparator: ECC</p> <ul style="list-style-type: none"> • Cord clamping immediately after birth • N = 14 babies <p>Additional information</p> <ul style="list-style-type: none"> • Gestational subgroup: < 32-34 weeks' gestation (this is considered the majority of babies) • Resuscitation with cord intact: not available • Access to NICU: unclear though resuscitation was available • Length of delay: 60 secs • Baby placed: no information so assume level with uterus and placenta • Uterotonic: given to half the DCC group and unclear for ECC group • UCM: n/a <p>Comparison 1</p> <p>DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by gestation)</p> <p><u>Subgroup 1:</u> < 32-34 weeks' gestation</p> <p>Comparison 2</p> <p>DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by type intervention)</p> <p><u>Subgroup 3:</u> DCC at 1-2 mins with baby level with uterus and placenta</p>
Outcomes	Outcomes: PVH/IVH assessed by cerebral ultrasound 6-72 hrs after birth, Apgar score at 5 mins, birth-weight, systolic blood pressure at 5 mins, cord blood gas, death.
Notes	<p>Setting: South Africa</p> <p>Dates: not reported</p> <p>Declaration of interest: not reported</p> <p>Trial funding source: not reported</p> <p>Further information</p>

Hofmeyr 1988 (Continued)

- Randomised to 3 groups, but the 2 deferred cord clamping groups 1) cord clamped at 1 minute and 2) cord clamped at 1 minute then ergometrine administered, were pooled as no difference in outcomes was identified. Outcome data for these 2 intervention groups were not reported separately.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Allocation by quote: "randomisation cards".
Allocation concealment (selection bias)	Unclear risk	Allocation by quote: "randomisation cards". No further information was provided on allocation concealment.
Blinding of participants and personnel (performance bias) All outcomes	High risk	Blinding of the intervention was not possible. Knowledge of group allocation may have influenced other aspects of clinician behaviour, and assessment of some outcomes.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Cranial ultrasound examination was blind to the allocated group. There is no information about blinding assessment of other outcomes.
Incomplete outcome data (attrition bias) All outcomes	Low risk	38 mother-infant pairs were randomised. All women and babies appeared to be accounted for in the analyses.
Selective reporting (reporting bias)	Low risk	Data for the outcomes listed in methods are reported. Assessment of risk of bias from published paper.
Other bias	Unclear risk	There was some baseline imbalance between the groups, suggesting those allocated delayed clamping might have been at higher risk of IVH.

Hofmeyr 1993

Methods	Randomised controlled trial
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Mother-infant pairs, with the woman expected to give birth to an infant weighing < 2000 g • No information as to whether multiple births were included or not. • N = 86 babies <p>Exclusion criteria</p> <ul style="list-style-type: none"> • Cord around the neck.
Interventions	<p>Intervention: DCC</p> <ul style="list-style-type: none"> • Cord clamping time 60-120 secs, with the infant held at the level of the uterus for vaginal births and the infant held just above the level of the uterus for CS (on the mothers' thighs) • N = 40 babies <p>Comparator: ECC</p> <ul style="list-style-type: none"> • Cord clamped shortly after delivery, according to usual practice • N = 46 babies

Hofmeyr 1993 (Continued)

Additional information

- Gestational subgroup: expected < 2000 g birthweight
- Resuscitation with cord intact: not available
- Access to NICU: unclear though resuscitation was available
- Length of delay: 1-2 mins
- Baby placed: baby at level of uterus for vaginal births and on mother's thigh at CS
- Uterotonic: administered after cord clamping
- UCM: n/a

Comparison 1

DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by gestation)

Subgroup 3: mixed gestation

Comparison 2

DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by type intervention)

Subgroup 3: DCC at 1-2 mins with baby level with uterus and placenta

Outcomes	Outcomes: death of the baby, PVH/IVH assessed by cerebral ultrasound 6-72 hrs after birth, Apgar score at 5 mins, cord-pH, bilirubin.
Notes	<p>Setting: South Africa</p> <p>Dates: not reported</p> <p>Declaration of interest: not reported</p> <p>Trial funding source: not reported</p> <p>Further information</p> <ul style="list-style-type: none"> • 8 infants who were allocated delayed clamping had the cord clamped early, either due to cord round the neck, or the need for resuscitation

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote:"randomised sealed cards", no further information.
Allocation concealment (selection bias)	Unclear risk	Quote:"randomised sealed cards", no further information.
Blinding of participants and personnel (performance bias) All outcomes	High risk	For this type of intervention blinding participants and the staff present at delivery to group allocation is not possible. Staff providing care may have modified their behaviour according to randomisation group.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Cranial ultrasound scans were blind to the allocated group. Blinding for assessment of other outcomes is not discussed. For death lack of blinding remains low risk of bias.
Incomplete outcome data (attrition bias) All outcomes	Low risk	All participants randomised were accounted for in the analysis and analysis was according to randomisation.

Hofmeyr 1993 (Continued)

Selective reporting (reporting bias)	Unclear risk	Bilirubin was reported for only 30 infants. We did not assess the trial protocol.
Other bias	Low risk	Groups appeared similar at baseline. No other bias identified.

Hosono 2008

Methods	Randomised controlled trial
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Mother-infant pairs as 24-28 weeks' gestation, and admitted at least 6 hrs before birth. • Singleton pregnancies • N = 40 babies <p>Exclusion criteria</p> <ul style="list-style-type: none"> • Multiple pregnancies, major congenital anomalies or chromosomal anomalies, hydrops fetalis.
Interventions	<p>Intervention: UCM</p> <ul style="list-style-type: none"> • Infant placed below or at the level of the placenta and about 20 cm of the umbilical cord milked vigorously towards umbilicus. • Milking 2-3 times (estimated speed 20 cm/sec). • N = 20 babies <p>Comparator: ECC</p> <ul style="list-style-type: none"> • Cord clamped immediately • N = 20 babies <p>Additional information</p> <ul style="list-style-type: none"> • Gestational subgroup: < 32-34 weeks' gestation • Resuscitation with cord intact: not available • Access to NICU: yes • Length of delay: n/a • Baby placed: placed below level of placenta • Uterotonic: no information • UCM with cord intact <p>Comparison 7</p> <p>UCM vs ECC (subgroup by gestation)</p> <p><u>Subgroup 1</u>: < 32-34 weeks' gestation</p> <p>Comparison 8</p> <p>UCM vs ECC (subgroup by type of intervention)</p> <p><u>Subgroup 1</u>: cord intact during UCM</p>
Outcomes	<p>Primary outcomes: not needing transfusion and total number of RBC transfusions.</p> <p>Secondary outcomes: Hb and BP on admission, polycythaemia, IVH, IVH grade 3 or 4, patent ductus, gut perforation, death.</p>
Notes	Setting: Nihon University Itabashi Hospital, Tokyo, Japan (a single tertiary perinatal centre)

Hosono 2008 (Continued)

Dates: January 2001-December 2002

Declaration of interest: reports no competing interests.

Trial funding source: quote: "This study was supported by "The Mother and Child Health Foundation".

Further information

- EPO from 3rd week onwards in both groups. Strict guidelines for indication of red cell transfusion depending on age and illness status. 63 women were assessed for eligibility.
- A secondary analysis of blood pressure and urine output at 120 hrs of life has been reported, and it is unclear if this was prespecified.
- Data on neurodevelopment at 24 months in this study are reported in the Ghavan 2014 meta-analysis (referenced in Included studies under [Hosono 2008](#)), measured by Tumori-Inage as UCM 3/13 and ECC 4/13.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote: "randomly selected", no further information.
Allocation concealment (selection bias)	Unclear risk	Serially numbered opaque envelopes opened just before delivery. It was not stated if any envelopes were unaccounted for, or if they were opened in the correct order. Also as sequence generation is unknown it is possible the next allocation could be predicted.
Blinding of participants and personnel (performance bias) All outcomes	High risk	Blinding of the intervention was not possible. Staff providing care may have modified their behaviour according to randomisation group.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Some of the outcomes depended on clinical decisions that may have been affected by knowledge of group status, However, other outcomes are unlikely to have been affected by lack of blinding (e.g. infant death).
Incomplete outcome data (attrition bias) All outcomes	Low risk	40 mother-infant pairs were randomised and there was no apparent loss to follow-up for the babies.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Low risk	Groups appeared balanced at baseline. Other bias was not apparent.

Hosono 2015

Methods	Randomised controlled trial - multicentre (14 centres)
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Preterm neonates 24 to 27⁶ weeks' gestation • No information as to whether dichorionic twins were included or not

Hosono 2015 (Continued)

- N = 203 babies were randomised in 14 centres. Data available on 154 infants. No information about losses after randomisation (= 24%)

Exclusion criteria

- Major anomalies diagnosed in utero; IUGR (less than 3 SD); monochorionic twins; super twins

Interventions

Intervention: UCM

- Cord clamped at 30 cm from infant.
- Baby placed on radiant warmer
- Cord milked just once
- N = 102 babies but only 77 analysed. 62 analysed at follow-up

Comparator: ECC

- Cord clamped within 30 secs
- N = 101 babies but only 77 analysed. 63 analysed at follow-up

Additional information

- Gestational subgroup: < 32-34 weeks' gestation
- Resuscitation with cord intact: not available
- Access to NICU: yes
- Length of delay: n/a
- Baby placed: no information so assume level with uterus and placenta
- Uterotonic: no information
- UCM: cord cut before milking

Comparison 7

UCM vs ECC (subgroup by gestation)

Subgroup 1: < 32-34 weeks' gestation

Comparison 8

UCM vs ECC (subgroup by type of intervention)

Subgroup 2: cord cut before UCM

Outcomes

Primary

- Death; probability of not needing transfusion; amount of blood transfused in first 4 weeks

Secondary

- Mortality; major complications (IVH; chronic lung disease; PVL; RoP; intestinal perforation); serious adverse event; Hb within 24 hrs; stabilisation of BP and use of volume expander and/or inotrope; polycythaemia; hyperbilirubinaemia; developmental disorder at 18 months and 3 years (neurodevelopmental delay; CP; epilepsy; visual impairment; hearing loss).

Notes

Setting: Japan in 14 centres

Dates: January 2008 to December 2013

Declaration of interest: not reported.

Trial funding source: The Ministry of Health, Labour and Welfare

Further information

- Conference abstract and trial registration only

Hosono 2015 (Continued)

- Stopped early (aimed for 534 babies) because of a difference in mortality and IVH.
- Only entered data on: blood transfusions, Hb, blindness and cerebral palsy.
- There were 8 deaths reported but no information as to which group they were allocated.
- Severe IVH was assessed but we have no data that we can use.
- Neurodevelopmental disabilities were reported at 18 months as: quote: "*Proportion of level 0 in Gross Motor Function Classification System in the UCM group was higher in the ICC group (91.9% vs. 71.4%, p=0.005) No differences were found in mean developmental quotient(DQ) using the Kyoto Scale of Psychological Development test between two groups (86.8±16.6 vs. 85.7±16.5, p=0.51). However, incidence of DQ < 70 in the UCM group was lower than in the ICC group (12.6% vs. 20.9%, p=0.046). No infants with hearing impairment or visual impairment were found in the two groups*".
- We wrote to the authors for the data on mortality and IVH (they report a significant difference) and we are awaiting a response.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	No information
Allocation concealment (selection bias)	Unclear risk	No information
Blinding of participants and personnel (performance bias) All outcomes	High risk	Open – no one is blinded
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No information
Incomplete outcome data (attrition bias) All outcomes	High risk	203 women recruited but outcomes on 154 only – lost 24%. Also planned to recruit 534 on power calculation but have stopped recruiting based on interim analysis.
Selective reporting (reporting bias)	High risk	There are many outcomes listed in the trial registration form which are not reported on in the conference abstract. Hopefully they will be reported in the full paper.
Other bias	High risk	Study quote: " <i>terminated before completion of its planned recruitment of 534 patients based on interim analysis.</i> " Also, conference abstract only so very little information to assess other biases.

Josephsen 2014

Methods	Randomised controlled trial
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Singletons born between 24 and 27⁺⁶ weeks' gestation. • N = 26 babies <p>Exclusion criteria</p> <ul style="list-style-type: none"> • Multiple gestation, congenital abnormalities, hydrops fetalis, and known fetal anaemia.

Josephsen 2014 (Continued)

Interventions

Intervention: UCM

- Cord milking technique involved actively milking 18 cm of the umbilical cord to the umbilicus 3 times by a limited group of physicians trained in this specific technique
- N = 13 babies

Comparator: ECC

- Cord clamped immediately
- N = 13 babies

Additional information

- Gestational subgroup: < 32-34 weeks' gestation
- Resuscitation with cord intact: not available
- Access to NICU: yes
- Length of delay: n/a
- Baby placed: no information
- When uterotonic given: no information
- UCM - unclear when cord cut

Comparison 7

UCM vs ECC (subgroup by gestation)

Subgroup 1: < 32-34 weeks' gestation

Comparison 8

UCM vs ECC (subgroup by type of intervention)

Subgroup 3: unclear

Outcomes

Mean initial Hb; number of blood transfusions in first 28 days; IVH; NEC; mortality

Notes

Setting: USA

Dates: August 2013

Declaration of interest: not reported

Trial funding source: not reported

Further information:

- Conference abstract only
- The authors excluded from the analysis 1 baby who died in the delivery room. We have re-included this baby in our data on death

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	No information
Allocation concealment (selection bias)	Unclear risk	No information

Josephsen 2014 (Continued)

Blinding of participants and personnel (performance bias) All outcomes	High risk	No information, but clearly clinicians providing the intervention would have known though it is unclear if women knew or not.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No information
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	No information
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Unclear risk	No information. Only a conference abstract.

Katheria 2014

Methods	Randomised controlled trial, stratified by gestational age (23 to 28 + 6/7) and (29 to 31 + 6/7).
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Pregnant women expected to give birth before 32 weeks' gestation • Also infants who had nuchal cords or the need for resuscitation • Included multiple births (2 sets of twins) • N = 60 babies <p>Exclusion criteria</p> <ul style="list-style-type: none"> • Pregnant women who on admission were considered to have imminent delivery were not approached • Monochorionic multiples, incarcerated mothers, placenta previa, concern for abruptions, or refusal to perform the intervention by the obstetrician (OB)
Interventions	<p>Intervention: UCM</p> <ul style="list-style-type: none"> • UCM was performed by having the delivering OB hold the infant below the mother's introitus at vaginal delivery or below the level of the incision at caesarean delivery and having the assistant (the second OB) milk about 20 cm of umbilical cord over 2 secs (counting aloud), repeating 2 additional times as described previously • N = 30 babies <p>Comparator: ECC</p> <ul style="list-style-type: none"> • Cord clamped immediately, average time 14 secs • N = 30 babies <p>Additional information</p> <ul style="list-style-type: none"> • Gestational subgroup: < 32-34 weeks' gestation • Resuscitation with cord intact: not available • Access to NICU: yes • Length of delay: n/a • Baby placed: below introitus at VB and at level of incision for CS • When uterotonic given: no information

Katheria 2014 (Continued)

- UCM; cord intact

Comparison 7

UCM vs ECC (subgroup by gestation)

Subgroup 1: < 32-34 weeks' gestation

Comparison 8

UCM vs ECC (subgroup by type of intervention)

Subgroup 1: cord intact during UCM

Outcomes	<p>Primary</p> <ul style="list-style-type: none"> • SVC flow at 3 time points <p>Secondary</p> <ul style="list-style-type: none"> • Hct at birth and 12 hrs; transfusion; day of life transfusion; Hb before transfusion; peak bilirubin; days of phototherapy; treatment for PDA (patent duct arteriosis); PDA ligation; treatment with pressor; treatment with volume; treatment with hydrocortisone; any IVH; sever IVH; surfactant; days of ventilation; days on oxygen; oxygen at 36 weeks PMA (%); death. • 'Echocardiograms and head ultrasounds were performed mainly (> 90%) by the principal investigator (A.K.). If he was not available, 1 of the co-investigators (T.L., D.G.) completed the examinations. None of the investigators performing echocardiograms were involved in the randomisation or the recording of the intervention. All images were analysed and measured offline by use of the EchoPAC software (GE HealthCare, Horten, Norway) and were analysed without knowledge of the assigned group by the principle investigator'.
Notes	<p>Trial registration: NCT01434732</p> <p>Setting: California, USA. Single tertiary centre</p> <p>Dates: 1 February 2011 to 31 January 2013</p> <p>Declaration of interest: quote: "All authors declare no conflict of interest."</p> <p>Trial funding source: sponsors: Sharp HealthCare</p> <p>Further information</p> <ul style="list-style-type: none"> • Have not reported data by stratified gestational age • We have written to the author for some information.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	No information in publication but personal communication with author reports quote:"computer generated".
Allocation concealment (selection bias)	Low risk	Quote: "Infants were randomised by the placement of their information in opaque, sealed envelopes immediately before delivery."
Blinding of participants and personnel (performance bias) All outcomes	High risk	Quote:"The obstetricians were made aware of the randomizations by the neonatology team before delivery of the infant."

Katheria 2014 (Continued)

Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No specific information about the clinical outcomes and who measured those, although there were blinded echocardiographic examinations.
Incomplete outcome data (attrition bias) All outcomes	Low risk	Excluded 8% after randomisation.
Selective reporting (reporting bias)	Unclear risk	Outcomes from trial registration reported but added additional outcomes and this may cause bias but unclear.
Other bias	Low risk	Demographics – similar between groups. Trial not stopped early.

Katheria 2015

Methods	Randomised controlled trial, stratified by gestation and mode of birth
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> Babies less than 32 weeks' gestation born by CS Entry criteria included a gestational age of 23 0/7 to 31 6/7 weeks Multiple pregnancies included (though monochorionic multiples excluded) We did include infants with perinatal depression because it would not be feasible to detect perinatal depression at the time of delivery N = 197 babies randomised: 43 for vaginal birth analysis and 154 for CS analysis <p>Exclusion criteria</p> <ul style="list-style-type: none"> Monochorionic multiples; incarcerated mothers; placenta previa; concern for abruptions; Rh sensitization; hydrops, congenital anomalies; or the obstetrician declining to perform the intervention (i.e. unaware of the study protocol)
Interventions	<p>Intervention: DCC</p> <ul style="list-style-type: none"> DCC was performed by holding the infant at or ~20 cm below the level of the placenta and waiting at least 45 secs before clamping the cord In both arms, infants were dried and wrapped with sterile towels until the cord was clamped Total number randomised for CS analysis: N = 79 Total number randomised for VB analysis: N = 20 <p>Comparator: UCM</p> <ul style="list-style-type: none"> UCM was performed by holding the infant at or approximately 20 cm below the level of the placenta. The cord was pinched as close to the placenta as possible and milked toward the infant over a 2-second duration. The cord was then released and allowed to refill with blood for a brief 1- to 2-secs pause between each milking motion. This was repeated for a total of 4 times. After completion, the cord was clamped, and the neonate was handed to the resuscitation team. In both arms, infants were dried and wrapped with sterile towels until the cord was clamped N = total number randomised for CS analysis: N = 75 N = total number randomised for VB analysis: N = 23 <p>Additional information</p> <ul style="list-style-type: none"> Gestational subgroup: < 32-34 weeks' gestation Resuscitation with cord intact: not available Access to NICU: yes

Katheria 2015 (Continued)

- Length of delay: 45 secs
- Baby placed: low
- Uterotonic: no information
- UCM: with cord intact

Comparison 5

DCC with neonatal resuscitation after cord clamping vs UCM (subgroup by gestation)

Subgroup 1: < 32-34 weeks' gestation

Comparison 6

DCC with neonatal resuscitation after cord clamping vs UCM (subgroup by type of intervention)

Subgroup 2: DCC at < 1 min with baby low (+ gravity)

Outcomes	<p>Primary:</p> <ul style="list-style-type: none"> • Systemic blood flow <p>Secondary:</p> <ul style="list-style-type: none"> • Hemodynamic outcomes; Hb at birth; polycythaemia; urine output in first 24 hrs; need for transfusion; peak bilirubin; NEC; RoP: spontaneous intestinal perforation; oxygen at 36 weeks (corrected); any IVH; severe IVH (\geq grade 3); sepsis; death 				
Notes	<p>Setting: California, USA. 2 tertiary centres (Sharp Mary Birch Hospital for Women and Newborns (SMBHWN) and Loma Linda University Medical Center)</p> <p>Dates: interim analysis August 2013 - August 2014.</p> <p>Declaration of interest: “The authors have indicated they have no potential conflicts of interest to disclose.” and “The authors have indicated they have no financial relationships relevant to this article to disclose.”</p> <p>Trial funding source: “All phases of this study were supported by a National Institutes of Health (NIH) grant 5R03HD072934-02. Funded by the National Institutes of Health (NIH).”</p> <p>Further information:</p> <ul style="list-style-type: none"> • Multiples (twins or triplets) received the same random assignment. • Hemodynamic measurements were only performed at site 1 (SMBHWN). • Received information from A Katheria on 10.04.16 regarding methodology. • The study included women giving birth vaginally and by caesarean, and the main publication reports on women giving birth by caesarean section, We have reported only on death before discharge as this is the only data currently available on the whole cohort (Katheria 2017). We are in communication with A Katheria to obtain further outcome data on the whole cohort. • Neurodevelopmental outcomes at 22-26 months corrected age are reported in Katheria 2018. Data were available on 74% of the babies. We report in 'Data and analysis' the outcome 'Moderate to severe neurodevelopmental impairment' assessed by Bayley 111 and defined by the authors as: “≥ 1 of the following: a Cognitive composite score of < 70, GMFCS of ≥ 2, blindness (vision of < 20/200), or hearing impairment interfering with the ability to communicate with amplification.”. The paper focuses on the individual components of cognitive, language and motor skills. They report a significantly better scores for babies who had UCM for the cognitive and the language components. 				
Risk of bias					
Bias	<table border="1"> <thead> <tr> <th>Authors' judgement</th> <th>Support for judgement</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> </tr> </tbody> </table>	Authors' judgement	Support for judgement		
Authors' judgement	Support for judgement				

Katheria 2015 (Continued)

Random sequence generation (selection bias)	Low risk	Quote: "Computer-generated randomisation was stratified by age and mode of birth"
Allocation concealment (selection bias)	Low risk	Quote: "Infants were randomly assigned by opaque, sealed envelopes immediately before delivery". Also the envelopes were handed out in a pre-defined blinded order to provide allocation concealment (personal communication from A Katheria).
Blinding of participants and personnel (performance bias) All outcomes	High risk	Quote: "The obstetricians were made aware of the randomization by the neonatology team immediately before delivery of the infant."
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Quote: "Blinded echocardiograms and head ultrasounds were performed mainly (.90%) by the principal investigator (A.C.K.). None of the investigators performing echocardiograms were involved in the randomization or the recording of the intervention. All images were analyzed and measured offline by using EchoPAC software (GE HealthCare, Horten, Norway) and were analyzed without knowledge of the assigned group by the principal investigator. The blinding was achieved by allowing only the ALS nurse attending the delivery and the obstetrician performing the intervention to be aware of the allocation arm."
Incomplete outcome data (attrition bias) All outcomes	High risk	Only reported outcomes on caesarean births and not the vaginal births (a few outcomes in a supplementary on-line sheet).
Selective reporting (reporting bias)	High risk	Not all outcomes listed in trial protocol are reported on, e.g. omitted admission to NICU and inotropic support, etc.
Other bias	Unclear risk	Similar at baseline. ITT but stopped trial following interim analysis.

Kilicdag 2016

Methods	Randomised controlled trial
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Infants at gestational age ≤ 32 weeks. • No information on whether multiple birth included or not. • N = 58 babies but 4 excluded leaving 54 (but not reported how many from each group) <p>Exclusion criteria</p> <ul style="list-style-type: none"> • Congenital anomalies, placenta abruption, IUGR, twin-twin transfusion syndrome, discordant twin growth, vaginal births and Rh haemolytic disease.
Interventions	<p>Intervention: UCM</p> <ul style="list-style-type: none"> • Umbilical cord was clamped after the cord was milked 4 times by a gynaecologist. • Infants in the milked group were placed at the level of the placenta. • 20 cm of the umbilical cord was vigorously milked towards the umbilicus 4 times before clamping the cord. The milking speed was about 20 cm/2 secs • N = 29 babies <p>Comparator: ECC</p> <ul style="list-style-type: none"> • Cord clamped immediately

Kilicdag 2016 (Continued)

- N = 25 babies

Additional information

- Gestational subgroup: < 32-34 weeks' gestation
- Resuscitation with cord intact: not available
- Access to NICU: yes
- Length of delay: n/a
- Baby placed: level of placenta
- When uterotonic given: no information
- UCM; cord intact when milking

Comparison 7

UCM vs ECC (subgroup by gestation)

Subgroup 1: < 32-34 weeks' gestation

Comparison 8

UCM vs ECC (subgroup by type of intervention)

Subgroup 1: cord intact during UCM

Outcomes	Primary outcome <ul style="list-style-type: none"> • Absolute neutrophil counts (ANCs) Secondary outcomes <ul style="list-style-type: none"> • Other haematological measurements (Hb values, Hct levels, platelet counts and neutropenia frequency) • Surfactant requirement, antibiotic treatment, positive blood cultures, respiratory support, RoP (according to the International Classification) requiring laser treatment and NEC (NEC; staging according to Bell et al.) 	
Notes	Setting: probably Turkey Dates: August 2012 - August 2013 Declaration of interest: quote: " <i>The authors report no conflicts of interest</i> " Trial funding source: not reported Further information: <ul style="list-style-type: none"> • NEC is reported as 2/29 vs 3/25, but it is unclear how the assessment is made so we have not included this in our data and analysis. We will write for information on this. 	
Risk of bias		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote: "...randomly assigned..." - no further information
Allocation concealment (selection bias)	Unclear risk	Quote: "...using sequentially numbered sealed nontransparent envelopes..." , however, it is not possible to have concealment of allocation if sequence generation is unclear.

Kilicdag 2016 (Continued)

Blinding of participants and personnel (performance bias) All outcomes	High risk	Not possible to blind clinicians at birth but unclear if women knew or not.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No information but laboratory tests likely to be blinded – unclear about the clinical assessments.
Incomplete outcome data (attrition bias) All outcomes	Low risk	58 randomised. Excluded 4 (8%) because: placental abruption x2; congenital anomaly x1; Rh haemolytic disease x1. Unlikely to bias outcomes.
Selective reporting (reporting bias)	Unclear risk	We did not assess trial protocol
Other bias	Low risk	No other biases apparent

Kinmond 1993

Methods	Randomised controlled trial
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Mother-infant pairs, 27 to 33 weeks' gestation • Multiples included (unpublished data) • Vaginal birth • N = 36 babies <p>Exclusion criteria</p> <ul style="list-style-type: none"> • Haemolytic disease, major congenital malformations
Interventions	<p>Intervention: regulated cord clamping - included in delayed clamping group (DCC)</p> <ul style="list-style-type: none"> • Cord clamped at 30 secs • Positioning 20 cm below the introitus • N = 17 babies <p>Comparator: conventional cord clamping - included in early clamping group (ECC)</p> <ul style="list-style-type: none"> • Cord clamped at clinicians discretion (median 10 secs) • Management at the attendant's discretion. An observer recorded distance baby held relative to introitus time and time of cord clamping. • N = 19 babies <p>Additional information</p> <ul style="list-style-type: none"> • Gestational subgroup: < 32-34 weeks' gestation • Resuscitation with cord intact: not available • Access to NICU: yes • Length of delay: 30 secs • Baby placed: low • Uterotonic: no information • UCM: n/a

Kinmond 1993 (Continued)

Comparison 1

DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by gestation)

Subgroup 1: < 32-34 weeks' gestation

Comparison 2

DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by type intervention)

Subgroup 2: DCC at < 1 min with baby low (+ gravity)

Outcomes	Outcomes: initial packed red cell volume, peak serum bilirubin, transfusion requirement, respiratory impairment, arterial-alveolar oxygen ratio, duration of oxygen.
Notes	<p>Setting: Glasgow, Scotland, UK</p> <p>Dates: not reported</p> <p>Declaration of interest: not reported</p> <p>Trial funding source: not reported</p> <p>Further information</p> <ul style="list-style-type: none"> • For control group, mean time to cord clamping 10 secs, clamping within 20 secs for 18/19 and at 25 secs for 1 • Infants under 30 weeks' gestation were electively ventilated from birth • S Kinmond kindly provided additional information regarding this study

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Method not described.
Allocation concealment (selection bias)	Unclear risk	Infants were quote:"randomised immediately before delivery by means of sealed envelopes". Not clear if envelopes opaque or sequentially numbered or that all envelopes were accounted for.
Blinding of participants and personnel (performance bias) All outcomes	High risk	For this type of intervention blinding participants and the staff present at delivery to group allocation is not possible. Staff providing care may have modified their behaviour according to randomisation group.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	There was no mention of blinding in this study, although it is not clear how lack of blinding would have affected those outcomes measured.
Incomplete outcome data (attrition bias) All outcomes	Low risk	All 36 participants were accounted for in the analysis.
Selective reporting (reporting bias)	Unclear risk	Assessment from published study report. We did not have access to the protocol.
Other bias	Unclear risk	The study was quote:"terminated when exogenous surfactant was introduced because this influenced our respiratory outcomes".

Kinmond 1993 (Continued)

We considered there was a “chance excess of boys” in the delayed clamping group (13/17 vs 7/19 controls).

Krueger 2015

Methods	Randomised controlled trial
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Women at risk of preterm birth. • Estimated gestational ages between 22 0/7 weeks and 31 6/7 weeks were included • Singleton births - both vaginal and caesarean. • N = 70 randomised then 3 excluded as did not meet inclusion criteria - analysis on 67 babies <p>Exclusion criteria</p> <ul style="list-style-type: none"> • Fetus had known anomalies or suspected placental abruption
Interventions	<p>Intervention: DCC</p> <ul style="list-style-type: none"> • 30-second delay (verbally stated in 5-second increments by the neonatal nurse practitioner). • Neonate below the level of the placenta (below the perineum in vaginal birth or to the maternal side at caesarean) • Uterotonics after cord clamping unless already given to achieve vaginal birth • After the cord clamp, the neonate was immediately transferred to the warmer and care was assumed by the awaiting paediatric team • N = 32 babies <p>Comparator: UCM</p> <ul style="list-style-type: none"> • In addition to the 30-second delay, the full length of the visible cord, which is estimated to be one-third to two-thirds of the full cord length, is manually stripped between 2 fingers by the surgeon or assistant toward the neonate • This stripping was done 4 times during the above-described delay with instructions to allow 4-5 secs between stripping to allow the cord to refill completely • Uterotonics after cord clamping unless already given to achieve vaginal birth • N = 35 babies <p>Additional information</p> <ul style="list-style-type: none"> • Gestational subgroup: < 32-34 weeks' gestation • Resuscitation with cord intact: not available • Access to NICU: yes • Length of delay: 30 secs • Baby placed: low • Uterotonic: after cord clamping unless already given at vaginal birth • UCM: 4 times <p>Comparison 5</p> <p>DCC with neonatal resuscitation after cord clamping vs UCM (subgroup by gestation)</p> <p><u>Subgroup 1</u>: < 32-34 weeks' gestation</p> <p>Comparison 6</p> <p>DCC with neonatal resuscitation after cord clamping vs UCM (subgroup by type of intervention)</p>

Krueger 2015 (Continued)

Subgroup 2: DCC at < 1 min with baby held low

Outcomes	<p>Primary</p> <ul style="list-style-type: none"> Initial Hct within the first 30 mins of life from either venous or arterial blood draws <p>Secondary</p> <ul style="list-style-type: none"> Length of time on the ventilator; days to discharge; neonatal mortality; peak bilirubin; number of phototherapy days; and neonatal complication rates
Notes	<p>Setting: University of South Alabama Children's and Women's Hospital, USA</p> <p>Dates: August 2012 and November 2013.</p> <p>Declaration of interest: authors report no conflict of interest.</p> <p>Trial funding source: not reported</p> <p>Further information:</p> <ul style="list-style-type: none"> Reported length of stay in NICU in days rather than weeks. 71.2 (+/- 33) vs 67.8 (+/- 29) days.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote: "Randomization was performed with opaque envelopes contained on the labor and delivery unit containing cards with instruction on either delayed cord clamping alone or delayed cord clamping plus cord stripping. An equal number of envelopes were created for each arm and were scrambled by a third-party registered nurse."
Allocation concealment (selection bias)	Unclear risk	Quote: "Randomization was performed with opaque envelopes contained on the labor and delivery unit containing cards with instruction on either delayed cord clamping alone or delayed cord clamping plus cord stripping. An equal number of envelopes were created for each arm and were scrambled by a third-party registered nurse."
Blinding of participants and personnel (performance bias) All outcomes	High risk	Not possible to blind clinicians at birth and it is unclear whether women were blinded or not.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Quote: "The neonatal team was not told which patients were participating in the study, and the randomisation arm was not documented on the infants' charts. This was done in an effort to avoid alteration in subsequent management and achieve blinding of the care team."
Incomplete outcome data (attrition bias) All outcomes	Low risk	3 excluded after randomisation because they did not meet inclusion criteria.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Unclear risk	Groups were similar in terms of birthweight and gestation. Women were excluded if baby had abnormality or suspected placental abruption – not sure if before or after randomisation. Other possible biases not clear.

Kugelman 2007

Methods	Randomised, controlled trial, stratification by mode of birth and risk of pregnancy (pre-eclampsia, PIH).
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Mother-infant pairs, at > 24 weeks and < 35 weeks' gestation • Multiple pregnancies included. 7 twins 1 triplet • N = 65 babies (and we estimated 56 mothers taking into account the twins included) <p>Exclusion criteria</p> <ul style="list-style-type: none"> • Women with vaginal bleeding due to placenta praevia or abruption or placental tear; fetus expected of having major anomaly; severe IUGR (< 3%); maternal gestational diabetes treated with insulin; suspected twin-to-twin transfusion or discordant twins (cautious definition of estimated weight difference by fetal ultrasound of < 20% even without monozygosity) and maternal drug abuse.
Interventions	<p>Intervention: DCC</p> <ul style="list-style-type: none"> • Cord clamped at 30-45 secs • Positioning of infant 20-30 cm below level of introitus (vaginal birth) or below level of the incision at CS, wrapped in dry towel. • N = 30 babies <p>Comparator: ECC</p> <ul style="list-style-type: none"> • Cord clamped immediately < 10 secs. • N = 35 babies <p>Additional information:</p> <ul style="list-style-type: none"> • Gestational subgroup: < 32-34 weeks' gestation (mostly) • Resuscitation with cord intact: not available • Access to NICU - unclear - probably yes • Length of delay: 30-45 secs • Baby placed: low • Uterotonic: administered after cord clamping • UCM: n/a <p>Comparison 1:</p> <p>DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by gestation)</p> <p><u>Subgroup 1:</u> < 32-34 weeks' gestation (mostly)</p> <p>Comparison 2:</p> <p>DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by type intervention)</p> <p><u>Subgroup 2:</u> DCC at < 1 min with baby low (+ gravity)</p>
Outcomes	Baby death, IVH, PVL, blood transfusion. peak bilirubin, serum complement, immunoglobulins between group, risk, of sepsis, sepsis events, antibiotic therapy.
Notes	<p>Setting: Haiha, Israel</p> <p>Dates: September 2004 to December 2005</p> <p>Declaration of interest: not reported</p>

Kugelman 2007 (Continued)

Trial funding source: not reported

Further information

- For multiple births there was a single assignment for all babies
- Data on sepsis and infection reported as a secondary analysis, and unclear if it was pre-specified

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Random assignment quote: "was performed with a system of randomly prepared cards in sealed nontransparent envelopes..."
Allocation concealment (selection bias)	Unclear risk	Random assignment quote: "was performed with a system of randomly prepared cards in sealed nontransparent envelopes..."
Blinding of participants and personnel (performance bias) All outcomes	High risk	The study was described as masked. However, clinical staff at the birth would be aware of group assignment but staff were asked not to record group status in case notes so neonatal staff were not aware of allocation.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	The study was described as masked. However, clinical staff at the birth would be aware of group assignment but staff were asked not to record group status in case notes so neonatal staff were not aware of allocation.
Incomplete outcome data (attrition bias) All outcomes	Low risk	65 participants were randomised and all appeared to be accounted for in the analyses.
Selective reporting (reporting bias)	Unclear risk	Assessment from published study reports. Outcomes on infection and sepsis not mentioned in first report. Hence unclear whether all outcomes collected have been reported. We did not assess the trial protocol.
Other bias	Low risk	Baseline characteristics were similar and there is no evidence of other biases.

Kumar 2015

Methods	Randomised controlled trial
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Babies born between 32 0/7 and 36 6/7 gestation • Born vaginally or by lower segment CS • Singleton pregnancies • N = 200 babies (but 10 lost to follow-up) <p>Exclusion criteria</p> <ul style="list-style-type: none"> • Umbilical cord length less than 25 cm, or were non-vigorous at birth. Multiple births (twins, triplets), those born to Rh negative or retrovirus positive mothers, hydrops fetalis and those with major congenital anomalies, cord prolapse or cord anomalies like true knots were also excluded. • Babies born to mothers with complications such as placental abruption, placental implantation disorders (placenta previa or accreta) or chorioamnionitis were excluded only if they were born limp.
Interventions	Intervention: UCM

Kumar 2015 (Continued)

- After clamping and cutting the cord at 25 cm from the umbilicus, the cord was milked 3 times at 10 cm/sec
- N = 100 babies (3 lost to follow-up only relevant for longer-term outcomes)

Comparator: ECC

- Cord clamped immediately
- N = 100 babies (7 lost to follow-up (only relevant for longer term outcomes) and 3 samples haemolysed)

Additional information

- Gestational subgroup: > 32-34 weeks' gestation
- Resuscitation with cord intact: not available
- Access to NICU: yes
- Length of delay: n/a
- Baby placed: under radiant warmer
- Uterotonic: given soon all births (IM for vaginal births and IV for CS)
- UCM: cord cut

Comparison 7

UCM vs ECC (subgroup by gestation)

Subgroup 2: > 32-34 weeks' gestation

Comparison 8

UCM vs ECC (subgroup by type of intervention)

Subgroup 2: cord cut before UCM

Outcomes	Primary <ul style="list-style-type: none"> • Hb and serum ferritin at 6 weeks Secondary <ul style="list-style-type: none"> • Jaundice needing phototherapy; respiratory distress; need for oxygen; polycythaemia • Hb, packed cell volume and bilirubin) in first 48 hrs of life; Hb at 48 hrs; Hct at 48 hrs • Bilirubin mg/dL in first 48 hrs • At 30 mins of life; Mean BP mmHg; HR/min; Resp rate/min
Notes	Setting: Department of Pediatrics and Obstetrics of a tertiary care institute in Northern India. Dates: September 2013 to August 2014 Declaration of interest: no competing interests reported Trial funding source: no funding.
Risk of bias	
Bias	Authors' judgement Support for judgement
Random sequence generation (selection bias)	Low risk Quote: "...online generated random number list and assigned even numbers to early cord clamping (control) group and"
Allocation concealment (selection bias)	Low risk Quote: "The numbers were written on small slips and placed in serially numbered opaque sealed envelopes. Sealed envelope was opened by a delivery room staff nurse, just"

Kumar 2015 (Continued)

Blinding of participants and personnel (performance bias) All outcomes	High risk	No information provided. Clinicians at the birth cannot be blinded but it is unclear if women were blinded.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No information but most of outcomes are laboratory tests – though there are a few clinical outcomes – so unclear.
Incomplete outcome data (attrition bias) All outcomes	Low risk	UCM group lost 3/100 and ECC group lost 7/100 for clinical outcomes. So well under 20%.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol
Other bias	Low risk	No indication of other biases,.

Malik 2013

Methods	Randomised controlled trial
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Preterm babies 30-37 weeks' gestation • No information as to whether multiple births were included or not • N = 80 babies <p>Exclusion criteria</p> <ul style="list-style-type: none"> • Congenital anomalies (on clinical examination); Rh negative mothers (laboratory evaluation of blood grouping of mother)
Interventions	<p>Intervention: DCC</p> <ul style="list-style-type: none"> • Cord clamped at 120 secs • N = 40 babies <p>Comparator: ECC</p> <ul style="list-style-type: none"> • Cord clamped at 30 secs • N = 40 babies <p>Additional information</p> <ul style="list-style-type: none"> • Gestational subgroup: > mixed • Resuscitation with cord intact: not available • Access to NICU: Lahore - probably • Length of delay: 120 secs • Baby placed: no information • Uterotonic: no information • UCM: n/a <p>Comparison 1</p> <p>DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by gestation)</p>

Malik 2013 (Continued)

Subgroup 2: > 32-34 weeks' gestation (mostly)

Comparison 2

DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by type intervention)

Subgroup 7: DCC at > 2 mins - unclear where baby placed

Outcomes	Hct and polycythaemia (high Hct)
Notes	<p>No data for this review</p> <p>Setting: Department of Pediatric Medicine, Services Hospital, Lahore and labour room, Services Hospital, Lahore, Pakistan</p> <p>Dates: 8 Jan 2009 to 7 July 2009</p> <p>Declaration of interest: not reported</p> <p>Trial funding source: not reported</p>

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "...random number table..."
Allocation concealment (selection bias)	Unclear risk	No information
Blinding of participants and personnel (performance bias) All outcomes	High risk	Clinicians at birth cannot be blinded – unclear if women blinded or not.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	No information but Hct and polycythaemia are the outcomes so unlikely to be influenced by knowledge of group allocation.
Incomplete outcome data (attrition bias) All outcomes	Low risk	Appears complete
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Unclear risk	Very little information on methodology, so unclear about other possible biases.

March 2013

Methods	Randomised controlled trial. Random permuted blocks of 10.
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> Pregnant women likely to give birth to a singleton preterm infant between 24 and 28 completed weeks of gestation.

March 2013 (Continued)

- 113 women and babies randomised, 56 to UCM and 57 to ECC. 38 (33.6%) were then excluded leaving 75 women, 36 UCM and 39 ECC. Exclusions mainly due to women going past 28 weeks' gestation.

Exclusion criteria

- Antenatally diagnosed major fetal congenital anomaly; known Rh sensitisation; hydrops fetalis; known recent maternal exposure to parvovirus; elevated peak systolic velocity of the fetal middle cerebral artery or clinical suspicion of placental abruption at delivery due to excessive maternal bleeding or uterine hypertonicity.

Interventions

Intervention: UCM

- An extended hand's width length of cord (from the tip of the thumb to the tip of the pinky finger, 20 ± 2 cm) was used as the standard.
- Infants in the cord milking group were placed at or below the level of the placenta if born vaginally or at the same level as the placenta if born by CS.
- 20 cm of the umbilical cord was actively milked towards the umbilicus 3 times before clamping the cord. Infants in the control group had the cord clamped and cut immediately after delivery.
- N = 36 babies

Comparator: ECC

- Immediate clamping
- N = 39 babies

Additional information

- Gestational subgroup: < 32-34 weeks' gestation
- Resuscitation with cord intact: not available
- Access to NICU: yes
- Length of delay: n/a
- Baby placed: below level of placenta
- When uterotonic given: no information
- UCM: cord intact during UCM

Comparison 7

UCM vs ECC (subgroup by gestation)

Subgroup 1: < 32-34 weeks' gestation

Comparison 8

UCM vs ECC (subgroup by type of intervention)

Subgroup 1: cord intact during UCM

Outcomes

Primary

- Red cell transfusion at 28 days

Secondary

- Apgar scores, umbilical cord pH, type of resuscitation, initial neonatal Hb and Hct, initial neonatal BP, time (in days) from birth to transfusion, total volume of RBCs transfused in the first 28 days of life, need for phototherapy, number of days of phototherapy and known complications of prematurity such as RDS, IVH (including stage), PVL, chronic lung disease, RoP, hyperkalaemia, sepsis, NEC (defined by Bell's criteria) and death

Notes

Setting: East Virginia, USA. Single tertiary centre.

Dates: September 2009 to June 2011

March 2013 (Continued)

Declaration of interest: authors declare no conflicts of interest.

Trial funding source: this work was conducted with support from Harvard Catalyst. The Harvard Clinical and Translational Science Center (National Center for Research Resources and the National Center for Advancing Translational Sciences, National Institutes of Health Award 8UL1TR000170-05 and financial contributions from the Harvard University and its affiliated academic healthcare centres.

Further information

- Dr Melisa March kindly provided clarification and additional data in a personal communication on 19 November 2015.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	'An independent statistician provided the randomisation sequence.' Personal communication with Dr March provided the following information: Quote: "A statistician provided random permuted blocks of 10 using a SAS program."
Allocation concealment (selection bias)	Low risk	'Serially numbered opaque envelopes'
Blinding of participants and personnel (performance bias) All outcomes	High risk	Quote: "The neonatologists and pediatric support staff were not blinded to treatment assignment given that they were required to be present for the delivery."
Blinding of outcome assessment (detection bias) All outcomes	High risk	Quote: "The neonatologists and pediatric support staff were not blinded to treatment assignment given that they were required to be present for the delivery....no notation of study participation was made in the neonate's chart in order to minimize the possibility that postnatal treatment decisions would be influenced by study participation."
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	33.6% of women were excluded because they gave birth beyond 28 weeks' gestation. This was 16 in each group and so we believe this is unlikely to cause serious bias but unclear.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Low risk	Baseline characteristics were similar in the groups. Compliance: 1 woman in the cord milking group had the cord inadvertently clamped and cut immediately. This was dealt with by ITT.

McDonnell 1997

Methods	Randomised controlled trial, stratified by vaginal or CS, 26 to 29 weeks, 30 to 33 weeks.
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Infants at 26 to 33 weeks' gestation • Vaginal or CS • Single or multiple pregnancies. 4 sets of twins included with each twin randomised separately. • N = 46 babies <p>Exclusion criteria</p>

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McDonnell 1997 (Continued)

- Severe fetal distress, IUGR with abnormal umbilical Doppler waveforms, fetal hydrops, fetal malformations, Rhesus incompatibility.

Interventions
Intervention: DCC

- Cord clamped at 30 secs, infant positioned between legs of the mother
- Syntocinon at birth of the infant
- N = 23 babies

Comparator: ECC

- Cord clamped immediately
- N = 23 babies

Additional information

- Gestational subgroup: < 32-34 weeks' gestation
- Resuscitation with cord intact: not available
- Access to NICU: yes
- Length of delay: 30 secs
- Baby placed: between mother's legs
- Uterotonic: syntocinon given IV after birth of infant according to standard practice
- UCM: n/a

Comparison 1

DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by gestation)

Subgroup 1: < 32-34 weeks' gestation

Comparison 2

DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by type intervention)

Subgroup 1: DCC at < 1 min with baby level with uterus and placenta

Outcomes

Primary outcome: Hct at 4 hrs.

Secondary outcomes: Apgar score, temperature on admission, requirement for ventilation, oxygen, surfactant, peak serum bilirubin, inotropic support, cerebral ultrasound, blood transfusion, death

Notes

Setting: Sydney, Australia

Dates: January to December 1994

Declaration of interest: not reported

Trial funding source: not reported

Further information

- Unit of randomisation was the infant - so for twin pregnancies each infant was randomised separately
- M McDonnell kindly provided additional information regarding this study

Risk of bias
Bias
Authors' judgement
Support for judgement

Random sequence generation (selection bias)

Unclear risk

Sequence not stated. There was stratification by gestational age and type of delivery.

McDonnell 1997 (Continued)

Allocation concealment (selection bias)	Unclear risk	Quote: "sealed opaque envelopes". Not clear if envelopes numbered and used sequentially.
Blinding of participants and personnel (performance bias) All outcomes	High risk	Blinding was not mentioned. It is possible that lack of blinding could influence other aspects of care and the recording of outcomes.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Blinding was not mentioned. It is possible that lack of blinding could influence other aspects of care and the recording of outcomes.
Incomplete outcome data (attrition bias) All outcomes	High risk	46 infants were randomised. It was not clear in the publication how many infants were in each randomised group and we understand that personal communication with the authors provided the information and data. For the outcomes, of IVH and PVL there were only 31/46 (67%) of data available though death is reported on all babies. Analysis was according to randomisation group.
Selective reporting (reporting bias)	Unclear risk	Assessment of risk of bias from published trial report. Several outcomes were not reported in the brief trial report although the authors offer other data on request. We did not assess the trial protocol.
Other bias	Unclear risk	Groups appeared similar at baseline although there were more boys in the immediate clamping group (15 vs 9, denominators not clear).

Mercer 2003

Methods	Randomised controlled trial
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Mother-infant pairs < 32 weeks • Vaginal or CS births • N = 32 babies <p>Exclusion criteria</p> <ul style="list-style-type: none"> • Obstetrician's refusal to participate, major congenital anomalies, multiple gestations, intend to withhold care, severe maternal illnesses, placenta abruption or placenta previa.
Interventions	<p>Intervention: deferred cord clamping (DCC)</p> <ul style="list-style-type: none"> • Cord clamped at 30-45 secs. • At birth infant held 10 to 15 inches below the level of the placenta in vaginal deliveries or below the incision at CS • N = 16 babies <p>Comparator: ECC</p> <ul style="list-style-type: none"> • Cord clamped between 5-10 secs after delivery • N = 16 babies <p>Additional information</p> <ul style="list-style-type: none"> • Gestational subgroup: < 32-34 weeks' gestation • Resuscitation with cord intact: not available

Mercer 2003 (Continued)

- Access to NICU: yes
- Length of delay: 30-45 secs
- Baby placed: low
- Uterotonic: states 'Not given before cord clamping' but no information as to whether uterotonic was given after cord clamping
- UCM: n/a

Comparison 1

DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by gestation)

Subgroup 1: < 32-34 weeks' gestation

Comparison 2

DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by type intervention)

Subgroup 2: DCC at < 1 min with baby low (+ gravity)

Outcomes	<p>Primary outcome</p> <ul style="list-style-type: none"> • Mean arterial BP on arrival in the neonatal unit. <p>Secondary outcomes</p> <ul style="list-style-type: none"> • Apgar scores, initial blood sugars, initial Hct, mean BP over 4 hrs of life, and 12 hrs, number of volume expanders in 12 hrs of life, SNAPPE II scores, serum bilirubin levels, days on ventilation or oxygen, IVH, suspected NEC, days on ventilation or oxygen, oxygen use at 36 weeks and at discharge, volume of blood transfusions
Notes	<p>Setting: USA</p> <p>Dates: October 1998 to March 2001</p> <p>Declaration of interest: not reported</p> <p>Trial funding source: “Sigma Theta Tau, Epsilon Chapter; University of Rhode Island Foundation and College of Nursing”.</p> <p>Further information:</p> <ul style="list-style-type: none"> • Confirmed NEC data are in the text in the paper and suspected NEC in Table 4. The 2012 publication reported suspected NEC by mistake, This has been rectified. • J Mercer kindly provided additional information regarding this study reporting there were no baby deaths in this pilot study.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote: “system of randomly prepared cards in sealed nontransparent envelopes.”
Allocation concealment (selection bias)	Unclear risk	Quote: “system of randomly prepared cards in sealed nontransparent envelopes.”
Blinding of participants and personnel (performance bias) All outcomes	High risk	For this type of intervention blinding participants and the staff present at delivery to group allocation is not possible. Staff providing care may have modified their behaviour according to randomisation group.

Mercer 2003 (Continued)

Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	It is not clear whether lack of blinding would have had an effect on the outcomes measured. There was an attempt to achieve blinding for some of the outcomes assessed as staff were requested not to record group assignment on case notes.
Incomplete outcome data (attrition bias) All outcomes	Low risk	32 participants were randomised and all appeared to be accounted for in the analysis. 2 babies in the delayed clamping group were not treated according to protocol but they were analysed according to randomisation.
Selective reporting (reporting bias)	Unclear risk	Assessment from published study report.
Other bias	Low risk	Groups appeared similar at baseline. Other bias not apparent.

Mercer 2006

Methods	Randomised controlled trial, stratification by gestation: 24-27 and 28-32 weeks.
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Mother-infant pairs < 33 weeks' gestation • Vaginal or caesarean births • N = 72 babies <p>Exclusion criteria</p> <ul style="list-style-type: none"> • Obstetrician's refusal to participate, major congenital anomalies, multiple gestations, intend to withhold care, severe maternal illnesses, placenta abruption or previa.
Interventions	<p>Intervention: DCC</p> <ul style="list-style-type: none"> • At birth infant held 10 to 15 inches below the level of the placenta in vaginal deliveries or below the incision at CS • Cord clamped at 30-45 secs • N = 36 babies <p>Comparator: ECC</p> <ul style="list-style-type: none"> • Cord clamped between 5-10 secs after birth • N = 36 babies <p>Additional information</p> <ul style="list-style-type: none"> • Gestational subgroup: < 32-34 weeks' gestation • Resuscitation with cord intact: not available • Access to NICU: yes • Length of delay: 30-45 secs • Baby placed: low • Uterotonic: no information • UCM: n/a <p>Comparison 1</p> <p>DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by gestation)</p> <p><u>Subgroup 1</u>: < 32-34 weeks' gestation</p> <p>Comparison 2</p>

Mercer 2006 (Continued)

DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by type intervention)

Subgroup 2: DCC at < 1 min with baby low (+ gravity)

Outcomes	<p>Primary outcome</p> <ul style="list-style-type: none"> Broncho-pulmonary dysplasia (defined as oxygen therapy at 36 weeks). <p>Secondary outcomes</p> <ul style="list-style-type: none"> Death, Apgar scores, temperature on arrival at neonatal unit, highest serum bilirubin level, initial and hourly BP for 4 hrs, initial Hct, suspected NEC, IVH, LOS, RoP, neurodevelopment at age 7 months. 	
Notes	<p>Setting: Women and Infants Hospital, Providence, Rhode Island, USA</p> <p>Dates: August 2003 to December 2004</p> <p>Declaration of interest: authors have no financial relationships relevant to this work</p> <p>Trial funding source: this work was supported by National Institutes of Health, National Institute of Nursing Research grant K23 NR00078</p> <p>Additional information</p> <ul style="list-style-type: none"> CPD: authors report 'CPD + death' together so CPD was calculated from this and the number of babies who died in each group. The previous version of this review reported 'CPD + death' together by mistake. Since CPD is assessed at 36 weeks (corrected for gestation) the babies who have died (3 in the early clamped group) were excluded from the denominator as they were not eligible to be in this outcome. Similarly for home oxygen. MDI (Mental Development Index) < 70 at 7 months was DCC 5/29 vs ECC 2/28. This is too young for this assessment to be meaningful. Also MDI is only part of Neurodevelopmental impairment assessment/only part of Bailey Assessment. 58/67 (87%) alive at discharge from hospital assessed at age 7 months. Died by 7 months DCC 2/33 vs ECC 3/34 We are seeking to clarify with the authors if Sommers 2012 is subset of this study as implied by the trial registration numbers. The data collection dates, however, do not agree (Sommers data collection May 2009 - July 2010 and Clinical Trials Registration NCT00818220), hence the need for clarification. J Mercer kindly provided additional information regarding this study. 	
Risk of bias		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "A statistician who was not involved in the trial developed a computer-generated random number system. Block-stratified randomisation was used..." to take account of gestational age.
Allocation concealment (selection bias)	Low risk	Quote: "Two sets of cards labelled for randomisation were enclosed in sequenced, opaque envelopes containing group assignment..."
Blinding of participants and personnel (performance bias) All outcomes	High risk	For this type of intervention blinding participants and the staff present at delivery to group allocation is not possible. Staff providing care may have modified their behaviour according to randomisation group.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	The study was not blinded although the groups status was not recorded on case notes in an attempt to reduce detection bias.

Mercer 2006 (Continued)

Incomplete outcome data (attrition bias) All outcomes	Low risk	72 were randomised (36 in each group). Although there were some protocol violations the analysis was according to randomisation group. There were 3 early deaths in the immediate cord clamping group and these babies were excluded from subsequent analysis as they were no longer eligible to experience outcomes.
Selective reporting (reporting bias)	Unclear risk	'Risk of bias' assessment from published study report. We did not assess the trial protocol.
Other bias	Low risk	No baseline imbalance between groups apparent. Quote: "All infants remained in their assigned groups for analyses." hence ITT. By 7 months there had been 5 deaths, and of the 67 remaining babies 58 were followed up for longer-term outcomes where there is an inevitable loss to follow-up. Other bias not identified.

Mercer 2016

Methods	Randomised controlled trial. Block stratified by < 28 weeks or > 28 weeks.
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Women with a singleton pregnancy estimated at 24-31.6 weeks' gestation • N = 211 babies but 3 were withdrawn due to congenital anomalies and birth injury that precluded randomisation. <p>Exclusion criteria</p> <ul style="list-style-type: none"> • Multiple gestation, prenatally diagnosed major congenital anomalies, severe or multiple maternal illnesses, and mothers who were at risk for loss to follow-up.
Interventions	<p>Intervention: UCM</p> <ul style="list-style-type: none"> • Obstetrician placed the infant in a sterile warm towel or blanket and held the infant approximately 10-15 inches below the mother's introitus at vaginal delivery or below the level of the placenta at caesarean delivery. Care was taken to avoid traction on the cord. Suctioning was at the discretion of the obstetrician. • At 30-45 secs, the obstetrician was asked to milk the infant's cord once, then clamp and cut the umbilical cord. If unable to carry out the DCC protocol as planned, the cord was milked quickly 2-3 times before clamping when possible (n = 11). • In the event that the timing of the cord clamping was less than 30 secs with no cord milking and the baby was randomised to the DCC group, a protocol violation report was completed and the infant remained in the DCC group for primary ITT analyses (n = 15). • N = 104 babies but 1 excluded = 103 for analysis <p>Comparator: ECC</p> <ul style="list-style-type: none"> • Cord clamping at < 10 secs • N = 107 babies but 2 excluded = 105 for analysis <p>Additional information</p> <ul style="list-style-type: none"> • Gestational subgroup: < 32-34 weeks' gestation • Resuscitation with cord intact: not available • Access to NICU: yes • Length of delay: n/a • Baby placed: low • Uterotonic: no information

Mercer 2016 (Continued)

- UCM: with cord intact

Comparison 7

UCM vs ECC (subgroup by gestation)

Subgroup 1: < 32-34 weeks' gestation

Comparison 8

UCM vs ECC (subgroup by type of intervention)

Subgroup 1: cord intact during UCM

Outcomes	<p>Primary</p> <ul style="list-style-type: none"> • IVH; LOS; and motor outcomes at 18-22 months using the Bayley Scales of Infant Development, (Bayley-III). <p>Secondary</p> <ul style="list-style-type: none"> • Apgar scores, initial temperature upon admission, peak bilirubin the first week of life), initial blood pressure, initial hematocrit, NEC, bronchopulmonary dysplasia, and RoP as diagnosed by attending clinicians.
Notes	<p>Setting: Women and Infants' Hospital of Rhode Island, USA</p> <p>Dates: 15 May 2008 to 30 January 2012</p> <p>Declaration of interest: authors declare no conflicts of interest</p> <p>Trial funding source: National Institute of Nursing Research and Thrasher Research Fund.</p> <p>Further information</p> <ul style="list-style-type: none"> • Clinical Trials Registration: NCT000818220 and NCT01426698 • Comparison: for the purpose of the review, the intervention is DCC + UCM (once) with baby held low but if clinician felt he could not wait then the cord was milked 2-3 times. We therefore considered this intervention as UCM with a short delay rather than deferred cord clamping. • Neurodevelopment at 18 months. Bayley III score: methods section states: Quote: "<i>The Bayley Scales of Infant Development, Third Edition (Bayley-III) was used to assess cognitive, language, and motor function. The motor composite score and subscores for fine motor and gross motor skills were analyzed. The Bayley-III composite score has a mean ± SD of 100 ± 15.</i>" so 2 SDs gives cut-off at 70 and this is what we report in the Data and analysis. • J. Mercer kindly provided additional information and unpublished data on: severe IVH; NEC; Apgars; CPD; home oxygen; duration of respiratory support; volume of infant transfusion; infant Hb in 1st 24 hrs; mean arterial BP; length of stay in NICU and cerebral palsy (13.01.2016).

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	No information
Allocation concealment (selection bias)	Unclear risk	Sequenced and sealed envelopes identifying the stratification and group assignment on cards were prepared by a statistician not involved in the trial and kept in a locked file box in the labour and delivery unit (personal communication from J Mercer), however, it is not possible to have concealment of allocation if sequence generation is unclear.

Mercer 2016 (Continued)

Blinding of participants and personnel (performance bias) All outcomes	High risk	The study could not be blinded because of the nature of the intervention.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Personnel collecting on-going clinical data and the follow-up staff completing the developmental assessment remained blinded.
Incomplete outcome data (attrition bias) All outcomes	Low risk	3 babies excluded after randomisation 2 from ECC (2/107 = 2%) for congenital or birth trauma and 1 from DCC (1/104 = 1%) for congenital anomaly. At 18 months: DCC 82/100 (82%) ECC 79/99 (79%)
Selective reporting (reporting bias)	Unclear risk	Many outcomes where data were collected were not reported in the published paper. We understand we have all the data now (Personal communication with J Mercer).
Other bias	Unclear risk	Baseline data similar between groups for parity, public insurance, marital status, antenatal steroids, IUGR, or caesarean delivery rate (data not reported). However, there were significantly more women with PROM/PTL in the DCC group in both cohorts, and more women with pre-eclampsia (PEC) at admission in the ICC group. (Data not reported.) Authors undertook an additional multi-logistic regression analysis. Compliance: DCC 89/100 (86%) received DCC. ECC 98/99 (92%) received ECC

Nelle 1998

Methods	Randomised controlled trial. Randomisation by sealed opaque envelopes.
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Infants < 1500 g. • Born by CS • N = 19 babies <p>Exclusion criteria</p>
Interventions	<p>Intervention: DCC</p> <ul style="list-style-type: none"> • Cord clamping after 30 secs and positioning of the infant 30 cm below placenta • N = 11 babies <p>Comparator: ECC</p> <ul style="list-style-type: none"> • Cord clamped immediately after birth • N = 8 babies <p>Additional information</p> <ul style="list-style-type: none"> • Gestational subgroup: < 32-34 weeks' gestation • Resuscitation with cord intact: not available • Access to NICU: yes • Length of delay: 30 secs • Baby placed: low • Uterotonics: no information

Nelle 1998 (Continued)

- UCM: n/a

Comparison 1

DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by gestation)

Subgroup 1: < 32-34 weeks' gestation

Comparison 2

DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by type intervention)

Subgroup 2: DCC at < 1 min with baby low (+ gravity)

Outcomes	Outcomes: <ul style="list-style-type: none"> • Mean arterial blood pressure, left ventricular output, mean cerebral blood flow velocity, Hb, Hct, systemic and cerebral Hb transport, volume expansion during the first 24 hrs.
Notes	<p>No data for the review</p> <p>Setting: Germany</p> <p>Dates: not reported</p> <p>Declaration of interest: not reported</p> <p>Trial funding source: not reported</p> <p>Further information:</p> <ul style="list-style-type: none"> • Reported as abstract only • There is lack of clarity as to whether this was an RCT or not. However, as the study provides no data for the review this issue was considered relatively unimportant. • M Nelle kindly provided additional information regarding this study.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described.
Allocation concealment (selection bias)	Unclear risk	Sealed, opaque envelopes (information provided by the author).
Blinding of participants and personnel (performance bias) All outcomes	High risk	No blinding. Not clear whether outcomes would be affected by lack of blinding. Other aspects of care may have been affected by lack of blinding.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No blinding. Not clear whether outcomes would be affected by lack of blinding. Other aspects of care may have been affected by lack of blinding.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Not clear whether full data were available for all participants.
Selective reporting (reporting bias)	Unclear risk	Reported in brief abstract.

Nelle 1998 (Continued)

Other bias	Unclear risk	Very little information on study methods.
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Oh 2011

Methods	Randomised controlled trial. Stratified by mode of birth and centre. 3 centre trial.
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Infants 24⁺⁰ to 27⁺⁶ weeks' gestation • Singletons • N = 33 babies <p>Exclusion criteria</p> <ul style="list-style-type: none"> • None specified <p>Additional information</p> <p>190 women were screened, 97 were eligible and 54 consented. The main reason women who consented were not randomised was logistics, i.e. research staff not present at the birth</p>
Interventions	<p>Intervention: DCC</p> <ul style="list-style-type: none"> • Cord clamping 30-45 secs held 10 cm below the birth canal at vaginal birth and below the abdomen at caesarean • N = 16 babies <p>Comparator: ECC</p> <ul style="list-style-type: none"> • Immediate cord clamping < 10 secs after birth of presenting part • N = 17 babies <p>Additional information</p> <ul style="list-style-type: none"> • Gestational subgroup: < 32-34 weeks' gestation • Resuscitation with cord intact: not available • Access to NICU: yes • Length of delay: 30-45 secs • Baby placed: low • Uterotonic: no information • UCM: n/a <p>Comparison 1</p> <p>DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by gestation)</p> <p><u>Subgroup 1:</u> < 32-34 weeks' gestation</p> <p>Comparison 2</p> <p>DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by type intervention)</p> <p><u>Subgroup 2:</u> DCC at < 1 min with baby low (+ gravity)</p>
Outcomes	<p>Primary outcome</p> <ul style="list-style-type: none"> • Hct at 4 hrs <p>Secondary outcomes</p>

Oh 2011 (Continued)

- Resuscitation, Apgar score, BP during the first 12 hrs, IVH, NEC (greater than Bell's stage 2), RoP (all grades), LOS (> 3 days of age), PDA, blood transfusions.

Notes

Setting: USA. 3 centres: 1) University of Alabama, Birmingham, AL. 2) The Rainbow Babies and Children's Hospital, Cleveland, OH. 3) The Women and Infants Hospital, Providence, RI.

Dates: May 2000 to June 2001

Declaration of interest: quote: "The authors declare no conflict of interest"

Trial funding source: quote: "The National Institutes of Health and the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) provided grant support for the Neonatal Research Network's Delayed Cord Clamping Study."

Further information

- Data on neurodevelopment at 2 years comes from Ghavam 2014 - listed under the OH 2011 study. Ghavam 2014 reports Bayley II scales of Infant Development, MDI < 70, DCC 4/8 vs ECC 3/8, OR, 1.67; 95% CI, 0.23 to 12.22). We have not entered these data into the analyses because there is no methodology on collecting the long-term data and so it is unclear what happened to the remaining 17 babies (56%) - was there an attempt to contact them? We are contacting Professor Oh for additional information.
- W Oh kindly provided additional information and data regarding this study.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	No information on sequence generation.
Allocation concealment (selection bias)	Unclear risk	Quote: "The subject was randomized (per phone call to the RTI (Research Triangle Institute) International Data Coordinating Center) to one of the two groups: ..."
Blinding of participants and personnel (performance bias) All outcomes	High risk	The study was not blinded, although it was stated that efforts were made to quote: "avoid revelation of grouping of infants to the attending physicians".
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No mention of whether outcome assessment was blinded.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	33 were randomised and all appeared to be accounted for in the analysis, except for the outcome CLD where data were provided on 26/33 (79%) babies.
Selective reporting (reporting bias)	Unclear risk	Assessment from published reports. The main study paper was published in 2011; the first report (in abstract form) in 2002. It is not clear why so long elapsed before the publication of study findings. We also did not assess the trial protocol.
Other bias	Low risk	No baseline imbalance between groups was apparent. Many eligible women were not randomised for logistic reasons. Other bias not identified. Transfusion is mentioned in abstract as frequency and volume but numbers with transfusion are not reported which suggests not all data collected have been reported.

Oh 2011 (Continued)

Ghavam 2014 reports on long-term neurodevelopment outcome for 16 babies (8 in each group) with no mention of the methodology for collecting long-term follow-up data.

Pongmee 2010

Methods	Randomised controlled trial
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Infants < 35 weeks' gestation • N = 43 babies <p>Exclusion criteria</p> <ul style="list-style-type: none"> • Placenta praevia, placental abruption, gestational diabetes, IUGR, twin-twin transfusion syndrome, major congenital abnormalities.
Interventions	<p>Intervention: UCM</p> <ul style="list-style-type: none"> • 2 x milking of cord along 30 cm after cord cutting • N = 20 babies <p>Comparator: ECC</p> <ul style="list-style-type: none"> • Immediate cord clamping • N = 23 babies <p>Additional information</p> <ul style="list-style-type: none"> • Gestational subgroup: < 32-34 weeks' gestation • Resuscitation with cord intact: not available • Access to NICU: unclear - Thailand • Length of delay: n/a • Baby placed: no information • Uterotonic: no information • UCM: cord cut before milking <p>Comparison 7: but no usable data</p> <p>UCM vs ECC (subgroup by gestation)</p> <p><u>Subgroup 1:</u> < 32-34 weeks' gestation</p> <p>Comparison 8: but no usable data</p> <p>UCM vs ECC (subgroup by type of intervention)</p> <p><u>Subgroup 2:</u> cord cut before UCM</p>
Outcomes	<p>Primary outcomes</p> <ul style="list-style-type: none"> • Initial Hct, need for blood transfusion, morbidity. <p>Secondary outcome</p> <ul style="list-style-type: none"> • Hct at 2 weeks of age and at term postmenstrual age.
Notes	No usable data

Pongmee 2010 (Continued)

Setting: not reported

Dates: not reported

Declaration of interest: not reported

Trial funding source: not reported

Further information:

- Study published as abstract only, awaiting full publication.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	No information
Allocation concealment (selection bias)	Unclear risk	No information
Blinding of participants and personnel (performance bias) All outcomes	High risk	No information, but attending clinicians will have known the group allocation, it is unclear if women knew or not.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No information
Incomplete outcome data (attrition bias) All outcomes	Low risk	Data appears to be complete
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol
Other bias	Unclear risk	Very little information - conference abstract

Rabe 2000

Methods	Randomised controlled trial
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Infants < 33 weeks' gestation • N = 40 babies <p>Exclusion criteria</p> <ul style="list-style-type: none"> • Multiple pregnancies, Rhesus incompatibility, fetal hydrops, congenital malformation, Apgar < 3 at 0 mins.
Interventions	<p>Intervention: DCC</p> <ul style="list-style-type: none"> • Cord clamping at 45 secs and positioning of the infant below the level of placenta, if possible, • Uterotonic (9 IU oxytocin IV) with delivery of the first shoulder

Rabe 2000 (Continued)

- N = 19 babies

Comparator: ECC

- Cord clamping at 20 secs.
- N = 20 babies

Additional information

- Gestational subgroup: < 32-34 weeks' gestation
- Resuscitation with cord intact: not available
- Access to NICU: yes
- Length of delay: 45 secs
- Baby placed: low
- Uterotonic: before cord clamping
- UCM: n/a

Comparison 1

DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by gestation)

Subgroup 1: < 32-34 weeks' gestation

Comparison 2

DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by type intervention)

Subgroup 2: DCC at < 1 min with baby low (+ gravity)

Outcomes	Primary outcome <ul style="list-style-type: none"> • Number of blood transfusions during first 6 weeks of life Secondary outcomes <ul style="list-style-type: none"> • Apgar score, temperature on admission, BP at 1, 4 and 24 hrs, volume resuscitation during first 24 hrs, inotropic support, degree of respiratory distress, IVH, PDA, phototherapy.
Notes	Setting: Germany Dates: 1997 to 1998 Declaration of interest: none reported Trial funding source: Children's University Hospital of Münster Further information <ul style="list-style-type: none"> • For the outcome of death only, we re-included the 1 baby who was excluded due to cord being clamped at 30 secs rather than 45 secs. • For outcome of CLD denominator in ECC was changed from 20 to 19 as 1 baby died in this group at 3 days. • H Rabe provided additional information regarding this study including information on dates, declarations of interest and funding source.
Risk of bias	
Bias	Authors' judgement Support for judgement
Random sequence generation (selection bias)	Low risk The sequencing was computer generated. The allocation was done by a staff member not involved in clinical care or the clinical trial (personal communication).

Rabe 2000 (Continued)

Allocation concealment (selection bias)	Low risk	Quote:“by opening a sealed dark envelope”. The sealed dark envelopes were sequentially numbered. The clinician opening the envelope could not predict the allocation (personal communication).
Blinding of participants and personnel (performance bias) All outcomes	High risk	It was not possible to blind the clinicians at the birth, and it is unclear whether women knew their allocation or not (changed from unclear to high risk).
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	There was an attempt to blind outcome assessors (group status was not recorded in notes). It was not clear whether lack of blinding affected clinical care or decisions that may have influenced outcomes.
Incomplete outcome data (attrition bias) All outcomes	Low risk	40 participants were randomised and 39 were included in the analysis. 1 baby in the late clamping group had cord clamping at 30 secs due to clinical concern, and was excluded from the analysis.
Selective reporting (reporting bias)	Unclear risk	Assessment of bias from published study report.
Other bias	Low risk	Other bias not apparent. Study groups appeared similar at baseline.

Rabe 2011

Methods	Randomised controlled trial
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Preterm neonates between 24^{+0/7} and 32^{+6/7} completed weeks of gestation • N = 58 babies <p>Exclusion criteria</p> <ul style="list-style-type: none"> • Multiple pregnancies (twins and more), fetal hydrops, Rhesus sensitisation, or known major congenital abnormalities
Interventions	<p>Intervention: DCC</p> <ul style="list-style-type: none"> • Cord clamped at 30 secs • Babies were positioned 20 cm below the level of the placenta, between their mother’s thighs (vaginal birth) or to the mother’s side (caesarean). • The neonates in both groups were placed immediately in plastic bags to maintain their temperature. The 30 secs of cord clamping time was measured by using the wall-mounted clocks in each delivery suite. • Women received a combination of oxytocin and ergometrine by intramuscular injection (unless the mother had hypertension, in which case oxytocin alone was administered) and, after caesarean intravenous oxytocin was administered. • N = 31 babies <p>Comparator: UCM</p> <ul style="list-style-type: none"> • Cord milking involved holding the cord at the introitus or caesarean wound with 1 hand and milking the umbilical cord for its remaining accessible whole length toward the neonate 4 times. The cord was clamped after the 4th milking. • Neonates were positioned 20 cm below the level of the placenta, between the mother’s thighs (vaginal birth) or to the mother’s side (caesarean), with the cord being milked toward the neonate 4 times at a speed of 20 cm/2 secs.

Rabe 2011 (Continued)

- The neonates in both groups were placed immediately in plastic bags to maintain their temperature. The 30 secs of cord clamping time was measured by using the wall-mounted clocks in each delivery suite.
- Women received a combination of oxytocin and ergometrine by intramuscular injection (unless the mother had hypertension, in which case oxytocin alone was administered) and, after caesarean birth intravenous oxytocin was administered.
- N = 27 babies

Additional information

- Gestational subgroup: < 32-34 weeks' gestation
- Resuscitation with cord intact: not available
- Access to NICU: yes
- Length of delay: 30 secs
- Baby placed: low
- Uterotonic: after cord clamping
- UCM: 4 times with cord intact

Comparison 5

DCC with neonatal resuscitation after cord clamping vs UCM (subgroup by gestation)

Subgroup 1: < 32-34 weeks' gestation

Comparison 6

DCC with neonatal resuscitation after cord clamping vs UCM (subgroup by type of intervention)

Subgroup 2: DCC at < 1 min with baby low (+ gravity)

Outcomes

Primary

- Neonatal blood Hct and Hb at 1 hour after birth.

Secondary

- Cord blood pH; Apgar scores at 5 and 10 mins; temperature on admission to the neonatal unit; blood pressure at 4 hrs of age; blood sugar on admission; maximum serum bilirubin and duration of phototherapy; Hct and Hb at 24 hrs, day 3, day 7, and weekly thereafter; number of blood transfusions in first 42 days of life; IVH (staging according to Papile); number of septic episodes in first 42 days of life; death of newborn or mother; days requiring ventilation; number of surfactant treatments; days requiring oxygen; bronchopulmonary dysplasia defined as oxygen requirement at 36 weeks of corrected age; RoP; NEC (staging according to Bell); length of hospital stay.

Notes

Setting: single tertiary care centre - Royal Sussex County Hospital, Brighton, UK

Dates: 2007 to 2009

Declaration of interest: authors reported no potential conflicts of interest.

Trial funding source: quote: "Funded by a grant from the Brighton and Sussex University Hospitals Research and Development Directorate." Also partly funded by National Institute of Health Research under Research for Patient Benefit Programme (PB-PG-1208-18244).

Further information

- In the follow-up study in 2016, authors also reported on the Bayley-III scores for cognitive, language and motor development using Bayleys 111 at 2 and 3.5 years. The paper also reported the scores 70-84 and > 85 at both 2 years and 3.5 years.
- H Rabe provided some unpublished data regarding this study. This included data on dates, the Bayley III overall scores and the composite of 'Death and neurosensory disability at 3.5 years' in an email on 29/04/18.

Rabe 2011 (Continued)

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "Randomization was based on computer-created tables performed by a person not involved in the trial. The randomization was stratified by gestational age, 24 0/7 to 27 6/7 completed weeks of gestation and 28 0/7 to 32 6/7 weeks of gestation"
Allocation concealment (selection bias)	Low risk	Quote: "The randomization allocation cards were kept on the labor ward in sealed opaque envelopes and consecutively numbered. The attending midwife opened the envelope before birth"
Blinding of participants and personnel (performance bias) All outcomes	High risk	Unable to blind participants/personnel due to quote: "nature of the interventions" and "routine practice that the neonatal team is directly present in the delivery room".
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Unable to blind data collector to allocation group but data retrospectively collected from patient records so difficult to influence numerical data, e.g. Hb or presence/absence of morbidity.
Incomplete outcome data (attrition bias) All outcomes	Low risk	All randomised babies had data available. All exclusions accounted for. No loss to follow-up and no failures to deliver intended intervention. Except the long-term follow-up where data were missing on 14/31 (45%) in DCC and 5/27 (18%) in UCM. Authors report that some parents did not want to come back for the 3.5. year follow-up.
Selective reporting (reporting bias)	Unclear risk	All outcomes appear to be reported but 2 and 3.5 year neurological data reported in a later paper (Rabe 2015) and it was unclear in the original paper that these data were to be collected.
Other bias	Unclear risk	Baseline data on women and babies were similar. Long-term follow up - data missing on 14/31 (45%) in DCC and 5/27 (18%) in UCM. Authors report that some parents lost interest at 3.5 years as children were doing well and often families were busy.

Rana 2017

Methods	Randomised, parallel group trial
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> Newborn infant with gestation less than 34 weeks N = 100 babies <p>Exclusion criteria</p> <ul style="list-style-type: none"> Known congenital malformations; serious maternal illnesses (a) severe pre-eclampsia or eclampsia (b) third stage PPH (c) uncompensated heart disease; twins, triplets or babies requiring resuscitation
Interventions	<p>Intervention: DCC</p> <ul style="list-style-type: none"> Cord clamping at 120 secs after the birth of baby N = not reported <p>Comparator: ECC</p>

Rana 2017 (Continued)

- Cord clamping within 30 secs after the birth of baby
- N = not reported

Outcomes
Primary

- Hyperbilirubinemia and polycythaemia during initial 7 days of life in infants

Secondary

- Requirement for resuscitation
- Skin temperature at 5 mins and 30 mins of age
- Incidence of RDS
- Culture positive or culture negative sepsis
- Hypoperfusion requiring fluid boluses and/or vasopressors
- Need for blood transfusion
- IVH
- NICU and hospital stay

Notes
No usable data for this review

Setting: no information - authors live in India

Dates: Started 15 April 2014 but no information on completion date though trial reported as complete on trial registration form.

Declaration of interest: not reported

Trial funding source: Maulana Azad Medical College (Government Medical College), Bahadur Shah Zafar Marg, New Delhi 110002

Further information:

- Trial Registration: CTRI/2013/04/003529
- We will write to authors for further information, in particular how many were allocated to each group.
- Previous reporting of this study was under Agarwal 2014, but we consider the Rana 2017 the main publication now.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Computer-generated randomisation (information from trial registration).
Allocation concealment (selection bias)	Low risk	Sequentially numbered, sealed, opaque envelopes (information from trial registration).
Blinding of participants and personnel (performance bias) All outcomes	High risk	Clinicians cannot be blinded.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	There is no information to show that the assessments of outcomes were blinded. For lab tests it is likely there was blinding - but unclear for the clinical outcomes.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	No information

Rana 2017 (Continued)

Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Unclear risk	There is very little information in this short 'Letter to the Editor'.

Ranjit 2015

Methods	Randomised controlled trial
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Neonates born between 30 0/7 and 36 6/7 weeks of gestation • N = 100 babies <p>Exclusion criteria</p> <ul style="list-style-type: none"> • Mothers with Rhesus negative blood group and monoamniotic – monochorionic twins
Interventions	<p>Intervention: DCC</p> <ul style="list-style-type: none"> • Cord was clamped more than 2 mins after the birth of the baby. • Until the cord was clamped, the baby was placed covered on the mother's abdomen in case of vaginal births or on the mother's thigh in case of CSs. • In babies needing resuscitation at birth, immediate cord clamping was practiced irrespective of group allocation. • N = 50 babies (6 were excluded because they needed resuscitation) - analysed 44 <p>Comparator: ECC</p> <ul style="list-style-type: none"> • Cord was clamped immediately after birth of the infant, the standard practice at authors' institution. • N = 50 babies <p>Additional information</p> <ul style="list-style-type: none"> • Gestational subgroup: mixed gestation • Resuscitation with cord intact: not available • Access to NICU: yes • Length of delay: > 2 mins • Baby placed: on mother's abdomen at vaginal births and on mother's thigh at caesarean • Uterotonic: no information • UCM: n/a <p>Comparison 1</p> <p>DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by gestation)</p> <p><u>Subgroup 3</u>: mixed gestation</p> <p>Comparison 2</p> <p>DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by type intervention)</p> <p><u>Subgroup 5</u>: DCC at > 2 mins with baby level with uterus and placenta</p>
Outcomes	<p>Primary</p> <ul style="list-style-type: none"> • Hct and serum ferritin levels at 6 weeks of age <p>Secondary</p>

Ranjit 2015 (Continued)

- Hct on day 1; anaemia, polycythaemia, significant jaundice, duration of phototherapy; need for blood transfusions; PDA; RDS; NEC; transient tachypnoea of newborn (TTNB); sepsis; IVH; hypoglycaemia; apnoea; shock; hypoxic ischaemic encephalopathy (HIE); acute kidney injury (AKI) and death.

Definitions

- Significant jaundice was defined as need for phototherapy based on AAP 2004 policy statement for babies > 35 weeks (6) and phototherapy guidelines for very low birthweight infants (7).
- Anemia and polycythaemia on day 1 were defined as Hct < 45% and > 65% respectively.

Notes

Setting: tertiary care hospital in South India

Dates: May 2010 to November 2010

Declaration of interest: no conflict of interest.

Trial funding source: quote: "Role of funding source - None"

Further information

- Reported sepsis and unclear of this is late sepsis, but we used the data.
- Reported transfusion of packed cells and we used this data under 'Blood transfusion'.
- Reported exclusive breastfeeding: 100% for DCC and 89.5% for ECC.
- We are writing to the authors to ask whether any of the 6 babies excluded from the DCC group (because they needed resuscitation) had died. We have included the data on death in our data and analysis.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Qquote: "...based on computer generated random numbers."
Allocation concealment (selection bias)	Low risk	Quote: "Allocation concealment was achieved by sequentially numbered opaque sealed envelopes containing the codes for intervention"
Blinding of participants and personnel (performance bias) All outcomes	High risk	It is not possible to blind clinicians nor women.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	There is no information as to whether there was any attempt to blind outcome assessment.
Incomplete outcome data (attrition bias) All outcomes	High risk	6 babies (12%) randomised to DCC group were excluded from the study as they did not receive the intervention due to the need for resuscitation. None were excluded from the ECC group, yet 5 died in the ECC group and no deaths were reported in the DCC group, but there is no information on the 6 who were excluded - it is important to know how many of these died. 4 in the ECC group and 3 in the DCC group were lost for follow-up. Total exclusion DCC 9/50 (18%) ECC 4/50 (8%). Overall 13% exclusions, but uneven.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.

Ranjit 2015 (Continued)

Other bias	Unclear risk	Baseline characteristics were similar but they excluded 6 babies from DCC because they needed resuscitation.
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Salae 2016

Methods	Randomised controlled trial
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> Pregnant women aged 18-45 years, admitted in preterm labour in the active phase with gestational ages 34-36⁺⁶ weeks. N = 100 but 14 dropped out leaving 86 women <p>Exclusion criteria</p> <ul style="list-style-type: none"> Pregnancies with thalassaemia syndrome, pre-eclampsia, gestational diabetes (GDM), renal impairment, placental abnormalities, fetus with major congenital anomalies, multiple gestation, instrumental births and or abnormal fetal tracing.
Interventions	<p>Intervention: DCC</p> <ul style="list-style-type: none"> Delay – clamping within 2 mins with baby held level (quote: “<i>same level as maternal body trunk</i>”) N = 50 but 8 dropped out leaving 42 <p>Comparator: ECC</p> <ul style="list-style-type: none"> Immediate clamping < 30 secs N = 50 but 6 dropped out leaving 44 <p>Additional information</p> <ul style="list-style-type: none"> Gestational subgroup: > 32-34 weeks' gestation Resuscitation with cord intact: not available Access to NICU: Thailand - not reported Length of delay: ≤ 2 mins Baby placed: at the same level as the mother Uterotonic: no information UCM: n/a <p>Comparison 1:</p> <p>DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by gestation)</p> <p><u>Subgroup 2:</u> > 32-34 weeks' gestation</p> <p>Comparison 2:</p> <p>DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by type intervention)</p> <p><u>Subgroup 3:</u> DCC at 1-2 mins with baby level with uterus and placenta</p>
Outcomes	<p>Primary:</p> <ul style="list-style-type: none"> Hematocrit (Hct) at 48 hrs <p>Secondary:</p> <ul style="list-style-type: none"> Microbilirubin (MB) at 48 hrs; Apgar; maternal and neonatal complications.

Salae 2016 (Continued)

Notes

Setting: Department of Obstetrics and Gynaecology, Thammasat University Hospital, Pathumthani, Thailand

Dates: July 2014 – April 2015.

Declaration of interest: no conflict of interest

Trial funding source: Faculty of Medicine, Thammasat University, Pathumthani, Thailand,

Further information:

- Dr Tanprasertkul kindly send a copy of the full paper prior to publication.
- We understand that quote: "*There were no serious maternal and fetal complications in either group.*" means there were no deaths.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Statistical computer program. Simple randomisation was used. Sealed envelopes containing numbers which had been generated by a statistical computer program were placed in a box.
Allocation concealment (selection bias)	Low risk	Sealed envelopes containing numbers – attached to woman's medical records in an intact manner opened only at start of second stage of labour....The first attending physician at the labour room picked up a sealed envelope, opened at the start of the second stage of labour.
Blinding of participants and personnel (performance bias) All outcomes	High risk	Not mentioned but attending clinician cannot be blinded. No information as to whether women knew or not.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Not mentioned but most likely blind as main outcome as Hct (a laboratory estimation) and the clinical data likely to be collected by ward staff.
Incomplete outcome data (attrition bias) All outcomes	Low risk	Lost 8/50 (16%) from DCC and 6/50 (12%) from ECC – so unlikely to cause bias.
Selective reporting (reporting bias)	Unclear risk	We did not assess trial protocol and paper just documents that it will report maternal and neonatal complications – without specifying. We would expect other data to be collected.
Other bias	Unclear risk	Nothing apparent but we would have expected more methodological information to be included.

Sekhavat 2008

Methods	Randomised controlled trial
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Infants of 26 to 34 weeks' gestation • N = 52 babies

Sekhavat 2008 (Continued)

Exclusion criteria

Interventions	<p>Intervention group: DCC</p> <ul style="list-style-type: none"> Deferred cord clamping at 30 to 60 secs. N = 28 babies <p>Comparator: ECC</p> <ul style="list-style-type: none"> Immediate cord clamping at 10 to 15 secs. N = 24 babies <p>Additional information</p> <ul style="list-style-type: none"> Gestational subgroup: < 32-34 weeks' gestation Resuscitation with cord intact: not available Access to NICU: yes Length of delay: 30-60 secs Baby placed: no information assume not held low Uterotonic: no information UCM: n/a <p>Comparison 1: but no usable data</p> <p>DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by gestation)</p> <p><u>Subgroup 1:</u> < 32-34 weeks' gestation</p> <p>Comparison 2: but no usable data</p> <p>DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by type intervention)</p> <p><u>Subgroup 7:</u> unclear</p>
Outcomes	<p>Primary outcomes</p> <ul style="list-style-type: none"> BP, Hct and blood glucose. <p>Secondary outcomes</p> <ul style="list-style-type: none"> Typical complications from prematurity.
Notes	<p>No usable data</p> <p>Setting: Shahid Sedudhu University, Iran.</p> <p>Dates: not reported</p> <p>Declaration of interest: not reported</p> <p>Trial funding source: not reported</p> <p>Further information</p> <ul style="list-style-type: none"> Study published as abstract only, awaiting full trial publication.
Risk of bias	
Bias	Authors' judgement Support for judgement
Random sequence generation (selection bias)	Unclear risk No information

Sekhavat 2008 (Continued)

Allocation concealment (selection bias)	Unclear risk	No information
Blinding of participants and personnel (performance bias) All outcomes	High risk	Not possible to blind clinicians and unclear whether mothers knew or not.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No information
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	No information on how many had outcome data assessed.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Unclear risk	Conference abstract only so very little information on which to judge.

Shi 2017

Methods	Randomised controlled trial
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Term and preterm babies but no definition of preterm • N = 520 women and babies (preterm = 60; term = 460) <p>Exclusion criteria</p> <ul style="list-style-type: none"> • Pre-eclampsia, gestational diabetes, severe gestational anaemia, differing blood types between mother + fetus, twins with twin transfusion syndrome
Interventions	<p>Intervention: DCC</p> <ul style="list-style-type: none"> • The umbilical cord is ligated only after pulsations in the umbilical cord cease on its own. The fetus undergoes routine clearing of the respiratory passages. Then wrapped in sterile towels. • All other treatments/management are the same • N = 30 preterm <p>Comparator: ECC</p> <ul style="list-style-type: none"> • Immediate clamping after birth 5-10 secs • N = 30 preterm <p>Additional information</p> <ul style="list-style-type: none"> • Gestational subgroup: unclear but preterm • Resuscitation with cord intact: not available • Access to NICU: yes • Length of delay: till cord stops pulsating • Baby placed: no information • Uterotonic: no information • UCM: n/a

Shi 2017 (Continued)

Comparison 1

DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by gestation)

Subgroup 3: gestation unclear

Comparison 2: but no usable data

DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by type intervention)

Subgroup 7: unclear

Outcomes	<ul style="list-style-type: none"> • Apgar 1 min, 5 mins • Infant bilirubin levels (daily from D1 to D7 after birth); highest is considered the “peak”; measured using a non-invasive instrument placed on the head • Umbilical cord blood and 24 hrs heel capillary blood red blood cells • Postpartum blood loss (measured using 24-hour weighing of pads) • Length of 3rd stage of delivery (from birth to placental delivery) • Number with retained placenta (not delivered within 30 mins) or incomplete placenta
Notes	<p>Setting: ZhengZhou University Third Affiliated Hospital, China</p> <p>Dates: June to October 2015</p> <p>Funding source: not reported</p> <p>Declaration of interest: not reported</p> <p>Further information</p> <ul style="list-style-type: none"> • Due to limited expertise in Chinese translations, this information from the body of the paper has been extracted by 1 person. 2 people assessed the abstract. • Included data on hyperbilirubinaemia although no information on whether treated or not.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: “Random number method to allocate groups”
Allocation concealment (selection bias)	Unclear risk	Quote: “Random number method to allocate groups”
Blinding of participants and personnel (performance bias) All outcomes	High risk	No statement on blinding although the clinicians at the birth cannot be blinded.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No statement on blinding.
Incomplete outcome data (attrition bias) All outcomes	Low risk	No exclusions. All 520 participants completed the study and were analysed.
Selective reporting (reporting bias)	Unclear risk	All methodology stated outcomes were reported, either in text or prose but we did not assess the trial protocol.

Shi 2017 (Continued)

Other bias	Low risk	Seems generally okay, reported values were given (not blanket P values. They used recognised scales like Apgar scores.
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Strauss 2008

Methods	Randomised controlled trial. Stratified by gestation (< 30 weeks and > 30 weeks).
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Infants < 36 weeks' gestation, but analysis on infants 30-36 weeks' gestation • N = 105 babies for 30-36 weeks' gestation. 158 in all were randomised, of which 53 were < 30 weeks and 105 were 30-36 weeks' gestation but only the 105 between 30 to 36 weeks' gestation included in analysis because it became clear that neonates less than 30 weeks could not be studied successfully so excluded. <p>Exclusion criteria</p> <ul style="list-style-type: none"> • Congenital abnormality
Interventions	<p>Intervention: DCC</p> <ul style="list-style-type: none"> • Cord clamped at 60 secs • Vaginal births: infant positioned 10 to 12 inches below introitus of the mother, cord clamped 3-5 cm from infant's abdomen • CS: infant positioned beside the supine mother's thigh and cord clamped as above. • N = 45 babies <p>Comparator: ECC</p> <ul style="list-style-type: none"> • Cord clamping immediately within 2-5 secs (not exceeding 15 secs) • N = 60 babies <p>Additional information</p> <ul style="list-style-type: none"> • Gestational subgroup: mixed gestation • Resuscitation with cord intact: not available • Access to NICU: yes • Length of delay: 60 secs • Baby placed: low • Uterotonic: no information • UCM: n/a <p>Comparison 1:</p> <p>DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by gestation)</p> <p>Subgroup 3: mixed gestation</p> <p>Comparison 2:</p> <p>DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by type intervention)</p> <p>Subgroup 4: DCC at 1-2 mins with baby low (+ gravity)</p>
Outcomes	<p>Primary outcome</p> <ul style="list-style-type: none"> • Neonatal red cell volume/mass <p>Secondary outcome</p>

Strauss 2008 (Continued)

- Reduction in red cell blood transfusion by 50%, Apgar, death, IVH

Notes

Setting: USA.

Dates: not reported

Declaration of interest: R Strauss and D Mock report nothing to disclose in the conference abstract of 2007. Other authors have not reported.

Trial funding source: not reported

Further information

- Infants < 30 weeks randomised to DCC had immediate cord clamping and placental blood harvesting for re-transfusion within 24 hrs after birth. This group of infants is not further recorded in the main publication. The study data on 30-36 weeks' gestation babies are reported. Randomisation was stratified by < 30 and > 30 weeks
- The main outcomes for this study were neonatal haematological measures. As these were not possible to measure in babies < 30 weeks, 53 infants recruited before 30 weeks' gestation are excluded.
- Strauss 2007 is a conference abstract and covers all babies, so these data are not included because in the end babies in < 30 weeks' gestation were excluded.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Table of random numbers. Stratified by gestation (< 30 weeks, > 30 weeks).
Allocation concealment (selection bias)	Unclear risk	Quote: "written instructions in sealed envelopes opened immediately before delivery." Not clear whether envelopes were numbered and opaque.
Blinding of participants and personnel (performance bias) All outcomes	High risk	Because the focus of this trial was on haematological outcomes it is unlikely that lack of blinding of women had an impact on outcomes. However, the focus of the review is clinical outcomes. It is possible staff who were aware of group assignment may have altered other aspects of care. It was stated that laboratory staff were blind to group assignment. Lack of blinding may have influenced other aspects of clinician behaviour and the recording of outcomes.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Because the focus of this trial was on haematological outcomes it is unlikely that lack of blinding of women had an impact on outcomes. It is possible staff who were aware of group assignment may have altered other aspects of care. It was stated that laboratory staff were blind to group assignment. Lack of blinding may have influenced other aspects of clinician behaviour and the recording of outcomes.
Incomplete outcome data (attrition bias) All outcomes	High risk	Attrition and missing data were not clearly described. For babies less than 30 weeks' gestation there was major loss to follow-up (but data for these infants have not been included in the review as they did not undergo true early clamping). Of 105 deliveries after 30 weeks all seemed to be accounted for in the analysis although the authors reported some missing data for some variables.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol .

Strauss 2008 (Continued)

Other bias	High risk	The study groups were not balanced in terms of size (60 in the immediate clamping group and 45 delayed). The reason for uneven group size for births < 30 weeks' gestation was not explained.
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Tarnow-Mordi 2017

Methods	<p>Randomised controlled trial</p> <p>With minimisation and stratification according to gestational age (< 27 weeks vs ≥ 27 weeks), by centre, and multiple birth status (singleton birth vs. multiple birth). Infants of multiple births underwent randomisation individually.</p>
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Women expected to give birth before 30 weeks' gestation. • Babies were eligible if obstetricians or maternal–fetal medicine specialists considered that they might be born before 30 weeks of gestation. • 24.8% multiple births: babies: 1176 singletons; 344 twins; 42 triplets and 4 quadruplets = 1566 babies. Mothers: 1176 singletons; 172 twins; 14 triplets and 1 quads = 1363 mothers in total. • N = 1634 babies randomised. Mortality data on 1156 babies and primary analyses on 1497. 1363 mothers included. <p>Exclusion criteria</p> <ul style="list-style-type: none"> • Exclusion criteria included fetal haemolytic disease, hydrops fetalis, twin–twin transfusion, genetic syndromes, and potentially lethal malformations.
Interventions	<p>Intervention: DCC</p> <ul style="list-style-type: none"> • Clamping 60 secs or more after birth, with the infant held as low as possible below the introitus or placenta and without palpation of the cord. • N = 818 babies with data on 748 (and on 784 for death) <p>Comparator: ECC</p> <ul style="list-style-type: none"> • Cord clamping within 10 secs • N = 816 babies with data on 749 (and on 782 for death) <p>Additional information</p> <ul style="list-style-type: none"> • Gestational subgroup: < 32-34 weeks' gestation • Resuscitation with cord intact: not available • Access to NICU: yes • Length of delay: 60 secs • Baby placed: low • Uterotonic: recorded as an outcome • UCM: n/a <p>Comparison 1</p> <p>DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by gestation)</p> <p><u>Subgroup 1</u>: < 32-34 weeks' gestation</p> <p>Comparison 2</p> <p>DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by type intervention)</p>

Tarnow-Mordi 2017 (Continued)

Subgroup 4: DCC at 1-2 mins with baby low (+ gravity)

Outcomes

Primary outcomes

- Composite of death or major morbidity - initially defined as severe brain injury on postnatal ultrasonography, severe RoP, NEC, late-onset sepsis, or chronic lung disease, each diagnosed by 36 completed weeks of postmenstrual age.
- The protocol was amended in July 2016 to reflect the updated primary outcome of death, severe brain injury, severe RoP, NEC, or late-onset sepsis.

Secondary outcomes

- Death by 36 completed weeks of postmenstrual age
- Death or severe brain injury on postnatal ultrasonography
- Severe brain injury
- Late cerebral abnormality on ultrasonography
- IVH (all grades, grade 3 or 4, and grade 4 only)
- Severe RoP
- NEC
- Late-onset sepsis
- Treated PDA
- Chronic lung disease, defined as below
- Additional secondary outcomes of death, disability, and death or disability by 3 years are not reported here

Tertiary outcomes (analyses of which were considered to be hypothesis generating)

- Birthweight,
- Number of red-cell transfusions by 36 weeks,
- Temperature of the infant on admission,
- Peak bilirubin level in the first week,
- Peak Hct in the first week;
- Duration of hospital stay if the infant was discharged alive,
- Maternal blood transfusion for postpartum haemorrhage,
- The use of uterotonic drugs,
- Exchange transfusions by 36 weeks of gestation,
- Because rates of endotracheal intubation at delivery can vary considerably among centres and may not correlate with the rate of morbidity, they were not recorded,
- 5-minute Apgar score of less than 4 was considered to be a better index of initial risk than endotracheal intubation,
- Apgar score at 1 minute and 5 mins and an Apgar score of less than 4 at 5 mins were prespecified as tertiary outcomes in the statistical analysis plan.

Notes

Setting: 25 centres in 7 countries: Australia; New Zealand; Canada; France; Northern Ireland; Pakistan and USA. Led by University of Sydney, Australia.

Dates: December 2010 to January 2017

Declaration of interest: disclosure forms provided by the authors are available with the full text of this article at NEJM.org.

Trial funding source: supported by the National Health and Medical Research Council (NHMRC) and by the NHMRC Clinical Trials Centre, University of Sydney.

Further information:

- The trial registration in 2009 was for a 4-arm trial: 1) DCC with baby held low; 2) UCM; 3) DCC with baby low + UCM; 4) ECC. However, the APTS trial undertaken was only on DCC with baby held low vs ECC.

Tarnow-Mordi 2017 (Continued)

- For the outcome of death, we have added the 5 babies who were stillborn in each group so we report all deaths after randomisation.
- D. Osborn kindly provided additional data on 'Maternal blood transfusions' for women with singleton births as we were unable to use the data in the publication because the randomisation was by baby. He also clarified the data on IVH and we included that from Supplementary Appendix Table 4 (previously Table 3).

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "...computer generated randomisation..."
Allocation concealment (selection bias)	Low risk	Quote: "The computer generated randomisation lists used with the interactive voice response system will be prepared by an independent statistician at the NHMRC Clinical Trials Centre, University of Sydney. The randomisation code will be stored securely by the statistical group at the centre." (Trial registration form) "Randomization was performed centrally ... with the use of an interactive voice-response system with minimization and with stratification according to gestational age (<27 weeks vs. ≥27 weeks), center, and multiplebirth status (singleton birth vs. multiple birth)." (2017 publication)
Blinding of participants and personnel (performance bias) All outcomes	High risk	Clinicians at the birth cannot be blinded and it is unclear whether women knew or not but women knowing is unlikely to affect outcome assessment.
Blinding of outcome assessment (detection bias) All outcomes	High risk	Quote: "For practical reasons, no attempt was made to make staff who were diagnosing these morbidities unaware of the timing of cord clamping."
Incomplete outcome data (attrition bias) All outcomes	Low risk	1634 infants randomised. 68 were excluded and 69 had missing data for ≥ 1 component of primary outcome. So overall loss of primary data were 8%.
Selective reporting (reporting bias)	Low risk	All outcomes from full trial protocol are reported in the 2017 paper and Supplementary Appendix.
Other bias	Low risk	No other biases apparent.

Tiemersma 2015

Methods	Randomised controlled trial
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Pregnant women expected to give birth vaginally to a low birthweight infant. • We used intrapartum symphysis-fundal height (SFH) ≤ 32 cm as a predictor for low birthweight (Mohanthy et al. 1998; Bothner et al. 2000). As the actual birthweight could only be assessed after delivery, we accepted an error of 500 g (20%) and included newborns up to 3000 g. • N = 108 babies but this included all gestations. <p>Exclusion criteria</p>

Tiemersma 2015 (Continued)

- Women admitted in advanced labour; multiple pregnancies; twin pregnancies; history of PPH; various maternal complications (antepartum blood loss, PIH, pre-eclampsia and gestational diabetes).
- Infants initially randomised but subsequently not studied were those who needed resuscitation, those who ended up being delivered by CS, those with major congenital abnormalities, those with a tight nuchal cord and those with a birthweight over 3000 g.

Interventions

Intervention: DCC

- Cord clamped between 120 secs and 180 secs after birth
- N = 88 babies but this includes all gestations - 26 babies were preterm

Comparator: ECC

- Cord clamped within 30 secs
- N = 93 babies but this includes all gestations - 24 babies were preterm

Additional information

- Gestational subgroup: mixed gestation
- Resuscitation with cord intact: not available
- Access to NICU: yes
- Length of delay: 120-180 secs
- Baby placed: mother's abdomen
- Uterotonic: before cord clamping
- UCM: n/a

Comparison 1

DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by gestation)

Subgroup 3: mixed gestation

Comparison 2:

DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by type intervention)

Subgroup 5: DCC at > 2 mins with baby level with uterus and placenta

Outcomes

Primary

- Difference between the Hb obtained from the cord blood and the Hb at 2 months.

Secondary

- Hyperviscosity syndrome
- Hyperbilirubinaemia on the first day postnatally
- Infant iron status 2 months later.

Also:

- mortality, weight; length; head circumference; Hb and changes from baseline; anaemia; MCV; ferritin; transferrin saturation; breastfeeding; formula feeding; mixed feeding; positive HIV PCR result

Notes

Setting: Stanger Provincial Hospital in Stanger, KwaZulu-Natal, South Africa.

Dates: February to October 2012

Declaration of interest: not reported

Trial funding source: quote: "This study was supported by the Otto Kranendonk Fund of the Netherlands Society for Tropical Medicine and International Health and Drager Medical South Africa (Pty) Ltd. The funding organisations did not participate in the study design, collection, analysis and interpretation

Tiemersma 2015 (Continued)

of data. They had no participation either in the writing of the report or in the decision to submit the manuscript for publication.”

Further information

- S Tiemersma kindly provided data on the preterm babies (26 randomised to DCC and 24 to ECC) on 11 December 2015. The only data helpful to this review were that on infant mortality.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "Computer generated blocks of 10 participants"
Allocation concealment (selection bias)	Low risk	Quote: "...sequentially numbered sealed opaque envelopes. Randomisation cards were not reused in case of post-randomisation exclusion."
Blinding of participants and personnel (performance bias) All outcomes	High risk	Quote: "The nature of the intervention prevented us from blinding the study."
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Quote: "The nature of the intervention prevented us from blinding the study." Not stated whether assessment postnatally was done by blinded assessors or not. If unblinded, unlikely to have influenced Hb/Hct or non-subjective measures but may have influenced clinical judgement, e.g. regarding hyperviscosity diagnosis in the intervention. However, no diagnoses were made of this in either group – reduced effect of bias.
Incomplete outcome data (attrition bias) All outcomes	High risk	77 out of 181 randomised were excluded (42.5%) because birthweight was > 3 kg. also 7/88 (8%) babies in DCC group excluded because they needed resuscitation and had ECC. None in ECC group were excluded for this.
Selective reporting (reporting bias)	Unclear risk	Reported data on all primary and secondary objectives mentioned as well as reported non-significant parameters. However, we have not assessed trial protocol.
Other bias	Unclear risk	There were no differences between groups with respect to maternal age, maternal nutritional status, HIV-positivity, Hb, birthweight, gestational age, gender or cord blood values. Not using ITT because they excluded babies in DCC group who got ECC.

Ultee 2008

Methods	Randomised controlled trial
Participants	Inclusion criteria <ul style="list-style-type: none"> • Mother-infant pairs 34-36 weeks' gestation • Vaginal births only • N = 41 babies Exclusion criteria

Ultee 2008 (Continued)

- Congenital abnormality, maternal diabetes, expected serious perinatal pathology, and twins. Reasons for exclusion included post randomisation criteria: Apgar scores < 5 at 1 min, < 7 at 5 mins.

Interventions
Intervention: DCC

- Cord clamped after 180 secs
- Infant placed on mother's abdomen
- N = 21 babies

Comparator: ECC

- Cord clamped within 30 secs (mean 13.4 secs (SD 5.6))
- Infant placed on mother's abdomen
- N = 20 babies

Additional information

- Gestational subgroup: > 32-34 weeks' gestation
- Resuscitation with cord intact: not available
- Access to NICU: yes
- Length of delay: 3 mins
- Baby placed: mother's abdomen
- Uterotonic: no information
- UCM: n/a

Comparison 1

DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by gestation)

Subgroup 2: > 32-34 weeks' gestation

Comparison 2

DCC with neonatal resuscitation after cord clamping vs ECC (subgroup by type intervention)

Subgroup 5: DCC at > 2 mins with baby level with uterus and placenta

Outcomes

Outcomes:

- Blood glucose levels at 1, 2 and 3 hrs of age, Hb and Hct at 1 hr and 10 weeks. Ferritin at 10 weeks.

Notes

Setting: the Netherlands

Dates: not reported

Declaration of interest: report no competing interests.

Trial funding source: not reported

Further information

- Control group < 30 secs, but actual time < 20 secs.
- Blinded box with loose papers. 4 (10%) post randomisation exclusions. Data for 37/41 (90%) reported, with 34/41 (83%) for follow-up at 10 weeks.

Risk of bias
Bias
Authors' judgement
Support for judgement

Ultee 2008 (Continued)

Random sequence generation (selection bias)	Unclear risk	Quote: "... subjects were randomly assigned ... by pulling the category out of a blinded box with loose papers". The same person carried out randomisation, delivered clinical care and collected some outcome data".
Allocation concealment (selection bias)	High risk	Quote: "... subjects were randomly assigned ... by pulling the category out of a blinded box with loose papers". The same person carried out randomisation, delivered clinical care and collected some outcome data."
Blinding of participants and personnel (performance bias) All outcomes	High risk	It is not possible to blind clinicians at baby's birth and it is unclear if women knew or not.
Blinding of outcome assessment (detection bias) All outcomes	High risk	It was stated that some clinical staff were unaware of groups assignment. However, the same person delivered care and assessed Apgar score and low score was a reason for post-randomisation exclusion (although this would not have been assessed until AFTER the designated intervention period).
Incomplete outcome data (attrition bias) All outcomes	Low risk	41 were randomised and outcome data were available for 37 (4/41 = 10% loss).
Selective reporting (reporting bias)	Unclear risk	Assessment of bias from published study report. We did not assess trial protocol.
Other bias	High risk	Groups appeared similar at baseline. There were 4 post-randomisation exclusions, 2 because of protocol violations and a further 1 because of a low Apgar score at 1 and 5 mins and 1 for congenital malformation. Exclusion because of an outcome which is assessed after randomisation (low Apgar) raises concern about potential for bias. Appears to be no ITT analysis as they excluded protocol violations.

BP: blood pressure
 BPD: bronchopulmonary dysplasia
 BUN: blood urea nitrogen
 BW: birthweight
 cm: centimetres
 CP: cerebral palsy
 CS: caesarean section
 DCC: delayed cord clamping
 ECC: early cord clamping
 EPO: erythropoietin
 hr(s): hour(s)
 Hb; haemoglobin
 Hct: haematocrit
 HR: heart rate
 IM: intramuscular
 ITT: intention to treat
 IU: international unit
 IUGR: intrauterine growth restriction
 IV: intravenous
 IVH: intraventricular haemorrhage
 LOS: late onset sepsis
 MCV: mean cell volume
 MDI: Mental Development Index
 mins: minutes
 MRP: manual removal of the placenta
 n/a: not applicable

NICU: neonatal intensive care unit
 NIPB: non-invasive blood pressure
 NIRS: near-infrared spectroscopy
 NEC: necrotising enterocolitis
 OR: odds ratio
 PDA: Patent ductus arteriosus
 PIH: pregnancy-induced hypertension
 PPH: postpartum haemorrhage
 PRBC: packed red blood cell
 PVH: periventricular haemorrhage
 PVL: periventricular leukomalacia
 RBC: red blood cell
 RCT: randomised controlled trial
 RDS: respiratory distress syndrome
 Rh: Rhesus
 RoP: retinopathy of prematurity
 RR: risk ratio
 SD: standard deviation
 sec(s): second(s)
 SVC: superior vena cava
 UCM: umbilical cord milking
 VB: vaginal birth
 vs: versus

Characteristics of excluded studies [ordered by study ID]

Study	Reason for exclusion
Aitchison	Trial plan only. No data recorded with this citation (Aitchison).
Akhtar 2014	Babies at term not preterm (Akhtar 2014).
Ashish 2017	Does not fit with the objectives of the review as the authors compared 2 different lengths of delayed cord clamping (≥ 180 seconds versus ≤ 60 seconds) (Ashish 2017).
Chopra 2016	Study includes a different population of babies (≥ 35 weeks who were small for gestational age). Although some preterm babies would be included in this study, the mean gestational age of those providing data was around 37.6 weeks and the study was not stratified by gestational age. In addition, there was a loss of 42% of data.
Frank 1967	This was a non-randomised study in which delayed cord clamping was defined as that performed after the second breath (Frank 1967).
Garabedian 2016	Not an RCT. A cohort study of a continuous series compared with a historical continuous series (Garabedian 2016).
Ibrahim 2000	Randomised trial with adequate concealment. The intervention consisted of a delay in cord clamping of 20 seconds. Control infants had their cords clamped immediately. The study was excluded for the reason that the intervention group at a cord clamping time of less than 30 seconds. Delay of cord clamping was defined in the protocol for this review to be of at least 30 seconds duration (Ibrahim 2000).
Katheria 2016	The comparison is ventilation during delayed cord clamping (V-DCC) compared with delayed cord clamping alone (DCC only). DCC was 60 seconds in both groups (Katheria 2016).
Kattwinkel 2016	This study is a comparison of ventilation before or after clamping, either with standard ventilation or CPAP.

Study	Reason for exclusion
Mungkornkaew 2015	Does not fit with the objectives of the review as the authors compared 2 different lengths of delayed cord clamping (2 minutes versus 1 minute) (Mungkornkaew 2015).
Narendra 1998	Abstract only, further details on women and study not available from the authors (Narendra 1998).
Ruangkit 2015	Not an RCT but compared with historical cohort (Ruangkit 2015).
Saigal 1972	Sequential allocation procedure, which is not a randomised trial (Saigal 1972).
Saigal 1977	Sequential allocation procedure, which is not a randomised trial (Saigal 1977).
Spears 1966	Randomisation procedure was unclear. Gestational age of the low birthweight infants was not given (Spears 1966).
Taylor 1963	Inadequate randomisation. Largely term infants. DCC > 1 minute vs ECC < 1 minute quote: "...patients were assigned in rotation..." i.e. quasi randomised so excluded. Also report randomisation of premature infants failed (Taylor 1963).
Tipwaree 2015	Study included women and babies at term only (Tipwaree 2015).
Yadav 2015	Study included women and babies at term only (Yadav 2015).
Yasmeen 2014	Does not fit with the objectives of the review as the authors compared 2 different lengths of delayed cord clamping (≥ 3 minutes versus ≤ 1 minute) (Yasmeen 2014).
Zisovska 2008	Quasi-RCT reported as quote: "...randomised alternatively..." (Zisovska 2008).

CPAP: continuous positive airway pressure

DCC: delayed cord clamping

ECC: early cord clamping

RCT: randomised controlled trial

Characteristics of studies awaiting assessment [ordered by study ID]

Das 2018a

Methods	Randomised controlled trial
Participants	
Interventions	
Outcomes	
Notes	New report identified in November 2018 to add to Das 2018 study - to be assessed in next update

El-Naggar 2018

Methods	Randomised controlled trial
Participants	
Interventions	

El-Naggar 2018 *(Continued)*

Outcomes

Notes New report identified in November 2018 to be added to [El-Naggar 2016](#) - to be assessed in next update

Hu 2015

Methods Randomised controlled trial

Participants Babies born between 28 and 35 weeks' gestation.

Interventions Group A: ECC (10 secs)

Group B: DCC (30 secs)

Group C: DCC (60 secs)

Group D; DCC 120 secs)

Outcomes

Notes Seeking full text of thesis. Interlibrary loans service (UK) received no reply from Zhejiang University (November 2017) Conference abstract published in 2017 but no data reported.

Hua 2010

Methods

Participants

Interventions

Outcomes

Notes Awaiting translation help.

Kazemi 2017

Methods Randomised controlled trial

Participants

Interventions

Outcomes

Notes New study identified in November 2018 - to be assessed in next update

Leal 2018

Methods	Randomised controlled trial
Participants	
Interventions	
Outcomes	
Notes	New study identified in November 2018 - to be assessed in next update

Li 2018

Methods	Randomised controlled trial
Participants	
Interventions	
Outcomes	
Notes	New study identified in November 2018 - to be assessed in next update

Medina 2014

Methods	
Participants	
Interventions	
Outcomes	
Notes	Awaiting translation from Spanish. Only part translated into English in paper is title "Late clamping of the umbilical cord in premature neonates: The real haemodynamic benefits". Looks like an additional report of Mercer 2006 - awaiting confirmation.

Ram Mothan 2018

Methods	Randomised controlled trial
Participants	
Interventions	
Outcomes	
Notes	New study identified in November 2018 - to be assessed in next update

Song 2017

Methods	Randomised controlled trial
Participants	
Interventions	
Outcomes	
Notes	New study identified in November 2018 - to be assessed in next update

Wang 2018

Methods	Randomised controlled trial
Participants	
Interventions	
Outcomes	
Notes	New report identified in November 2018 to be added to Mercer 2016 - to be assessed in next update

Weeks 2018

Methods	Randomised controlled trial
Participants	
Interventions	
Outcomes	
Notes	New study identified in November 2018 - to be assessed in next update

DCC: delayed cord clamping
 ECC: early cord clamping
 secs: seconds

Characteristics of ongoing studies *[ordered by study ID]*
Aghai 2018

Trial name or title	Umbilical cord milking in neonates who are depressed at birth (MIDAB)
Methods	
Participants	
Interventions	

Aghai 2018 (Continued)

Outcomes

Starting date

Contact information

Notes

 Trial registration: <https://clinicaltrials.gov/ct2/show/NCT03657394>
Al-Wassia 2016

Trial name or title	Deferred cord clamping compared to umbilical cord milking in preterm infants
Methods	RCT
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Preterm infants < 32 weeks' gestation • Anticipate 180 infants recruited <p>Exclusion criteria</p> <ul style="list-style-type: none"> • Any proven or suspected congenital or chromosomal abnormalities; placenta previa or abruption; cord prolapse; known Rh sensitisation; fetal hydrops; monochorionic multiples
Interventions	<p>Intervention: DCC</p> <ul style="list-style-type: none"> • Clamping at 60 secs • Baby held at level of placenta at vaginal birth and at mother's thighs for caesarean section <p>Comparator: Umbilical cord milking (UCM)</p> <ul style="list-style-type: none"> • Manually stripping 20 cm of cord segment toward the umbilicus over a period of 2-3 secs 3 times before cord clamping. <p>Comparison 5:</p> <p>DCC with neonatal resuscitation after cord clamping vs UCM (subgroup by gestation)</p> <p>S1: < 32-34 weeks' gestation</p> <p>Comparison 6:</p> <p>DCC with neonatal resuscitation after cord clamping vs UCM (subgroup by type of intervention)</p> <p>S3: DCC at 1-2 mins with baby level with uterus and placenta</p>
Outcomes	<p>Primary</p> <p>IVH at 28 days</p> <p>Secondary</p> <p>Need for resuscitation; Apgar score at 1 minute; Apgar score at 5 minutes; need for blood transfusion during hospital stay; venous Hb; venous Hct; bilirubin; maximum bilirubin level; polycythaemia; RDS; oxygen dependency; need for volume administration; use of inotropes; NEC; mortality in hospital; sepsis</p>
Starting date	January 2017 (anticipated end date January 2019)
Contact information	Heidi Al-Wassia, King Abdulaziz University, Jeddah, Saudi Arabia.

Al-Wassia 2016 (Continued)

Notes	Trial Registration: NCT02996799
	Trial funding source:
	Declaration of interest:

Allam 2018

Trial name or title	Delayed fetal cord clamping in premature labour: the effect on fetal haemoglobin, bilirubin and neonatal death, maternal haemoglobin, neonatal ICU admission and postpartum haemorrhage,
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Methods	
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Participants	
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Interventions	
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Outcomes	
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Starting date	
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Contact information	
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Notes	Trial registration: https://www.anzctr.org.au/Trial/Registration/TrialReview.aspx?ACTRN=12618000758202
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Anusha 2017

Trial name or title	Early cord clamping versus delayed cord clamping in very low birthweight neonates.
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Methods	Multi-centre RCT
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Participants	Inclusion criteria Low birthweight babies: < 1500 g. Estimated birthweight antenatally
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Exclusion criteria

Interventions	Intervention: DCC <ul style="list-style-type: none"> • Delay of 30 secs Comparator: ECC <ul style="list-style-type: none"> • Clamping at < 10 secs Comparison: C1 S1
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Outcomes	Haemodynamic stability; blood transfusions; IVH; iron deficiency anaemia; hyperbilirubinaemia; polycythaemia.
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Starting date	02/02/2017
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Anusha 2017 (Continued)

Contact information	Anusha S, 1st floor, Department of Pediatrics, WC Block, Kasturba Hospital, Manipal, Udupi, KAR-NATAKA 576104 India. Tel: 8197188444. Email: anushacoolanu@gmail.com
Notes	Setting: India Clinical Trials: CTRI/2017/01/007671 Trial funding source: Declaration of interest:

Bhriguvanshi 2017

Trial name or title	The effects of umbilical cord milking in neonates requiring resuscitation at birth: a randomised controlled trial
Methods	RCT
Participants	Inclusion criteria <ul style="list-style-type: none"> • Neonates > 28 weeks. So term and preterm. Exclusion criteria <ul style="list-style-type: none"> • Antenatally detected major congenital anomalies; cord prolapse; placenta previa or development of placental abruption; hydrops; umbilical cord abnormalities like true knot; refusal by the obstetrician
Interventions	Intervention: UCM <ul style="list-style-type: none"> • Milking x3 at 10 cm/s then clamped at 2-3 cm from umbilicus Comparator: ECC <ul style="list-style-type: none"> • Clamping at < 30 secs) Comparison
Outcomes	Hb and Hct; Apgar scores; cord pH; resuscitation; transfusion; jaundice; phototherapy; inotropes; RDS; NEC; IVH; PVL; CPD; RoP; sepsis; mortality; neurodevelopment
Starting date	31/08/2017
Contact information	Arpita Bhriguvanshi, Department of Pediatrics, King Georges Medical University, Lucknow, UTTAR PRADESH, 226003, India. Telephone: 7376865064, Email: arpime84@gmail.com
Notes	Setting: India Trial registration: CTRI/2017/08/009484. Trial funding source: Declaration of interest:

Bienstock 2011

Trial name or title	Milking the umbilical cord versus immediate clamping in preterm infants < 33 weeks: a randomised controlled trial
Methods	Randomised controlled trial
Participants	Preterm neonates born between 24 0/7 and 32 6/7
Interventions	<p>Intervention</p> <p>UCM: umbilical cord will be "milked" in direction towards neonate 4 times over the course of 10 minutes</p> <p>Comparator</p> <p>ECC: immediate cord clamping</p>
Outcomes	<p>Primary</p> <ul style="list-style-type: none"> Hb within 24 hours of birth <p>Secondary</p> <ul style="list-style-type: none"> 1-min Apgar 5 min Apgar Blood Sugar upon admission to NICU Temperature on admission to NICU Cord blood pH Blood pressure upon admission to NICU Number of volume challenges in first 24 hours of life Days requiring ventilation Neonatal death Length of hospital stay IVH Number and volume of blood transfusions Duration of phototherapy Maximum serum bilirubin
Starting date	September 2011
Contact information	Contact: Christopher Wayock, Tel: 01 4106145143 Email: cwayock1@jhmi.edu
Notes	<p>Trial Registration: NCT01819532</p> <p>Trial funding source:</p> <p>Declaration of interest:</p> <p>Comparison 3.</p>

Caroli 2017

Trial name or title	Early versus delayed umbilical cord clamping in preterm infants born at less than 31 weeks of gestational age: a study to know which one is better for infant health
Methods	A multicentre randomised controlled trial

Carroli 2017 (Continued)

Participants	Women and infants between 24 and 30 ⁺⁶ gestation. Target 700 women and babies.
Interventions	DCC (90 secs) vs DCC (30 secs)
Outcomes	Sepsis, Apgar, IVH
Starting date	29/06/2015. Expected finish date 30/12/2020.
Contact information	Dr Guillermo Carroli, Centro Rosarino de Estudios Perinatales, Moreno 878, 6th Floor, Rosario 2000 Argentina.
Notes	Sponsor: Pan American Health Organisation (PAHO) - research organisation - government funded Need new comparison - next update. Trial funding source: Declaration of interest:

Chamnanvanakij 2015

Trial name or title	Effect of delayed cord clamping versus cord milking in infants born at < 34 weeks' gestation: a randomised controlled trial
Methods	Randomised controlled trial
Participants	Pregnant women who have preterm labour at 25 to 34 weeks of gestation
Interventions	Intervention DCC: deferred cord clamping (60 seconds) Comparator UCM: umbilical cord milking (3-4 times)
Outcomes	Primary • Hct within 2 hours after birth Secondary • Haemodynamic status • Rates of complications • Blood transfusion • Blood pressure • Heart rate
Starting date	4 April 2015
Contact information	Sangkae Chamnanvanakij, Department of Pediatrics, Phramongkutklo Hospital 315 Rajavithree Rd, Bangkok, Postal code: 10400, Thailand. Phone: 66850712700. Email: chamnanvanakij@gmail.com
Notes	Trial registration: TCTR20150106001 Comparison 2.

De Paco Matallana 2013

Trial name or title	Randomised study of delayed cord clamping versus early cord clamping in preterm infants born between 24 and 34 weeks
Methods	Randomised controlled trial
Participants	Women who are expected to give birth below 34 weeks of gestation.
Interventions	<p>Intervention</p> <p>DCC: cord clamping 45-60 seconds after birth</p> <p>Comparator</p> <p>ECC: cord clamping within 10 seconds</p>
Outcomes	<p>Primary</p> <ul style="list-style-type: none"> Evaluation of neonatal Hb, Hct and bilirubin levels within the first 7 days after birth <p>Secondary</p> <ul style="list-style-type: none"> Neonatal Hb, Hct and ferritin at 6 months of life will be evaluated by blood sampling Neonatal complications (IVH, NEC, retinopathy, sepsis, respiratory problems, days on ventilation or oxygen, need for phototherapy, transfusions) and days in the neonatal intensive care will be evaluated by medical history review Cardiac output in the first week after birth will be measured by echocardiography Blood loss in the mother (blood test 48 hours after birth) Neurodevelopmental assessment of newborns at the age of 2-3 years in both groups of the study will be test by Bayley Scales of Infant Development.
Starting date	01 February 2011 to 01 September 2014
Contact information	Dr Catalina De Paco Matallana, C/Alhelies 4. Edif. Al Andalus 3E El Ranero 30009 Spain. +34676672617 +34676672617 Email: katy.depaco@gmail.com
Notes	<p>Trial registration: ISRCTN66018314</p> <p>Setting: Clinic University Hospital 'Virgen de la Arrixaca', Murcia, Spain</p> <p>Trial funding source: Sistema Murciano de Salud, Spain</p> <p>Declaration of interest:</p>

Dempsey 2016

Trial name or title	Clamping the Umbilical cord In Premature Deliveries (CUPID): a randomised controlled pilot trial
Methods	A randomised controlled pilot trial.
Participants	Preterm infants
Interventions	<p>Intervention 1: DCC (60 secs)</p> <p>Intervention 2: ECC (< 20 secs)</p>

Dempsey 2016 (Continued)

	Intervention 3: UCM
Outcomes	Infant outcomes: ECG brain activity; Apgar; haemodynamics; sepsis; NEC; death. Maternal outcomes:
Starting date	1 July 2015. Expected finish 1 July 2017.
Contact information	Prof Eugene Dempsey, Department of Paediatrics and Child Health, Cork University Maternity Hospital, Wilton, Cork, Ireland.
Notes	<p>Trial registration: ISRCTN92719670</p> <p>Trial funding source: University College Cork (research organisation).</p> <p>Declaration of interest:</p>

Driggers 2013

Trial name or title	Delayed umbilical cord clamping versus cord milking in preterm neonate - a randomised, controlled trial
Methods	Randomised controlled trial
Participants	Singleton or multiples pregnancies in women admitted for medically indicated delivery or in advanced spontaneous preterm labour with imminent delivery at 24 0/7 - 28 6/7 weeks' gestation. Women ages 18 and older
Interventions	<p>Intervention 1</p> <p>DCC: delay cord clamping for 30 seconds after birth</p> <p>Intervention 2</p> <p>UCM: milking of the cord 4 times in 10 seconds</p> <p>Comparator</p> <p>ECC: immediate cord clamping</p>
Outcomes	<p>Primary</p> <ul style="list-style-type: none"> Adverse neonatal event: composite of bronchopulmonary dysplasia (BPD), necrotising enterocolitis (NEC), grade 3 or 4 intraventricular haemorrhage (IVH) or periventricular leukomalacia (PVL), or death prior to discharge home <p>Secondary</p> <ul style="list-style-type: none"> Maternal estimated blood loss Estimated blood loss at delivery Any grade IVH Severe IVH (grade 3 or 4) PVL BPD Peak transcutaneous and/or serum bilirubin concentrations Phototherapy Requirement and length of phototherapy Inotropic support

Driggers 2013 (Continued)

- Requirement and length of inotropic support
- NICU length of stay
- Sepsis
- NEC
- RDS
- Number of blood transfusions while in the neonatal intensive care unit
- Ventilator time
- Apgar score < 7 at 5 minutes
- Umbilical cord pH < 7.0
- Blood pressure on admission to neonatal intensive care unit
- Polycythemia
- Hematocrit on admission to NICU
- Neonatal death
- Length of 3rd stage of labour
- Time period between birth of the baby and delivery of the placenta
- Use of uterotonic agents
- Maternal blood transfusion
- Manual removal of placenta
- Operating time for caesarean delivery

Starting date	December 2011 to January 2013
Contact information	Rita W Driggers, MD, Washington Hospital Center, Georgetown University Hospital
Notes	<p>Trial registration: NCT01393834</p> <p>Sponsors: Medstar Research Institute</p> <p>Declarations of interest:</p> <p>Comparisons 1;2;3</p>

Gomaa 2017

Trial name or title	The hematologic impact of umbilical cord milking versus deferred cord clamping in premature neonates. a randomised controlled trial
Methods	Randomised controlled trial
Participants	Premature infants (24 to 35 weeks' gestation)
Interventions	DCC (60 secs) versus UCM (5 times)
Outcomes	Haematological parameters
Starting date	1 December 2016. Estimated finish date 1 January 2018.
Contact information	<p>Mohamed K Gomaa, MD. 00966/0501783606; mekano_1@yahoo.com</p> <p>Hytham Atia, MD. 00966/0538308500; hythamatia@gmail.com</p>
Notes	<p>Trial registration: NCT03147846</p> <p>Setting: Zagazig, Saudi Arabia</p>

Gupta 2018

Trial name or title	Early versus delayed cord clamping in IUGR preterms a randomised controlled study
Methods	
Participants	
Interventions	
Outcomes	
Starting date	
Contact information	
Notes	Trial registration: http://www.ctri.nic.in/Clinicaltrials/pmaindet2.php?trialid=25064

Haghshenas 2014

Trial name or title	Comparative study of the effect of delayed versus early cord clamping on the incidence of intraventricular haemorrhage in preterm neonate
Methods	Randomised controlled trial
Participants	Premature infants; delivered via caesarean section; gestational age of less 32 weeks; birthweight of less than 1500 g
Interventions	<p>Intervention</p> <p>DCC: cord clamping within 30 to 45 seconds of life</p> <p>Comparator</p> <p>ECC: cord clamping in the first 10 seconds of life</p>
Outcomes	<p>Primary</p> <ul style="list-style-type: none"> • IVH • Brain ultrasonography • Survival of the infant
Starting date	20 March 2014 to 20 March 2015
Contact information	Mohsen Haghshenas, NICU ward, Ayatollah Rouhani Hospital, Babol University of Medical Sciences, Babol Babol Mazandaran, Islamic Republic Of Iran. Phone: 00981132238290 Email: matia.mojaveri@yahoo.com
Notes	<p>Trial registration: IRCT2014091319145N1</p> <p>Sponsor: Babol University of Medical Sciences</p>

Hao 2018

Trial name or title	Effect of delayed cord clamping versus umbilical cord milking on cerebral blood flow in preterm infant: a randomised, double-blind controlled trial
Methods	
Participants	
Interventions	
Outcomes	
Starting date	
Contact information	
Notes	Trial registration: http://www.chictr.org.cn/showproj.aspx?proj=30981

Hemmati 2014

Trial name or title	Comparing the effect of delayed versus immediate cord clamping on the incidence of intraventricular haemorrhage (IVH) in preterm neonates with gestational age = 34 weeks in Hafez and Zeynab hospitals from September 2012 to December 2013.
Methods	
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Preterm infants; \leq 34 weeks' gestation <p>Exclusion criteria</p> <ul style="list-style-type: none"> • Decline to participate; refuse of neonatologist or obstetrician; severe congenital anomalies; need for immediate resuscitation after birth in neonate or mothers; placenta abruption or placenta previa; umbilical cord clamped in a time other than what is considered.
Interventions	<p>Intervention: DCC</p> <ul style="list-style-type: none"> • 30-45 seconds delay in clamping of umbilical cord <p>Comparator: ECC</p> <ul style="list-style-type: none"> • Immediate cord clamping - 10 to 15 seconds after birth
Outcomes	<p>Primary</p> <ul style="list-style-type: none"> • IVH <p>Secondary</p> <ul style="list-style-type: none"> • Hb • Hct • Platelets • Bilirubin • Apgar scores at 1 min and 5 mins
Starting date	September 2012

Hemmati 2014 (Continued)

Contact information	Dr. Fariba Hemmati, Neonatal part, Nemazee Hospital, Zand Street, Shiraz, Fars, Iran, Islamic Republic. Email: hemmatif@sums.ac.ir
Notes	IRCT2014031116936N1. Retrospective registration: May 17, 2014 Iran September 2012 to December 2013

Holland 1998

Trial name or title	Placento-fetal (autologous) transfusion at birth in infants born preterm: a randomised, controlled trial.
Methods	Randomised controlled trial
Participants	Infants < 32 weeks' gestation.
Interventions	Intervention: DCC <ul style="list-style-type: none"> • Delay of 40 to 90 seconds with positioning of the infant below the placenta as far as possible. Comparator: <ul style="list-style-type: none"> • Write to ask is this is early cord clamping - and at what time.
Outcomes	Primary outcome <ul style="list-style-type: none"> • Median arterial/alveolar PO2 ratio over the first 24 hours of life. Secondary outcome <ul style="list-style-type: none"> • CRIB score • RCV • Transfusion requirements
Starting date	1998
Contact information	BM Holland Queen Mother's Hospital Glasgow G3 8SH
Notes	Trial completed in 2001. Results not available. 2 centres have published part of their centre's results (Aladangady 2006 ; Baenziger 2007).

Isac 2017

Trial name or title	Effect of umbilical cord milking of late preterm and term infants on maternal and neonatal outcomes in a tertiary care hospital in South India: a randomised control trial.
Methods	Randomised, parallel group, placebo-controlled trial. Permuted block randomisation, fixed. Sequentially-numbered, sealed, opaque envelopes. Participant and Investigator blinded.
Participants	Inclusion criteria

Effect of timing of umbilical cord clamping and other strategies to influence placental transfusion at preterm birth on maternal and infant outcomes (Review)

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Isac 2017 (Continued)

- Term and preterm infants > 35 weeks.

Exclusion criteria

Interventions	<p>Intervention: umbilical cord milking (UCM)</p> <ul style="list-style-type: none"> • Neonates born under the milking group will be positioned at the level of the uterus (approximately 20 cm away), in vaginal delivery and on the thighs of mother in caesarean section. An assistant will milk the cord while holding it at the introitus or caesarean delivery wound with 1 hand and milking the umbilical cord for its remaining accessible whole length toward the neonate at a speed of 10 cm/s 3 times. The cord would be clamped after the third time. <p>Comparator: ECC</p> <ul style="list-style-type: none"> • The neonates born under this group will undergo early cord clamping without milking.
Outcomes	<p>Primary</p> <ul style="list-style-type: none"> • Infant Hb and Hct measured using a portable haemoglobinometer at 3 days and 6 weeks. <p>Secondary</p> <ul style="list-style-type: none"> • Postpartum complications at birth; Infant bilirubin (trans cutaneous bilirubin) at 3 days; Need for photo therapy a 3 days of age till discharge.
Starting date	3 November 2017. Estimated duration 1 year.
Contact information	<p>Scientific enquiry: Dr Mini Isac, Professor, Dept. of Obstetrics and Gynecology MOSC Medical College Hospital, Kolenchery, Ernakulam, KERALA 682311, India. Email: drminiisac@gmail.com</p> <p>Public enquiry: Anu Anna George, Post Graduate, Dept. of Obstetrics and Gynecology MOSC MMH Kolenchery, Ernakulam, KERALA 682311, India. Email: annamed013@gmail.com</p>
Notes	Sample size: 142.

Jomjak 2018

Trial name or title	To compare the effects of delayed versus early cord clamping on neonatal outcomes in preterm (gestational age at >24 weeks to 36+6 weeks) and maternal outcomes
Methods	
Participants	
Interventions	
Outcomes	
Starting date	
Contact information	
Notes	Trial registration: http://www.clinicaltrials.in.th/index.php?tp=regtrials&menu=trialssearch&menu=fulltext&task=search&task2=view1&id=3833

Katheria 2017

Trial name or title	Premature Infants Receiving Milking or Delayed Cord Clamping: PREMOD2 (PREMOD2) and PREMOD2 With Near Infrared Spectroscopy Sub-study (PREMOD2)
Methods	<p>Randomised, parallel assignment.</p> <p>It is not possible to blind the delivering obstetrician, however all other caregivers will be blinded. The procedure will be documented as "placental transfusion" in the delivery summary or admission-progress notes and all study assessments whether primary (head US) or secondary (neurodevelopmental exams) will be performed by blinded team members.</p>
Participants	<p>Inclusion criteria:</p> <ul style="list-style-type: none"> • Preterm infants - 23 - 31⁺⁶ weeks' gestation • Multiples unless monochorionic <p>Exclusion criteria:</p> <ul style="list-style-type: none"> • Congenital anomalies; major cardiac defects; placental abruption or previa with haemorrhage; cord prolapse; hydrops; bleeding accreta; monochorionic multiples (i.e. Di/Mo or Mo/Mo twins); fetal or maternal risk (i.e. compromise); parents declined study; unlikely to return for 2 yr follow up.
Interventions	<p>Intervention: DCC</p> <ul style="list-style-type: none"> • Cord clamped at > 60 secs. <p>Comparator: Umbilical cord milking</p> <ul style="list-style-type: none"> • UCM
Outcomes	<p>Primary:</p> <ul style="list-style-type: none"> • Death or neurodevelopmental impairment at 2 years corrected gestational age • Any intraventricular haemorrhage (grades 1-4) • Severe intraventricular haemorrhage (bleeding in the brain parenchyma and/or ventricular dilation) • Hemoglobin/hematocrit at 4 hours <p>Secondary:</p> <ul style="list-style-type: none"> • Delivery room interventions (Time frame: In the first 10 minutes of life) • Resuscitation interventions including positive pressure ventilation, continuous positive airway pressure, intubation, chest compressions and medications • Blood pressure on admission, 6, 12, 18 and 24 hours of life
Starting date	June 6, 2017
Contact information	<p>Anup Katheria: Email: anup.katheria@sharp.com</p> <p>Kathy Arnell: Email: kathy.arnell@sharp.com</p>
Notes	<p>'Premature Infants Receiving Milking or Delayed Cord Clamping: PREMOD2'</p> <p>Recruiting 1500 infants. Dates aiming for: June 2017 to Dec 2020 (complete 2022)</p> <p>Setting: Canada, Germany, Ireland, United States</p> <p>Sponsor: Sharp HealthCare</p> <p>Declarations of interest:</p>

Katheria 2017 (Continued)

Substudy: assessing Near IR spectroscopy for cerebral oxygenation in 400 infants.
Comparison 5 and 6

Katheria 2018

Trial name or title	Umbilical Cord Milking in Non-Vigorous Infants Developmental Follow-up (MINVI-FU) (MINVIFU)
Methods	
Participants	
Interventions	
Outcomes	
Starting date	
Contact information	
Notes	Trial registration: https://clinicaltrials.gov/ct2/show/NCT03621943

Liu 2018

Trial name or title	Delayed cord clamping prevents respiratory distress of infants delivered by selective caesarean section in between 34-38 weeks of gestational age, a randomised controlled trial
Methods	
Participants	
Interventions	
Outcomes	
Starting date	
Contact information	
Notes	Trial registration: http://www.chictr.org.cn/showproj.aspx?proj=30199

Martin 2013

Trial name or title	Timing of umbilical cord clamping after vaginal or caesarean preterm birth.
Methods	Randomised controlled trial
Participants	Inclusion criteria <ul style="list-style-type: none"> Preterm birth - 23 - 37 weeks' gestation

Martin 2013 (Continued)

- N = 72

Exclusion criteria

- Multiple gestation/known intrauterine fetal death unable to sign consent.

Interventions	Intervention: DCC <ul style="list-style-type: none"> • Delay at 40 secs • Delay at 60 secs Comparator: ECC <ul style="list-style-type: none"> • Immediate cord clamping at 20 secs
Outcomes	Primary <ul style="list-style-type: none"> • IVH - number and severity Secondary <ul style="list-style-type: none"> • Red blood cell transfusions
Starting date	December 2012
Contact information	James Martin, University of Mississippi Medical Center
Notes	NCT01766908 Completion date: June 2014

Mirzaeian 2018

Trial name or title	Investigation and comparison of neonatal complications of 2 methods of umbilical cord milking and early cord clamping in neonates
Methods	
Participants	
Interventions	
Outcomes	
Starting date	
Contact information	
Notes	Trial registration: https://en.irct.ir/trial/29424

Nour 2018a

Trial name or title	Effect of delayed cord clamping in preterm neonates with placental insufficiency
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Nour 2018a *(Continued)*

Methods

Participants

Interventions

Outcomes

Starting date

Contact information

Notes

 Trial registration: <https://clinicaltrials.gov/ct2/show/NCT03731546>
Nour 2018b

Trial name or title

Impact of umbilical cord milking in preterm neonates with placental insufficiency

Methods

Participants

Interventions

Outcomes

Starting date

Contact information

Notes

 Trial registration: <https://clinicaltrials.gov/ct2/show/NCT03731611>
Panichkul 2015

Trial name or title

Effects of delayed versus early cord clamping in late preterm infants: a randomised controlled trial.

Methods

Randomised controlled trial

Participants

Inclusion criteria

- Pregnant women who have preterm labour at 34-36 weeks of gestation and delivery at Phramongkutklao Hospital

Exclusion criteria

- Pregnant women who have multiple gestations prenatal diagnosis of fetal major congenital anomalies a plan to withhold neonatal resuscitation placental previa or abruption with active bleeding non-reassuring fetus coagulopathy and those who refuse to participate in the study

Interventions

Intervention: DCC

- Delay - 60 secs

Panichkul 2015 (Continued)

	Comparator: ECC <ul style="list-style-type: none"> • Immediate - 10 secs
Outcomes	Primary <ul style="list-style-type: none"> • Hct at 2 hrs Secondary <ul style="list-style-type: none"> • Hct at 6 hrs • Bilirubin at 6 hrs
Starting date	Not yet recruiting (as per 6 Jan 2015)
Contact information	Prisana Panichkul, Department of Obstetrics and Gynecology, Phramongkutkloao Hospital 315 Rajavithree Rd, Bangkok 10400, Thailand. Email: boonsuki@gmail.com
Notes	TCTR20150107001 Thailand

Perlman 2015

Trial name or title	The effects of delayed cord clamping on postnatal circulatory status in preterm neonates.
Methods	Randomised controlled trial
Participants	Inclusion criteria <ul style="list-style-type: none"> • Premature infants between 28 and 34 6/7 weeks Exclusion criteria <ul style="list-style-type: none"> • Suspected placental abruption; bleeding from placenta previa; terminal bradycardia; cord prolapse; meconium; any major congenital anomalies
Interventions	Intervention: DCC <ul style="list-style-type: none"> • Delay - 60 secs Comparator: ECC <ul style="list-style-type: none"> • Clamp at 30 secs
Outcomes	Primary <ul style="list-style-type: none"> • Hct at 1 hour Secondary
Starting date	July 2015
Contact information	Jeffrey M Perlman, jmp2007@med.cornell.edu
Notes	ClinicalTrials.gov Identifier: NCT02478684

Ping 2010

Trial name or title	Immediate versus delayed cord clamping on newborns.
Methods	Randomised controlled trial several arms.
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Preterm and term infants <p>Exclusion criteria</p> <ul style="list-style-type: none"> • Stillbirths.
Interventions	<p>Intervention 1: DCC</p> <ul style="list-style-type: none"> • Delayed cord clamping after 90 seconds. <p>Intervention 2: DCC</p> <ul style="list-style-type: none"> • Delay cord clamping until pulsations cease. <p>Intervention 3: DCC with stabilisation with cord intact</p> <ul style="list-style-type: none"> • Delay cord clamping until pulsations cease and resuscitate infant during this time. <p>Comparator: ECC</p> <ul style="list-style-type: none"> • Clamping the cord within 10 seconds of birth.
Outcomes	Not specified in trials register.
Starting date	September 2009.
Contact information	Dr Zhang Hong Yu, Hainan Medical Centre, China
Notes	Ongoing trial. ClinicalTrials.gov Identifier: NCT01029496

Puiggros 2014

Trial name or title	Umbilical cord milking compared with delayed cord clamping to increase placental transfusion in preterm infants less than 34 weeks' gestation born by caesarean section. Randomised clinical trial
Methods	Randomised controlled trial
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Preterm babies of less 34 weeks' gestation born by caesarean section • N = 40 <p>Exclusion criteria</p> <ul style="list-style-type: none"> • Inability to obtain informed consent from the mother state; monochorionic-monoamniotic twin gestation; placenta abruption; uterine rupture; transplacental caesarean; hydrops fetalis
Interventions	<p>Intervention: DCC</p> <ul style="list-style-type: none"> • Once the preterm is born the neonatologist keep the baby beside the mother at level of the operating table during 30 seconds without cord clamping. The baby is covered with a polythene bag and put a cap on his head. Then the obstetrician clamps the cord.

Puiggros 2014 (Continued)

Comparator: umbilical cord milking (UCM)

- Once the preterm is born keep the baby from the mother's thighs. The obstetrician cord milking 3 times (2 seconds/milking) taking the cord from the base 20 cm respect towards the baby. Then clamp the cord.

Comparison

Outcomes	<p>Primary</p> <ul style="list-style-type: none"> • Hb <p>Secondary</p> <ul style="list-style-type: none"> • Apgar Score at 1 and 5 minutes • Mean of systolic and diastolic arterial pressure in mm Hg • Total volume of urine at 24 and 48 hours of life. Total mL. • Use of vasopressors drugs during the first 24 hours of life • Total number of concentrate haematite transfusions during the hospital stay. • IVH • BPD • Total intensive care unit stay • Hct
Starting date	July 2014
Contact information	Monica Domingo-Puiggros, MD; Corporacio Sanitaria Parc Tauli, Spain
Notes	<p>ClinicalTrials.gov Identifier: NCT02187510</p> <p>Other study number: CSPTNeonat2014_01</p> <p>Trial is on-going but not recruiting as at July 2014</p>

Ruangkit 2017

Trial name or title	A randomised controlled trial of immediate versus delayed umbilical cord clamping in preterm infants of multiple births
Methods	Randomised controlled trial
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Twins at 28 - 36 weeks' gestation <p>Exclusion criteria</p> <ul style="list-style-type: none"> • Prenatally diagnosed major congenital anomaly in any infants twin to twin transfusion syndrome TTTS or twin anaemic polycythaemica sequence TAPS discordant twins weight difference of more than 20 any intrauterine fetal death hydrops antepartum or intrapartum haemorrhage such as placental abruption or uterine rupture or declination by the medical team obstetrician or paediatrician in performing the intervention
Interventions	<p>Intervention: DCC</p> <ul style="list-style-type: none"> • Clampint at 30-60 secs. • In the DCC group, after each infant is delivered and placed on the mother's perineum (in case of vaginal delivery) or on the thigh (in case of caesarean section), the clamping and cutting of um-

Ruangkit 2017 (Continued)

bilical cord will be delayed for at least 30 seconds but not more than 60 seconds. During the first 30 second, the obstetrician can perform initial resuscitation steps, including providing warmth, newborn repositioning, airway clearance, drying, suctioning, and stimulating. In infants who re-sponse well to initial resuscitation, the clamping and cutting of the cord will be delayed until 60 seconds. However, in infants who do not responded to initial resuscitation or appear non-vigorous, the cord will be clamped and cut at 30 seconds or at any time during 30 to 60 seconds.

Comparator: ECC

- Clamping at < 10 secs
- In the ECC group, after each infant is delivered, the umbilical cord will be clamped and cut immediately by obstetrician (less than 10 seconds).

Outcomes	Primary <ul style="list-style-type: none"> • Infants' Hct level at birth Secondary <ul style="list-style-type: none"> • Echo-cardiogram measurement • Other maternal and infants' relevance clinical outcomes
Starting date	1 March 2016
Contact information	Chayatat Ruangkit, Division of Neonatology, Department of Pediatrics, Faculty of Medicine Ramathibodi Hospital, Bangkok 10400, Thailand. Email: chayatatr@hotmail.com
Notes	Trial reg: TCTR20170125001 Funding source: Faculty of Medicine Ramathibodi Hospital Research Fund Declaration of interest: no information Comparisons 1 and 2

Shahgheibi 2018

Trial name or title	The delayed umbilical cord clamping effects on early outcome in preterm neonates
Methods	
Participants	
Interventions	
Outcomes	
Starting date	
Contact information	
Notes	Trial registration: https://en.irct.ir/trial/17924

Smith 2014

Trial name or title	Delayed clamping and milking the umbilical cord in preterm infants
Methods	Randomised controlled trial
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Preterm infants less 34 weeks • Aiming for 240 babies <p>Exclusion criteria</p> <ul style="list-style-type: none"> • Known congenital anomalies; precipitous delivery preventing completion of the protocol; placental abruption around the time of or as indication for delivery; mother has uterine rupture; non reassuring fetal heart tracing (FHT) immediately prior/leading to delivery; multiple gestation; Parvo B19; infants known to be at risk of anaemia due to isoimmunisation (mother has red blood cell antibodies).
Interventions	<p>Intervention: DCC</p> <ul style="list-style-type: none"> • Cord clamped at 30 secs. • Infant held at or below level of perineum (vaginal delivery) or incision (caesarean delivery). • Exceptions: Placental separation, cord stops pulsating, need for immediate resuscitation, all would result in clamping prior to 30 seconds. <p>Comparator: UCM</p> <ul style="list-style-type: none"> • Infant held and the cord is milked from perineum to infant 4 times. • Infant held at or below level of perineum (vaginal delivery) or incision (caesarean delivery).
Outcomes	<p>Primary</p> <ul style="list-style-type: none"> • Hb and Hct values (H/H) in NICU (time frame: NICU admission to discharge, expected average of 50 days) (Designated as safety issue: no). All H/H values in the neonatal intensive care unit (NICU) will be recorded. <p>Secondary</p> <ul style="list-style-type: none"> • Neonatal transfusions; NEC; intraventricular haemorrhage; length of stay; survival to discharge
Starting date	March 2014 to March 2015
Contact information	Kathleen Smith
Notes	

Tanthawat 2017

Trial name or title	The effect of one-time umbilical cord milking and early cord clamping in preterm infants: a randomised controlled trial (one-time umbilical cord milking)
Methods	Randomised controlled trial
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Infants < 32 weeks' gestation <p>Exclusion criteria</p>

Tanthawat 2017 (Continued)

- Placenta previa or accreta and cord problem; major congenital anomalies; hydrop fetalis; twin-to-twin transfusion syndrome; parents refuse to join the project

Interventions

Intervention: UCM

- Clamp and cut cord at 30 cm from umbilical stump by obstetrician
- 1-time UCM by neonatology fellow/staff at speed of 10 cm/sec
- Clamp and cut cord at 1-2 cm from umbilical stump

Comparator: ECC

- Clamping at < 10 secs
- Clamp and cut cord (1-2 cm from stump) immediately (< 10 sec) after birth

Outcomes

Primary

- Hb and Hct level at admission

Secondary

- Hct BP inotropic drugs and fluid resuscitation urine output total amount of blood transfusion morbid

Starting date

1 March 2016

Contact information

Sopida Tanthawat, Ramathibodi Hospital, Bangkok 10400, Thailand. Email: sopida_tanth@hotmail.com

Notes

Recruitment complete - 40 babies enrolled

Trial reg: TCTR20170201003

Funding source: Ramathibodi hospital, Mahidol University

Declaration of interest:

Thukral 2016

Trial name or title

Comparison of umbilical cord milking with delayed cord clamping in late preterm and term neonates: randomised control trial

Methods

Randomised, parallel group, active controlled trial

Computer-generated randomisation; Sequentially-numbered, sealed, opaque envelopes. Participant and outcome assessor blinded.

Participants

Inclusion criteria

- Late preterm and term infants

Exclusion criteria

- Hydropic baby; Rh isoimmunisation, severe birth, asphyxia, HIV positive mother

Interventions

Intervention: DCC

- Delayed cord clamp of 60 seconds

Comparator: UCM

Thukral 2016 (Continued)

- Umbilical cord is milked in 10 seconds

Outcomes

Primary

- Venous Hct at 48 hours

Secondary

- Ferritin at 6 weeks and venous Hct at 6 weeks

Starting date

20 June 2016

Contact information

Dr Anu Thukral, AIIMS DELHI AIIMS DELHI, South West, DELHI, 110029, India. Email: dranuthukral@gmail.com

Mukul Kumar Mangla, AIIMS DELHI AIIMS DELHI, South West, DELHI, 110029, India. Email: dr-manglamukul@yahoo.co.in

Notes

Setting: India

Primary sponsor: AIIMS DELHI, a research institution and hospital

Declaration of interest:

Trial completed.

Upahyay 2014

Trial name or title

Umbilical cord milking in preterm newborns and its role in prevention of anaemia in early infancy

Methods

Randomised controlled trial

Participants

Inclusion criteria

- Preterm newborn babies of 32-36 weeks of gestation

Exclusion criteria

Interventions

Intervention: umbilical cord milking (UCM)

- Milking 3 times

Comparator: ECC

- Clamp within 30 secs

Outcomes

Primary

- Hb and serum ferritin at 1½ months

Secondary

- Heart rate, respiratory rate blood pressure at 30 min, 24 hrs, 48 hrs Hb, PCV and serum bilirubin at 48 hrs

Starting date

1 September 2013

Contact information

AMIT UPADHYAY, DEPARTMENT OF PEDIATRICS, LLRM MEDICAL COLLEGE, MEERUT Meerut UTTAR PRADESH 250004 India. Phone 9837405009; Email: anuamit7@rediffmail.com

Upahyay 2014 *(Continued)*

Notes CTRI/2014/12/005278 (registered retrospectively)

Varanattu 2017

Trial name or title	Effect of intact umbilical cord milking versus immediate cord clamping on neonatal outcomes and first year neurodevelopmental outcomes in very preterm infants - a randomised controlled trial
Methods	Randomised parallel assignment
Participants	<p>Inclusion criteria</p> <ul style="list-style-type: none"> • Infants < 32 weeks' gestation <p>Exclusion criteria</p>
Interventions	<p>Intervention: UCM</p> <ul style="list-style-type: none"> • Immediately after delivery, the infant will be placed at or ~20 cm below the level of the placenta and about 20 cm of the intact umbilical cord will be milked towards the umbilicus 3 times. The technique consists of pinching the cord close to the placenta and milking about 20 cm segment of the cord proximal to the umbilicus, towards the infant over a 2-second duration. The cord will then be released and allowed to refill with blood for a brief 2-second pause between each milking motion. After completion of milking 3 times, the cord will be clamped close to the umbilicus and the neonate handed over to the neonatal team. The procedure of cord milking will be completed within 20 seconds. <p>Comparator: ECC</p> <ul style="list-style-type: none"> • Umbilical cord will be clamped immediately after delivery and baby will be handed over to the neonatal team.
Outcomes	<p>Primary</p> <ul style="list-style-type: none"> • Hb at birth • Incidence and severity of IVH in the first week of life - cranial ultrasound done on day 7 • Resuscitation interventions <p>Secondary</p> <ul style="list-style-type: none"> • Hypotension • Inotropic support • Sepsis
Starting date	Anticipated 1 September 2017
Contact information	Manoj Varanattu, Email: manojvaranattu@gmail.com Varghese PR, Email: drprvarghese@gmail.com
Notes	

Whitehead 2014

Trial name or title	Effects of delayed cord clamp and/or indomethacin on preterm infant brain injury.
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Whitehead 2014 (Continued)

Methods	
Participants	
Interventions	Intervention: Comparator:
Outcomes	Primary <ul style="list-style-type: none"> Fraction of survivors with no severe IVH (grades 3 or 4) or PVL Secondary <ul style="list-style-type: none"> Occurrence of renal injury and/or dysfunction; haematological status; inflammatory stress; measurement of inflammatory biomarkers; circulating progenitor cell subpopulations; measures of several progenitor cell subtypes in blood during the NICU stay; neurocognitive assessments at post-NICU follow-up
Starting date	August 2014
Contact information	
Notes	ClinicalTrials.gov Identifier: NCT02221219

Xie 2017

Trial name or title	Study on umbilical cord milking to prevent and decrease the severity of anaemia in preterms
Methods	Randomised, parallel assignments
Participants	Inclusion criteria <ul style="list-style-type: none"> Women in labour or with a plan for delivery at a gestational age less than 34 weeks' gestation Singleton pregnancy Informed consent was obtained from the parent Exclusion criteria <ul style="list-style-type: none"> Multiple gestation; diagnosis of any of the following in the current pregnancy: haemorrhage requiring clinic/hospital admission; placental abnormalities; fetal anomalies; Down's syndrome of the fetus; anaemia; diagnosis of pre-eclampsia or eclampsia in current or previous pregnancies; diagnosis at any time for the mother of any of the following: serious diabetes, serious hypertension, chronic renal disease; infant with major congenital malformation; infant with blood disease; unwilling to return for follow-up study visits at the hospital
Interventions	Intervention: UCM <ul style="list-style-type: none"> Infants were placed at or below level of the placenta and about 25 cm of the umbilical cord was vigorously milked towards the umbilicus 2 to 3 times before clamping the cord. The milking speed was about 25 cm/2 seconds Comparator: ECC <ul style="list-style-type: none"> Umbilical cord was clamped immediately, or as close as possible, after delivery of the infant's shoulders. (This was standard practice in the study hospital, thus it served as the "control" group.)
Outcomes	Primary

Xie 2017 (Continued)

- Hb, Hct and ferritin at 48 hours

Secondary

- Hyperbilirubinemia requiring phototherapy
- Infant blood transfusions
- Length of admission
- Complications

Starting date	30 June 2017
Contact information	Lijuan Xie, director, Email: xlj68115@sina.com
Notes	Setting: China Sponsors: Xinhua Hospital, Shanghai Jiao Tong University School of Medicine

Yared 2015

Trial name or title	Delayed cord clamping at 30 vs. 60 seconds for very low birthweight infants: a randomised controlled trial
Methods	
Participants	
Interventions	Intervention: DCC <ul style="list-style-type: none"> • Clamp at 60 secs Comparator: ECC <ul style="list-style-type: none"> • Clamp at 30 secs
Outcomes	
Starting date	January 2015
Contact information	Edom Yared, Email: edom.yared@uchospitals.edu
Notes	ClinicalTrials.gov Identifier: NCT02337088

BPD: bronchopulmonary dysplasia
 cm: centimetres
 CPD: chronic pulmonary disease
 DCC: delayed cord clamping
 ECC: early cord clamping
 Hb; haemoglobin
 Hct: haematocrit
 IUGR: intrauterine growth restriction
 IVH: intraventricular haemorrhage
 NICU: neonatal intensive care unit
 NEC: necrotising enterocolitis
 PCV: packed cell volume
 PVL: periventricular leukomalacia
 RCT: randomised controlled trial
 RCV: red cell volume

RDS: respiratory distress syndrome

Rh: Rhesus

RoP: retinopathy of prematurity

sec(s): second(s)

UCM: umbilical cord milking

vs: versus

DATA AND ANALYSES

Comparison 1. DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by gestation)

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Death of baby (up to discharge)	20	2680	Risk Ratio (M-H, Random, 95% CI)	0.73 [0.54, 0.98]
1.1 < 32-34 weeks gestation	13	2108	Risk Ratio (M-H, Random, 95% CI)	0.71 [0.52, 0.96]
1.2 > 32-34 weeks gestation	3	237	Risk Ratio (M-H, Random, 95% CI)	5.18 [0.25, 105.47]
1.3 Mixed gestation	4	335	Risk Ratio (M-H, Random, 95% CI)	0.80 [0.09, 7.04]
2 Death or neurodevelopmental impairment in early years	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
2.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
2.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
2.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
3 Severe intraventricular haemorrhage (IVH grades 3, 4)	10	2058	Risk Ratio (M-H, Random, 95% CI)	0.94 [0.63, 1.39]
3.1 < 32-34 weeks gestation	9	1972	Risk Ratio (M-H, Random, 95% CI)	0.95 [0.64, 1.42]
3.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
3.3 Mixed gestation	1	86	Risk Ratio (M-H, Random, 95% CI)	0.58 [0.05, 6.11]
4 Intraventricular haemorrhage (IVH, all grades)	15	2333	Risk Ratio (M-H, Random, 95% CI)	0.83 [0.70, 0.99]
4.1 < 32-34 weeks gestation	11	1988	Risk Ratio (M-H, Random, 95% CI)	0.76 [0.56, 1.02]
4.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
4.3 Mixed gestation	4	345	Risk Ratio (M-H, Random, 95% CI)	0.66 [0.38, 1.16]
5 Periventricular leukomalacia (PVL)	4	1544	Risk Ratio (M-H, Random, 95% CI)	0.58 [0.26, 1.30]
5.1 < 32-34 weeks gestation	4	1544	Risk Ratio (M-H, Random, 95% CI)	0.58 [0.26, 1.30]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
5.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
5.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
6 Chronic lung disease (CLD) - oxygen supplement at 36 weeks (corrected for gestation)	6	1644	Risk Ratio (M-H, Random, 95% CI)	1.04 [0.94, 1.14]
6.1 < 32-34 weeks gestation	6	1644	Risk Ratio (M-H, Random, 95% CI)	1.04 [0.94, 1.14]
6.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
6.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
7 Maternal blood loss of 500 mL or greater	2	180	Risk Ratio (M-H, Random, 95% CI)	1.14 [0.07, 17.63]
7.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
7.2 > 32-34 weeks gestation	1	86	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
7.3 Mixed gestation	1	94	Risk Ratio (M-H, Random, 95% CI)	1.14 [0.07, 17.63]
8 Intraventricular haemorrhage (IVH, grades 1 & 2)	9	1968	Risk Ratio (M-H, Random, 95% CI)	0.72 [0.51, 1.02]
8.1 < 32-34 weeks gestation	8	1882	Risk Ratio (M-H, Random, 95% CI)	0.68 [0.45, 1.03]
8.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
8.3 Mixed gestation	1	86	Risk Ratio (M-H, Random, 95% CI)	0.89 [0.37, 2.18]
9 Necrotising enterocolitis (NEC) confirmed by X-ray or laparotomy	11	2010	Risk Ratio (M-H, Random, 95% CI)	0.91 [0.64, 1.28]
9.1 < 32-34 weeks gestation	10	1916	Risk Ratio (M-H, Random, 95% CI)	0.86 [0.60, 1.22]
9.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
9.3 Mixed gestation	1	94	Risk Ratio (M-H, Random, 95% CI)	2.84 [0.58, 13.92]
10 Respiratory Distress Syndrome (RDS)	7	457	Risk Ratio (M-H, Random, 95% CI)	1.09 [0.86, 1.38]
10.1 < 32-34 weeks gestation	3	165	Risk Ratio (M-H, Random, 95% CI)	1.21 [0.64, 2.27]
10.2 > 32-34 weeks gestation	1	86	Risk Ratio (M-H, Random, 95% CI)	0.79 [0.19, 3.30]
10.3 Mixed gestation	3	206	Risk Ratio (M-H, Random, 95% CI)	1.32 [0.52, 3.36]
11 Respiratory support (ventilator or CPAP)	6	325	Risk Ratio (M-H, Random, 95% CI)	0.95 [0.77, 1.16]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
11.1 < 32-34 weeks gestation	5	220	Risk Ratio (M-H, Random, 95% CI)	0.96 [0.78, 1.18]
11.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
11.3 Mixed gestation	1	105	Risk Ratio (M-H, Random, 95% CI)	0.57 [0.16, 2.09]
12 Duration of respiratory support (in days)	1	42	Mean Difference (IV, Random, 95% CI)	-0.60 [-3.04, 1.84]
12.1 < 32-34 weeks gestation	1	42	Mean Difference (IV, Random, 95% CI)	-0.60 [-3.04, 1.84]
12.2 > 32-34 weeks gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
12.3 Mixed gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
13 Surfactant treatment (for severe RDS)	3	145	Risk Ratio (M-H, Random, 95% CI)	0.80 [0.50, 1.28]
13.1 < 32-34 weeks gestation	3	145	Risk Ratio (M-H, Random, 95% CI)	0.80 [0.50, 1.28]
13.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
13.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
14 Treatment for Patent Ductus Arteriosus (PDA) (medical and/or surgical)	10	2046	Risk Ratio (M-H, Random, 95% CI)	1.12 [0.99, 1.26]
14.1 < 32-34 weeks gestation	9	1952	Risk Ratio (M-H, Random, 95% CI)	1.12 [0.99, 1.26]
14.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
14.3 Mixed gestation	1	94	Risk Ratio (M-H, Random, 95% CI)	1.14 [0.24, 5.34]
15 Treatment for Retinopathy of Prematurity (RoP)	8	1827	Risk Ratio (M-H, Random, 95% CI)	0.83 [0.62, 1.12]
15.1 < 32-34 weeks gestation	8	1827	Risk Ratio (M-H, Random, 95% CI)	0.83 [0.62, 1.12]
15.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
15.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
16 Hyperbilirubinemia (treated by phototherapy)	8	495	Risk Ratio (M-H, Random, 95% CI)	1.05 [0.95, 1.16]
16.1 < 32-34 weeks gestation	3	114	Risk Ratio (M-H, Random, 95% CI)	1.01 [0.91, 1.11]
16.2 > 32-34 weeks gestation	2	123	Risk Ratio (M-H, Random, 95% CI)	0.73 [0.38, 1.41]
16.3 Mixed gestation	3	258	Risk Ratio (M-H, Random, 95% CI)	1.17 [0.93, 1.47]
17 Inotropics for low blood pressure	5	250	Risk Ratio (M-H, Random, 95% CI)	0.37 [0.17, 0.81]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
17.1 < 32-34 weeks gestation	5	250	Risk Ratio (M-H, Random, 95% CI)	0.37 [0.17, 0.81]
17.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
17.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
18 Low Apgar as defined by trialists (generally < 8 at 5 mins)	4	1721	Risk Ratio (M-H, Random, 95% CI)	1.07 [0.70, 1.63]
18.1 < 32-34 weeks gestation	3	1637	Risk Ratio (M-H, Random, 95% CI)	1.01 [0.62, 1.62]
18.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
18.3 Mixed gestation	1	84	Risk Ratio (M-H, Random, 95% CI)	1.32 [0.53, 3.31]
19 Blood transfusion in infant	11	2280	Risk Ratio (M-H, Random, 95% CI)	0.66 [0.50, 0.86]
19.1 < 32-34 weeks gestation	8	1995	Risk Ratio (M-H, Random, 95% CI)	0.64 [0.47, 0.87]
19.2 > 32-34 weeks gestation	1	86	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
19.3 Mixed gestation	2	199	Risk Ratio (M-H, Random, 95% CI)	0.67 [0.26, 1.74]
20 Volume of blood transfused (mL)	1	72	Mean Difference (IV, Random, 95% CI)	-6.0 [-26.11, 14.11]
20.1 < 32-34 weeks gestation	1	72	Mean Difference (IV, Random, 95% CI)	-6.0 [-26.11, 14.11]
20.2 > 32-34 weeks gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
20.3 Mixed gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
21 Late sepsis (after 3 days or as defined by trialists)	10	2017	Risk Ratio (M-H, Random, 95% CI)	0.79 [0.56, 1.10]
21.1 < 32-34 weeks gestation	9	1923	Risk Ratio (M-H, Random, 95% CI)	0.76 [0.52, 1.11]
21.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
21.3 Mixed gestation	1	94	Risk Ratio (M-H, Random, 95% CI)	0.87 [0.43, 1.79]
22 Hydrocephalus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
22.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
22.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
22.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
23 Temperature < 36.0°C within 1 hour of birth	1	86	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
23.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

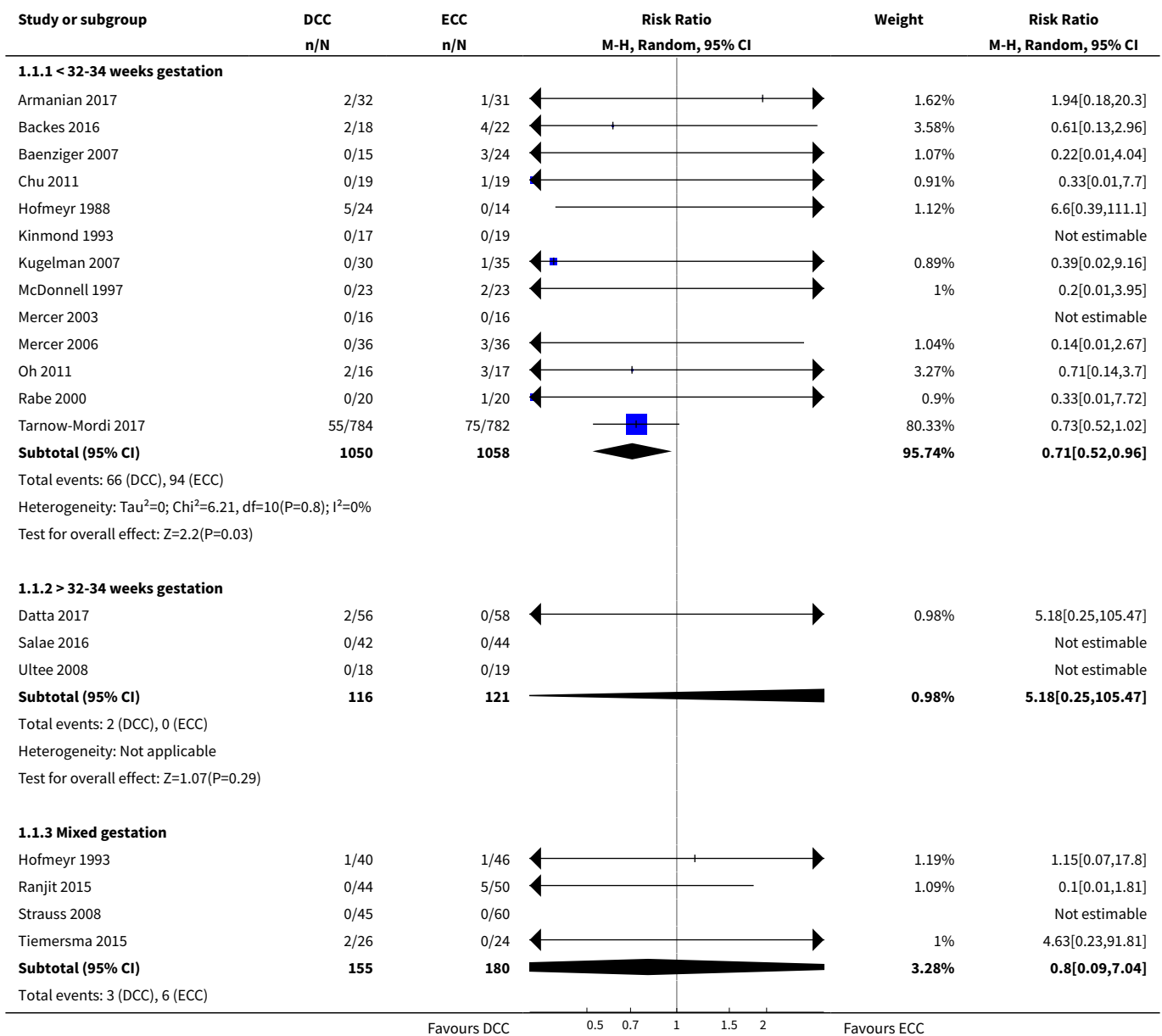
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
23.2 > 32-34 weeks gestation	1	86	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
23.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
24 Hb within 1 st 24 hour of birth (g/dL)	1	42	Mean Difference (IV, Random, 95% CI)	0.80 [-0.02, 1.62]
24.1 < 32-34 weeks gestation	1	42	Mean Difference (IV, Random, 95% CI)	0.80 [-0.02, 1.62]
24.2 > 32-34 weeks gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
24.3 Mixed gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
25 Mean arterial blood pressure in early hours after birth (mm Hg)	4	208	Mean Difference (IV, Random, 95% CI)	2.87 [1.09, 4.64]
25.1 < 32-34 weeks gestation	4	208	Mean Difference (IV, Random, 95% CI)	2.87 [1.09, 4.64]
25.2 > 32-34 weeks gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
25.3 Mixed gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
26 Length of infant stay in NICU	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
26.1 < 32-34 weeks gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
26.2 > 32-34 weeks gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
26.3 Mixed gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
27 Home oxygen	2	101	Risk Ratio (M-H, Random, 95% CI)	0.47 [0.06, 3.72]
27.1 < 32-34 weeks gestation	2	101	Risk Ratio (M-H, Random, 95% CI)	0.47 [0.06, 3.72]
27.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
27.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
28 Neurodevelopmental impairment at age two to three years (Baileys 11 MDI < 70)	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
28.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
28.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
28.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
29 Severe visual impairment	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
29.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

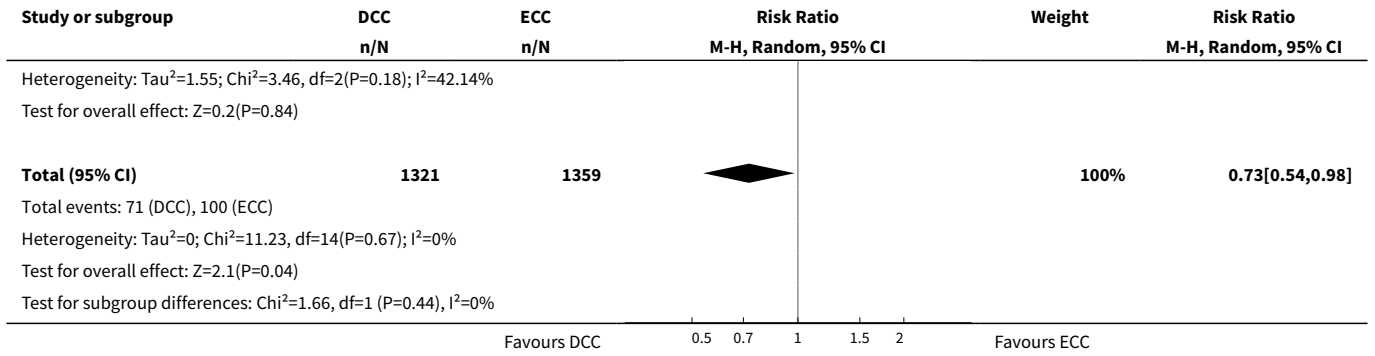
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
29.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
29.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
30 Cerebral palsy (CP)	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
30.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
30.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
30.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
31 Manual removal of placenta (denominator = vaginal births)	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
31.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
31.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
31.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
32 Prolonged third stage (> 30 minutes) (denominator = vaginal births)	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
32.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
32.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
32.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
33 Blood transfusion for mother	1	1176	Risk Ratio (M-H, Random, 95% CI)	0.67 [0.36, 1.24]
33.1 < 32-34 weeks gestation	1	1176	Risk Ratio (M-H, Random, 95% CI)	0.67 [0.36, 1.24]
33.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
33.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
34 Postpartum infection in mother	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
34.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
34.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
34.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
35 Rhesus isoimmunisation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
35.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
35.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
35.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
36 Psychological well being in mother	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
36.1 < 32-34 weeks gestation	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
36.2 > 32-34 weeks gestation	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
36.3 Mixed gestation	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37 Bonding	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37.1 < 32-34 weeks gestation	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37.2 > 32-34 weeks gestation	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37.3 Mixed gestation	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
38 Breastfeeding initiation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
38.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
38.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
38.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
39 Fully breastfed or mixed feeding at infant discharge	1	94	Risk Ratio (M-H, Random, 95% CI)	1.11 [1.00, 1.23]
39.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
39.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
39.3 Mixed gestation	1	94	Risk Ratio (M-H, Random, 95% CI)	1.11 [1.00, 1.23]
40 Maternal anxiety	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
41 Mothers' views	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]

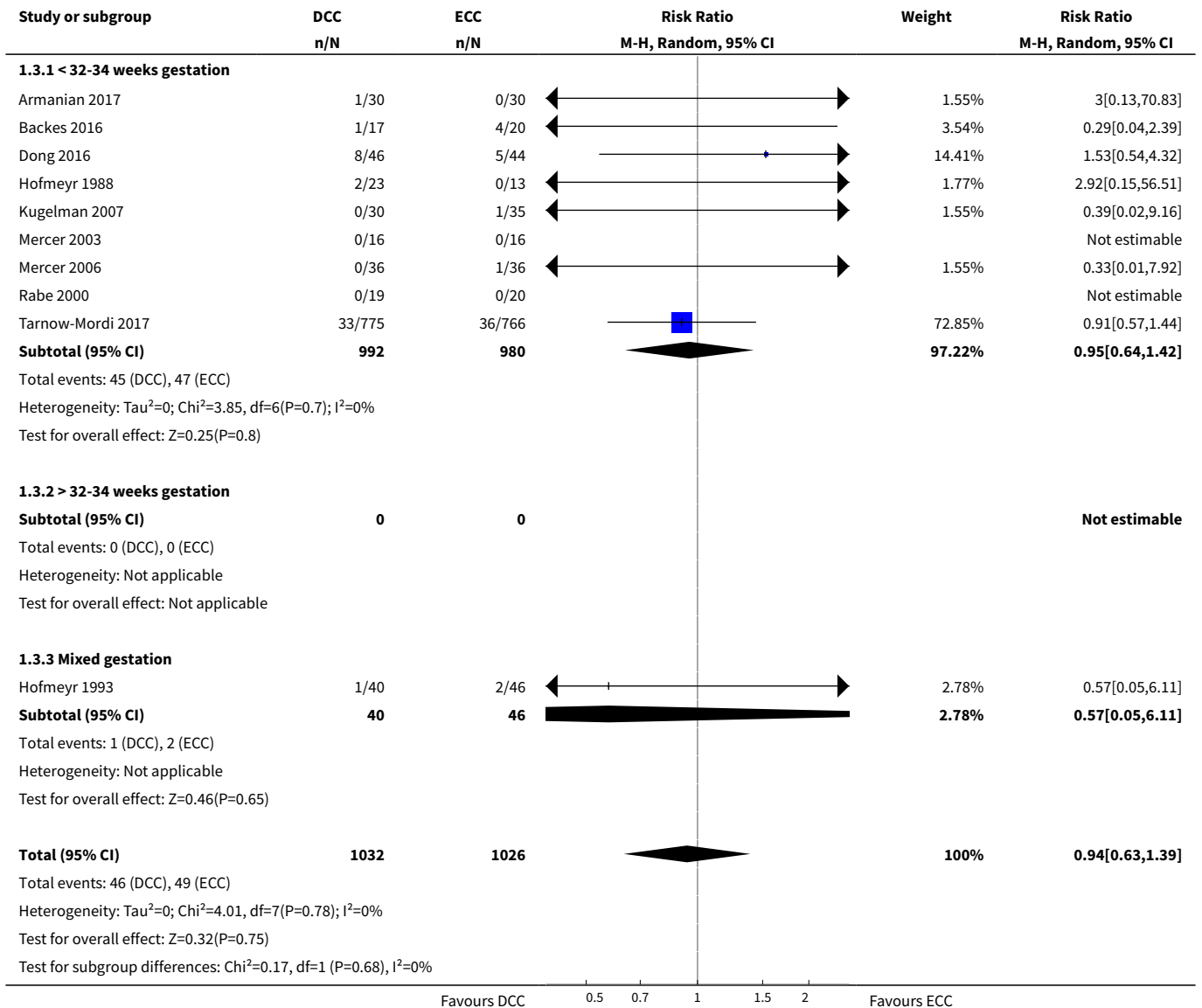
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
41.1 < 32-34 weeks gestation	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
41.2 > 32-34 weeks gestation	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
41.3 Mixed gestation	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]

Analysis 1.1. Comparison 1 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by gestation), Outcome 1 Death of baby (up to discharge).

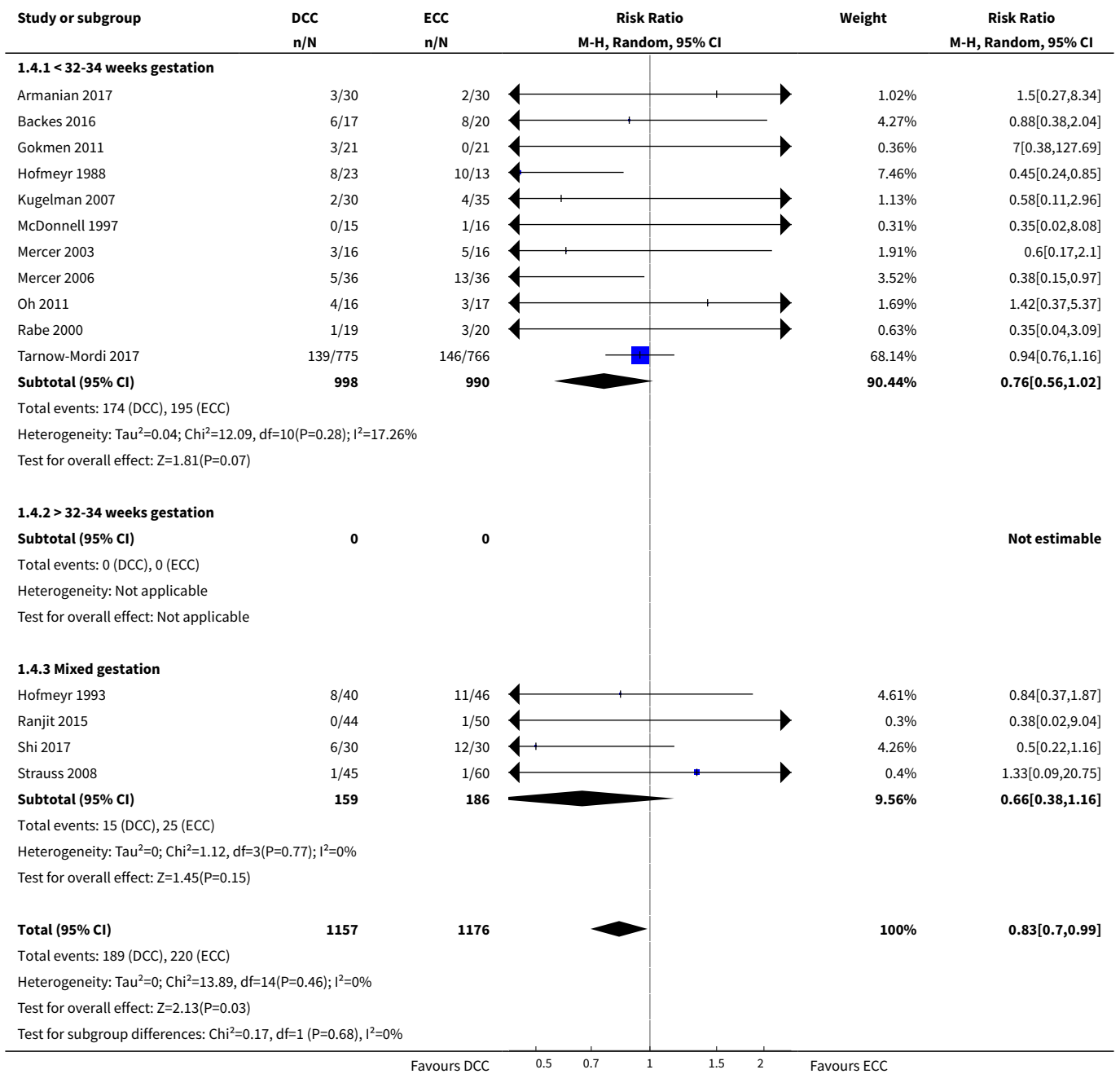




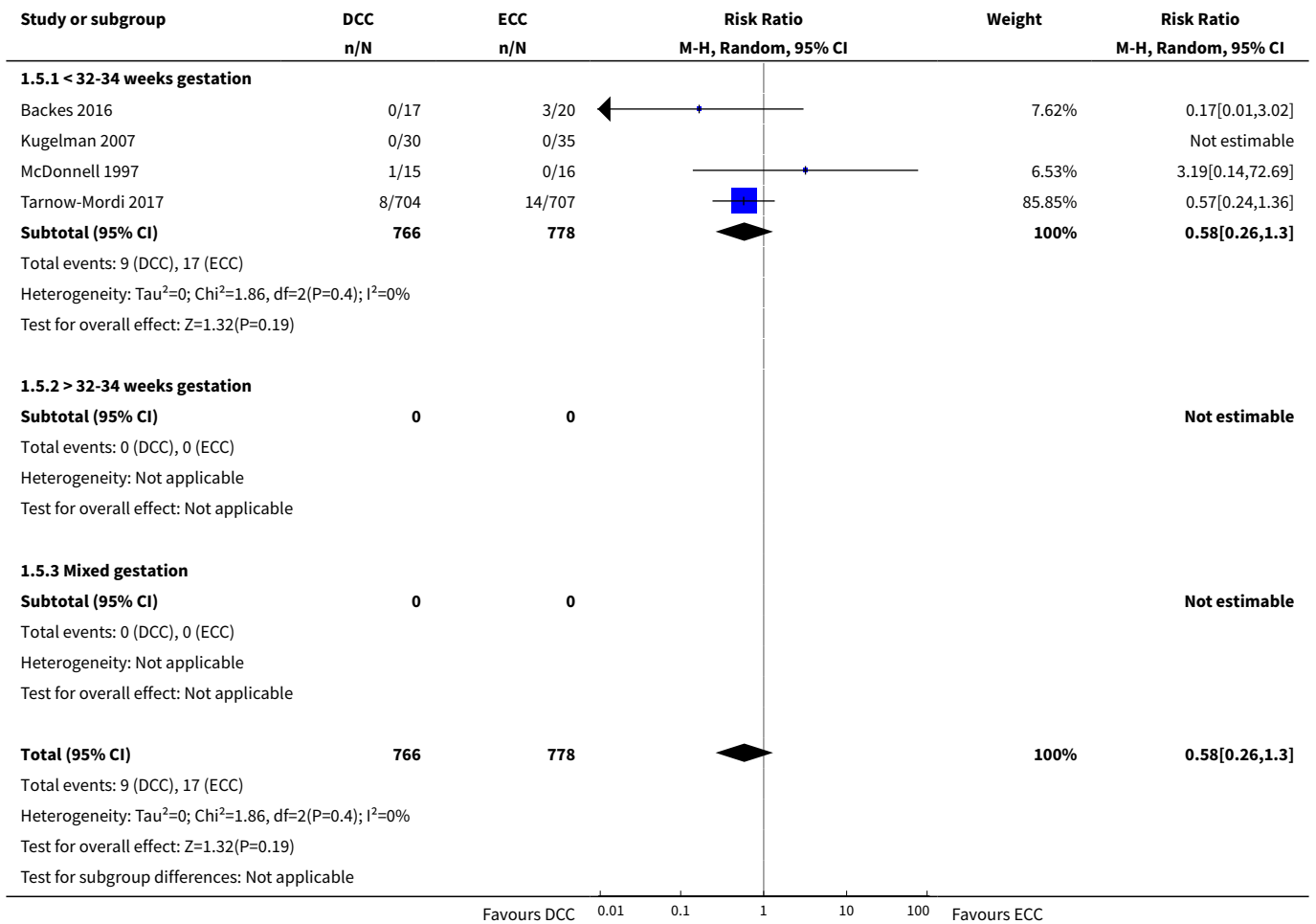
Analysis 1.3. Comparison 1 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by gestation), Outcome 3 Severe intraventricular haemorrhage (IVH grades 3, 4).



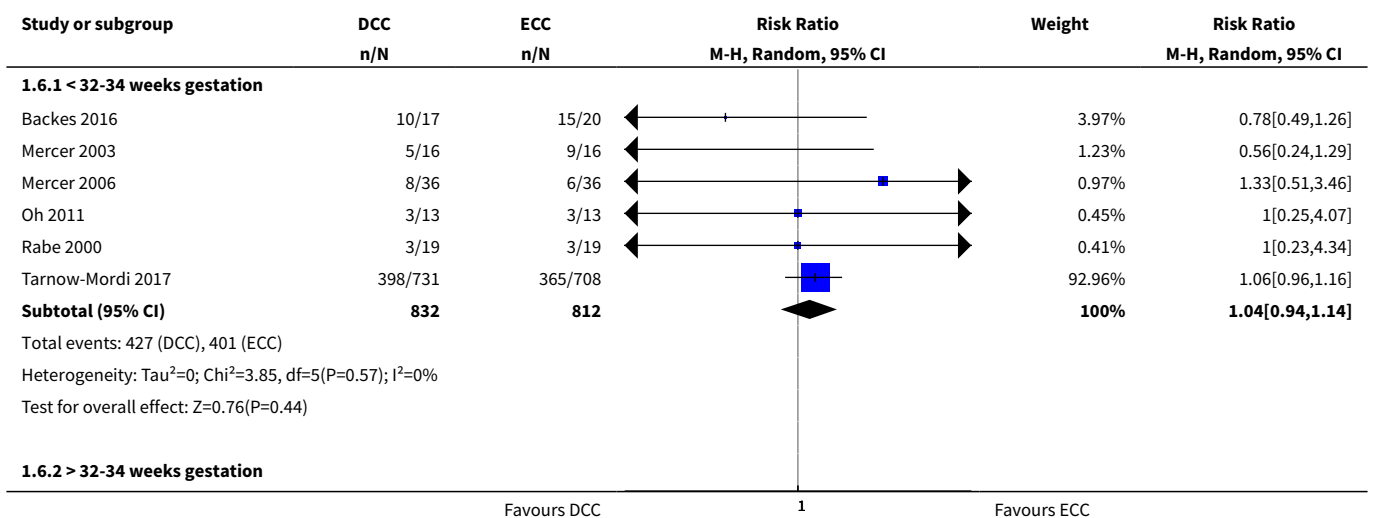
Analysis 1.4. Comparison 1 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by gestation), Outcome 4 Intraventricular haemorrhage (IVH, all grades).



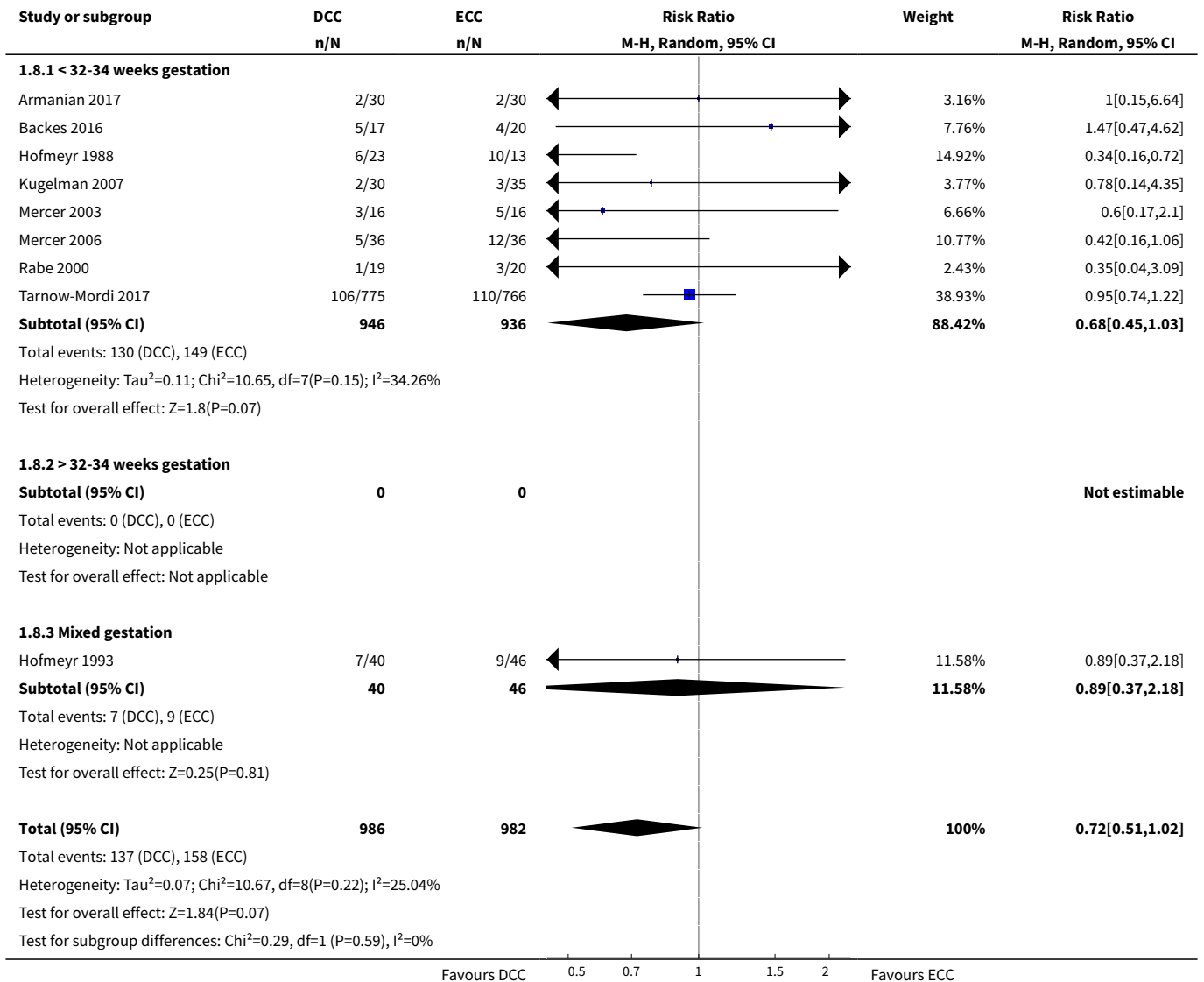
Analysis 1.5. Comparison 1 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by gestation), Outcome 5 Periventricular leukomalacia (PVL).



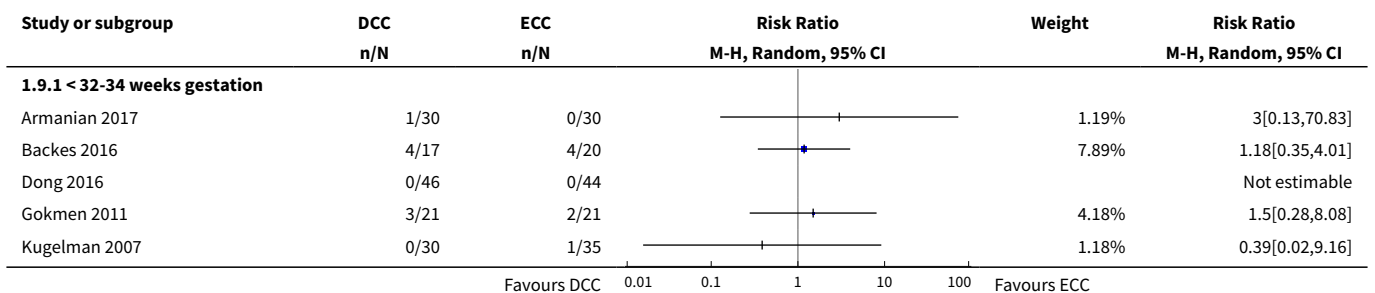
Analysis 1.6. Comparison 1 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by gestation), Outcome 6 Chronic lung disease (CLD) - oxygen supplement at 36 weeks (corrected for gestation).

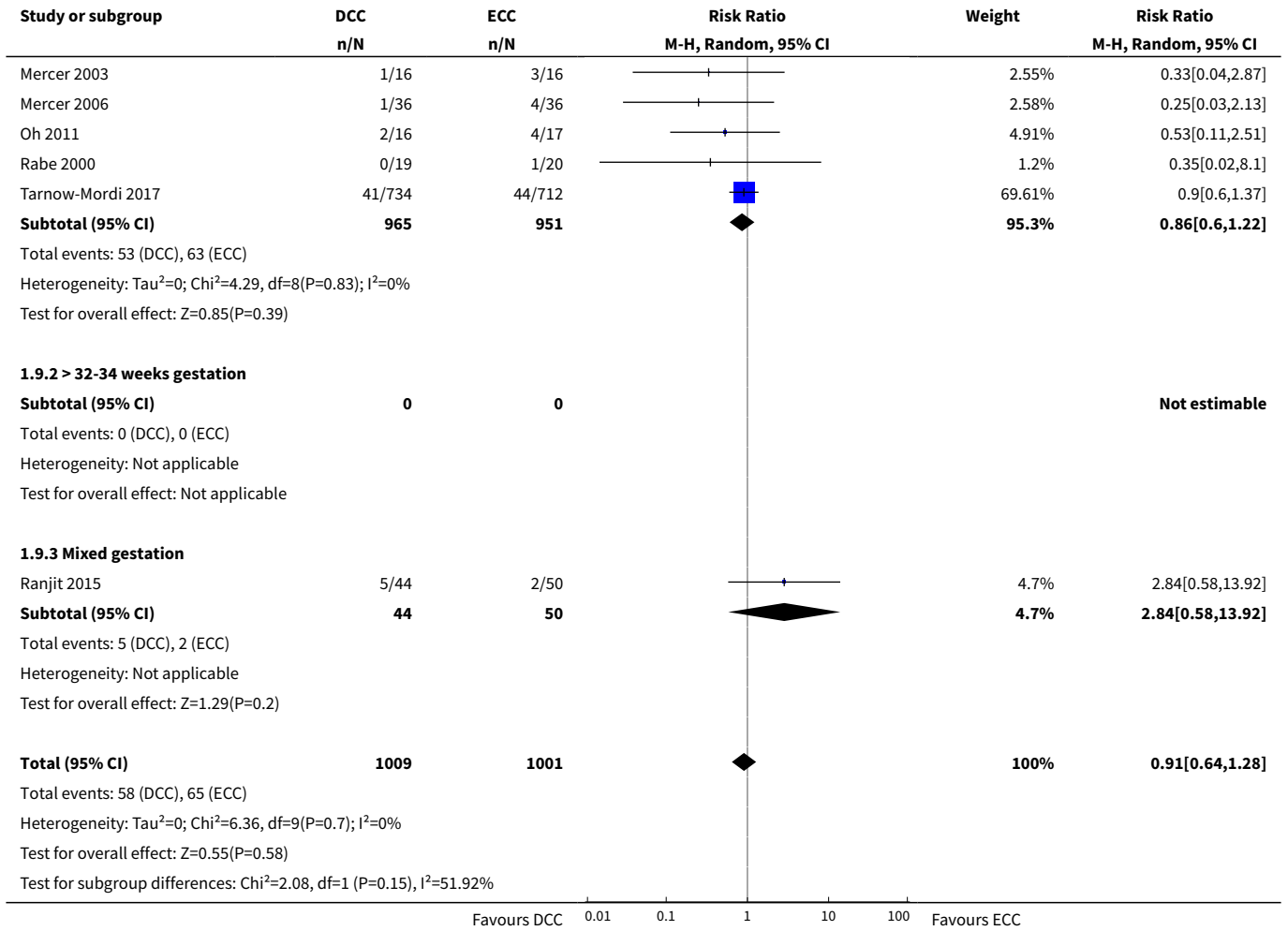


Analysis 1.8. Comparison 1 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by gestation), Outcome 8 Intraventricular haemorrhage (IVH, grades 1 & 2).

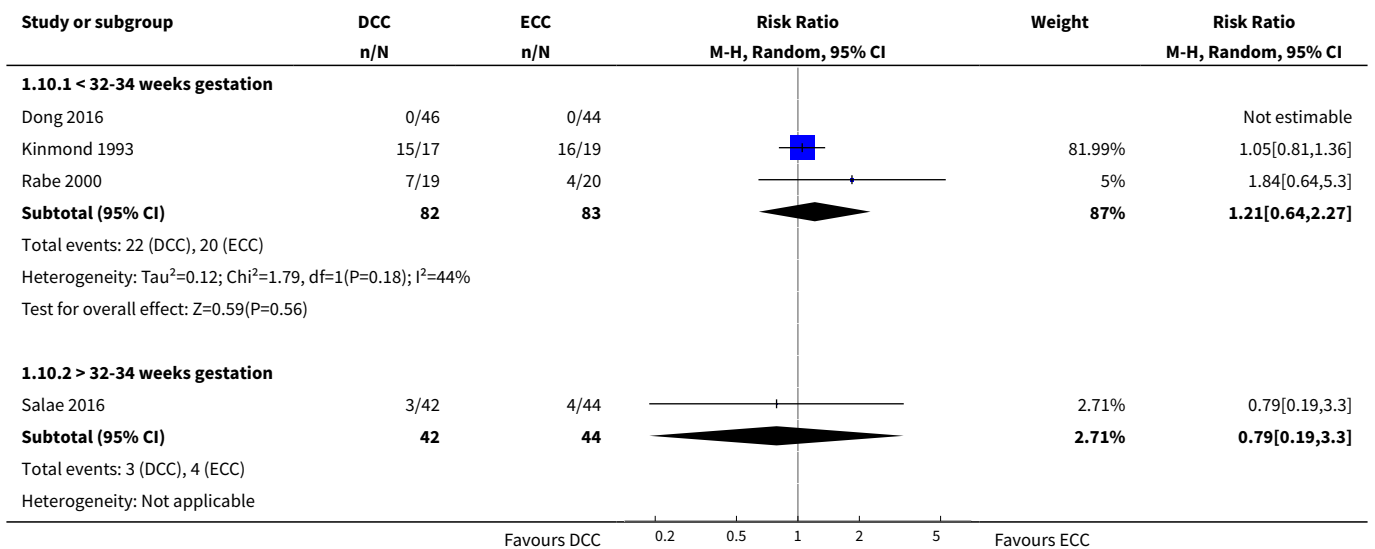


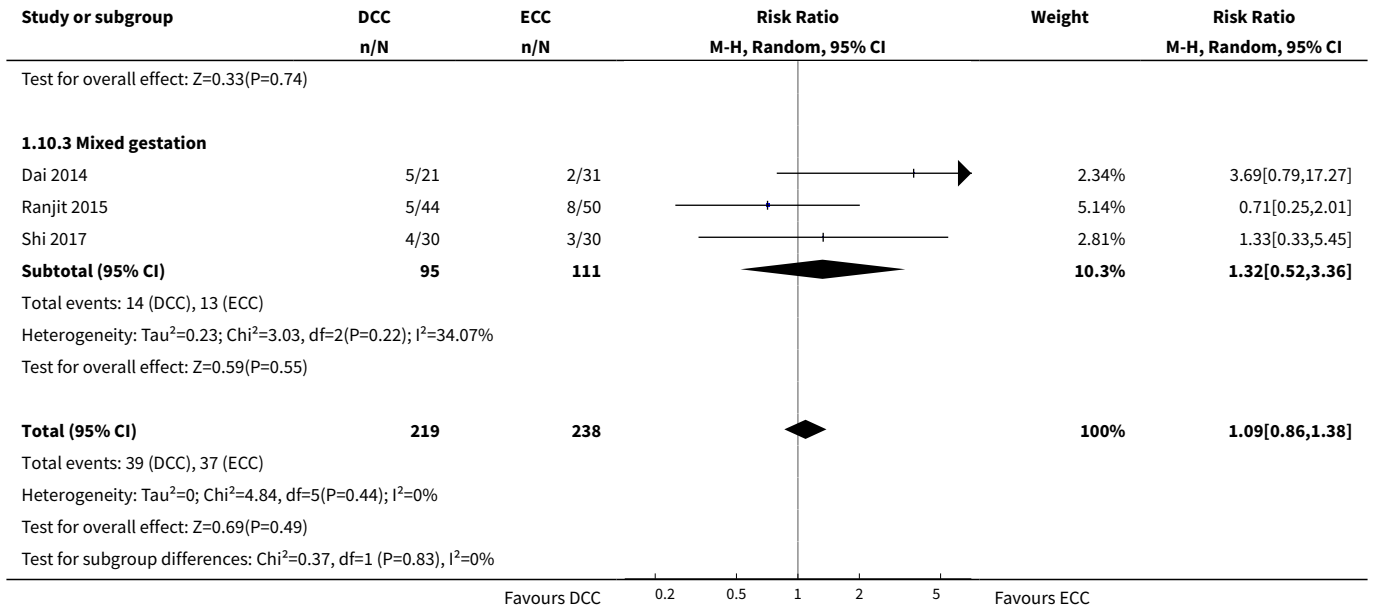
Analysis 1.9. Comparison 1 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by gestation), Outcome 9 Necrotising enterocolitis (NEC) confirmed by X-ray or laparotomy).



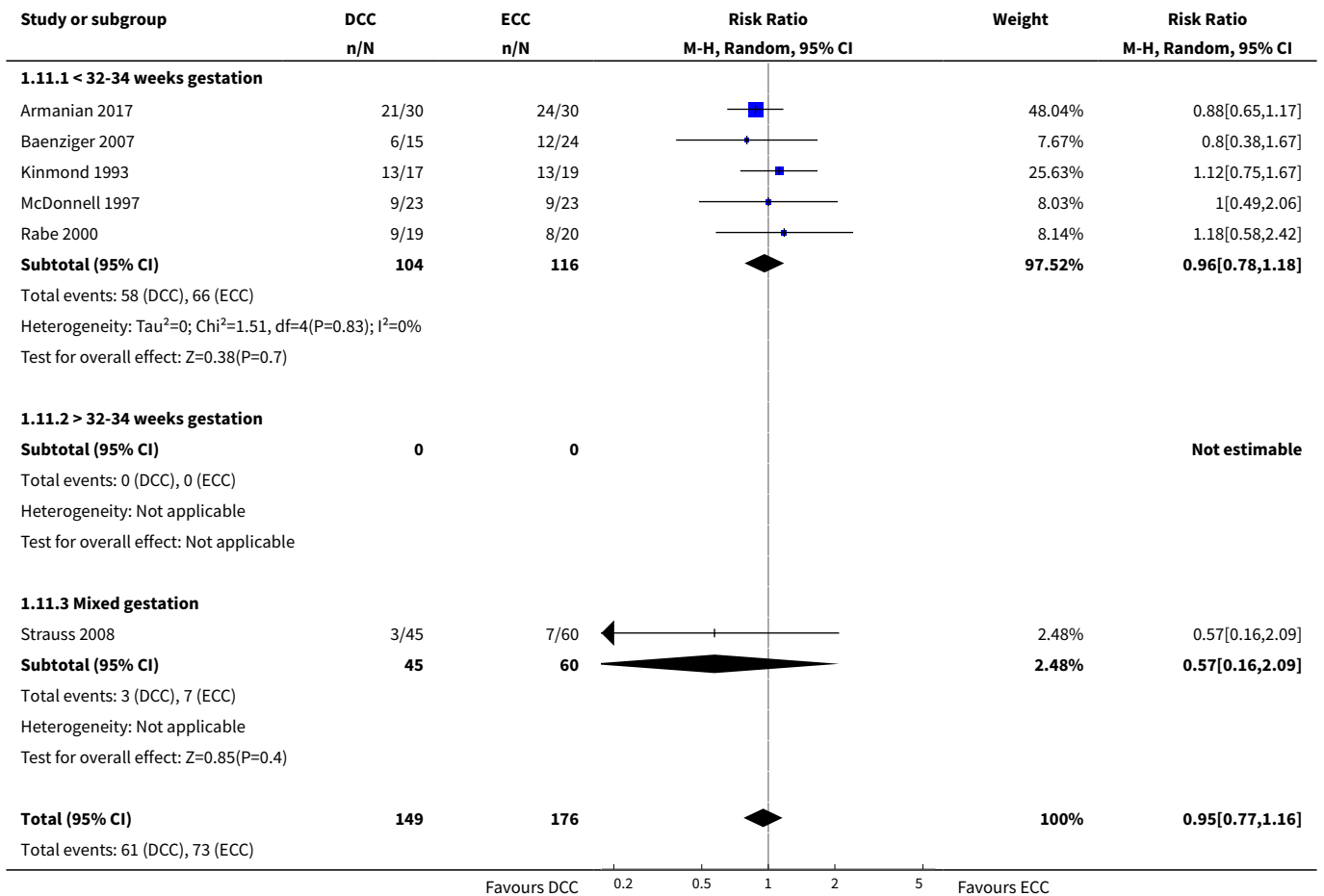


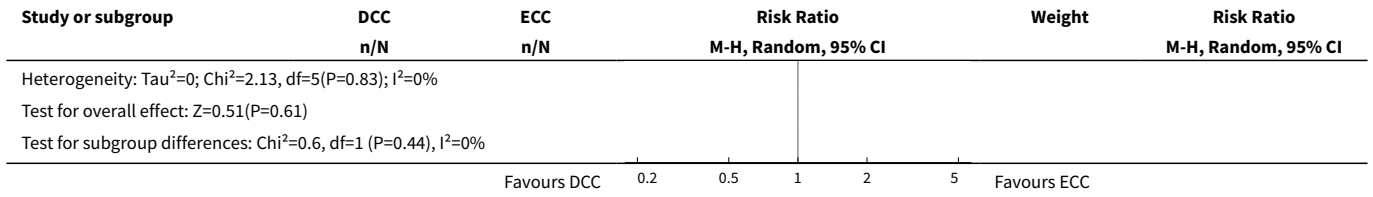
Analysis 1.10. Comparison 1 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by gestation), Outcome 10 Respiratory Distress Syndrome (RDS).



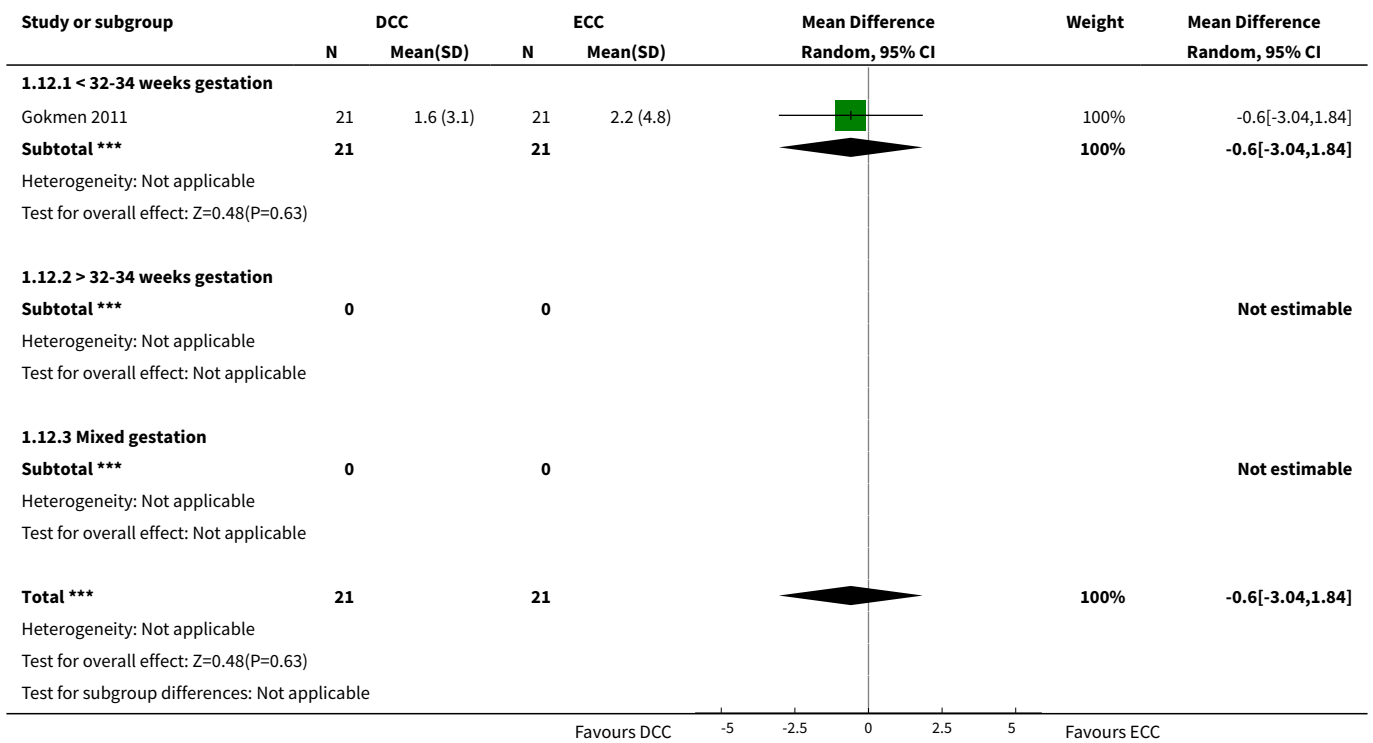


Analysis 1.11. Comparison 1 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by gestation), Outcome 11 Respiratory support (ventilator or CPAP).

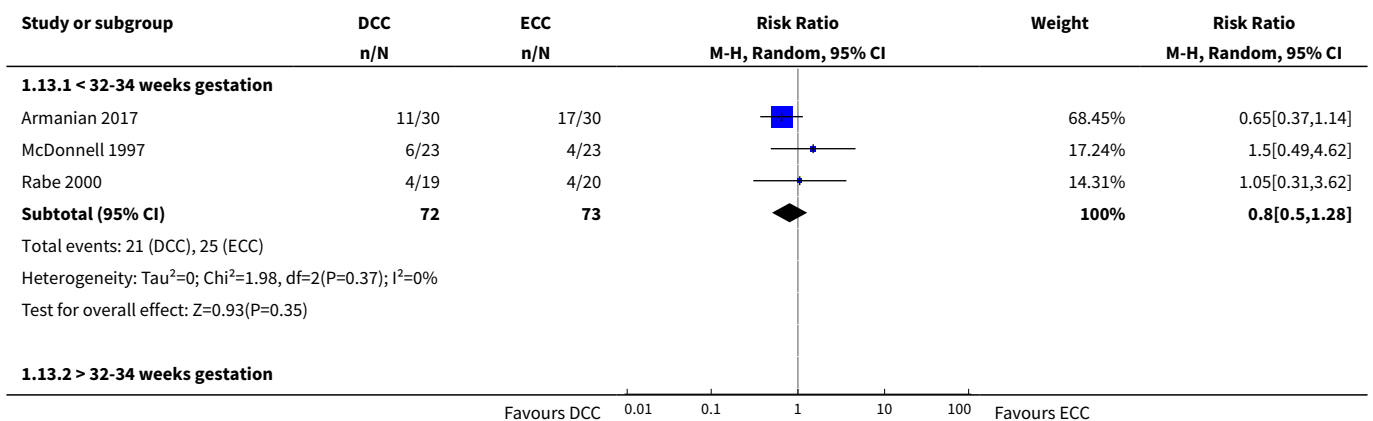


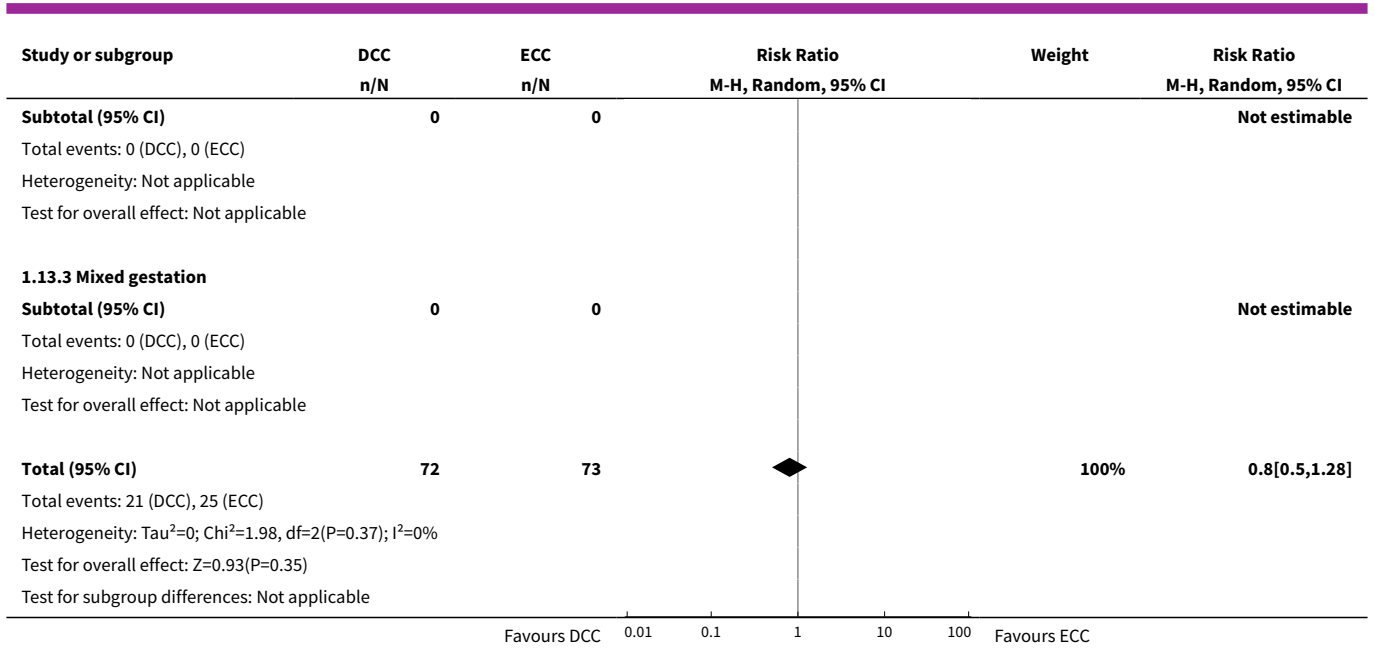


Analysis 1.12. Comparison 1 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by gestation), Outcome 12 Duration of respiratory support (in days).

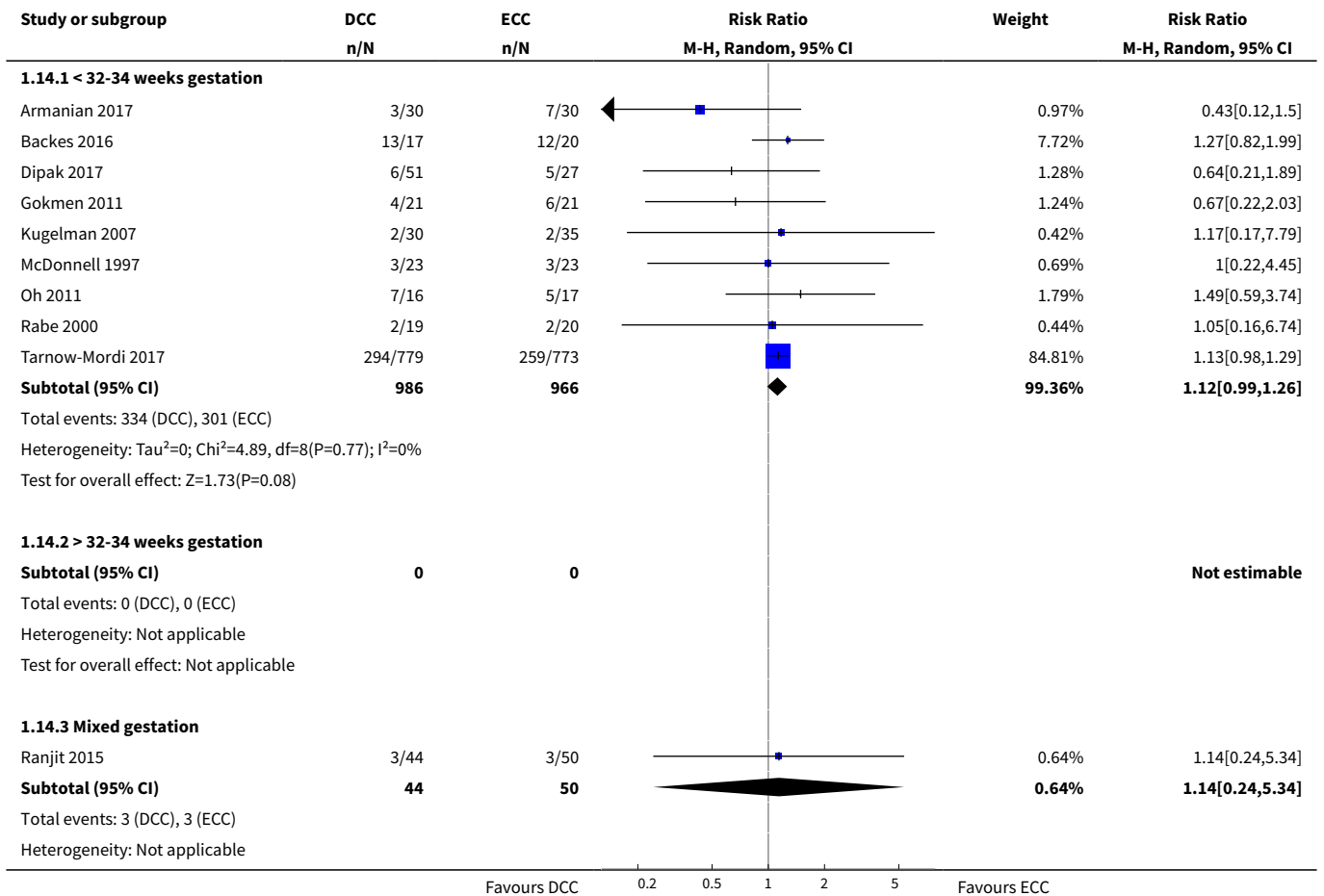


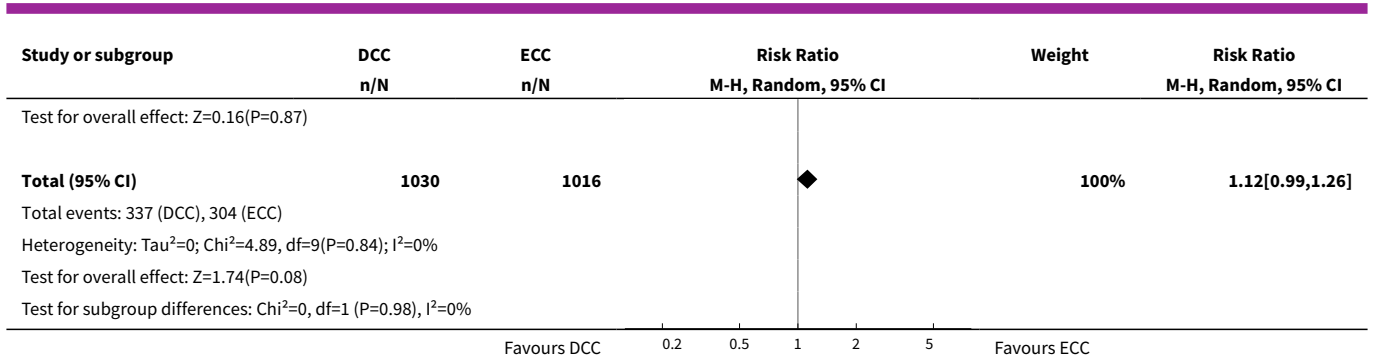
Analysis 1.13. Comparison 1 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by gestation), Outcome 13 Surfactant treatment (for severe RDS).



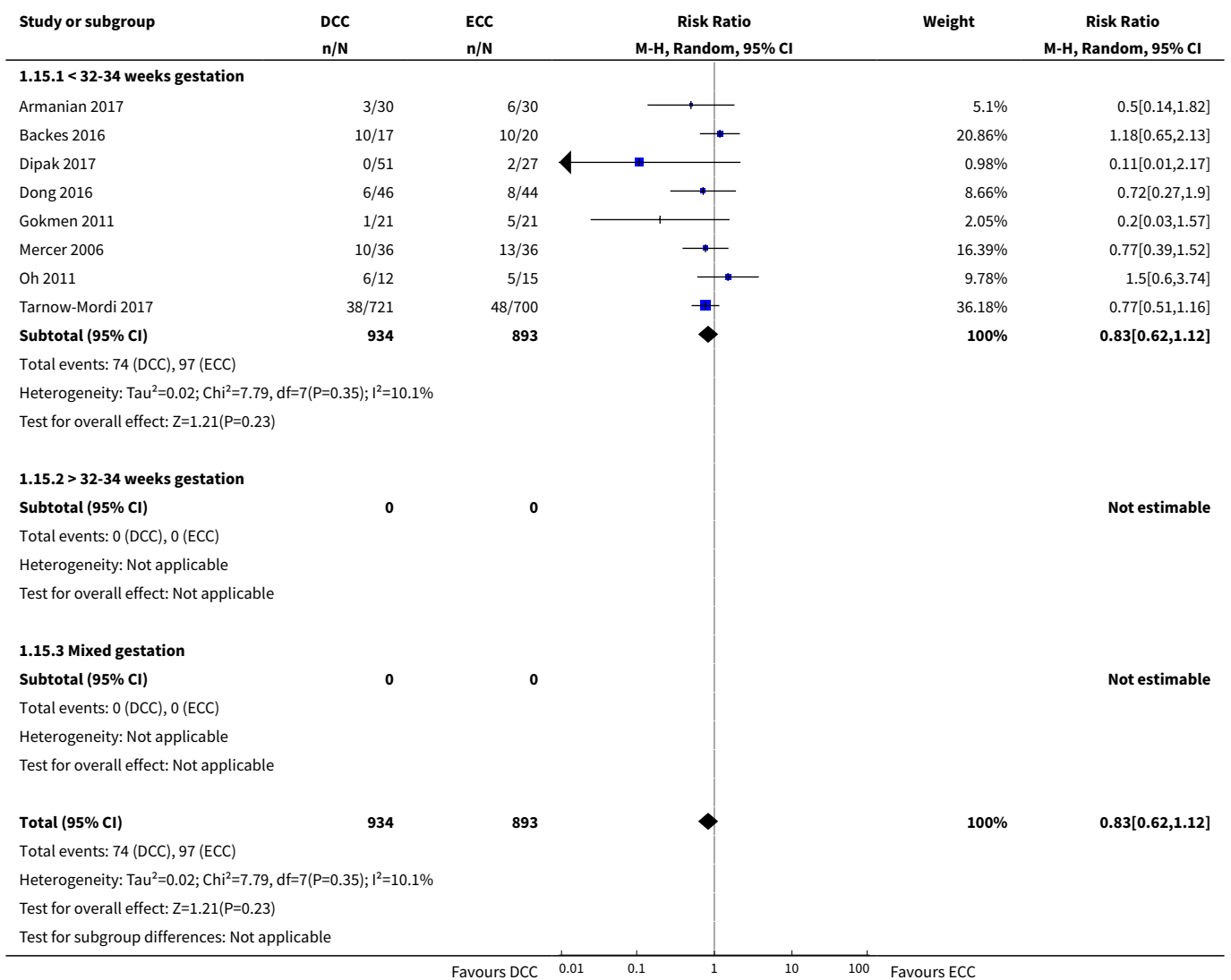


Analysis 1.14. Comparison 1 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by gestation), Outcome 14 Treatment for Patent Ductus Arteriosus (PDA) (medical and/or surgical).

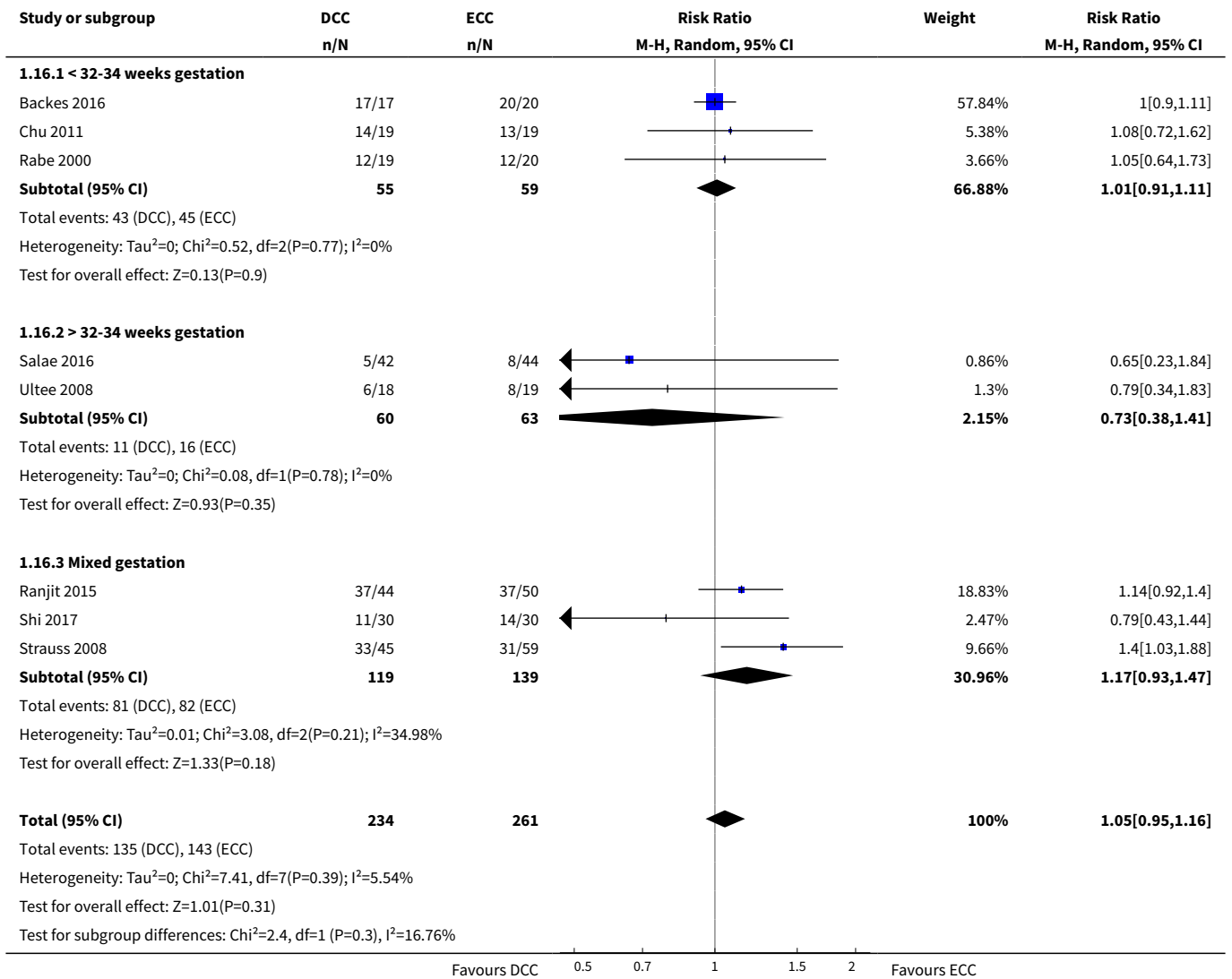




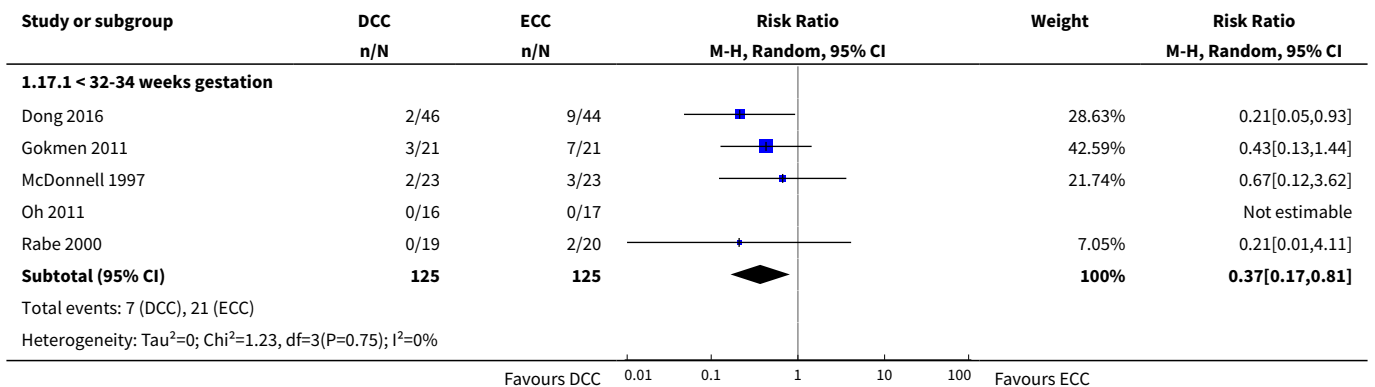
Analysis 1.15. Comparison 1 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by gestation), Outcome 15 Treatment for Retinopathy of Prematurity (RoP).

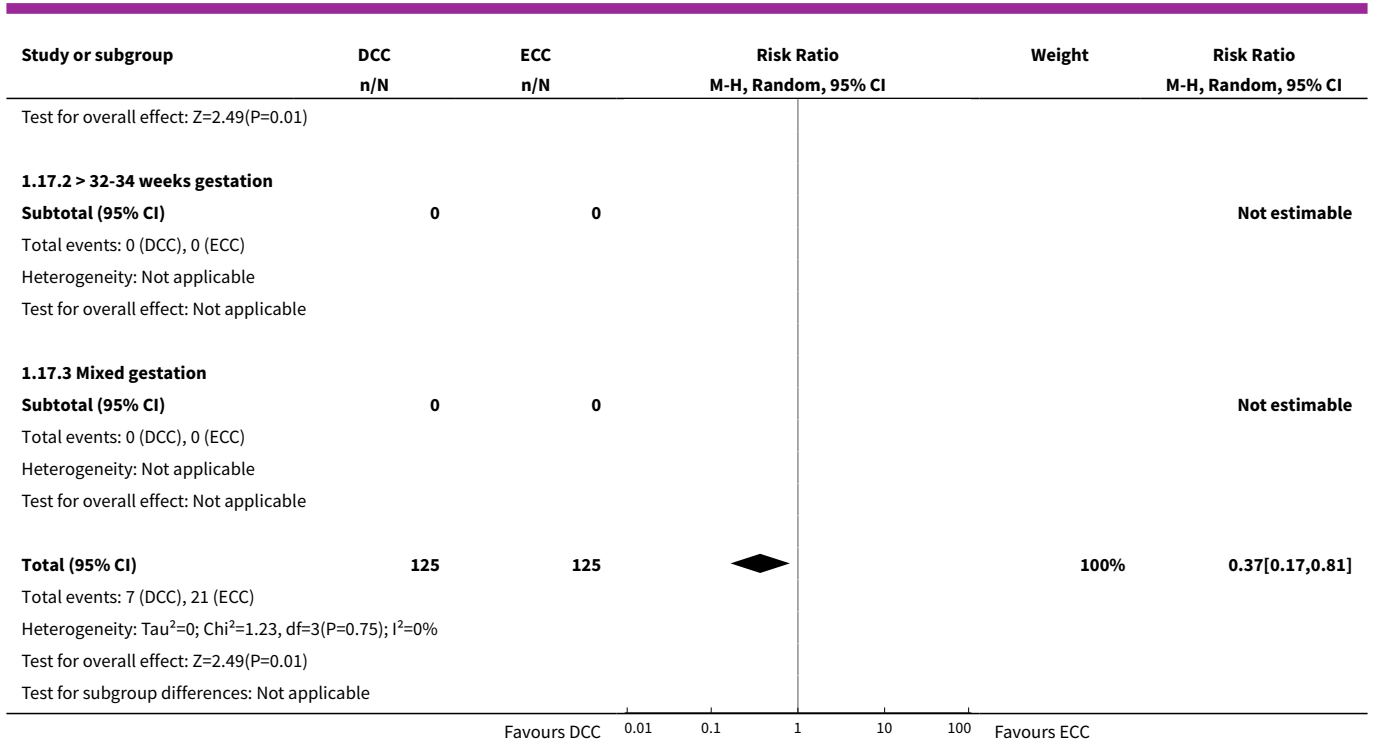


Analysis 1.16. Comparison 1 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by gestation), Outcome 16 Hyperbilirubinemia (treated by phototherapy).

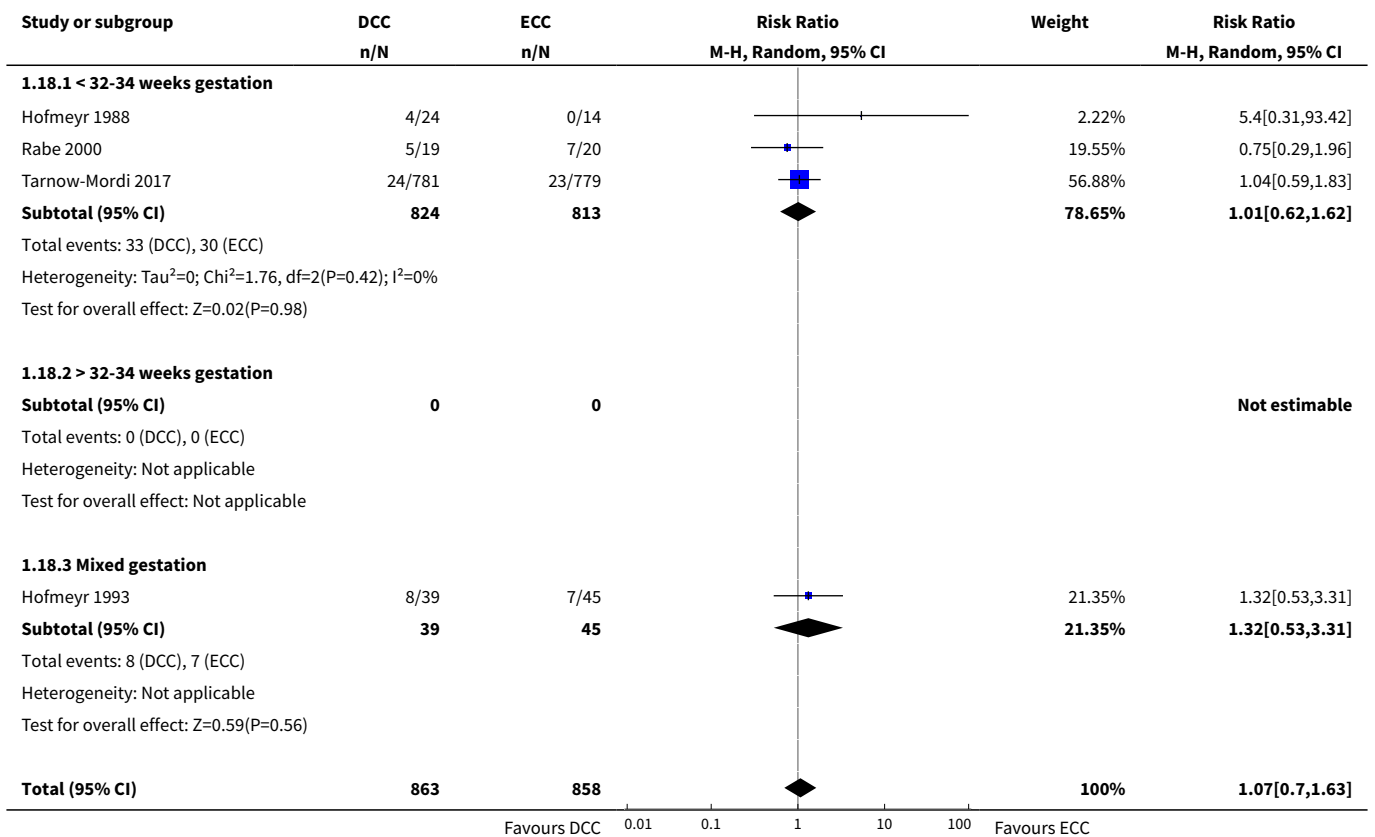


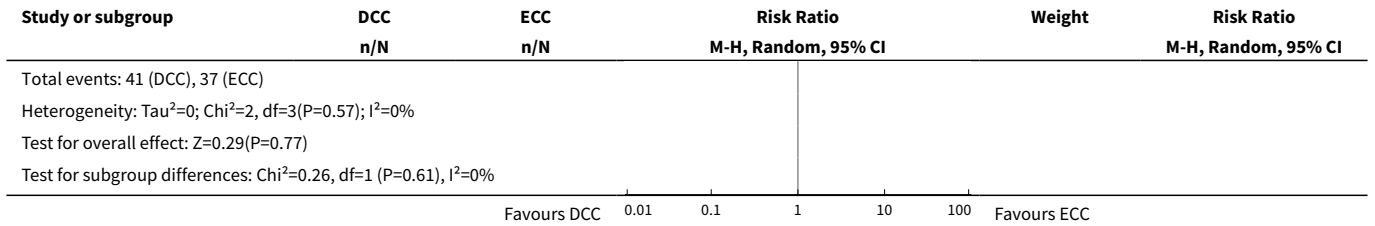
Analysis 1.17. Comparison 1 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by gestation), Outcome 17 Inotropics for low blood pressure.



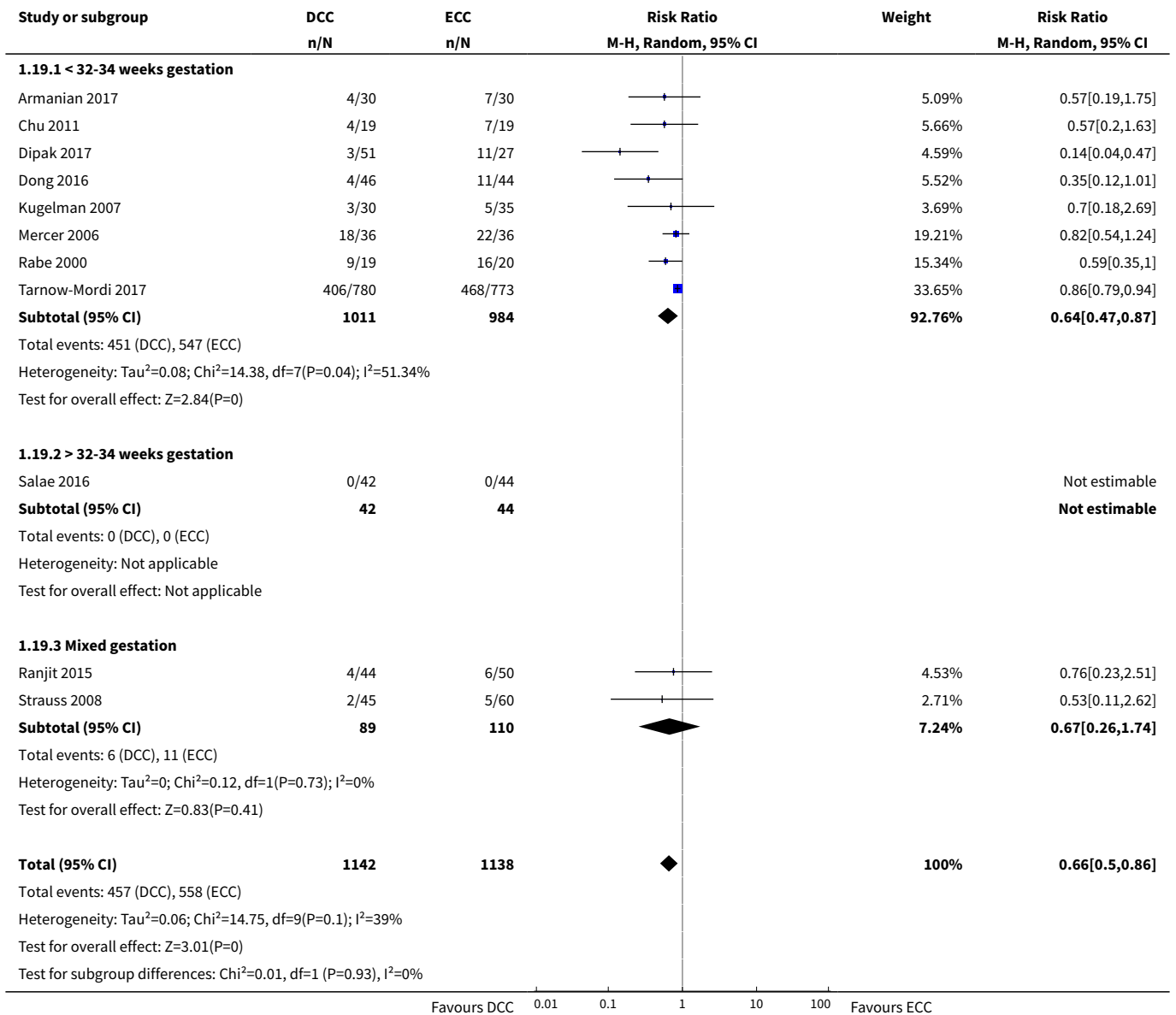


Analysis 1.18. Comparison 1 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by gestation), Outcome 18 Low Apgar as defined by trialists (generally < 8 at 5 mins).

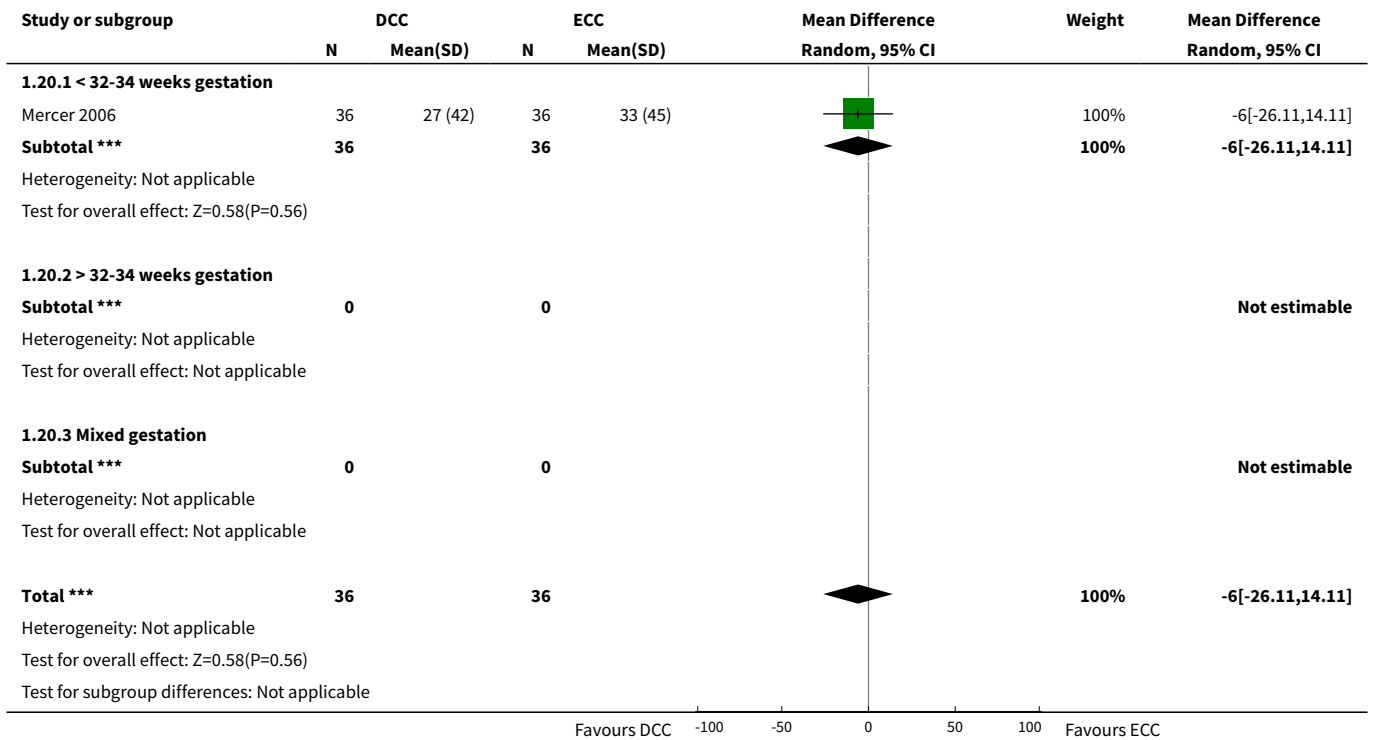




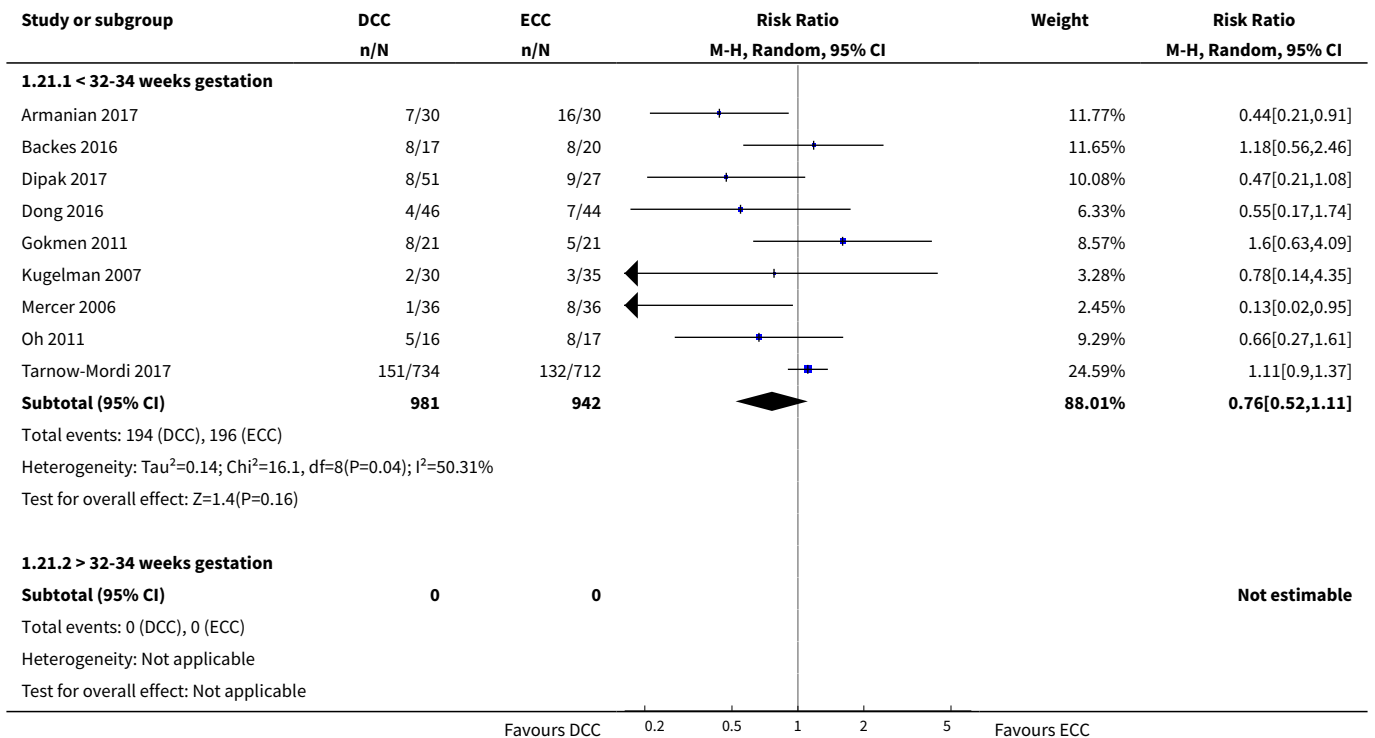
Analysis 1.19. Comparison 1 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by gestation), Outcome 19 Blood transfusion in infant.

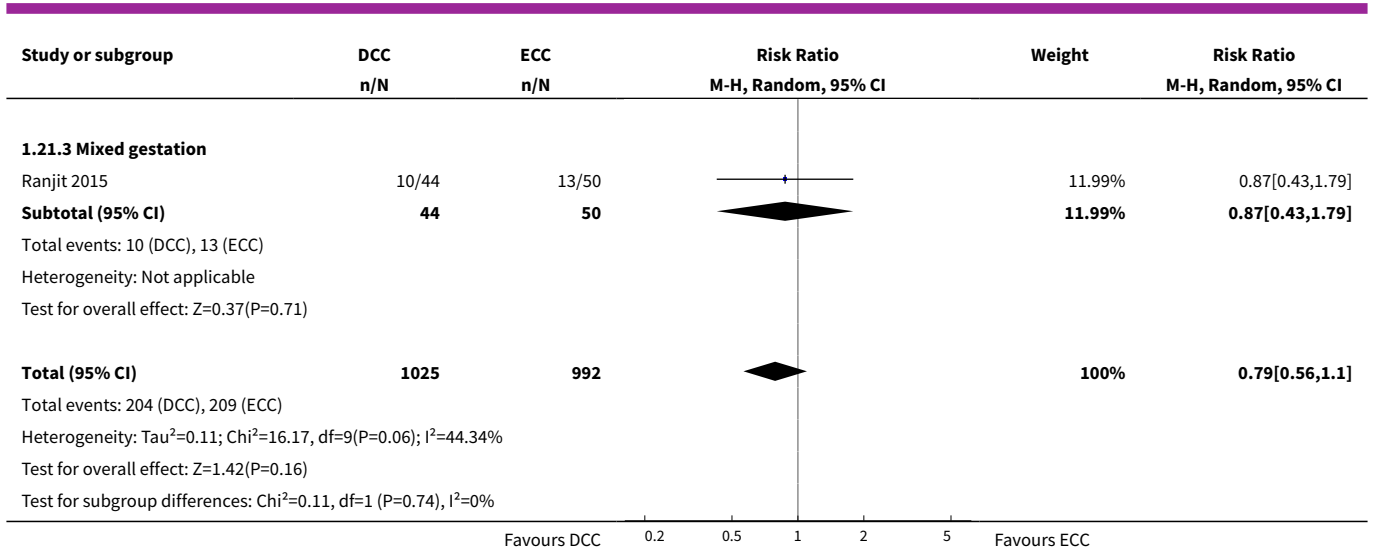


Analysis 1.20. Comparison 1 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by gestation), Outcome 20 Volume of blood transfused (mL).

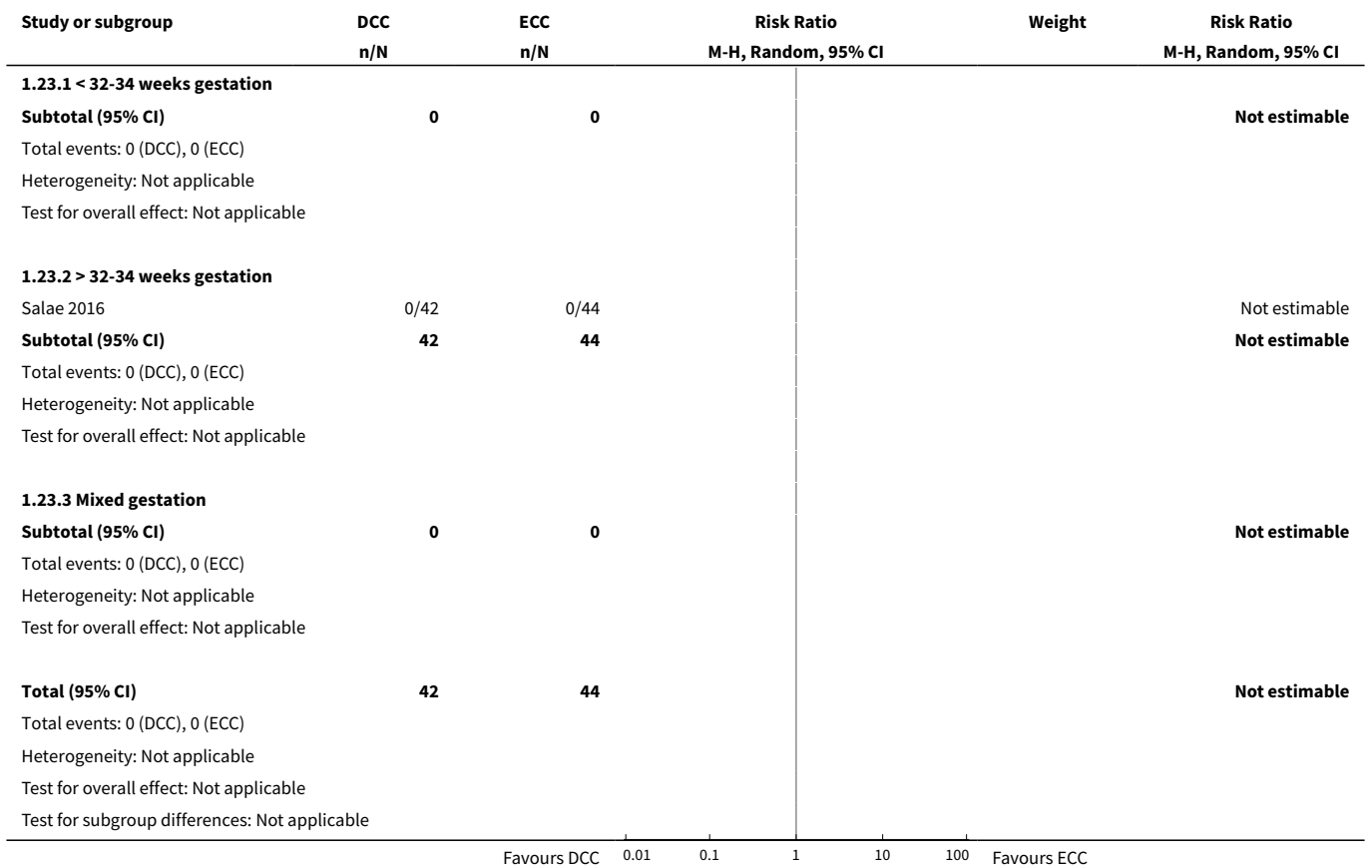


Analysis 1.21. Comparison 1 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by gestation), Outcome 21 Late sepsis (after 3 days or as defined by trialists).

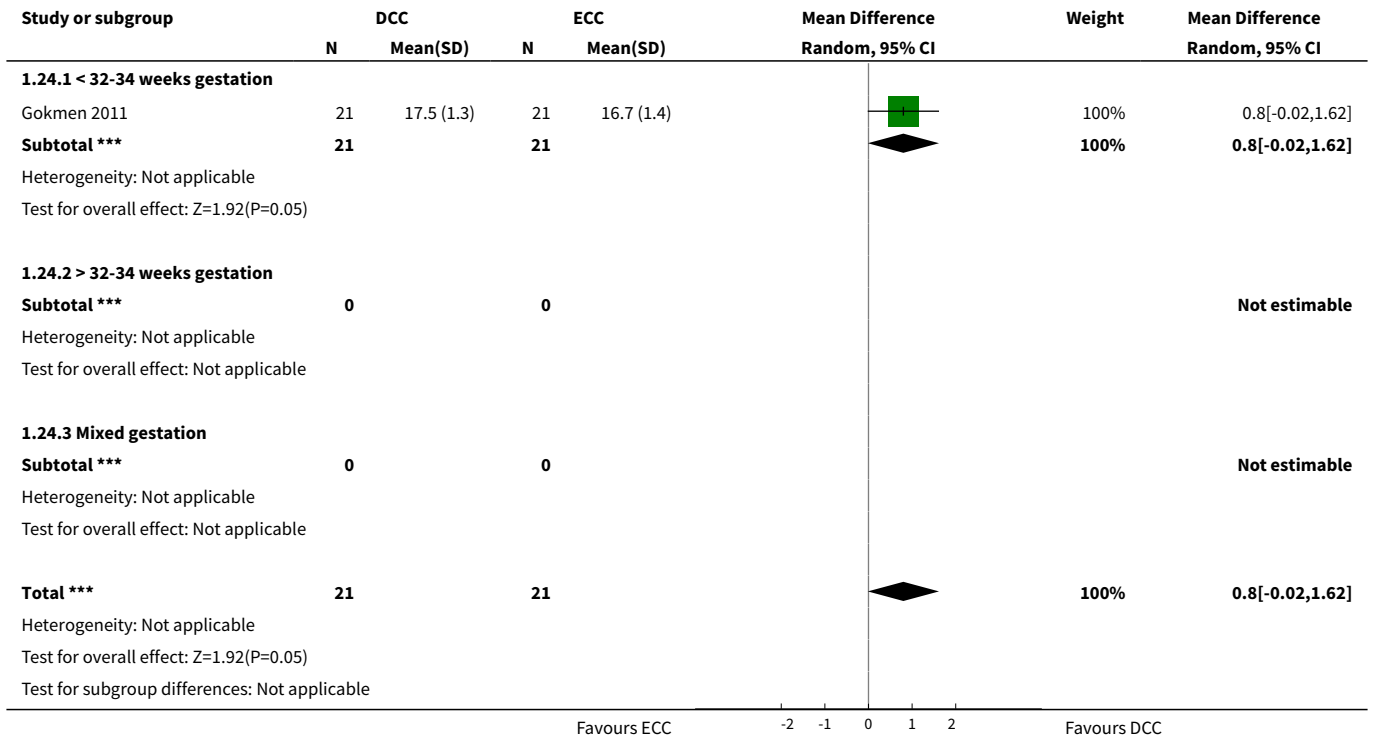




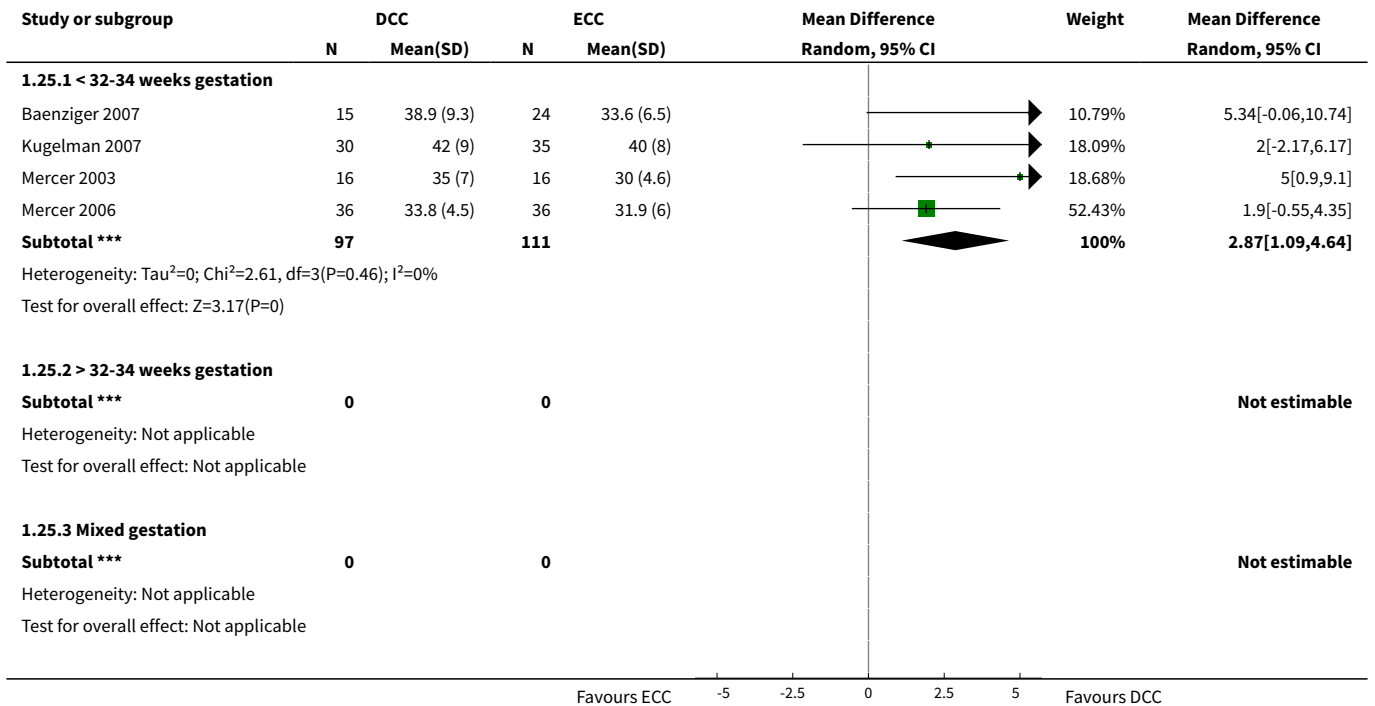
Analysis 1.23. Comparison 1 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by gestation), Outcome 23 Temperature < 36.0°C within 1 hour of birth.

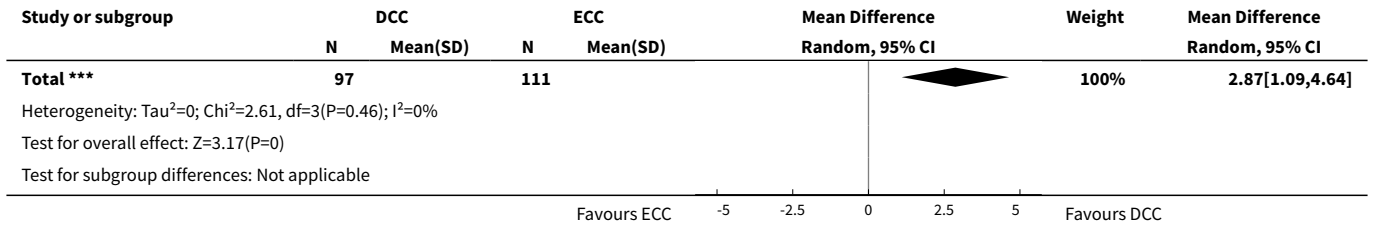


Analysis 1.24. Comparison 1 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by gestation), Outcome 24 Hb within 1st 24 hour of birth (g/dL).

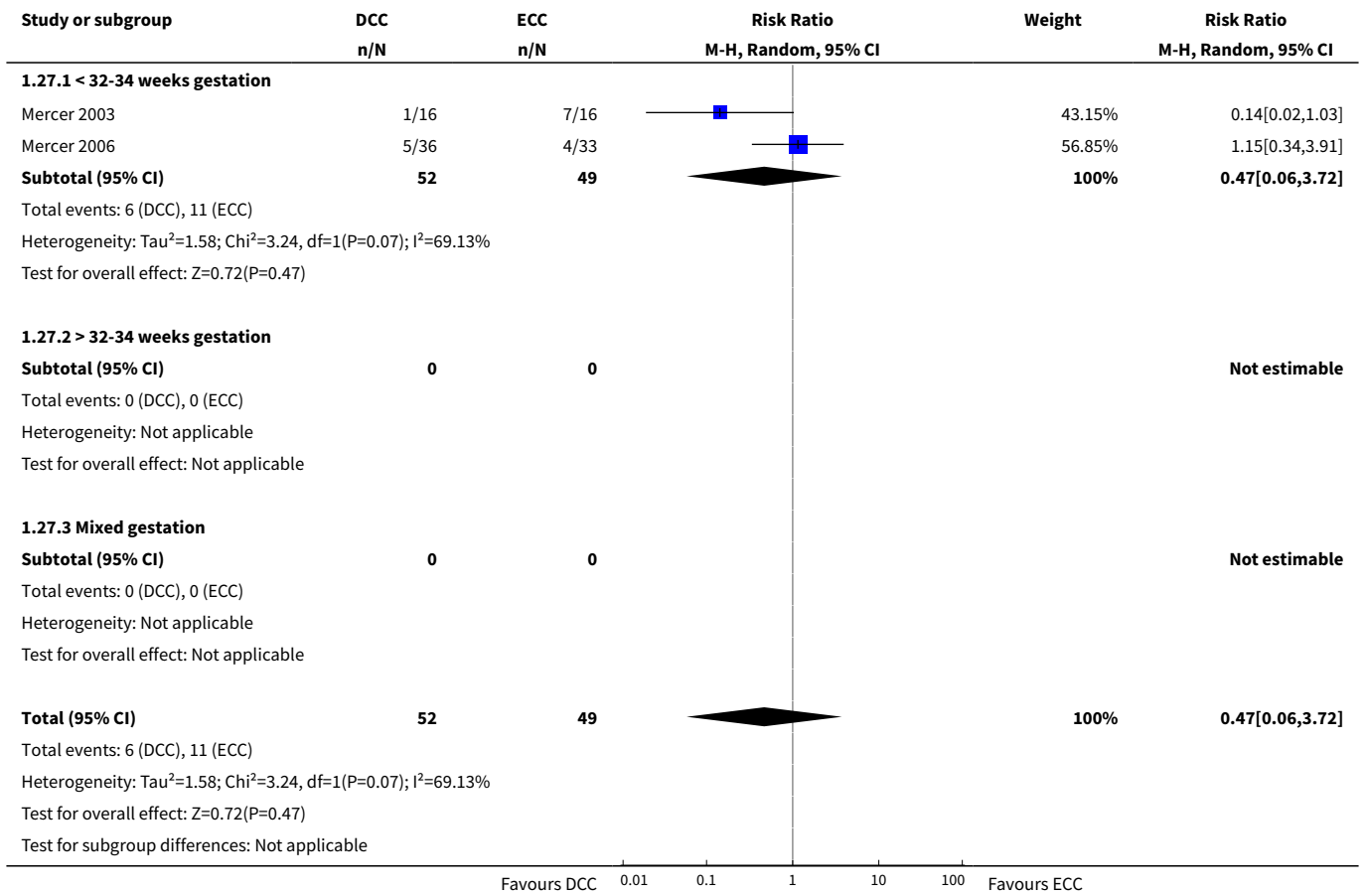


Analysis 1.25. Comparison 1 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by gestation), Outcome 25 Mean arterial blood pressure in early hours after birth (mm Hg).

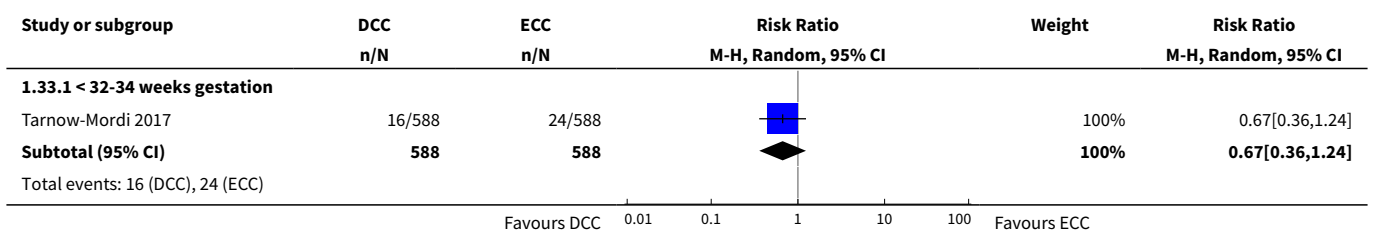


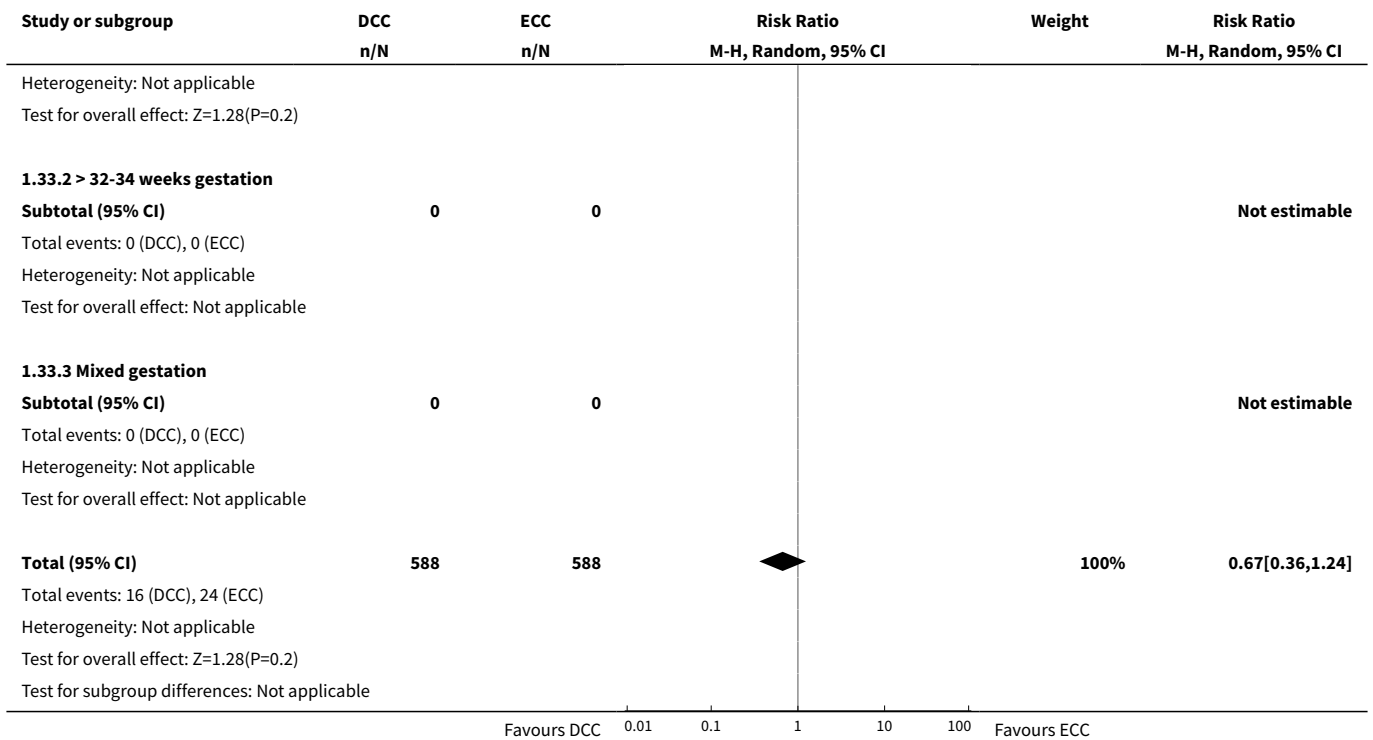


Analysis 1.27. Comparison 1 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by gestation), Outcome 27 Home oxygen.

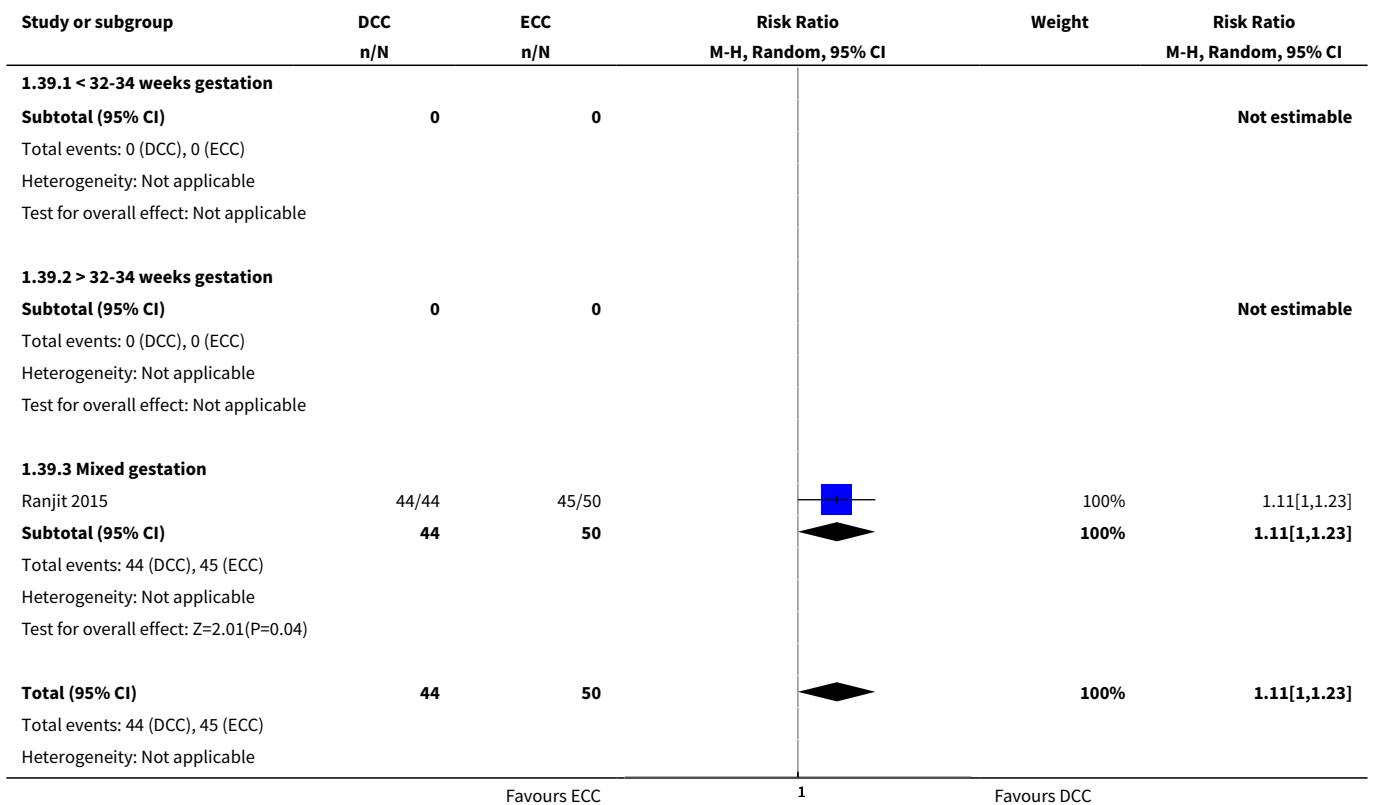


Analysis 1.33. Comparison 1 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by gestation), Outcome 33 Blood transfusion for mother.





Analysis 1.39. Comparison 1 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by gestation), Outcome 39 Fully breastfed or mixed feeding at infant discharge.



Study or subgroup	DCC n/N	ECC n/N	Risk Ratio M-H, Random, 95% CI	Weight	Risk Ratio M-H, Random, 95% CI
Test for overall effect: Z=2.01(P=0.04)					
Test for subgroup differences: Not applicable					
		Favours ECC	1		Favours DCC

Comparison 2. DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by type of intervention)

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Death of baby (up to discharge)	20	2680	Risk Ratio (M-H, Random, 95% CI)	0.73 [0.54, 0.98]
1.1 DCC < 1 min and baby level with uterus	1	46	Risk Ratio (M-H, Random, 95% CI)	0.20 [0.01, 3.95]
1.2 DCC < 1 min and baby held low	7	318	Risk Ratio (M-H, Random, 95% CI)	0.50 [0.19, 1.30]
1.3 DCC 1-2 mins and baby level with uterus	2	172	Risk Ratio (M-H, Random, 95% CI)	1.15 [0.07, 17.80]
1.4 DCC 1-2 mins and baby held low	3	1710	Risk Ratio (M-H, Random, 95% CI)	0.72 [0.52, 1.00]
1.5 DCC > 2 mins and baby level with uterus	3	181	Risk Ratio (M-H, Random, 95% CI)	0.67 [0.02, 28.73]
1.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
1.7 Mixed interventions or unclear	4	253	Risk Ratio (M-H, Random, 95% CI)	2.28 [0.57, 9.13]
2 Death or neurodevelopmental impairment at age two to three years	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
2.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
2.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
2.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
2.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
2.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
2.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
2.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
3 Severe intraventricular haemorrhage (IVH grades 3, 4)	10	2058	Risk Ratio (M-H, Random, 95% CI)	0.94 [0.63, 1.39]
3.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
3.2 DCC < 1 min and baby held low	6	335	Risk Ratio (M-H, Random, 95% CI)	0.94 [0.40, 2.21]
3.3 DCC 1-2 mins and baby level with uterus	1	86	Risk Ratio (M-H, Random, 95% CI)	0.58 [0.05, 6.11]
3.4 DCC 1-2 mins and baby held low	1	1541	Risk Ratio (M-H, Random, 95% CI)	0.91 [0.57, 1.44]
3.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
3.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
3.7 Mixed interventions or unclear	2	96	Risk Ratio (M-H, Random, 95% CI)	2.96 [0.34, 25.69]
4 Intraventricular haemorrhage (IVH, all grades)	15	2333	Risk Ratio (M-H, Random, 95% CI)	0.83 [0.70, 0.99]
4.1 DCC < 1 min and baby level with uterus	1	31	Risk Ratio (M-H, Random, 95% CI)	0.35 [0.02, 8.08]
4.2 DCC < 1 min and baby held low	6	278	Risk Ratio (M-H, Random, 95% CI)	0.66 [0.41, 1.06]
4.3 DCC 1-2 mins and baby level with uterus	1	86	Risk Ratio (M-H, Random, 95% CI)	0.84 [0.37, 1.87]
4.4 DCC 1-2 mins and baby held low	2	1646	Risk Ratio (M-H, Random, 95% CI)	0.94 [0.76, 1.16]
4.5 DCC > 2 mins and baby level with uterus	1	94	Risk Ratio (M-H, Random, 95% CI)	0.38 [0.02, 9.04]
4.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
4.7 Mixed interventions or unclear	4	198	Risk Ratio (M-H, Random, 95% CI)	0.66 [0.31, 1.42]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
5 Periventricular leukomalacia (PVL)	4	1544	Risk Ratio (M-H, Random, 95% CI)	0.58 [0.26, 1.30]
5.1 DCC < 1 min and baby level with uterus	1	31	Risk Ratio (M-H, Random, 95% CI)	3.19 [0.14, 72.69]
5.2 DCC < 1 min and baby held low	2	102	Risk Ratio (M-H, Random, 95% CI)	0.17 [0.01, 3.02]
5.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
5.4 DCC 1-2 mins and baby held low	1	1411	Risk Ratio (M-H, Random, 95% CI)	0.57 [0.24, 1.36]
5.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
5.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
5.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
6 Chronic lung disease (CLD) - oxygen supplement at 36 weeks (corrected for gestation)	6	1644	Risk Ratio (M-H, Random, 95% CI)	1.04 [0.94, 1.14]
6.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
6.2 DCC < 1 min and baby held low	5	205	Risk Ratio (M-H, Random, 95% CI)	0.82 [0.57, 1.17]
6.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
6.4 DCC 1-2 mins and baby held low	1	1439	Risk Ratio (M-H, Random, 95% CI)	1.06 [0.96, 1.16]
6.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
6.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
6.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
7 Maternal blood loss of 500 mL or greater	2	180	Risk Ratio (M-H, Random, 95% CI)	1.14 [0.07, 17.63]
7.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
7.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
7.3 DCC 1-2 mins and baby level with uterus	1	86	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
7.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
7.5 DCC > 2 mins and baby held level with uterus	1	94	Risk Ratio (M-H, Random, 95% CI)	1.14 [0.07, 17.63]
7.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
7.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
8 Intraventricular haemorrhage (IVH, grades 1 & 2)	9	1968	Risk Ratio (M-H, Random, 95% CI)	0.72 [0.51, 1.02]
8.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
8.2 DCC < 1 min and baby held low	5	245	Risk Ratio (M-H, Random, 95% CI)	0.65 [0.37, 1.15]
8.3 DCC 1-2 mins and baby level with uterus	1	86	Risk Ratio (M-H, Random, 95% CI)	0.89 [0.37, 2.18]
8.4 DCC 1-2 mins and baby held low	1	1541	Risk Ratio (M-H, Random, 95% CI)	0.95 [0.74, 1.22]
8.5 DCC > 2 mins and baby held level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
8.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
8.7 Mixed interventions or unclear	2	96	Risk Ratio (M-H, Random, 95% CI)	0.41 [0.18, 0.95]
9 Necrotising enterocolitis (NEC) confirmed by X-ray or laparotomy)	11	2010	Risk Ratio (M-H, Random, 95% CI)	0.91 [0.64, 1.28]
9.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
9.2 DCC < 1 min and baby held low	7	368	Risk Ratio (M-H, Random, 95% CI)	0.59 [0.28, 1.27]
9.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
9.4 DCC 1-2 mins and baby held low	1	1446	Risk Ratio (M-H, Random, 95% CI)	0.90 [0.60, 1.37]
9.5 DCC > 2 mins and baby held level with uterus	1	94	Risk Ratio (M-H, Random, 95% CI)	2.84 [0.58, 13.92]
9.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
9.7 Mixed interventions or unclear	2	102	Risk Ratio (M-H, Random, 95% CI)	1.75 [0.40, 7.73]
10 Respiratory Distress Syndrome (RDS)	6	367	Risk Ratio (M-H, Random, 95% CI)	1.09 [0.86, 1.38]
10.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
10.2 DCC < 1 min and baby held low	2	75	Risk Ratio (M-H, Random, 95% CI)	1.21 [0.64, 2.27]
10.3 DCC 1-2 mins and baby level with uterus	1	86	Risk Ratio (M-H, Random, 95% CI)	0.79 [0.19, 3.30]
10.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
10.5 DCC > 2 mins and baby held level with uterus	1	94	Risk Ratio (M-H, Random, 95% CI)	0.71 [0.25, 2.01]
10.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
10.7 Mixed interventions or unclear	2	112	Risk Ratio (M-H, Random, 95% CI)	2.12 [0.75, 5.99]
11 Respiratory support (ventilator or CPAP)	6	325	Risk Ratio (M-H, Random, 95% CI)	0.95 [0.77, 1.16]
11.1 DCC < 1 min and baby level with uterus	1	46	Risk Ratio (M-H, Random, 95% CI)	1.0 [0.49, 2.06]
11.2 DCC < 1 min and baby held low	2	75	Risk Ratio (M-H, Random, 95% CI)	1.13 [0.80, 1.61]
11.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
11.4 DCC 1-2 mins and baby held low	2	144	Risk Ratio (M-H, Random, 95% CI)	0.74 [0.39, 1.40]
11.5 DCC > 2 mins and baby held level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
11.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
11.7 Mixed interventions or unclear	1	60	Risk Ratio (M-H, Random, 95% CI)	0.88 [0.65, 1.17]
12 Duration of respiratory support	1	42	Mean Difference (IV, Random, 95% CI)	-0.60 [-3.04, 1.84]
12.1 DCC < 1 min and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
12.2 DCC < 1 min and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
12.3 DCC 1-2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
12.4 DCC 1-2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
12.5 DCC > 2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
12.6 DCC > 2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
12.7 Mixed interventions or unclear	1	42	Mean Difference (IV, Random, 95% CI)	-0.60 [-3.04, 1.84]
13 Surfactant treatment (for severe RDS)	3	145	Risk Ratio (M-H, Random, 95% CI)	0.80 [0.50, 1.28]
13.1 DCC < 1 min and baby level with uterus	1	46	Risk Ratio (M-H, Random, 95% CI)	1.5 [0.49, 4.62]
13.2 DCC < 1 min and baby held low	1	39	Risk Ratio (M-H, Random, 95% CI)	1.05 [0.31, 3.62]
13.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
13.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
13.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
13.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
13.7 Mixed interventions or unclear	1	60	Risk Ratio (M-H, Random, 95% CI)	0.65 [0.37, 1.14]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
14 Treatment for Patent Ductus Arteriosus (PDA) (medical and/or surgical)	10	2046	Risk Ratio (M-H, Random, 95% CI)	1.12 [0.99, 1.26]
14.1 DCC < 1 min and baby level with uterus	1	46	Risk Ratio (M-H, Random, 95% CI)	1.0 [0.22, 4.45]
14.2 DCC < 1 min and baby held low	4	174	Risk Ratio (M-H, Random, 95% CI)	1.29 [0.88, 1.90]
14.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
14.4 DCC 1-2 mins and baby held low	2	1630	Risk Ratio (M-H, Random, 95% CI)	1.10 [0.90, 1.36]
14.5 DCC > 2 mins and baby level with uterus	1	94	Risk Ratio (M-H, Random, 95% CI)	1.14 [0.24, 5.34]
14.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
14.7 Mixed interventions or unclear	2	102	Risk Ratio (M-H, Random, 95% CI)	0.55 [0.24, 1.26]
15 Treatment for Retinopathy of Prematurity (RoP)	8	1827	Risk Ratio (M-H, Random, 95% CI)	0.83 [0.62, 1.12]
15.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
15.2 DCC < 1 min and baby held low	4	226	Risk Ratio (M-H, Random, 95% CI)	1.01 [0.69, 1.46]
15.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
15.4 DCC 1-2 mins and baby held low	2	1499	Risk Ratio (M-H, Random, 95% CI)	0.52 [0.11, 2.44]
15.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
15.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
15.7 Mixed interventions or unclear	2	102	Risk Ratio (M-H, Random, 95% CI)	0.39 [0.13, 1.15]
16 Hyperbilirubinemia (treated by phototherapy)	8	495	Risk Ratio (M-H, Random, 95% CI)	1.05 [0.95, 1.16]
16.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
16.2 DCC < 1 min and baby held low	2	76	Risk Ratio (M-H, Random, 95% CI)	1.00 [0.91, 1.11]
16.3 DCC 1-2 mins and baby level with uterus	1	86	Risk Ratio (M-H, Random, 95% CI)	0.65 [0.23, 1.84]
16.4 DCC 1-2 mins and baby held low	1	104	Risk Ratio (M-H, Random, 95% CI)	1.40 [1.03, 1.88]
16.5 DCC > 2 mins and baby level with uterus	2	131	Risk Ratio (M-H, Random, 95% CI)	1.11 [0.91, 1.36]
16.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
16.7 Mixed interventions or unclear	2	98	Risk Ratio (M-H, Random, 95% CI)	0.98 [0.70, 1.37]
17 Inotropics for low blood pressure	5	250	Risk Ratio (M-H, Random, 95% CI)	0.37 [0.17, 0.81]
17.1 DCC < 1 min and baby level with uterus	1	46	Risk Ratio (M-H, Random, 95% CI)	0.67 [0.12, 3.62]
17.2 DCC < 1 min and baby held low	3	162	Risk Ratio (M-H, Random, 95% CI)	0.21 [0.06, 0.80]
17.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
17.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
17.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
17.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
17.7 Mixed interventions or unclear	1	42	Risk Ratio (M-H, Random, 95% CI)	0.43 [0.13, 1.44]
18 Low Apgar as defined by trialists (generally < 8 at 5 mins)	4	1721	Risk Ratio (M-H, Random, 95% CI)	1.07 [0.70, 1.63]
18.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
18.2 DCC < 1 min and baby held low	1	39	Risk Ratio (M-H, Random, 95% CI)	0.75 [0.29, 1.96]
18.3 DCC 1-2 mins and baby level with uterus	1	84	Risk Ratio (M-H, Random, 95% CI)	1.32 [0.53, 3.31]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
18.4 DCC 1-2 mins and baby held low	1	1560	Risk Ratio (M-H, Random, 95% CI)	1.04 [0.59, 1.83]
18.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
18.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
18.7 Mixed interventions or unclear	1	38	Risk Ratio (M-H, Random, 95% CI)	5.4 [0.31, 93.42]
19 Blood transfusion in infant	11	2280	Risk Ratio (M-H, Random, 95% CI)	0.66 [0.50, 0.86]
19.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
19.2 DCC < 1 min and baby held low	4	266	Risk Ratio (M-H, Random, 95% CI)	0.68 [0.50, 0.92]
19.3 DCC 1-2 mins and baby level with uterus	1	86	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
19.4 DCC 1-2 mins and baby held low	3	1736	Risk Ratio (M-H, Random, 95% CI)	0.44 [0.13, 1.46]
19.5 DCC > 2 mins and baby level with uterus	1	94	Risk Ratio (M-H, Random, 95% CI)	0.76 [0.23, 2.51]
19.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
19.7 Mixed interventions or unclear	2	98	Risk Ratio (M-H, Random, 95% CI)	0.57 [0.27, 1.23]
20 Volume of blood transfused (mL)	1	72	Mean Difference (IV, Random, 95% CI)	-6.0 [-26.11, 14.11]
20.1 DCC < 1 min and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
20.2 DCC < 1 min and baby held low	1	72	Mean Difference (IV, Random, 95% CI)	-6.0 [-26.11, 14.11]
20.3 DCC 1-2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
20.4 DCC 1-2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
20.5 DCC > 2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
20.6 DCC > 2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
20.7 Mixed interventions or unclear	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
21 Late sepsis (after 3 days or as defined by trialists)	10	2017	Risk Ratio (M-H, Random, 95% CI)	0.79 [0.56, 1.10]
21.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
21.2 DCC < 1 min and baby held low	5	297	Risk Ratio (M-H, Random, 95% CI)	0.70 [0.39, 1.25]
21.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
21.4 DCC 1-2 mins and baby held low	2	1524	Risk Ratio (M-H, Random, 95% CI)	0.80 [0.35, 1.81]
21.5 DCC > 2 mins and baby level with uterus	1	94	Risk Ratio (M-H, Random, 95% CI)	0.87 [0.43, 1.79]
21.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
21.7 Mixed interventions or unclear	2	102	Risk Ratio (M-H, Random, 95% CI)	0.81 [0.23, 2.87]
22 Hydrocephalus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
22.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
22.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
22.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
22.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
22.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
22.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
22.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
23 Temperature < 36.0°C within 1 hour of birth	1	86	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
23.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
23.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
23.3 DCC 1-2 mins and baby level with uterus	1	86	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
23.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
23.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
23.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
23.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
24 Hb within 1st 24 hour of birth (g/dL)	1	42	Mean Difference (IV, Random, 95% CI)	0.80 [-0.02, 1.62]
24.1 DCC < 1 min and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
24.2 DCC < 1 min and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
24.3 DCC 1-2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
24.4 DCC 1-2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
24.5 DCC > 2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
24.6 DCC > 2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
24.7 Mixed interventions or unclear	1	42	Mean Difference (IV, Random, 95% CI)	0.80 [-0.02, 1.62]
25 Mean arterial blood pressure in early hours after birth (mm Hg)	4	208	Mean Difference (IV, Random, 95% CI)	2.87 [1.09, 4.64]
25.1 DCC < 1 min and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
25.2 DCC < 1 min and baby held low	3	169	Mean Difference (IV, Random, 95% CI)	2.57 [0.69, 4.45]
25.3 DCC 1-2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
25.4 DCC 1-2 mins and baby held low	1	39	Mean Difference (IV, Random, 95% CI)	5.34 [-0.06, 10.74]
25.5 DCC > 2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
25.6 DCC > 2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
25.7 Mixed interventions or unclear	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
26 Length of infant stay in NICU	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
26.1 DCC < 1 min and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
26.2 DCC < 1 min and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
26.3 DCC 1-2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
26.4 DCC 1-2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
26.5 DCC > 2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
26.6 DCC > 2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
26.7 Mixed interventions or unclear	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
27 Home oxygen	2	101	Risk Ratio (M-H, Random, 95% CI)	0.47 [0.06, 3.72]
27.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
27.2 DCC < 1 min and baby held low	2	101	Risk Ratio (M-H, Random, 95% CI)	0.47 [0.06, 3.72]
27.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
27.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
27.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
27.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
27.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
28 Neurodevelopmental impairment at age two to three years	0		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
28.1 DCC < 1 min and baby level with uterus	0		Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
28.2 DCC < 1 min and baby held low	0		Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
28.3 DCC 1-2 mins and baby level with uterus	0		Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
28.4 DCC 1-2 mins and baby held low	0		Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
28.5 DCC > 2 mins and baby level with uterus	0		Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
28.6 DCC > 2 mins and baby held low	0		Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
28.7 Mixed interventions or unclear	0		Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
29 Severe visual impairment	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
29.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
29.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
29.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
29.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
29.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
29.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
29.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
30 Cerebral palsy (CP)	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
30.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
30.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
30.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
30.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
30.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
30.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
30.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
31 Manual removal of placenta (denominator = vaginal births)	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
31.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
31.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
31.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
31.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
31.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
31.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
31.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
32 Prolonged third stage (>30 minutes) (denominator = vaginal births)	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
32.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
32.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
32.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
32.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
32.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
32.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
32.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
33 Blood transfusion for mother	1	1176	Risk Ratio (M-H, Random, 95% CI)	0.67 [0.36, 1.24]
33.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
33.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
33.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
33.4 DCC 1-2 mins and baby held low	1	1176	Risk Ratio (M-H, Random, 95% CI)	0.67 [0.36, 1.24]
33.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
33.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
33.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
34 Postpartum infection in mother	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
34.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

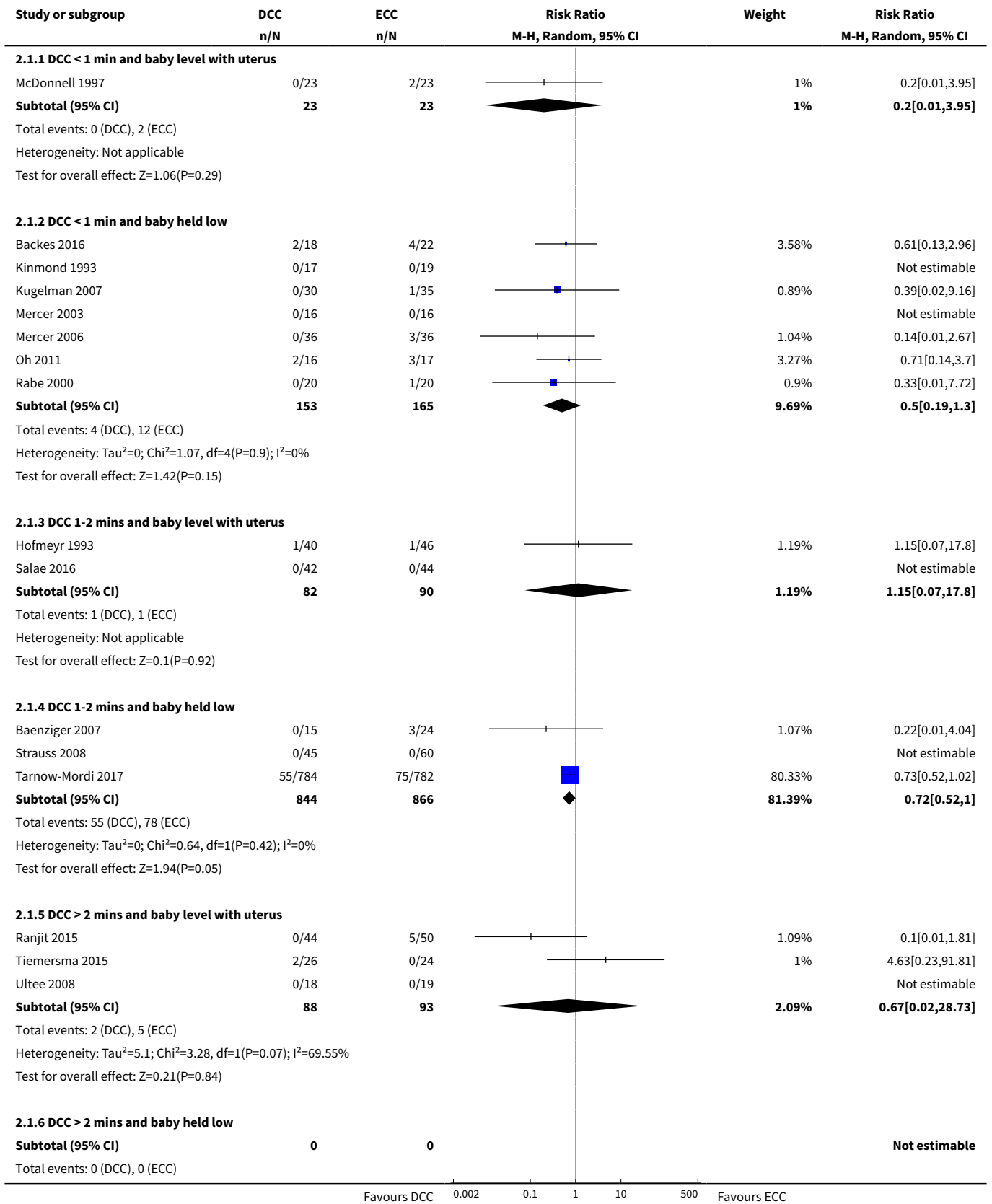
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
34.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
34.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
34.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
34.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
34.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
34.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
35 Rhesus isoimmunisation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
35.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
35.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
35.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
35.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
35.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
35.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
35.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
36 Psychological well being in mother	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
36.1 DCC < 1 min and baby level with uterus	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
36.2 DCC < 1 min and baby held low	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
36.3 DCC 1-2 mins and baby level with uterus	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]

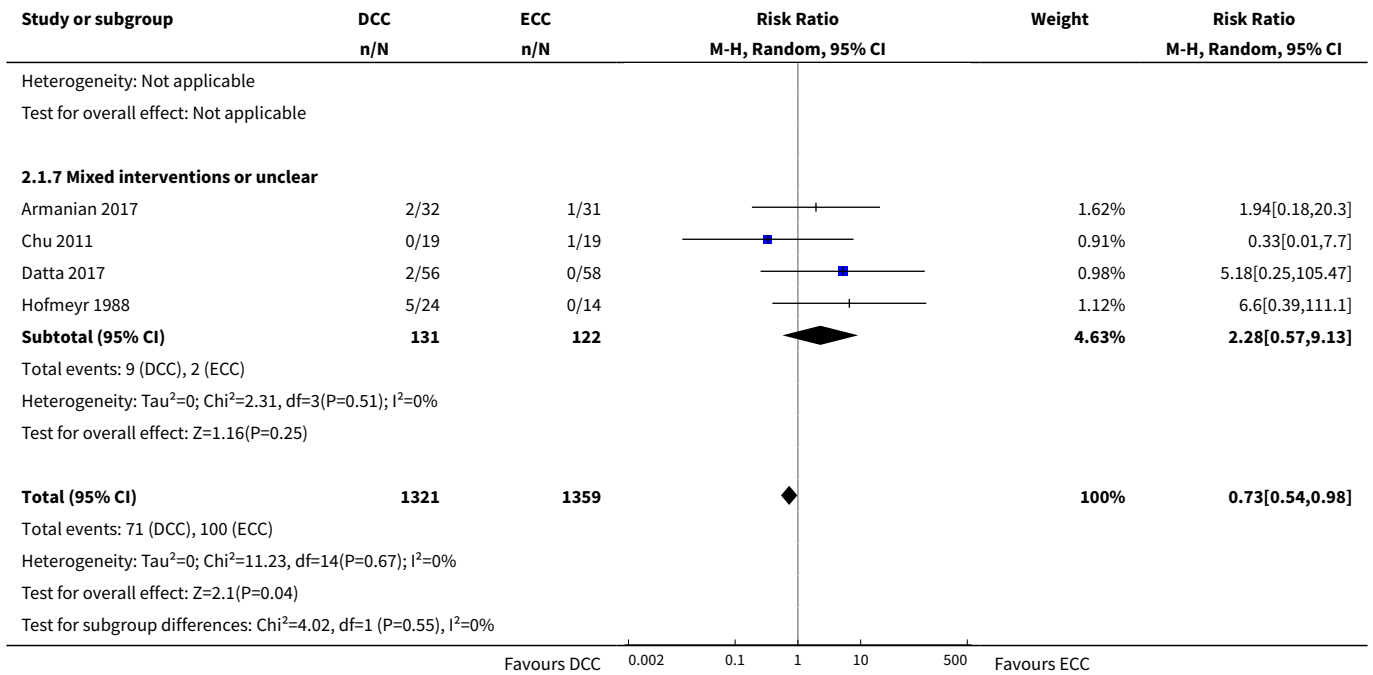
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
36.4 DCC 1-2 mins and baby held low	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
36.5 DCC > 2 mins and baby level with uterus	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
36.6 DCC > 2 mins and baby held low	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
36.7 Mixed interventions or unclear	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37 Bonding	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37.1 DCC < 1 min and baby level with uterus	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37.2 DCC < 1 min and baby held low	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37.3 DCC 1-2 mins and baby level with uterus	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37.4 DCC 1-2 mins and baby held low	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37.5 DCC > 2 mins and baby level with uterus	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37.6 DCC > 2 mins and baby held low	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37.7 Mixed interventions or unclear	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
38 Breastfeeding initiation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
38.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
38.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
38.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
38.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
38.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
38.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
38.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
39 Fully breastfed or mixed feeding at infant discharge	1	94	Risk Ratio (M-H, Random, 95% CI)	1.11 [1.00, 1.23]
39.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
39.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
39.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
39.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
39.5 DCC > 2 mins and baby level with uterus	1	94	Risk Ratio (M-H, Random, 95% CI)	1.11 [1.00, 1.23]
39.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
39.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40 Maternal anxiety	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

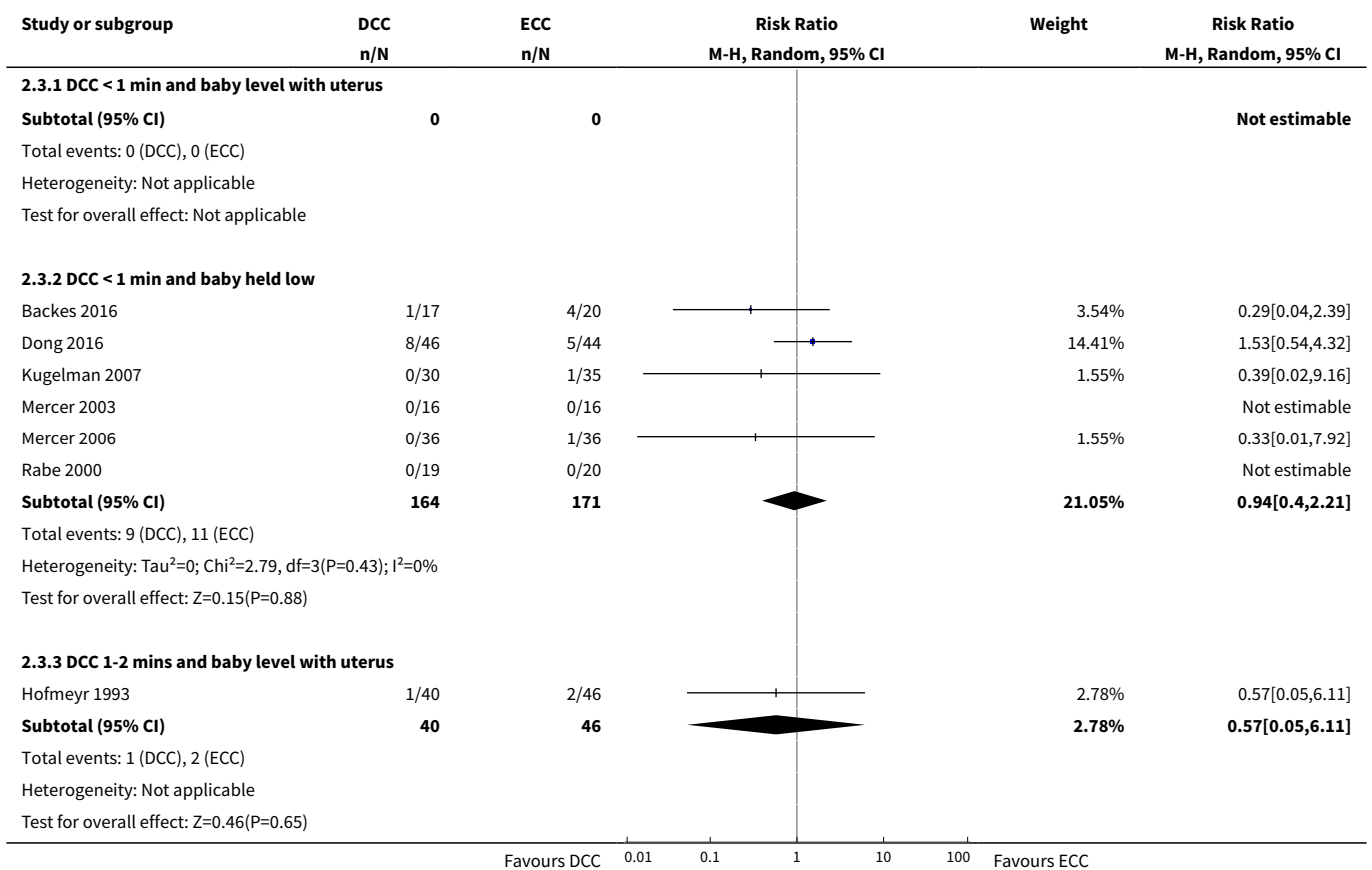
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
41 Mothers' views	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
41.1 DCC < 1 min and baby level with uterus	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
41.2 DCC < 1 min and baby held low	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
41.3 DCC 1-2 mins and baby level with uterus	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
41.4 DCC 1-2 mins and baby held low	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
41.5 DCC > 2 mins and baby level with uterus	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
41.6 DCC > 2 mins and baby held low	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
41.7 Mixed interventions or unclear	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
42 Neurosensory disability at 7 months (Bailey's MDI < 70) - not pre-specified	2	73	Risk Ratio (M-H, Random, 95% CI)	1.64 [0.66, 4.09]
42.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
42.2 DCC < 1 min and baby held low	2	73	Risk Ratio (M-H, Random, 95% CI)	1.64 [0.66, 4.09]
42.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
42.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
42.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
42.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
42.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

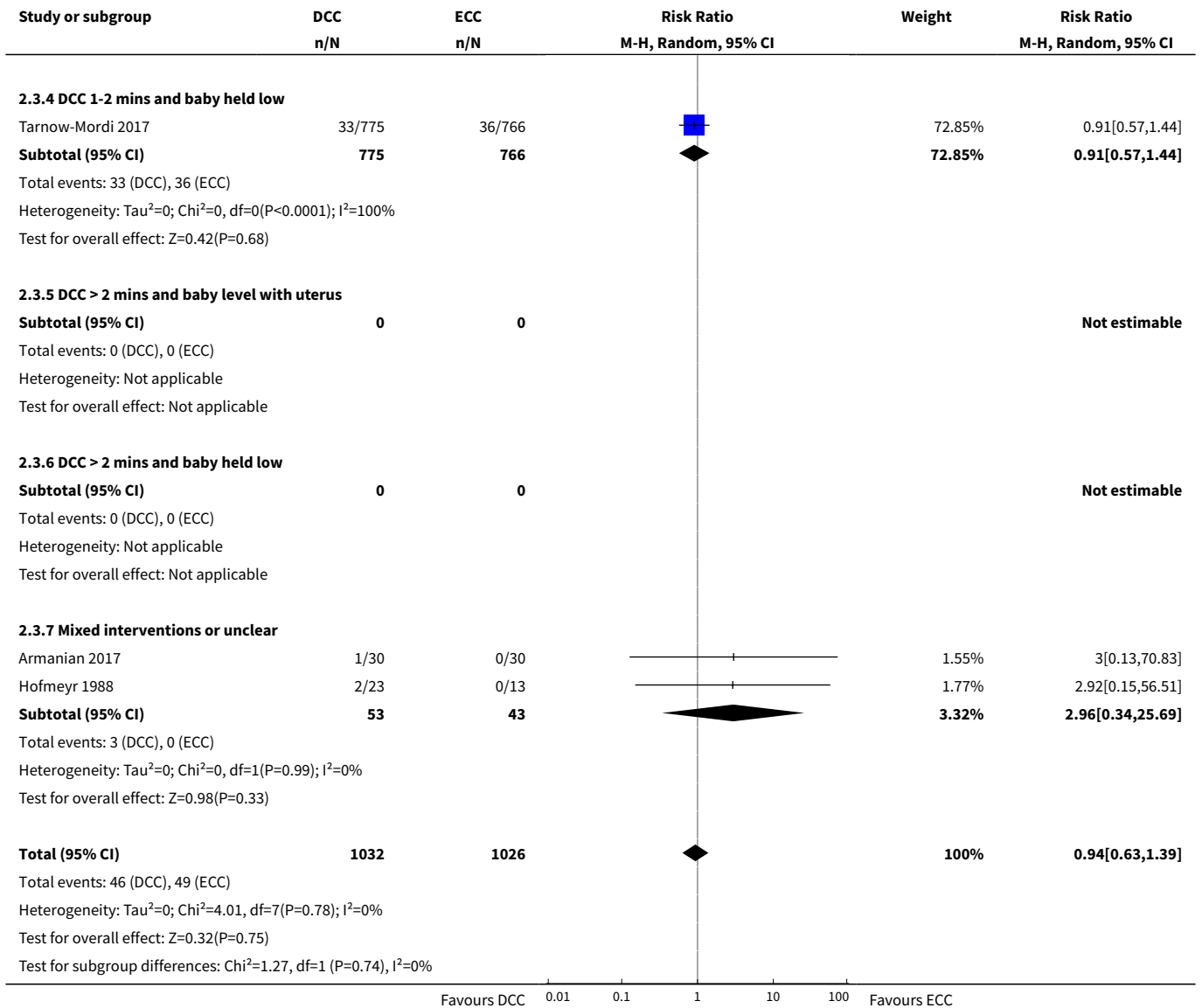
Analysis 2.1. Comparison 2 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by type of intervention), Outcome 1 Death of baby (up to discharge).



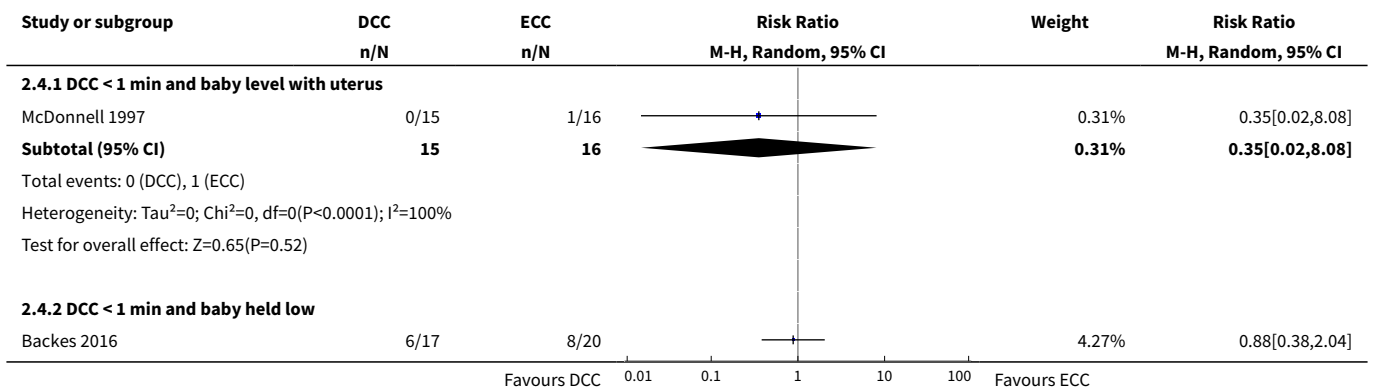


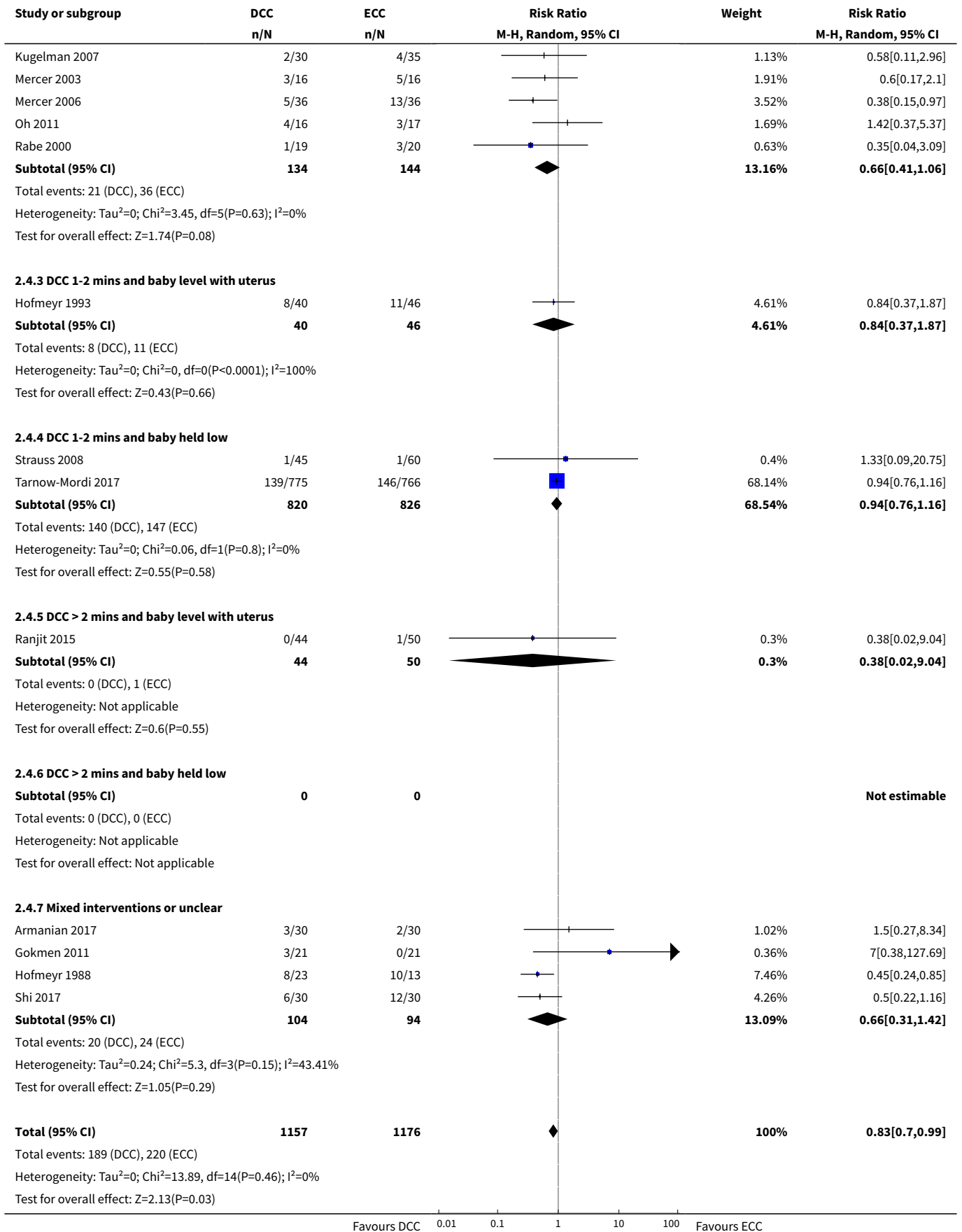
Analysis 2.3. Comparison 2 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by type of intervention), Outcome 3 Severe intraventricular haemorrhage (IVH grades 3, 4).

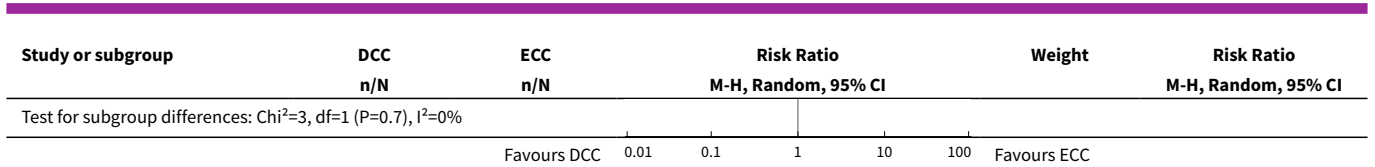




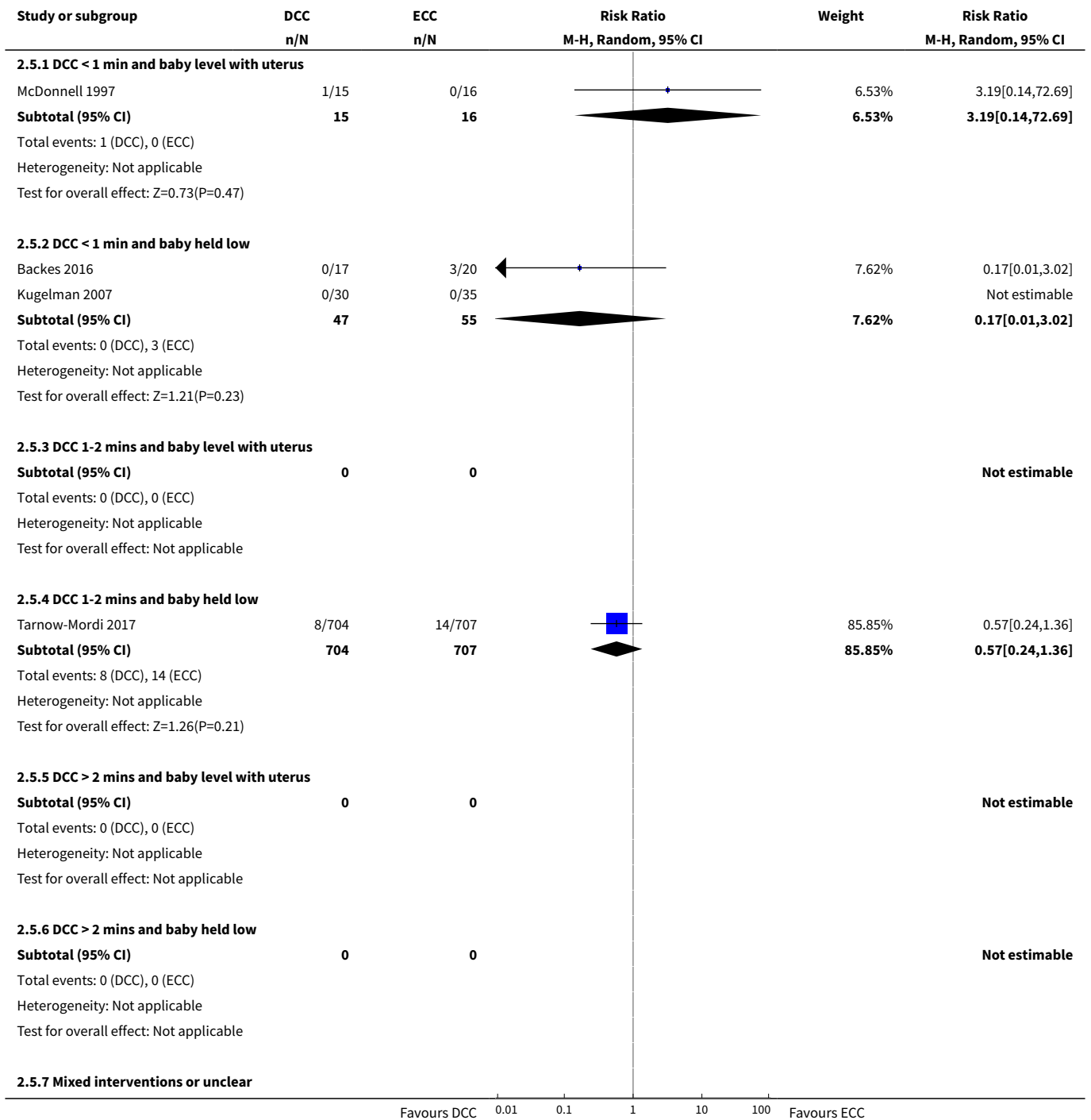
Analysis 2.4. Comparison 2 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by type of intervention), Outcome 4 Intraventricular haemorrhage (IVH, all grades).

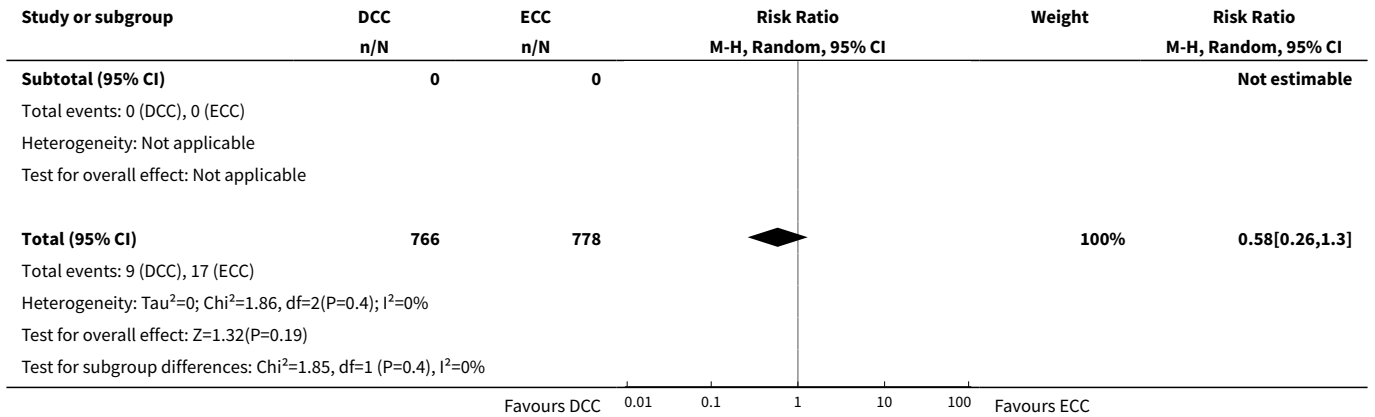




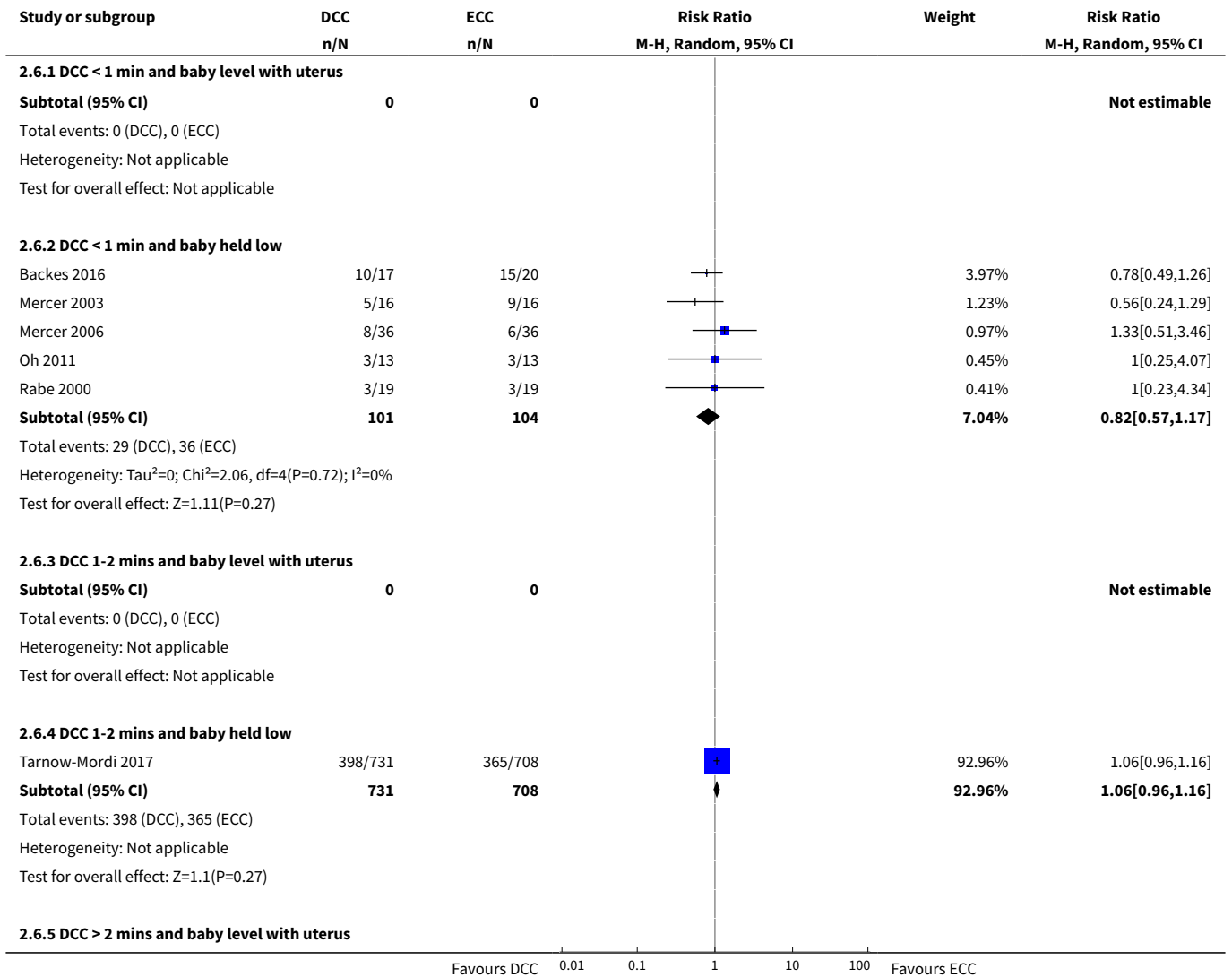


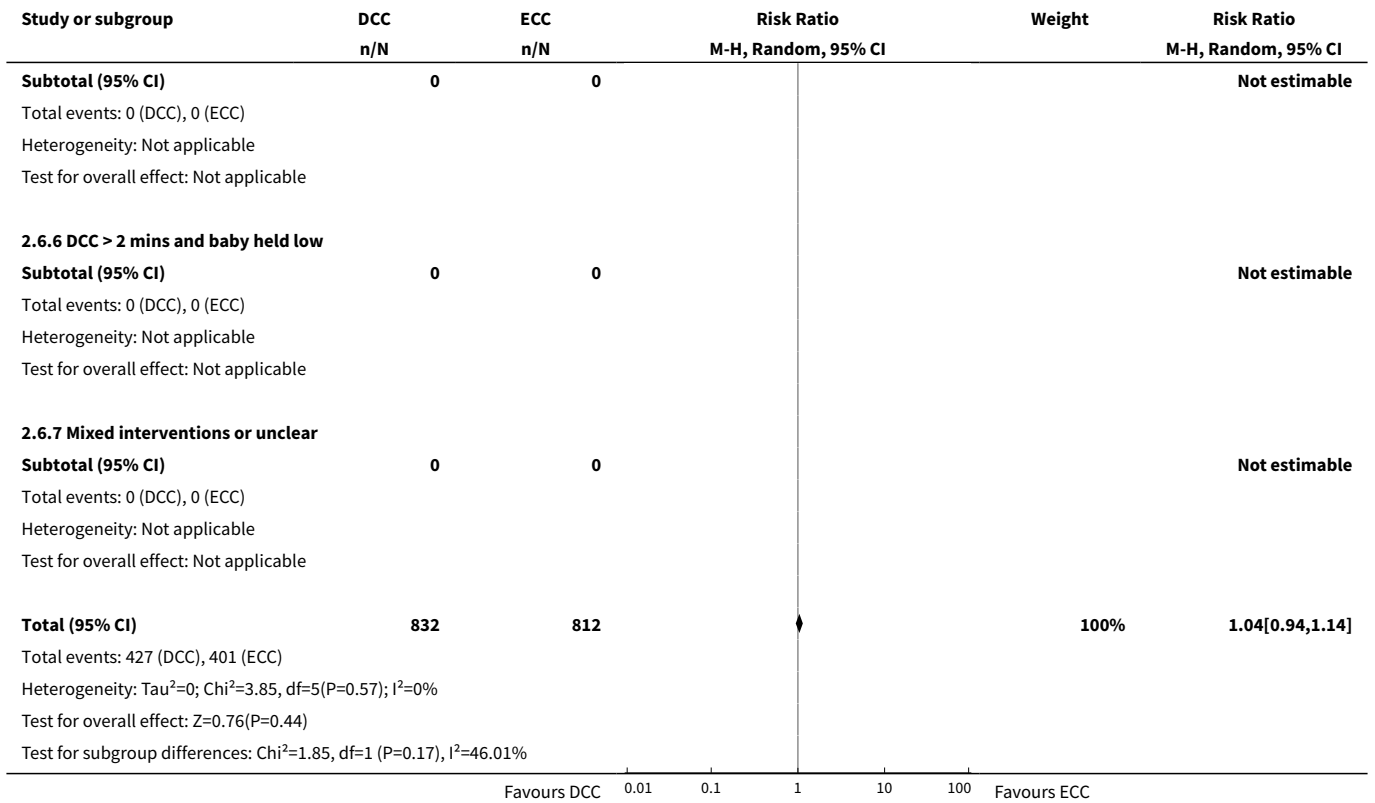
Analysis 2.5. Comparison 2 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by type of intervention), Outcome 5 Periventricular leukomalacia (PVL).



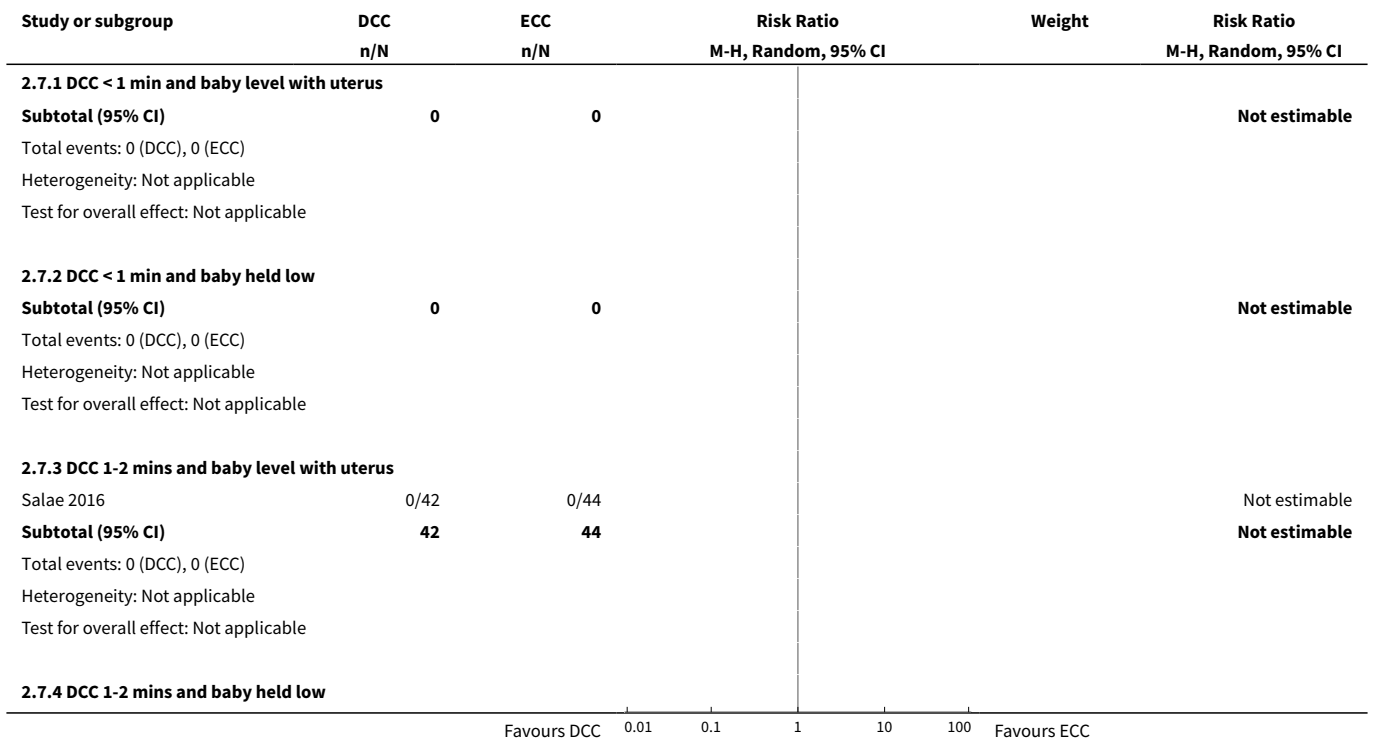


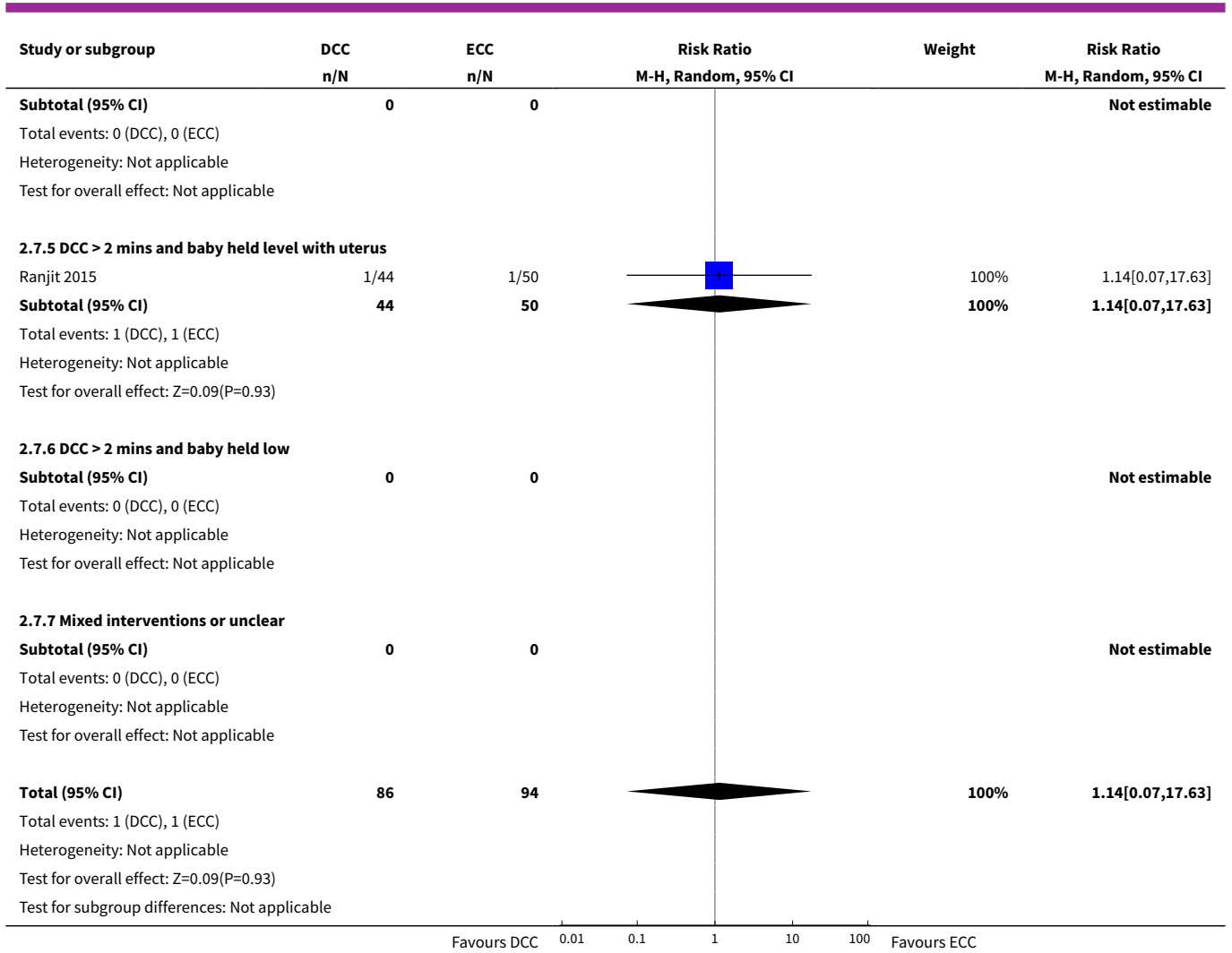
Analysis 2.6. Comparison 2 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by type of intervention), Outcome 6 Chronic lung disease (CLD) - oxygen supplement at 36 weeks (corrected for gestation).



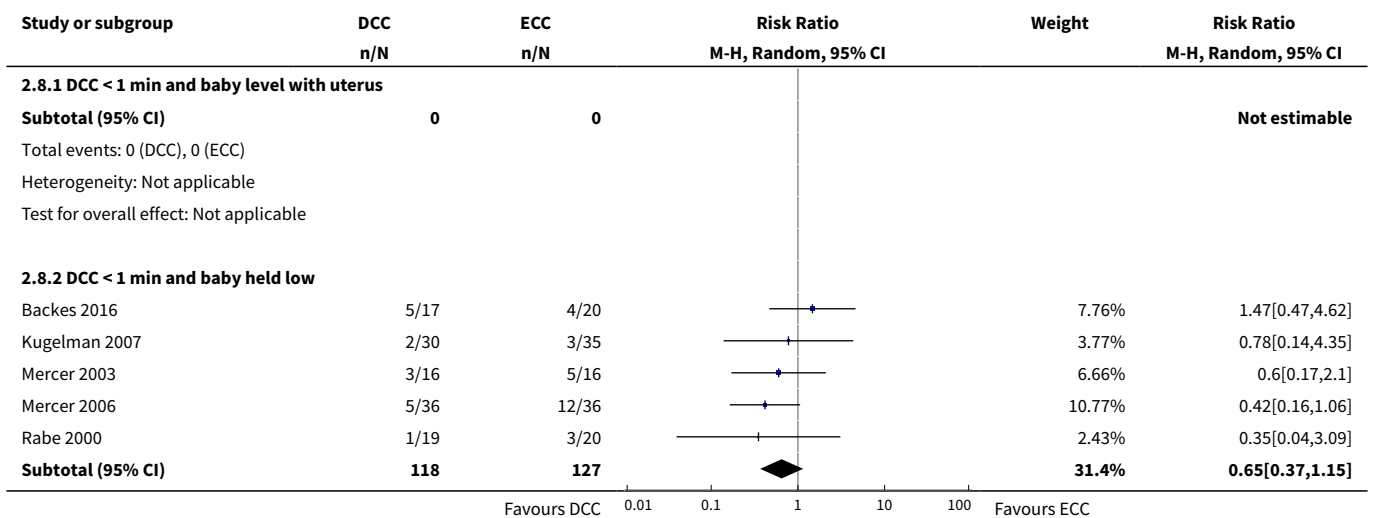


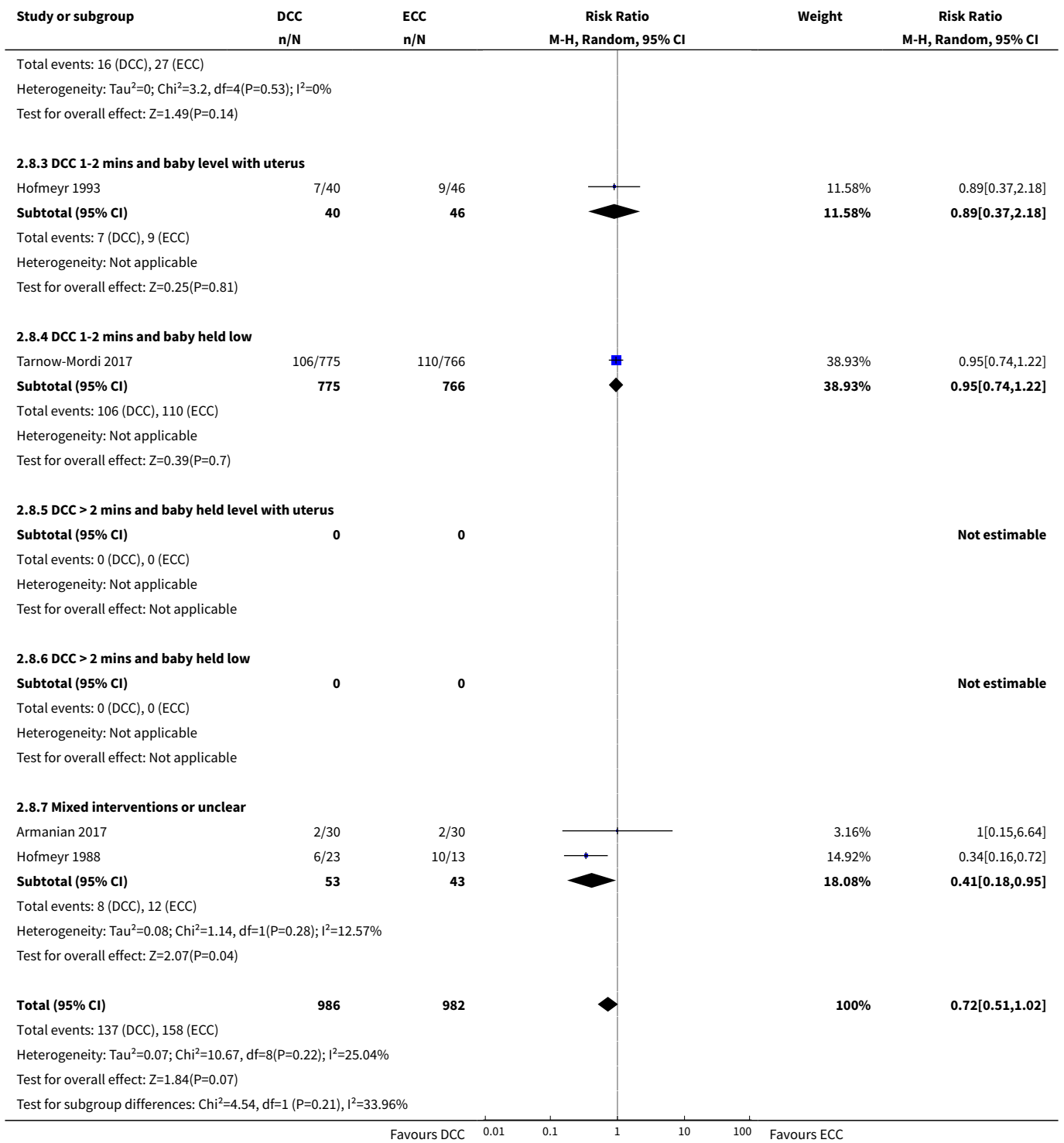
Analysis 2.7. Comparison 2 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by type of intervention), Outcome 7 Maternal blood loss of 500 mL or greater.



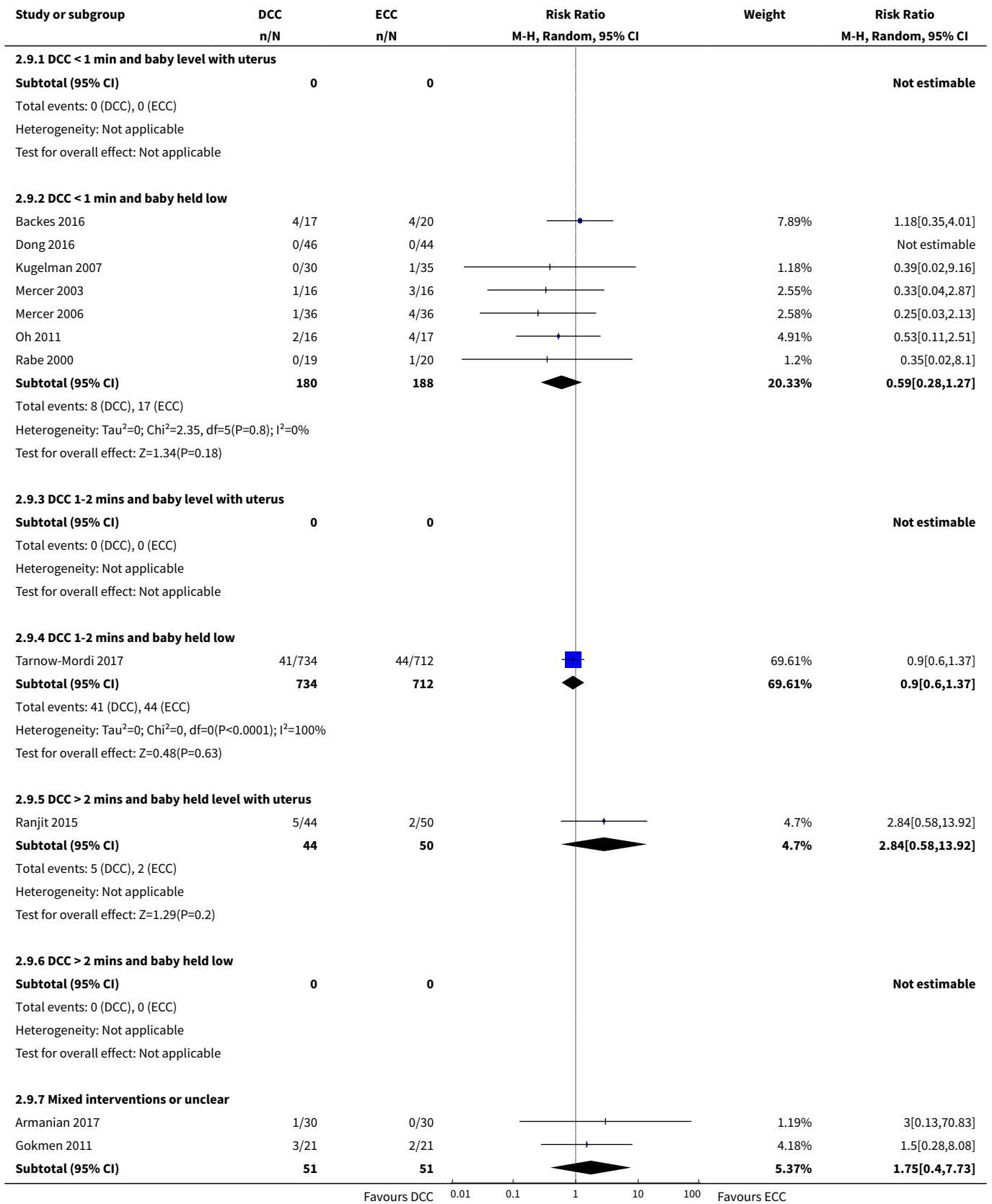


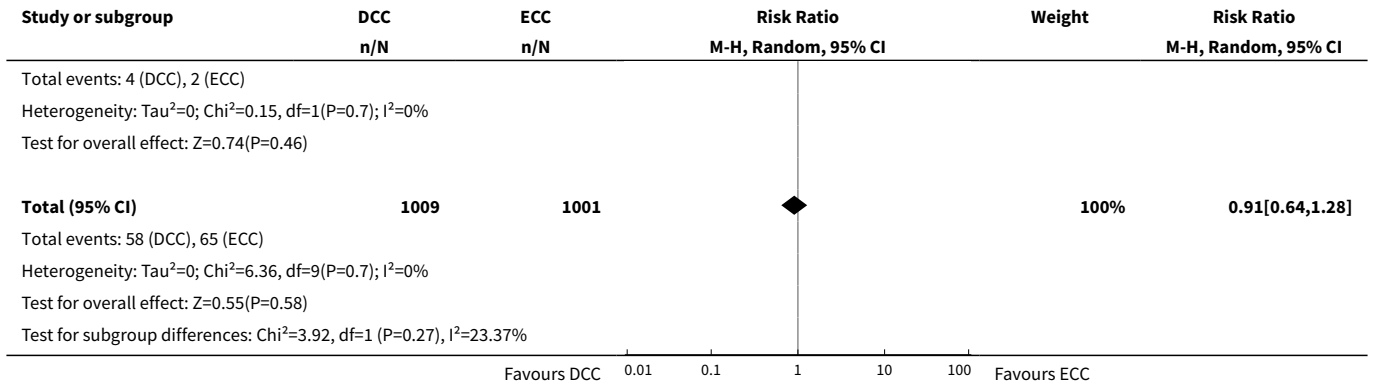
Analysis 2.8. Comparison 2 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by type of intervention), Outcome 8 Intraventricular haemorrhage (IVH, grades 1 & 2).



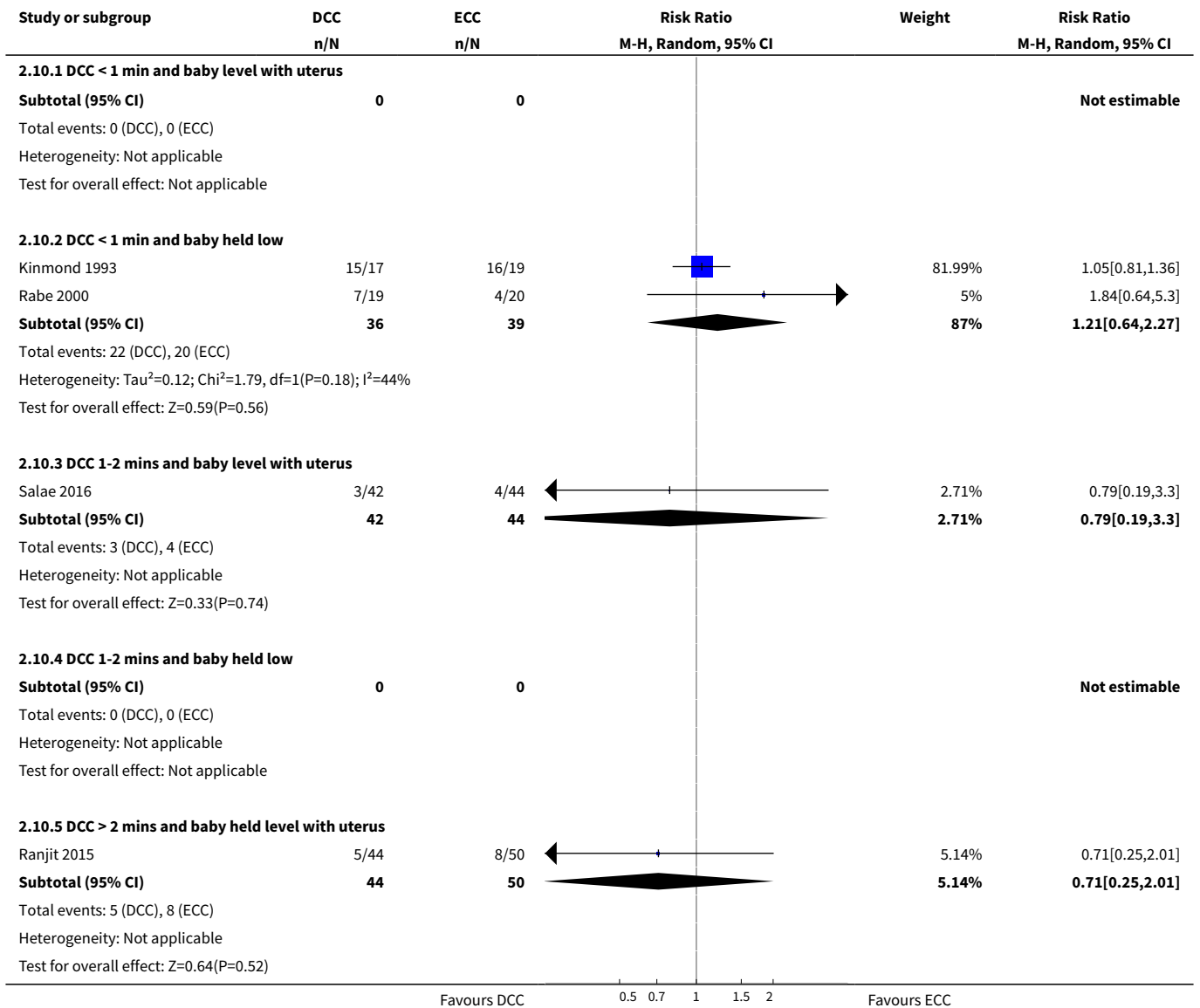


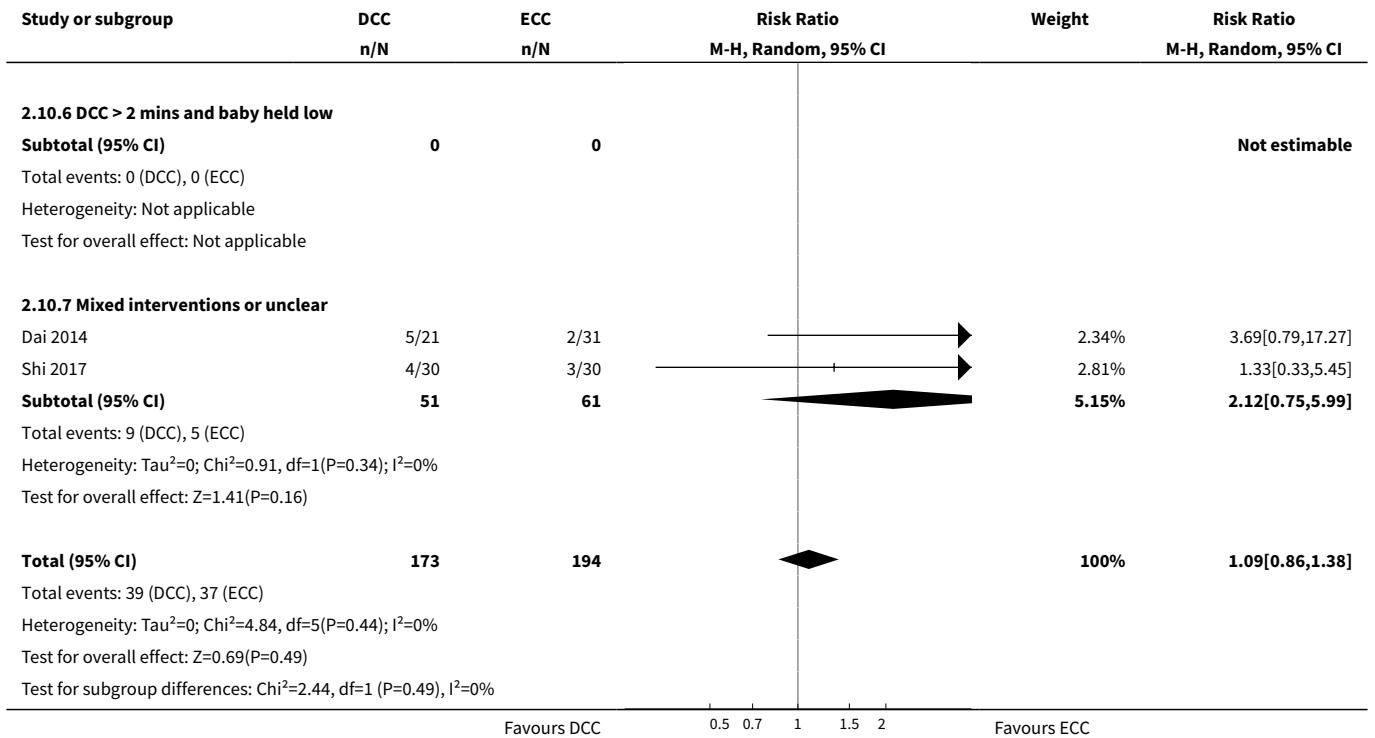
Analysis 2.9. Comparison 2 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by type of intervention), Outcome 9 Necrotising enterocolitis (NEC) confirmed by X-ray or laparotomy).



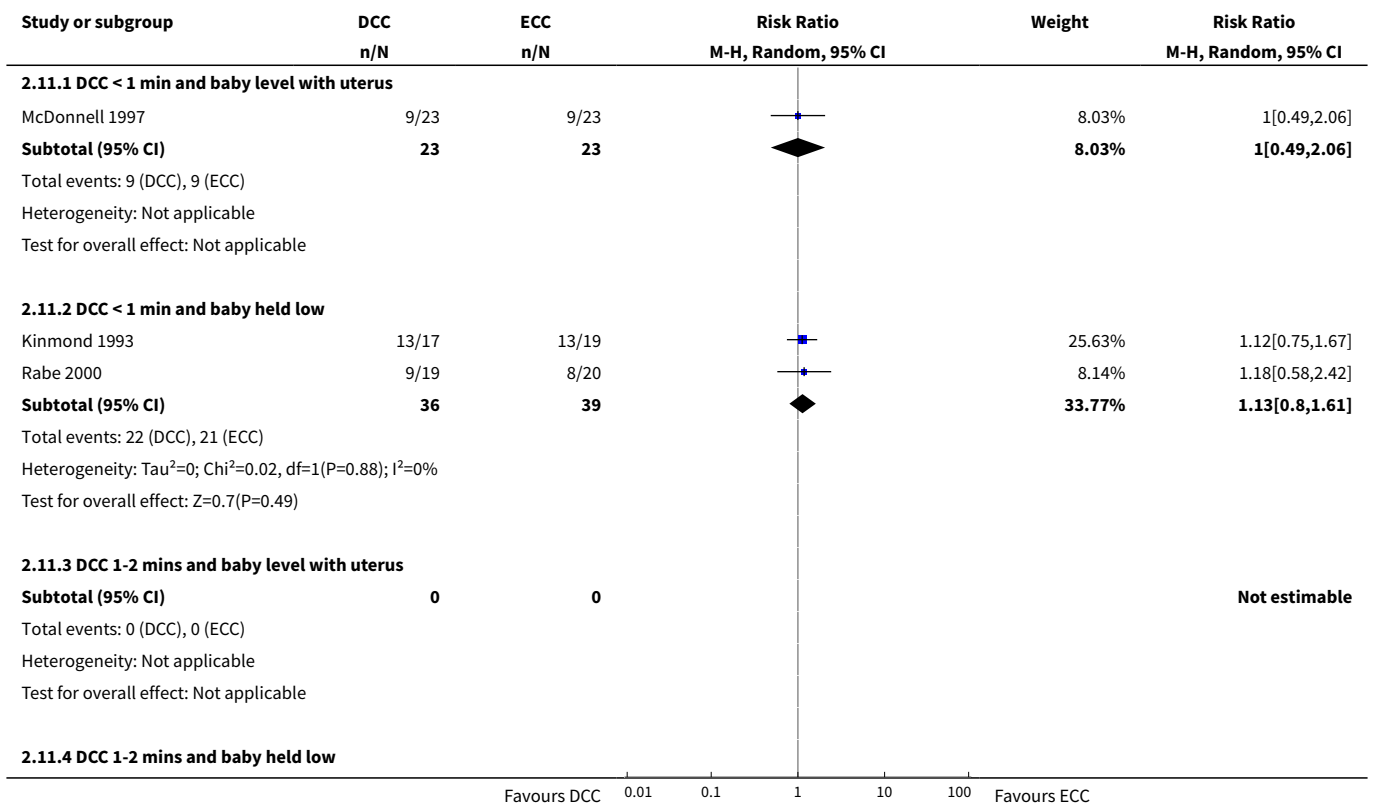


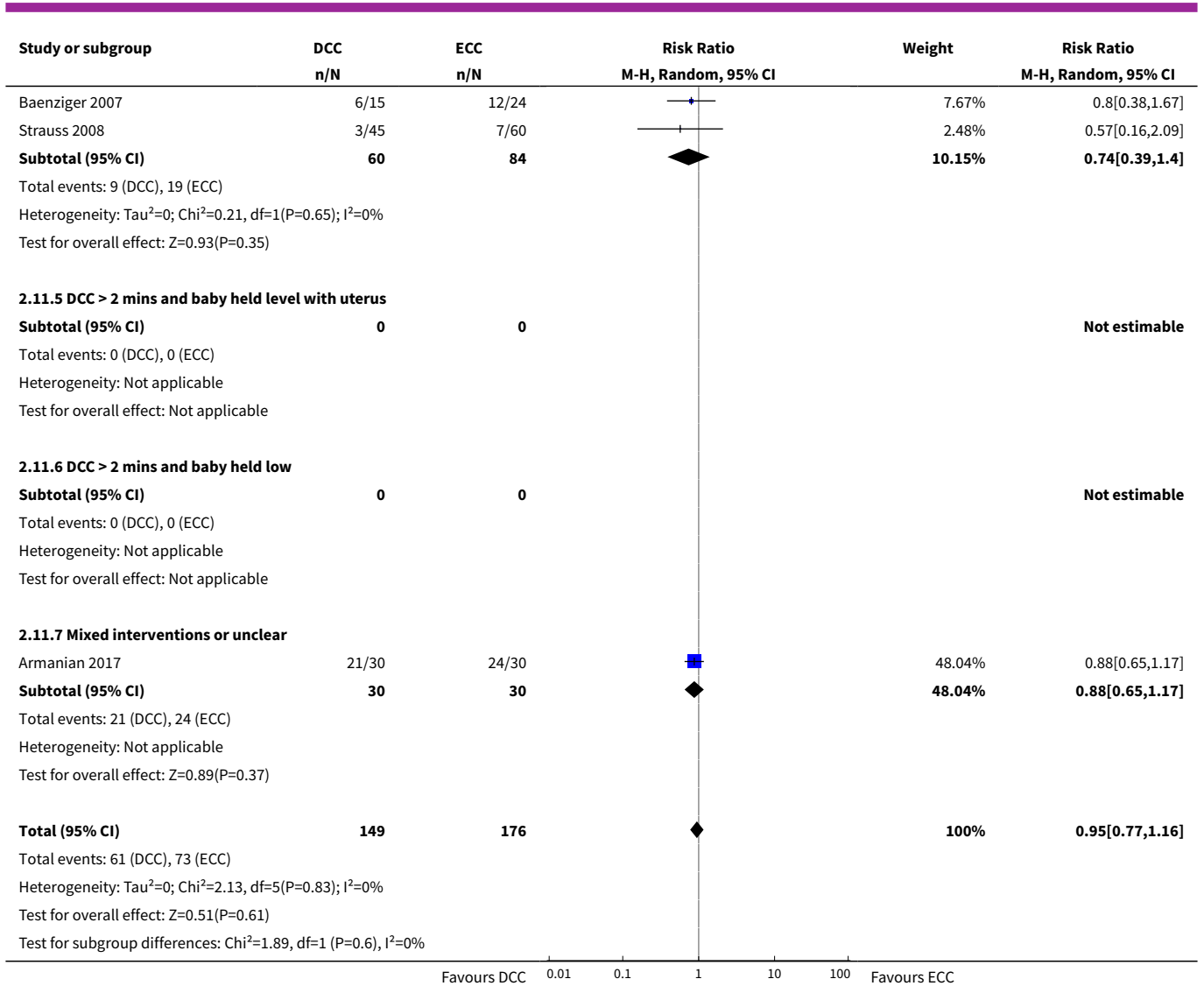
Analysis 2.10. Comparison 2 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by type of intervention), Outcome 10 Respiratory Distress Syndrome (RDS).



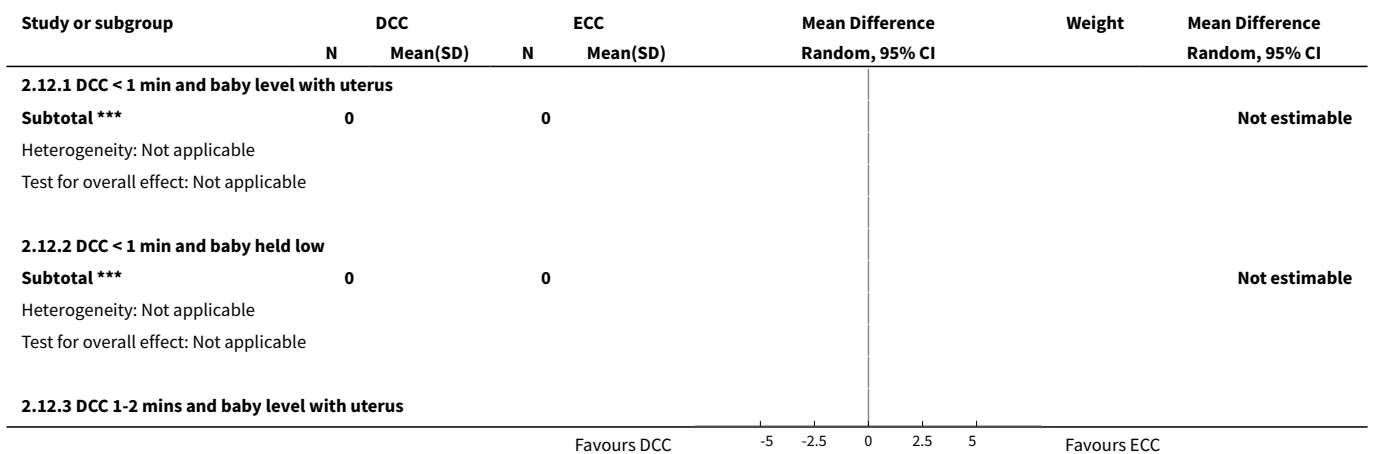


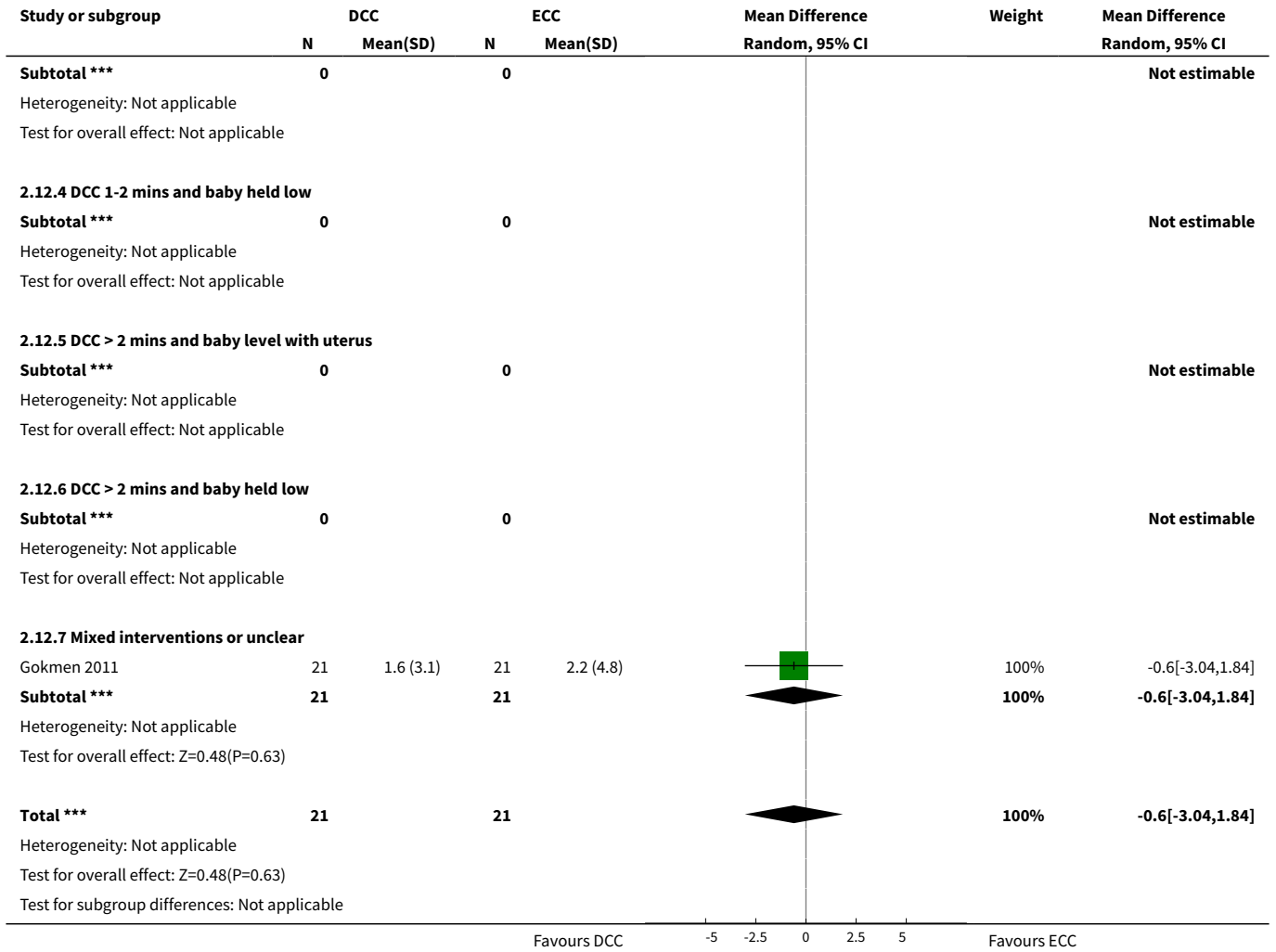
Analysis 2.11. Comparison 2 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by type of intervention), Outcome 11 Respiratory support (ventilator or CPAP).



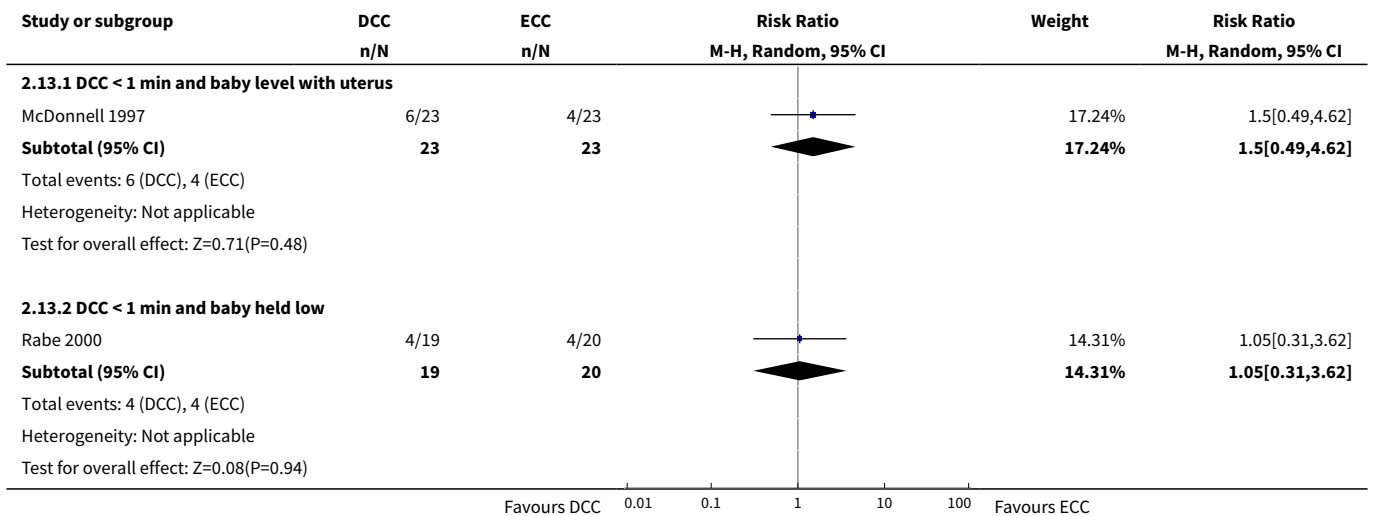


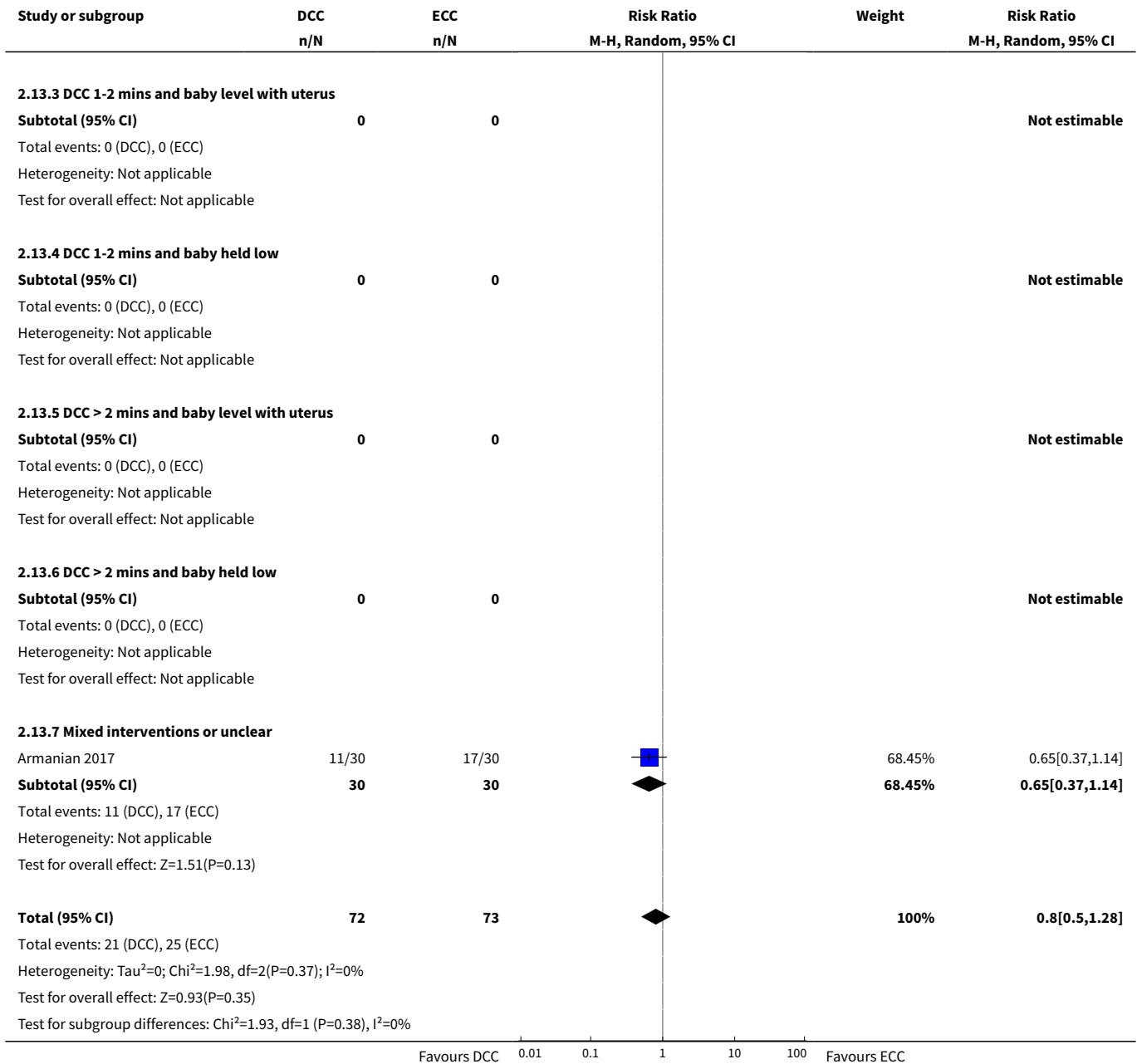
Analysis 2.12. Comparison 2 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by type of intervention), Outcome 12 Duration of respiratory support.



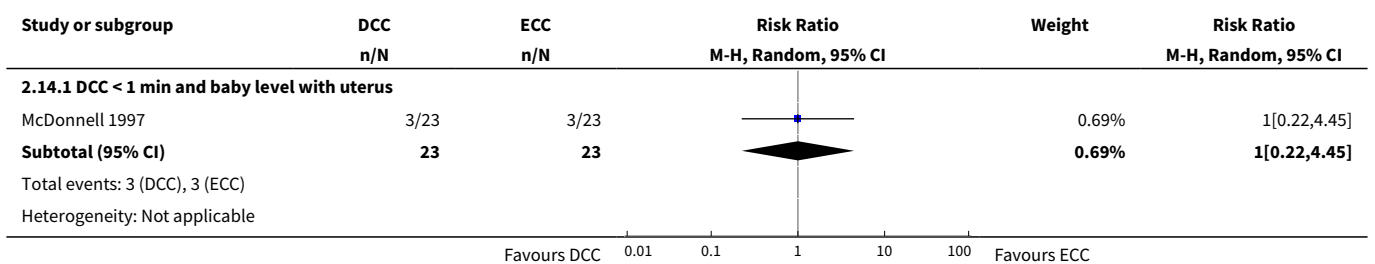


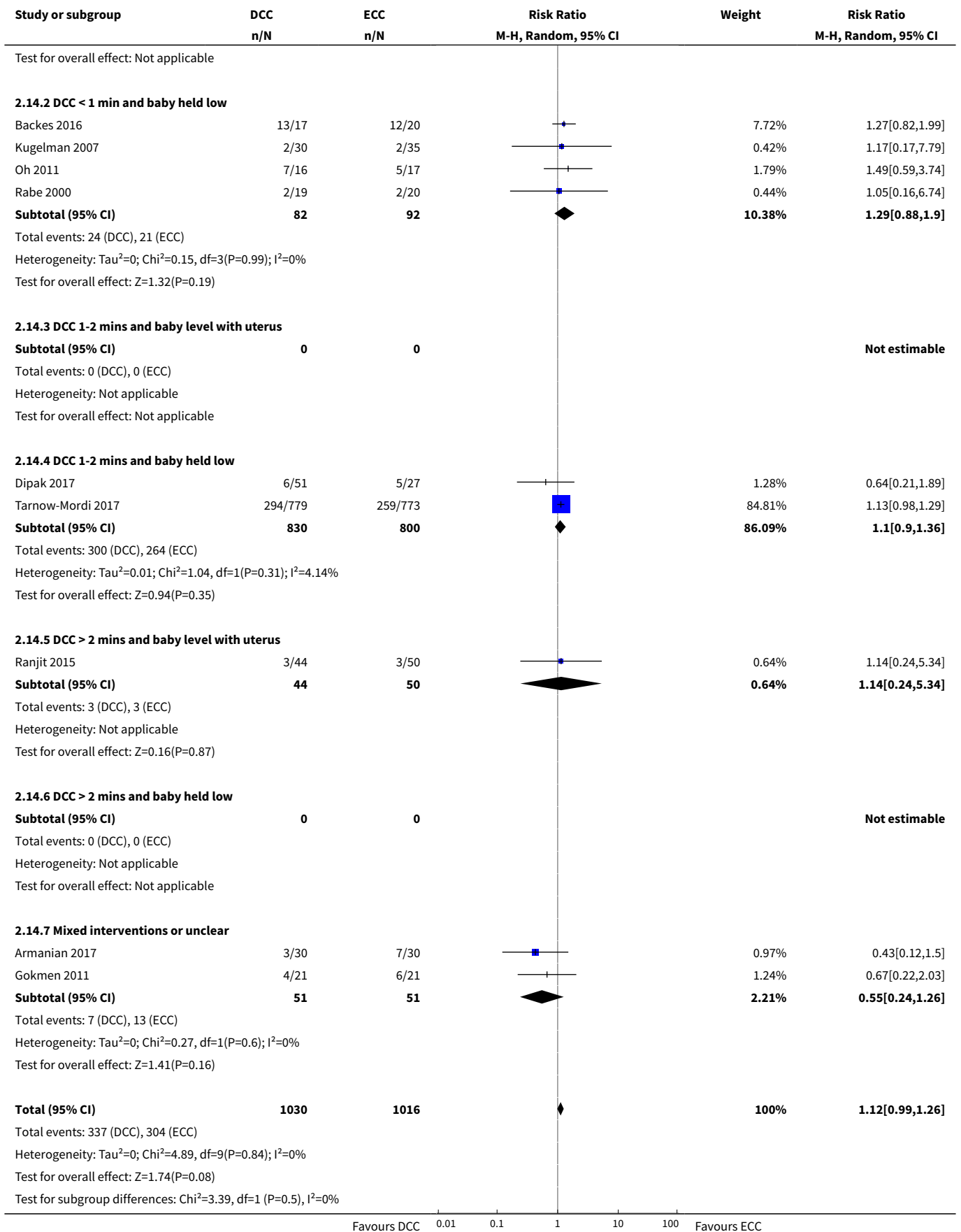
Analysis 2.13. Comparison 2 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by type of intervention), Outcome 13 Surfactant treatment (for severe RDS).



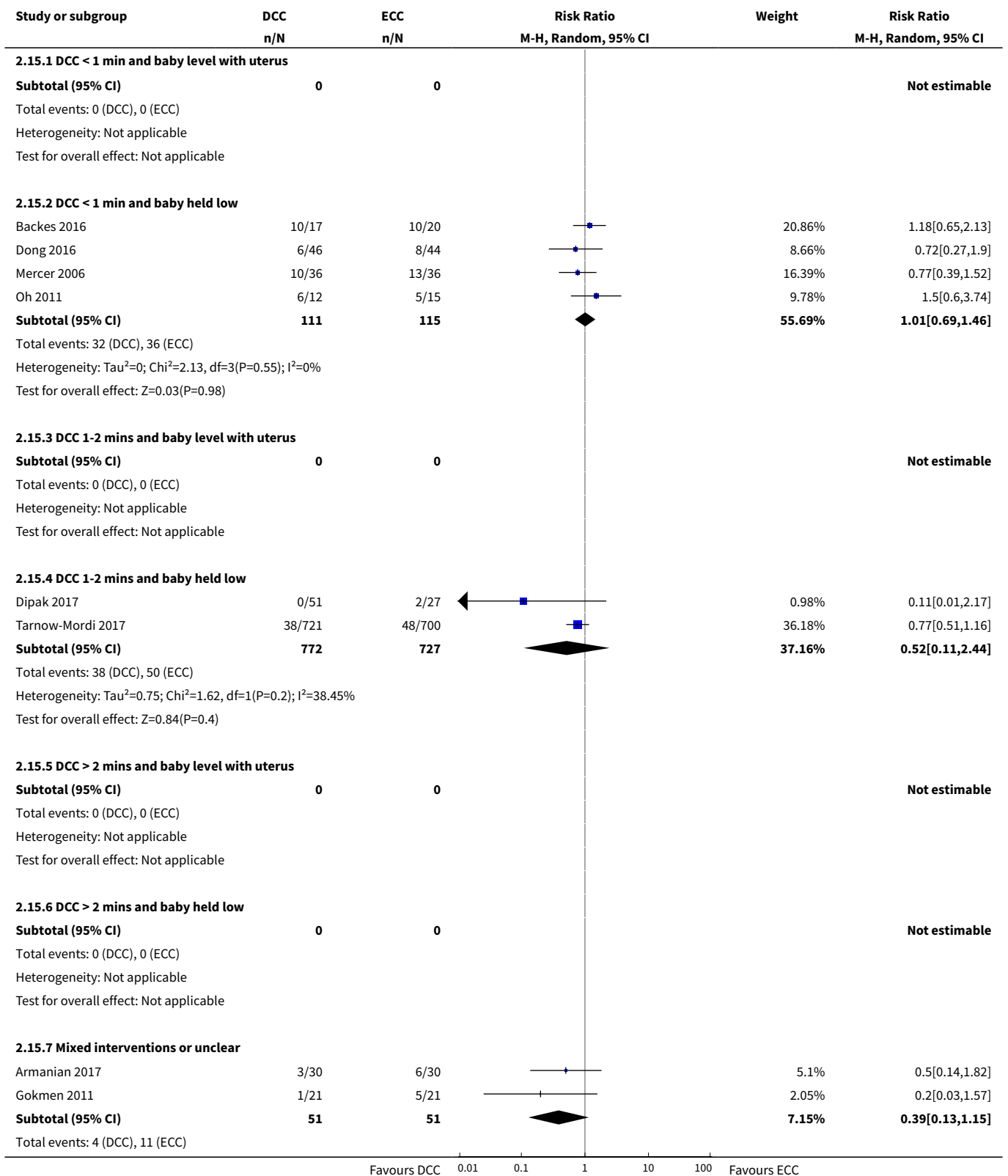


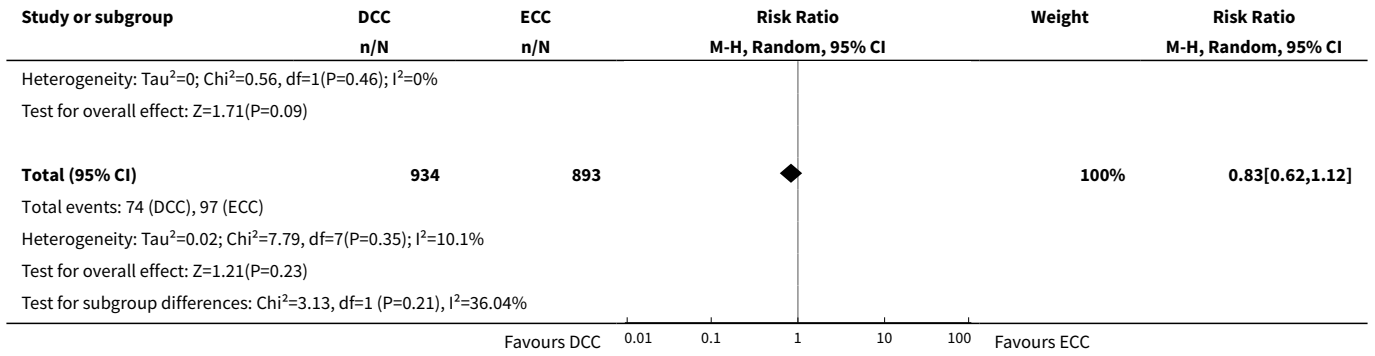
Analysis 2.14. Comparison 2 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by type of intervention), Outcome 14 Treatment for Patent Ductus Arteriosus (PDA) (medical and/or surgical).



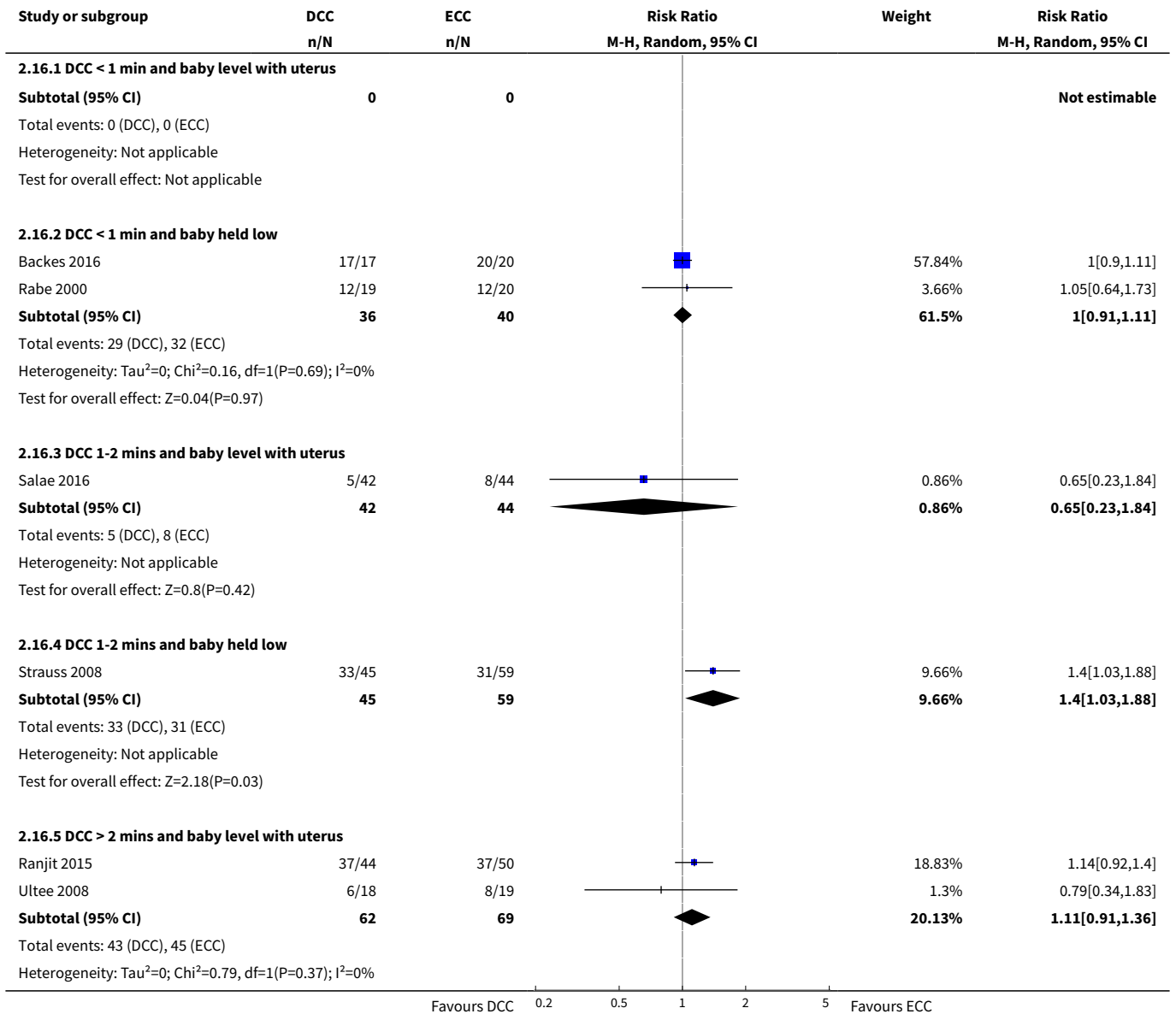


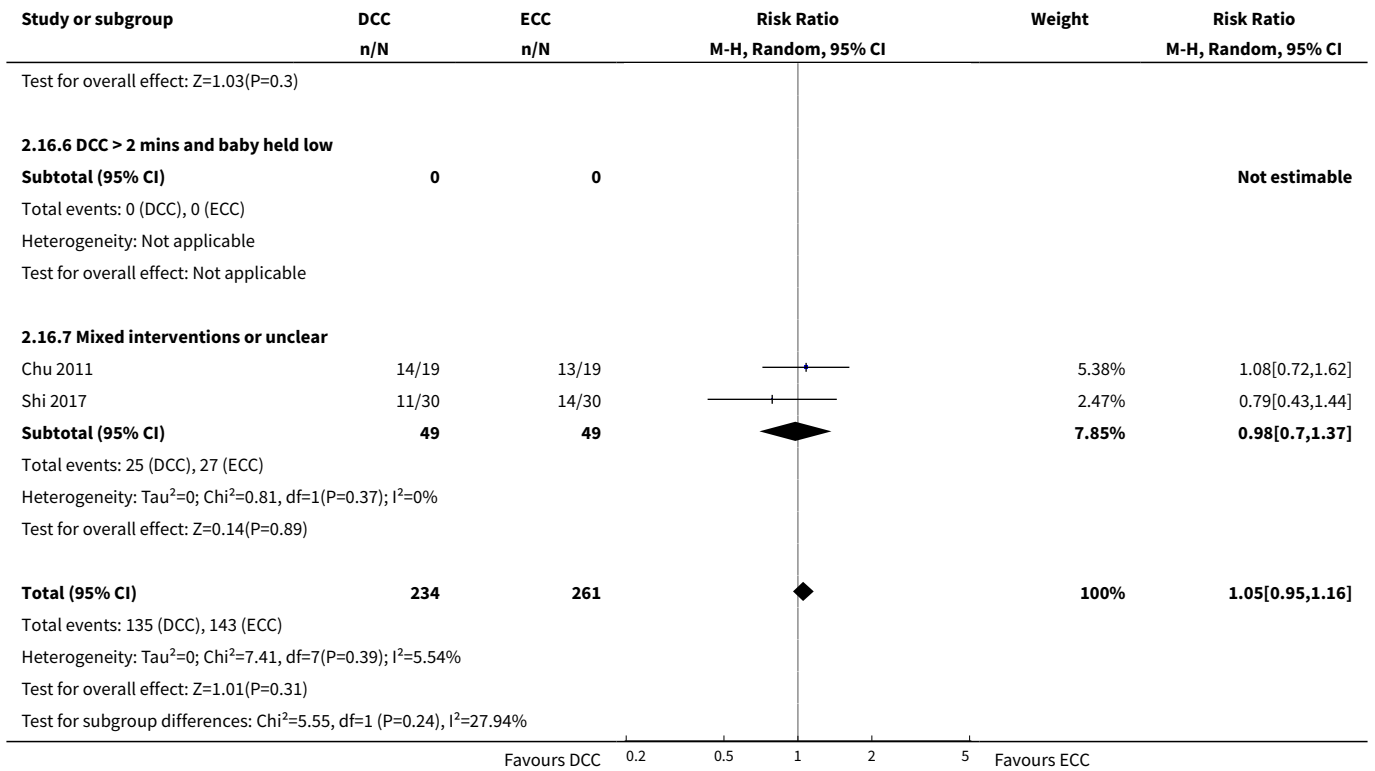
Analysis 2.15. Comparison 2 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by type of intervention), Outcome 15 Treatment for Retinopathy of Prematurity (RoP).



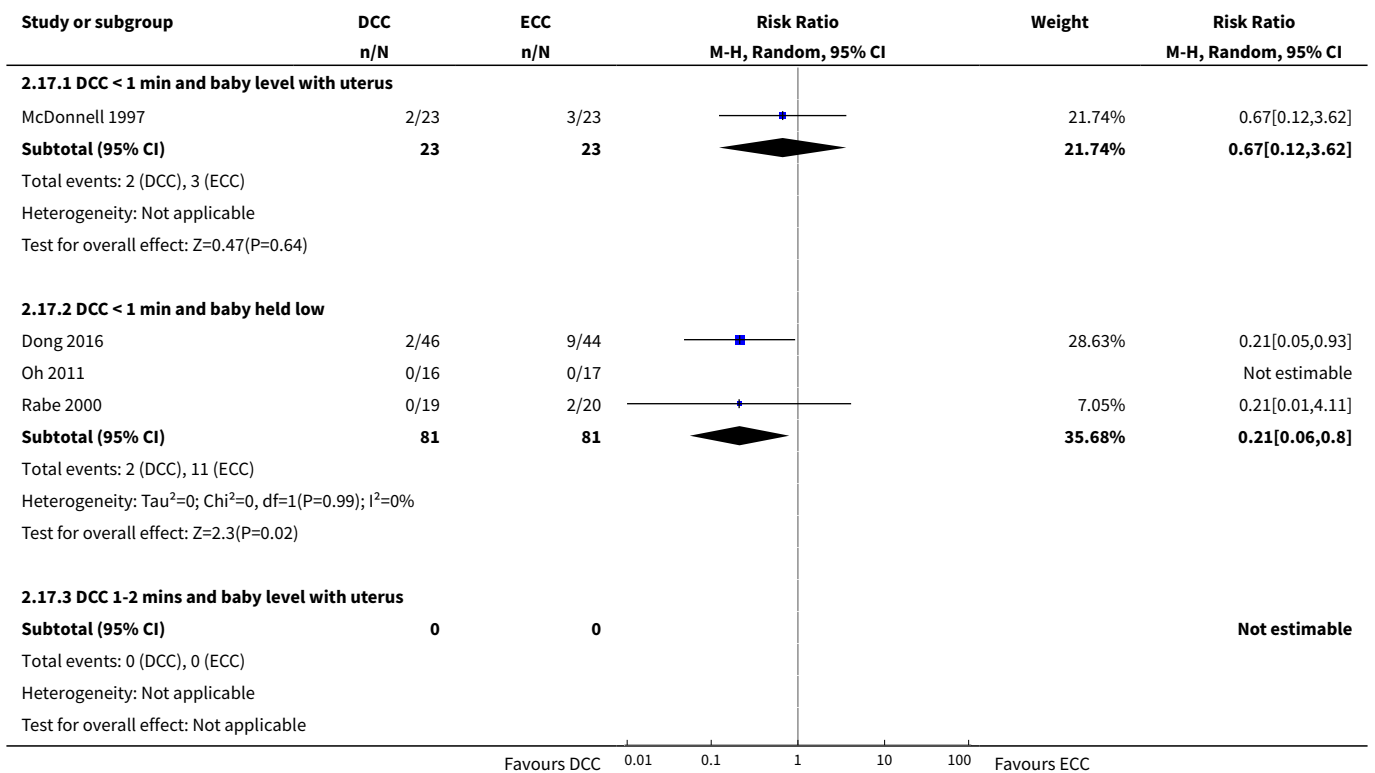


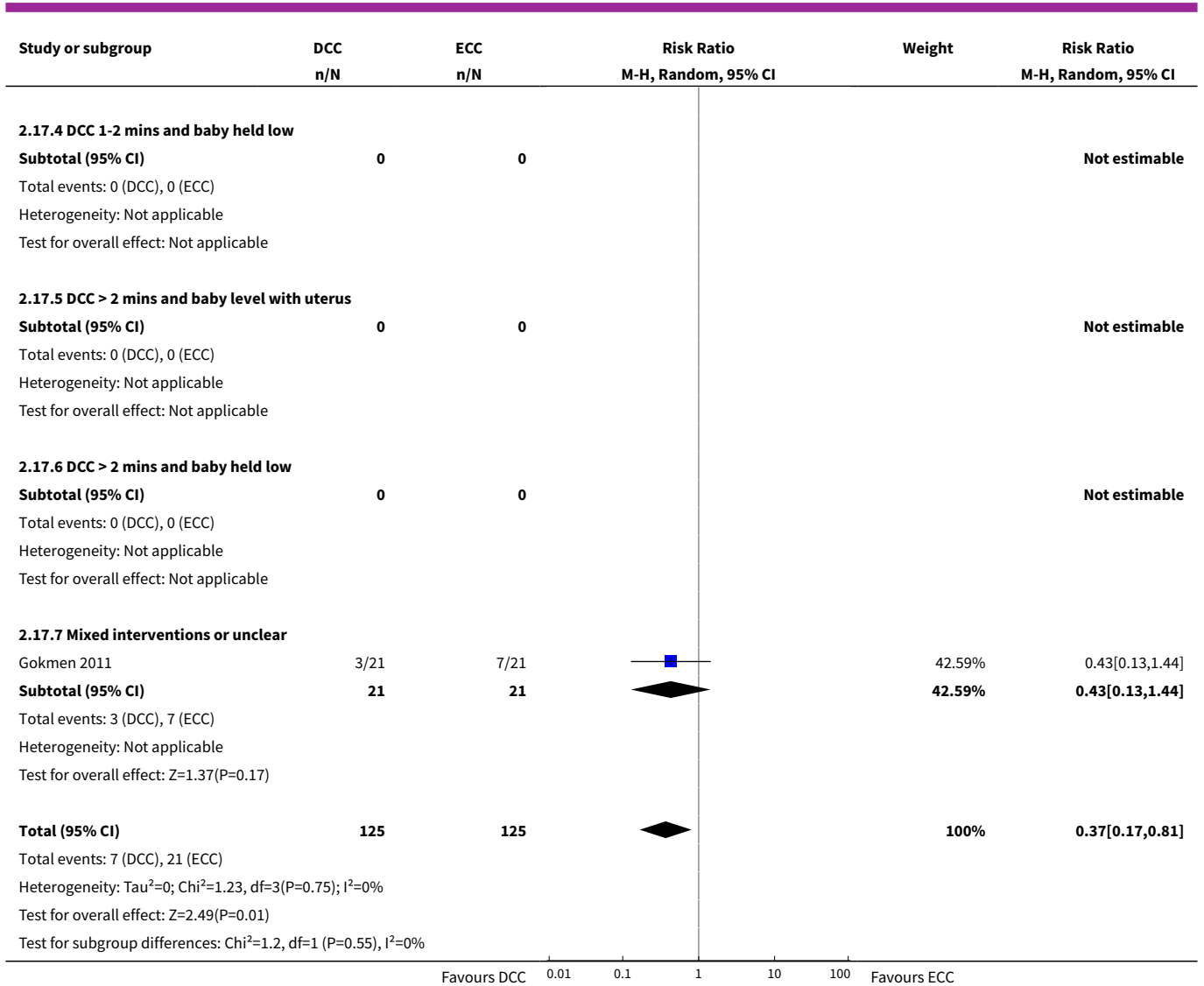
Analysis 2.16. Comparison 2 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by type of intervention), Outcome 16 Hyperbilirubinemia (treated by phototherapy).



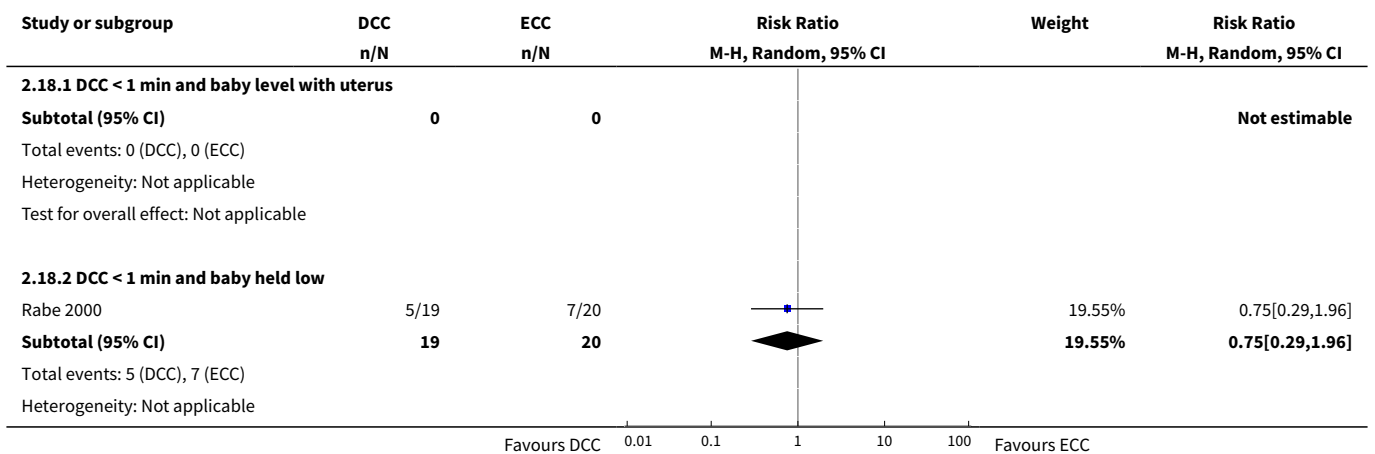


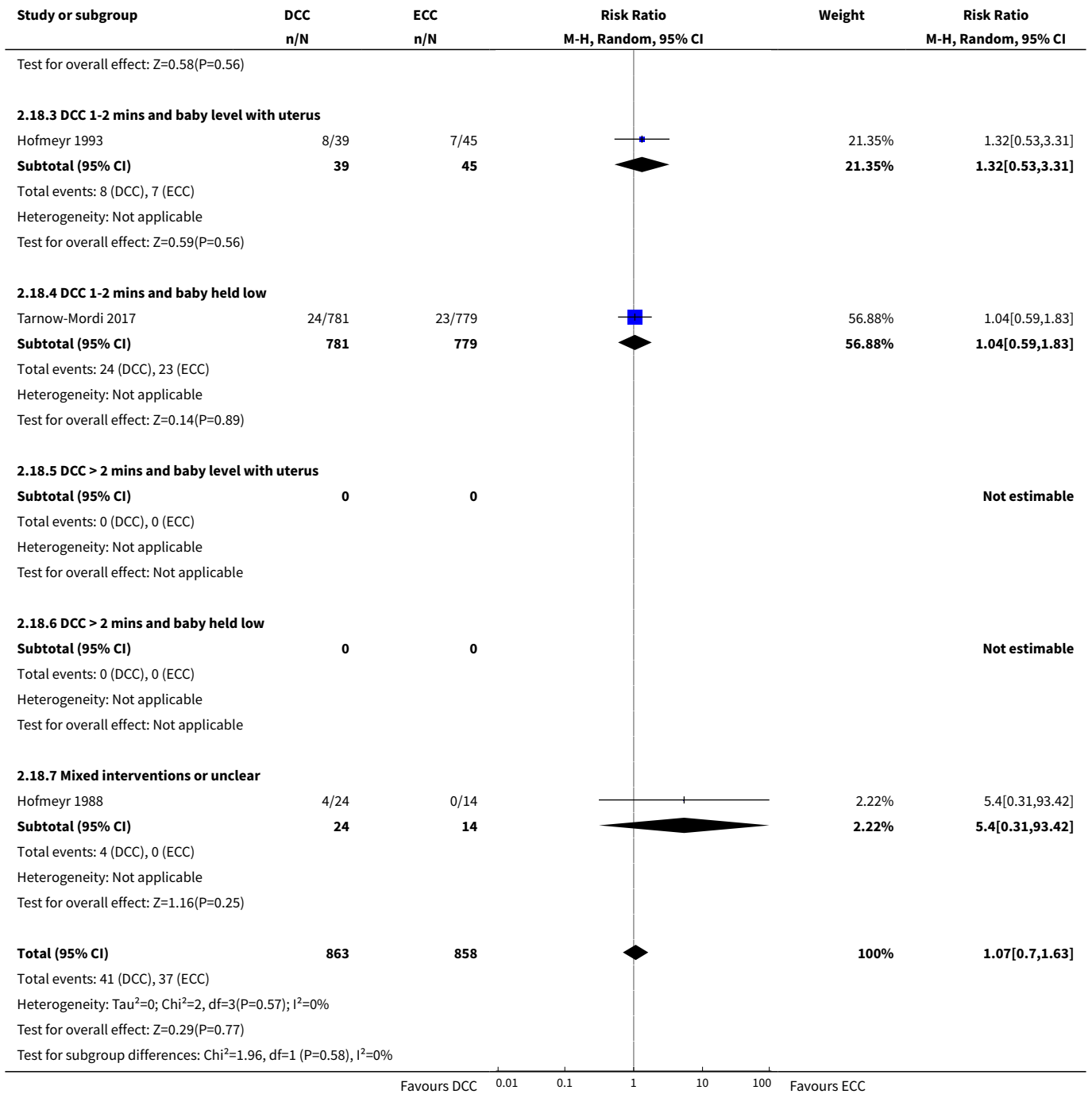
Analysis 2.17. Comparison 2 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by type of intervention), Outcome 17 Inotropics for low blood pressure.



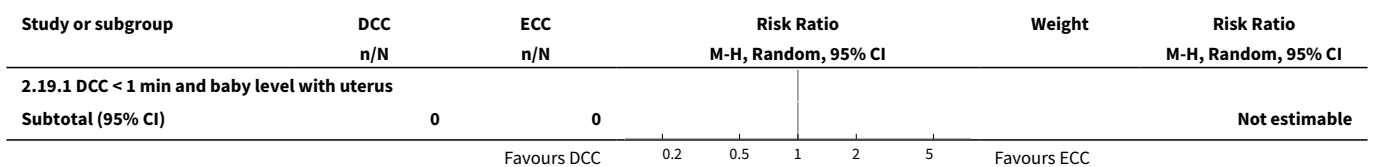


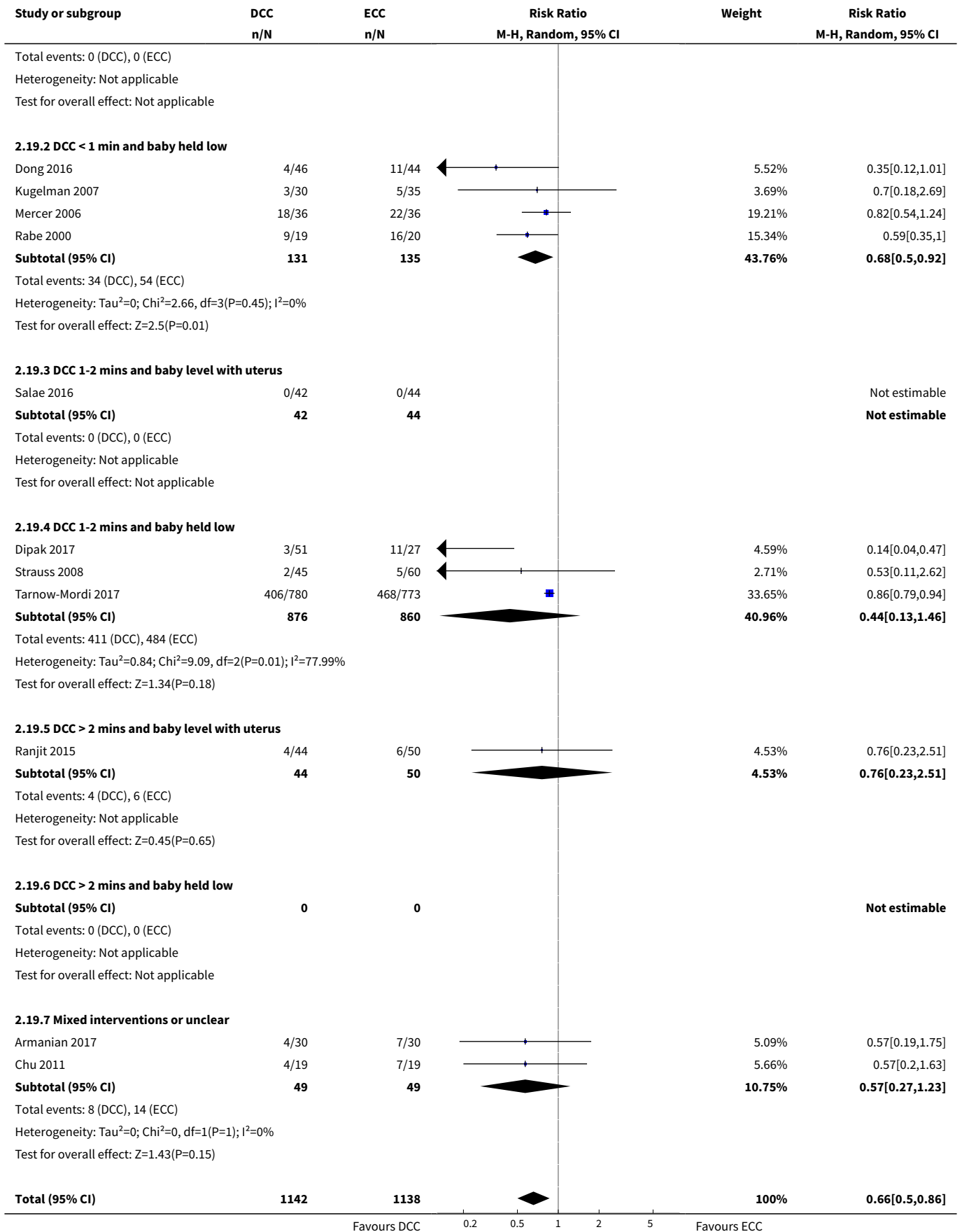
Analysis 2.18. Comparison 2 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by type of intervention), Outcome 18 Low Apgar as defined by trialists (generally < 8 at 5 mins).

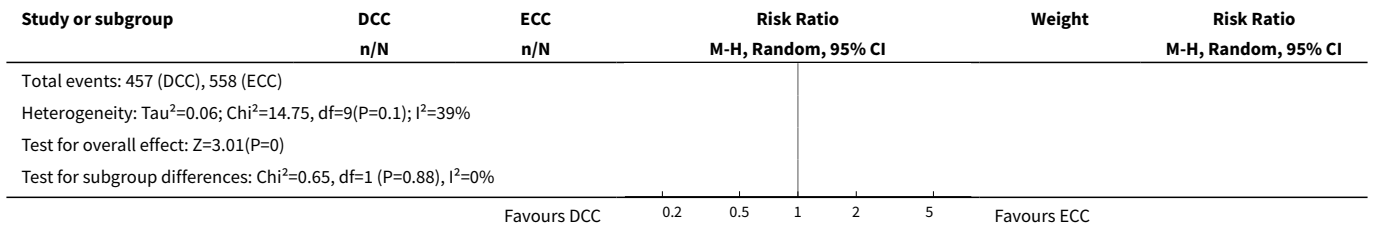




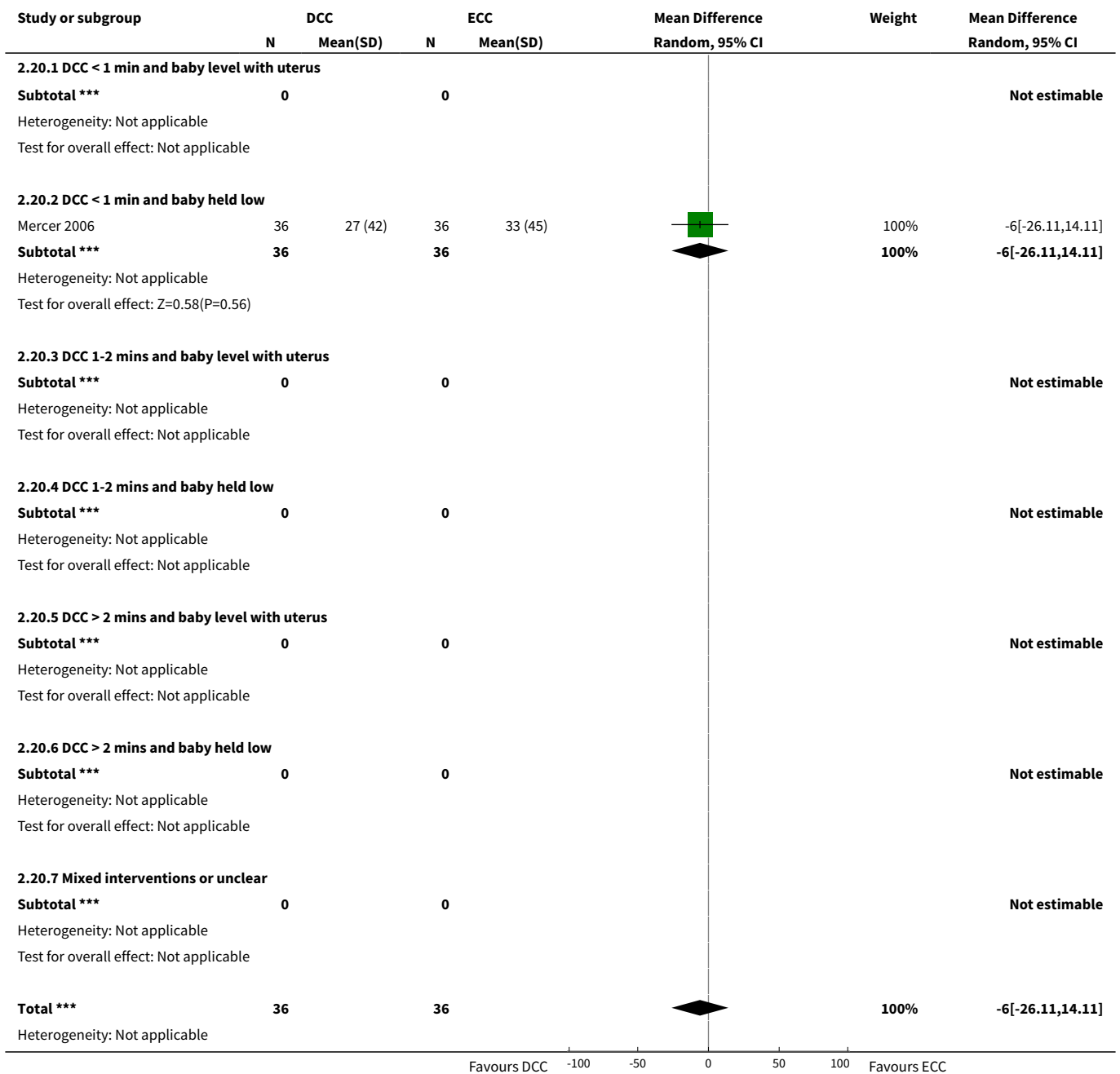
Analysis 2.19. Comparison 2 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by type of intervention), Outcome 19 Blood transfusion in infant.







Analysis 2.20. Comparison 2 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by type of intervention), Outcome 20 Volume of blood transfused (mL).



Study or subgroup	DCC		ECC		Mean Difference Random, 95% CI	Weight	Mean Difference Random, 95% CI
	N	Mean(SD)	N	Mean(SD)			

Test for overall effect: $Z=0.58(P=0.56)$
 Test for subgroup differences: Not applicable

Analysis 2.21. Comparison 2 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by type of intervention), Outcome 21 Late sepsis (after 3 days or as defined by trialists).

Study or subgroup	DCC		ECC		Risk Ratio M-H, Random, 95% CI	Weight	Risk Ratio M-H, Random, 95% CI
	n/N	n/N	n/N	n/N			

2.21.1 DCC < 1 min and baby level with uterus
Subtotal (95% CI) 0 0 **Not estimable**
 Total events: 0 (DCC), 0 (ECC)
 Heterogeneity: Not applicable
 Test for overall effect: Not applicable

2.21.2 DCC < 1 min and baby held low

Backes 2016	8/17	8/20			11.65%	1.18[0.56,2.46]
Dong 2016	4/46	7/44			6.33%	0.55[0.17,1.74]
Kugelman 2007	2/30	3/35			3.28%	0.78[0.14,4.35]
Mercer 2006	1/36	8/36			2.45%	0.13[0.02,0.95]
Oh 2011	5/16	8/17			9.29%	0.66[0.27,1.61]
Subtotal (95% CI)	145	152			33%	0.7[0.39,1.25]

Total events: 20 (DCC), 34 (ECC)
 Heterogeneity: $\text{Tau}^2=0.11$; $\text{Chi}^2=5.32$, $\text{df}=4(P=0.26)$; $I^2=24.85\%$
 Test for overall effect: $Z=1.2(P=0.23)$

2.21.3 DCC 1-2 mins and baby level with uterus
Subtotal (95% CI) 0 0 **Not estimable**
 Total events: 0 (DCC), 0 (ECC)
 Heterogeneity: Not applicable
 Test for overall effect: Not applicable

2.21.4 DCC 1-2 mins and baby held low

Dipak 2017	8/51	9/27			10.08%	0.47[0.21,1.08]
Tarnow-Mordi 2017	151/734	132/712			24.59%	1.11[0.9,1.37]
Subtotal (95% CI)	785	739			34.67%	0.8[0.35,1.81]

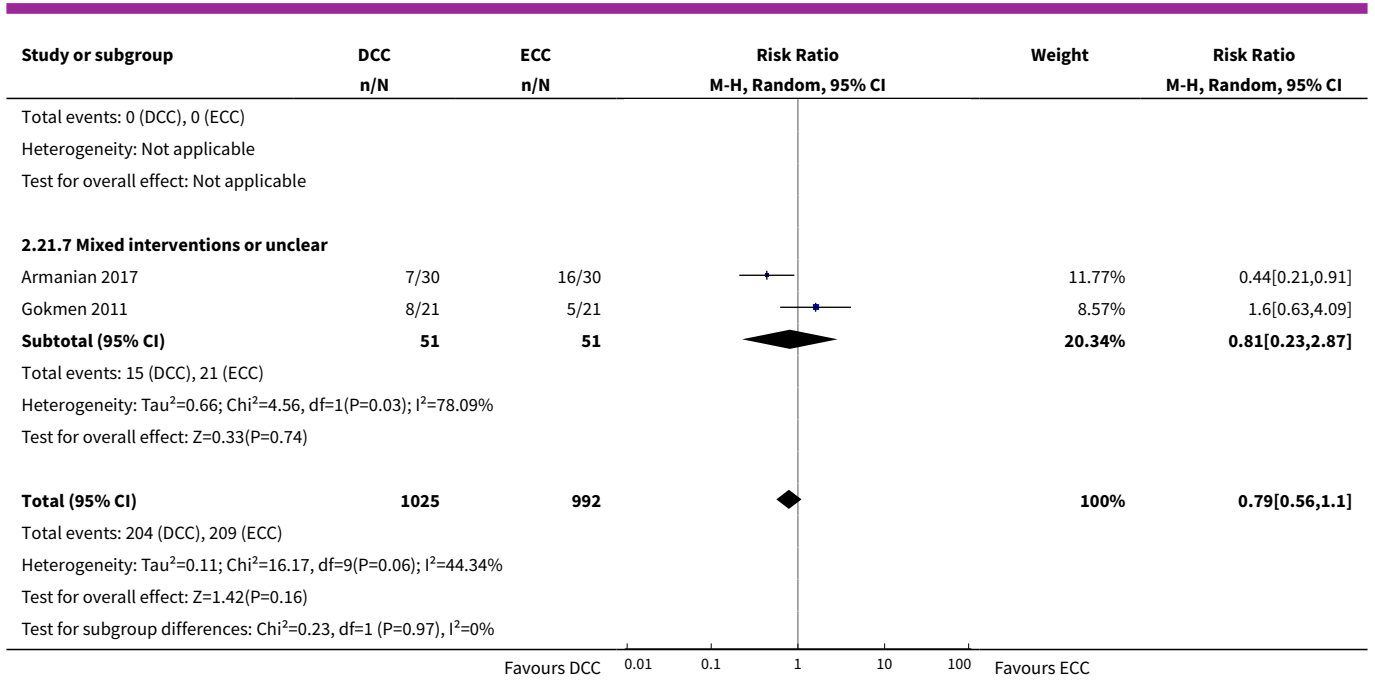
Total events: 159 (DCC), 141 (ECC)
 Heterogeneity: $\text{Tau}^2=0.27$; $\text{Chi}^2=3.86$, $\text{df}=1(P=0.05)$; $I^2=74.07\%$
 Test for overall effect: $Z=0.54(P=0.59)$

2.21.5 DCC > 2 mins and baby level with uterus

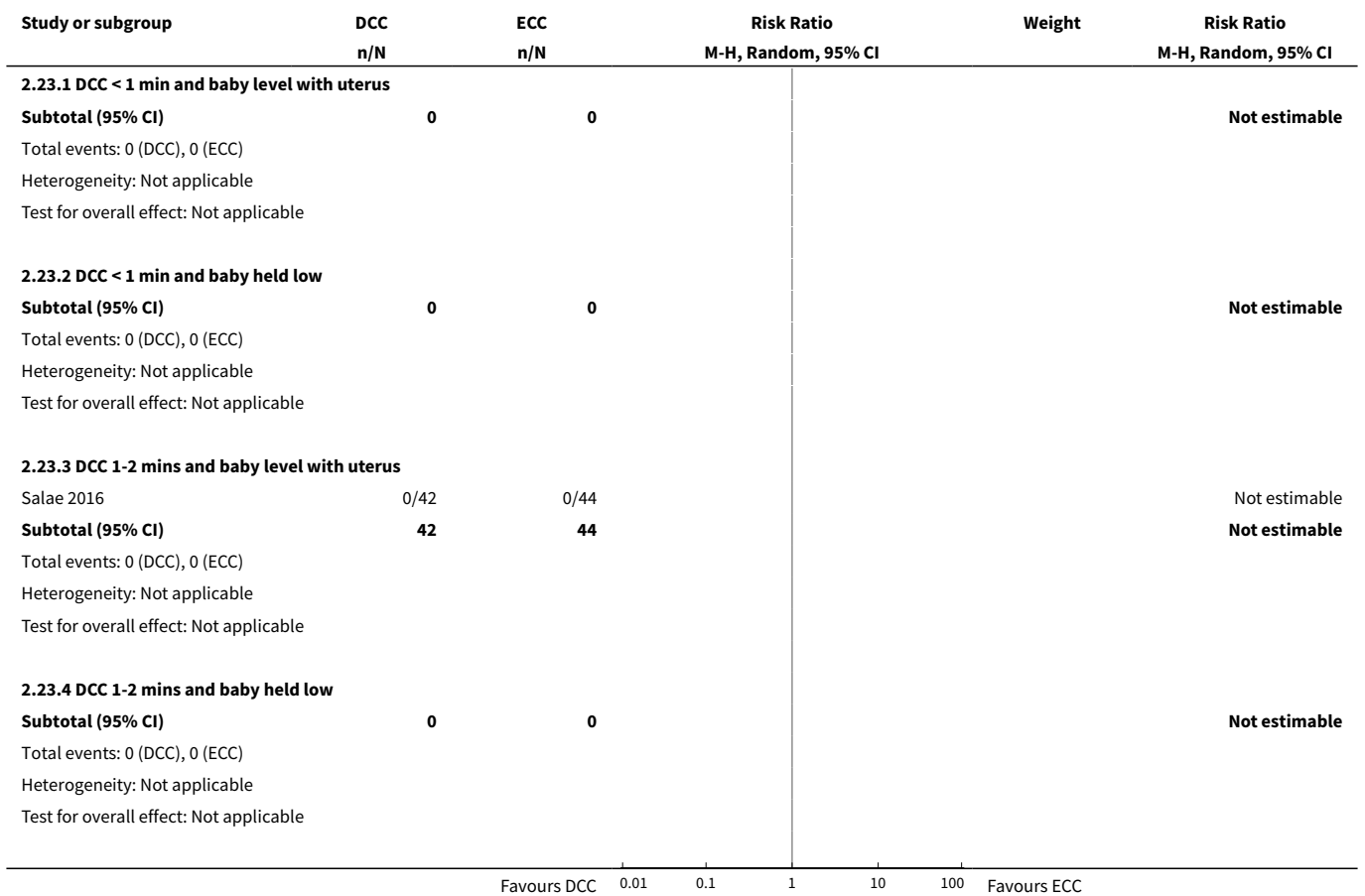
Ranjit 2015	10/44	13/50			11.99%	0.87[0.43,1.79]
Subtotal (95% CI)	44	50			11.99%	0.87[0.43,1.79]

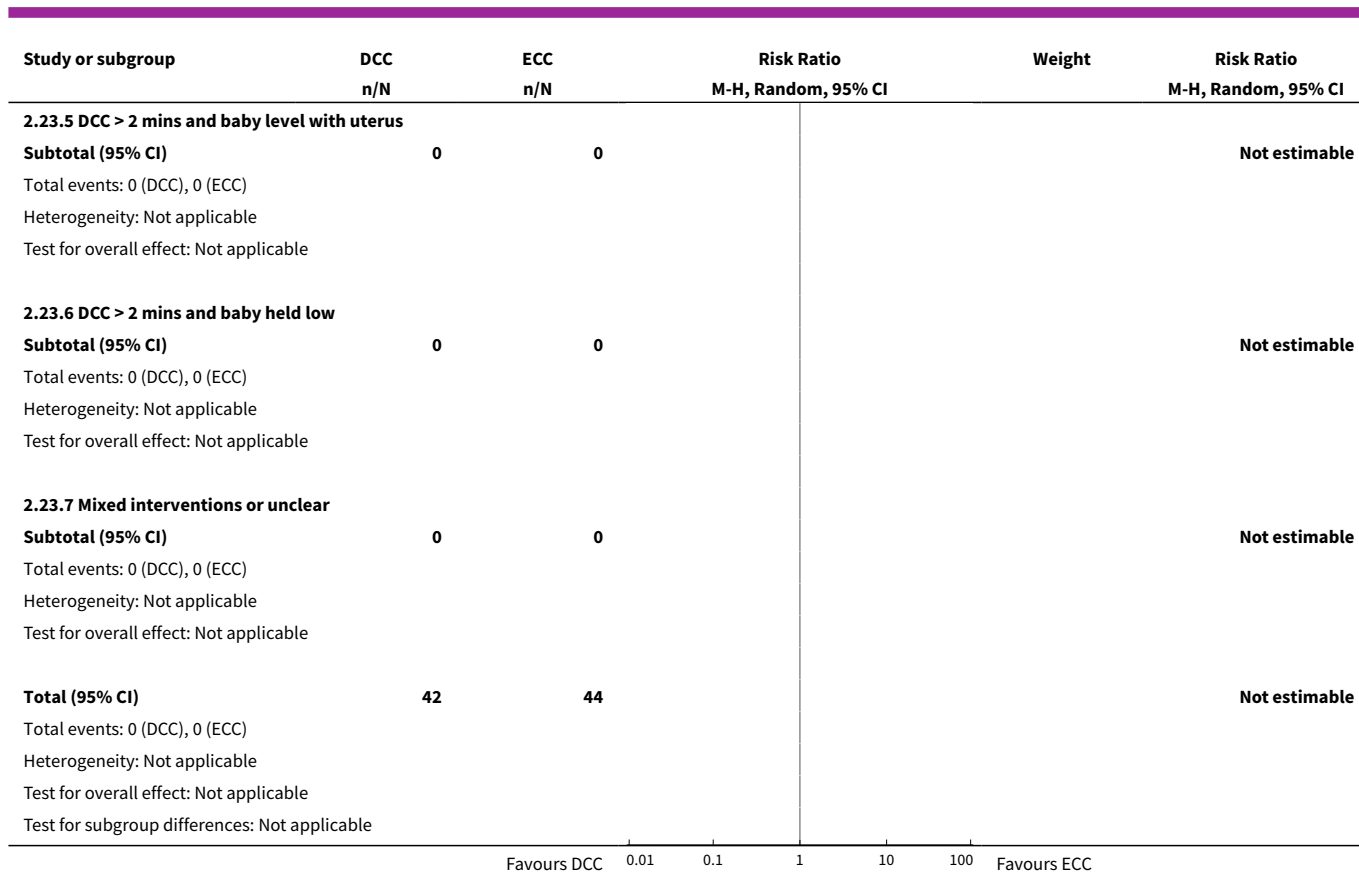
Total events: 10 (DCC), 13 (ECC)
 Heterogeneity: Not applicable
 Test for overall effect: $Z=0.37(P=0.71)$

2.21.6 DCC > 2 mins and baby held low
Subtotal (95% CI) 0 0 **Not estimable**

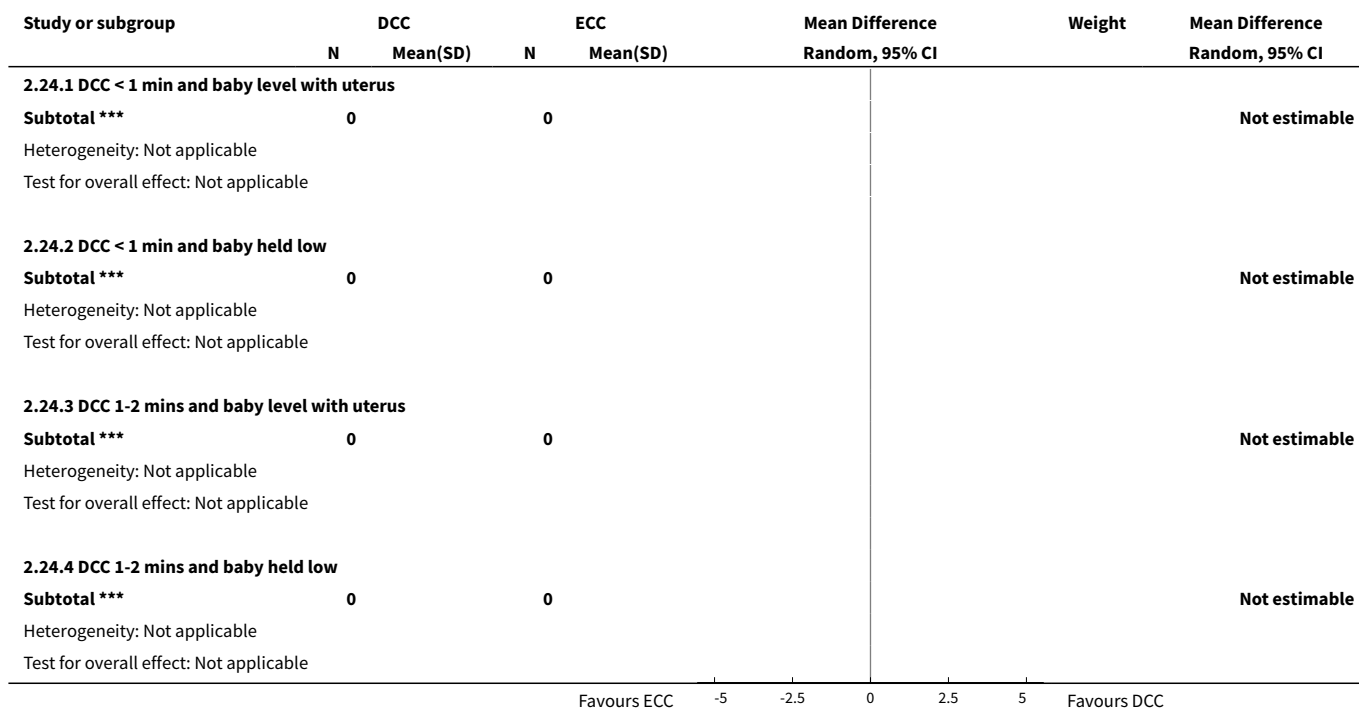


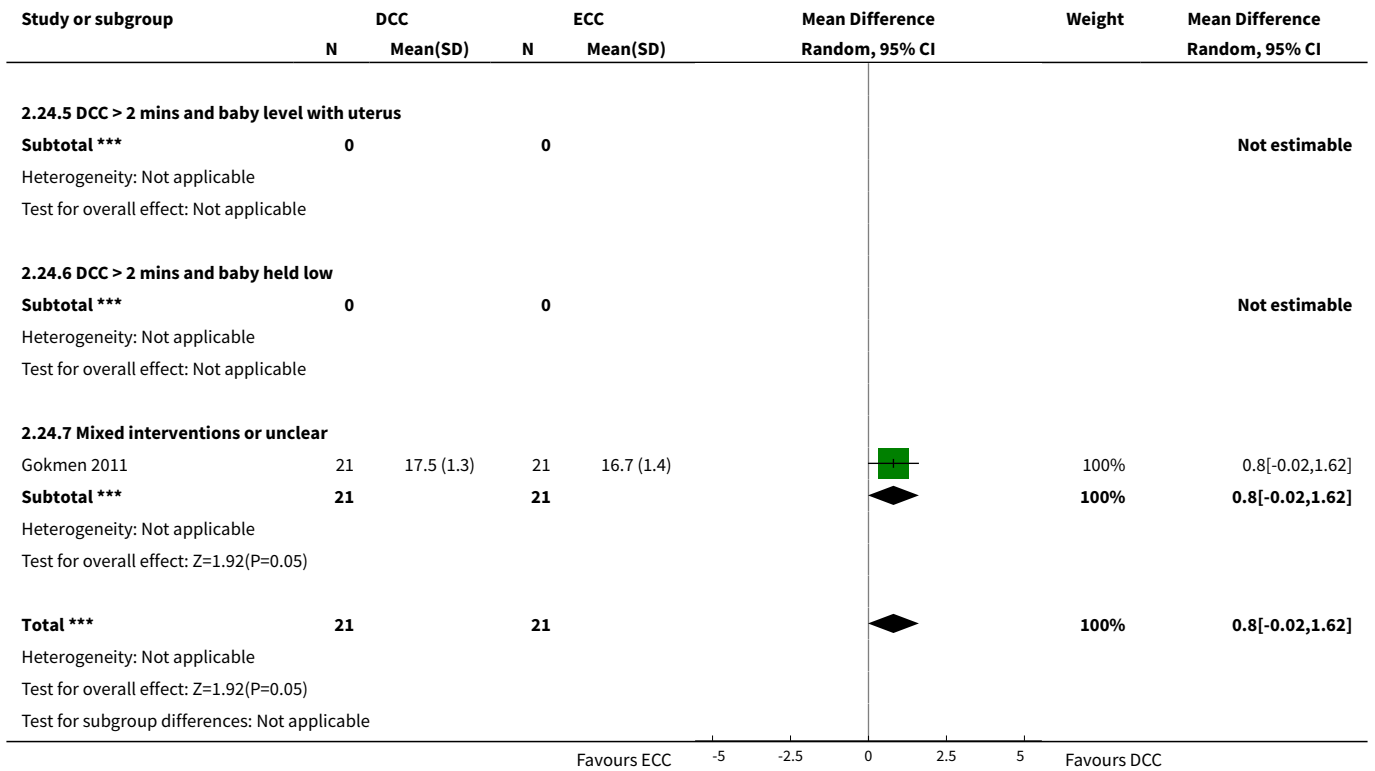
Analysis 2.23. Comparison 2 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by type of intervention), Outcome 23 Temperature < 36.0°C within 1 hour of birth.



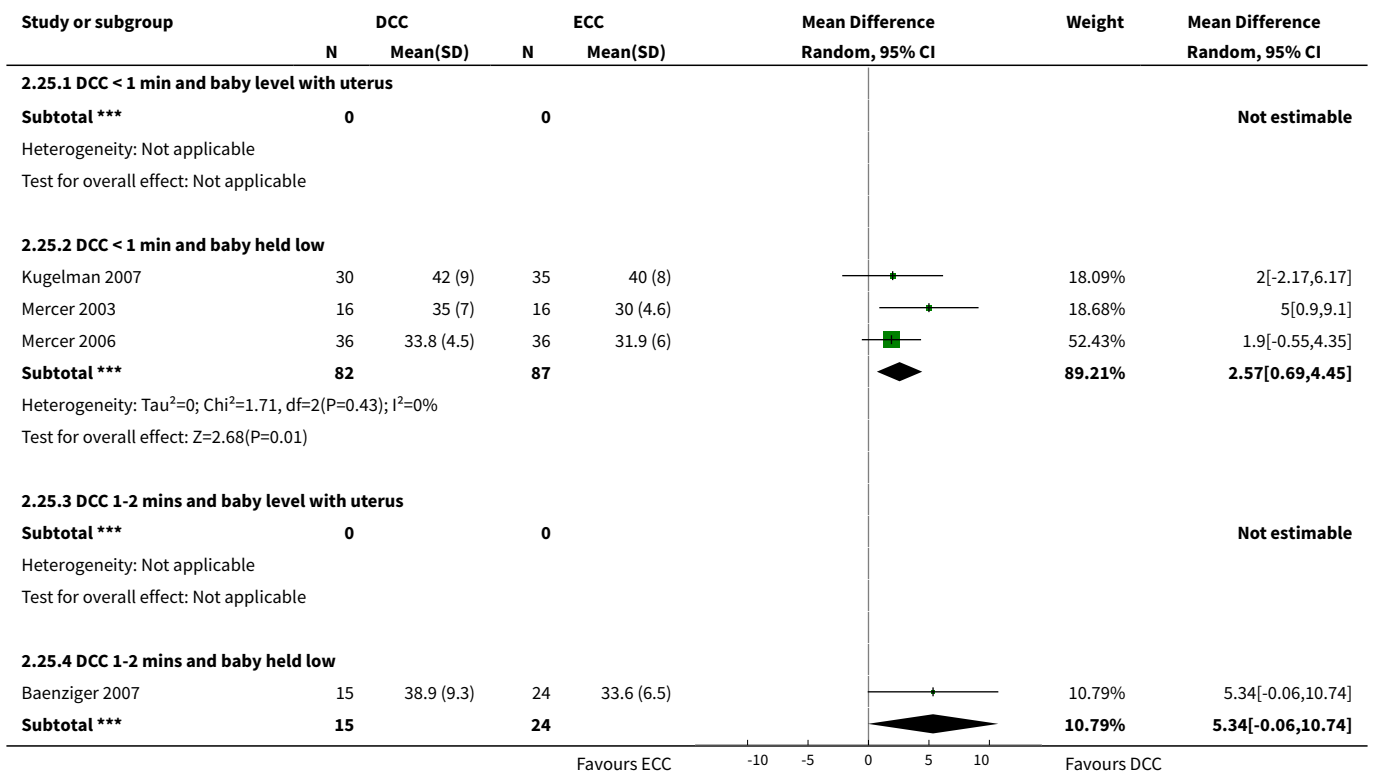


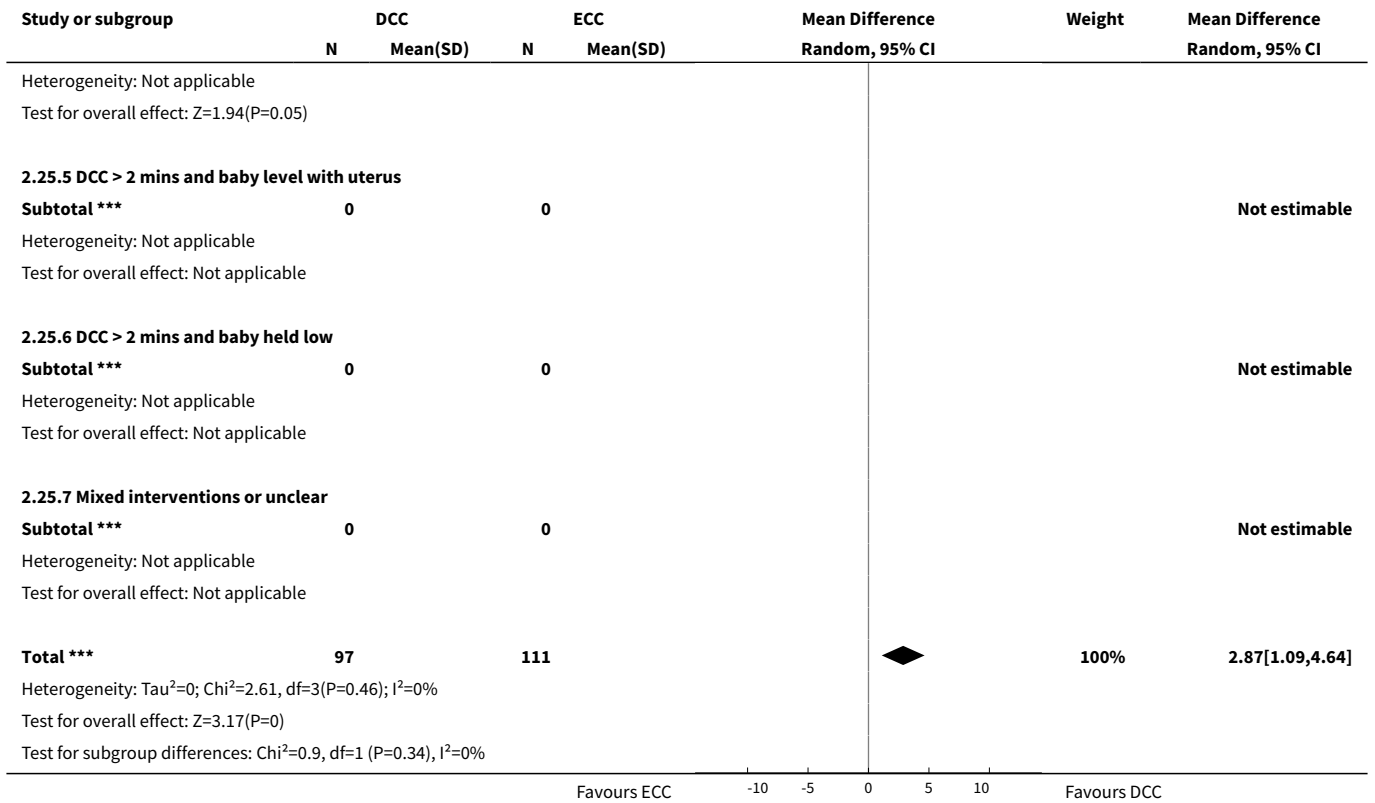
Analysis 2.24. Comparison 2 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by type of intervention), Outcome 24 Hb within 1st 24 hour of birth (g/dL).



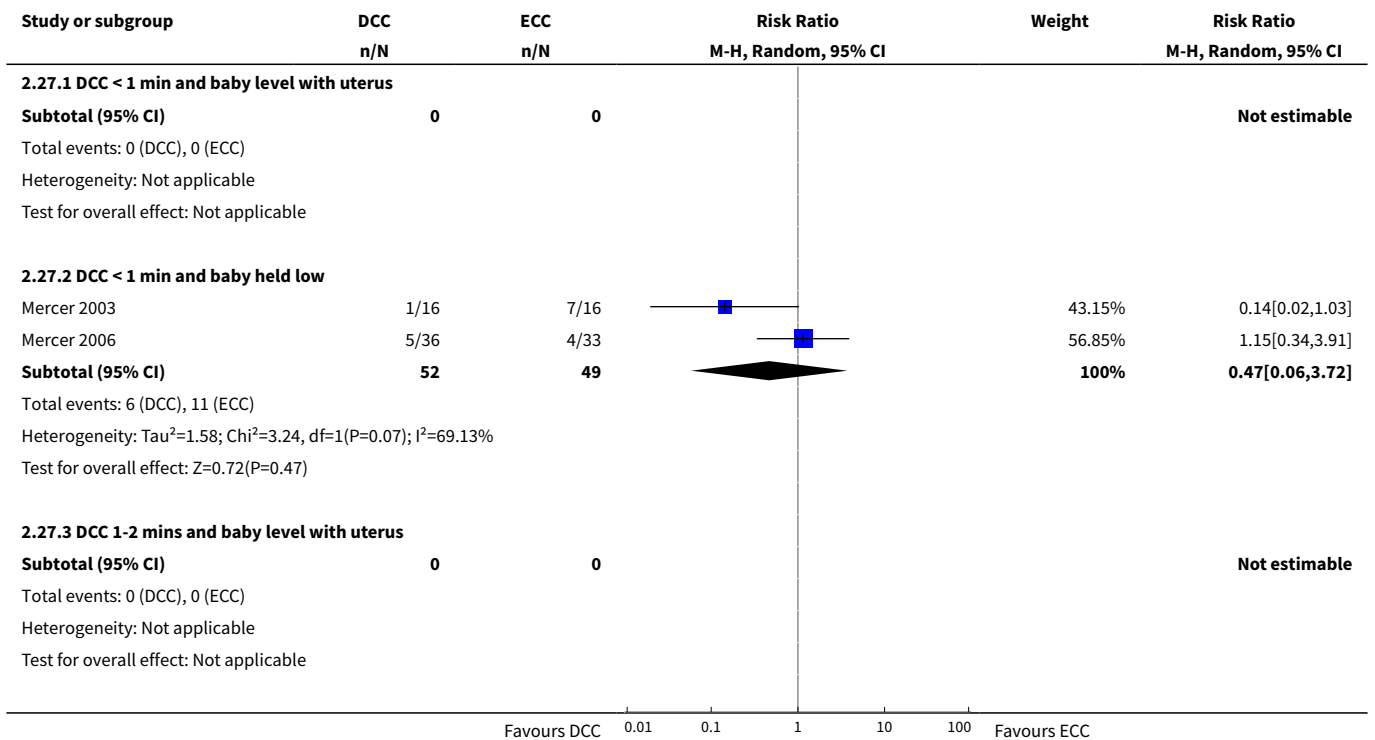


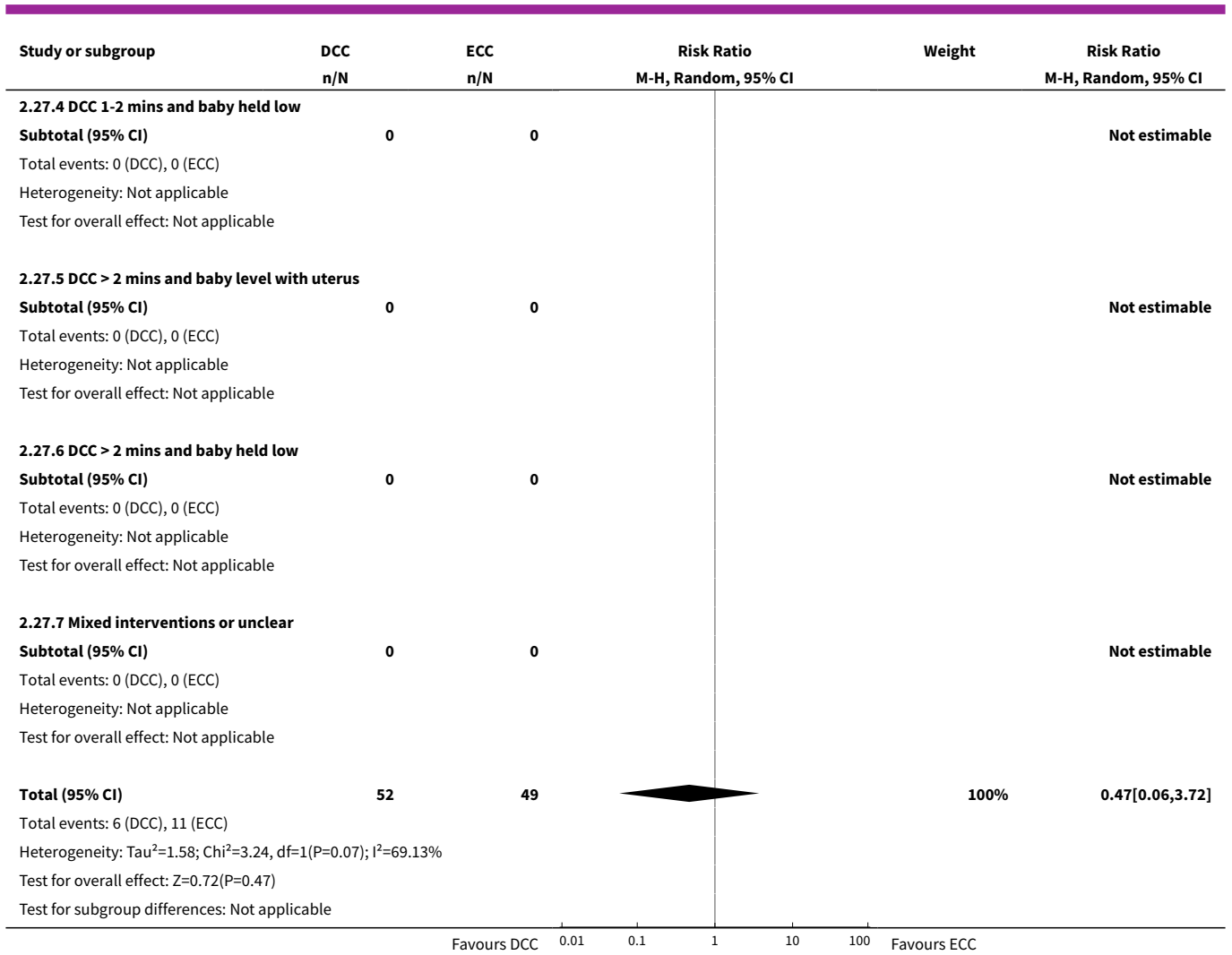
Analysis 2.25. Comparison 2 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by type of intervention), Outcome 25 Mean arterial blood pressure in early hours after birth (mm Hg).



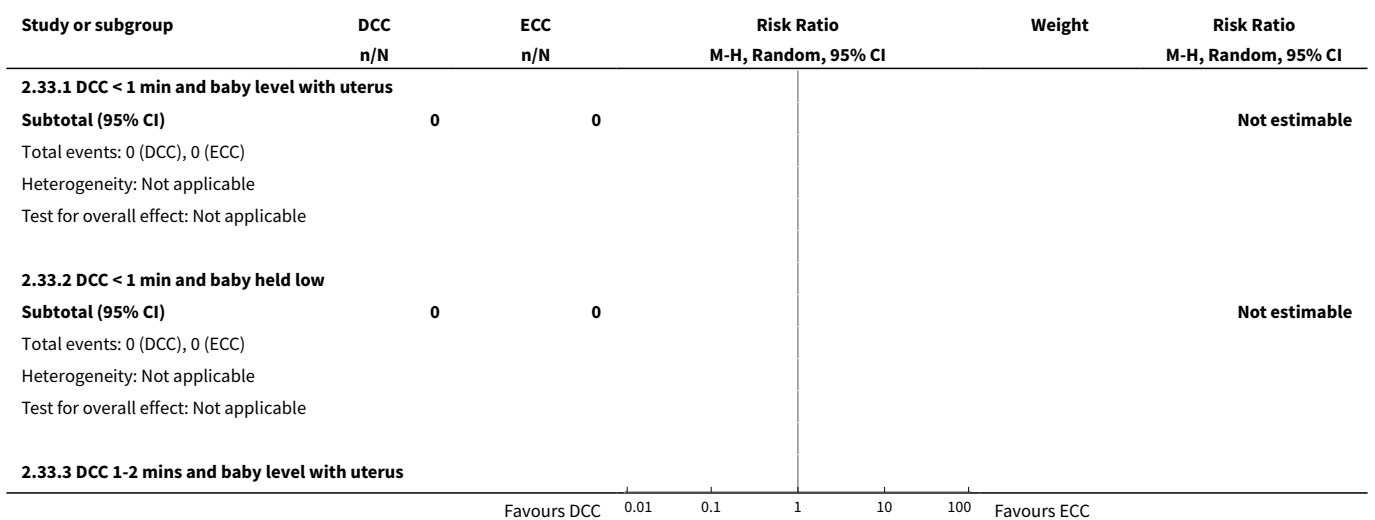


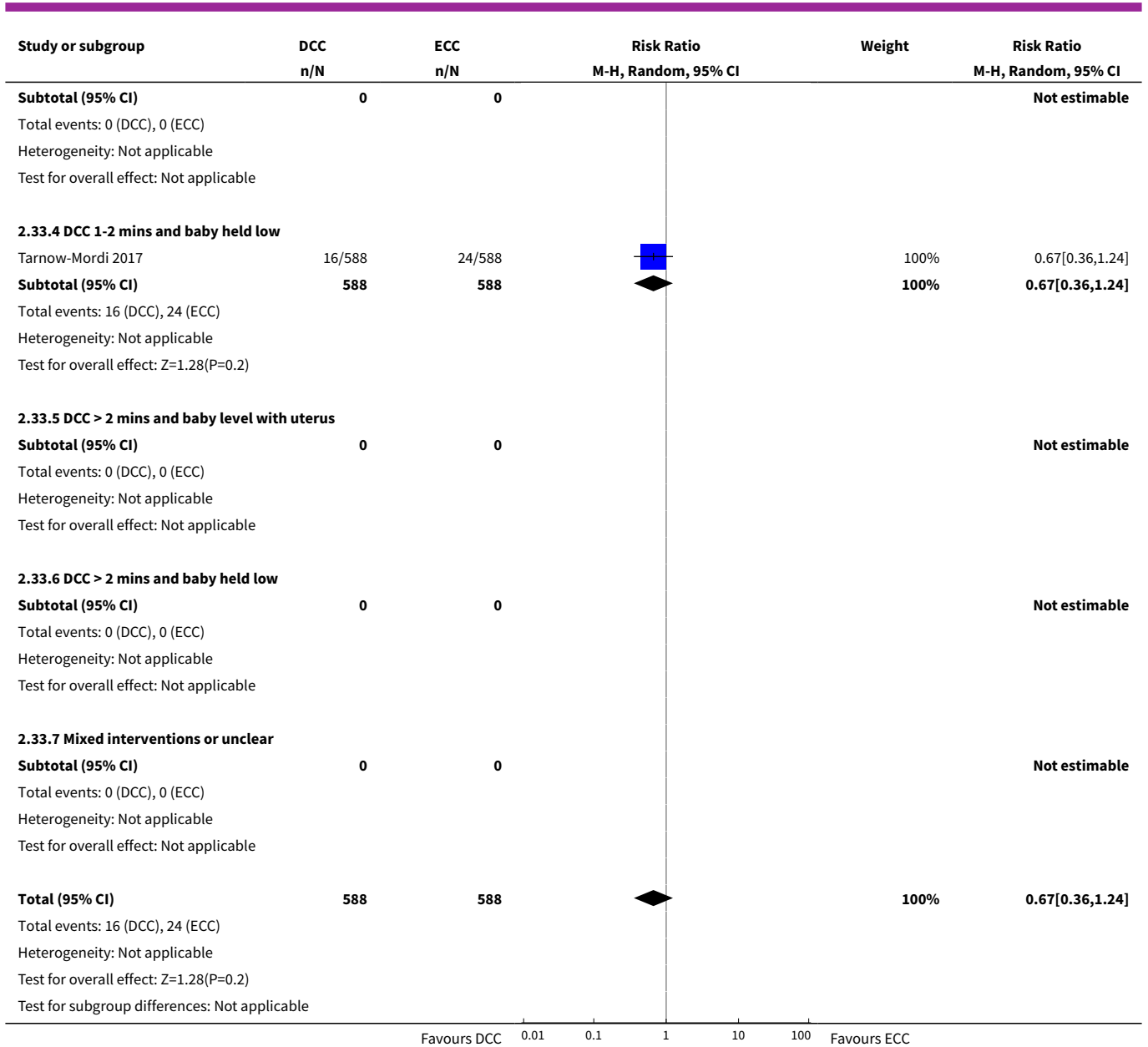
Analysis 2.27. Comparison 2 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by type of intervention), Outcome 27 Home oxygen.



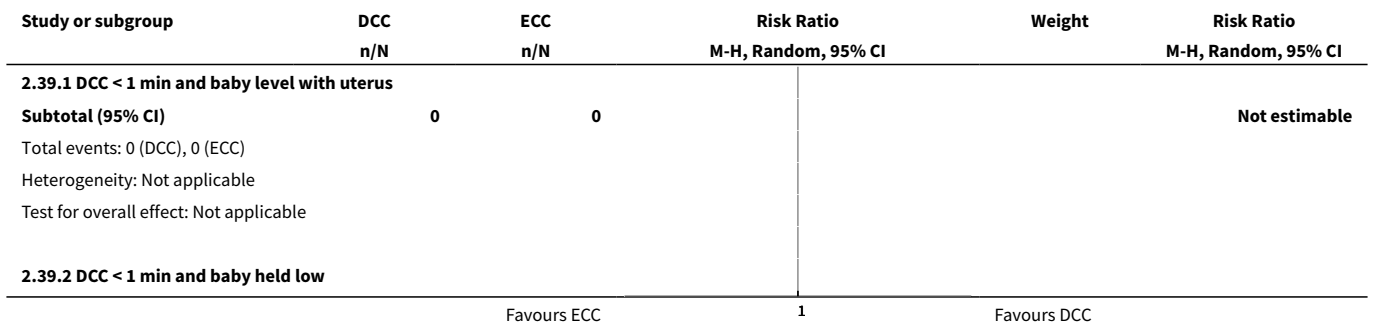


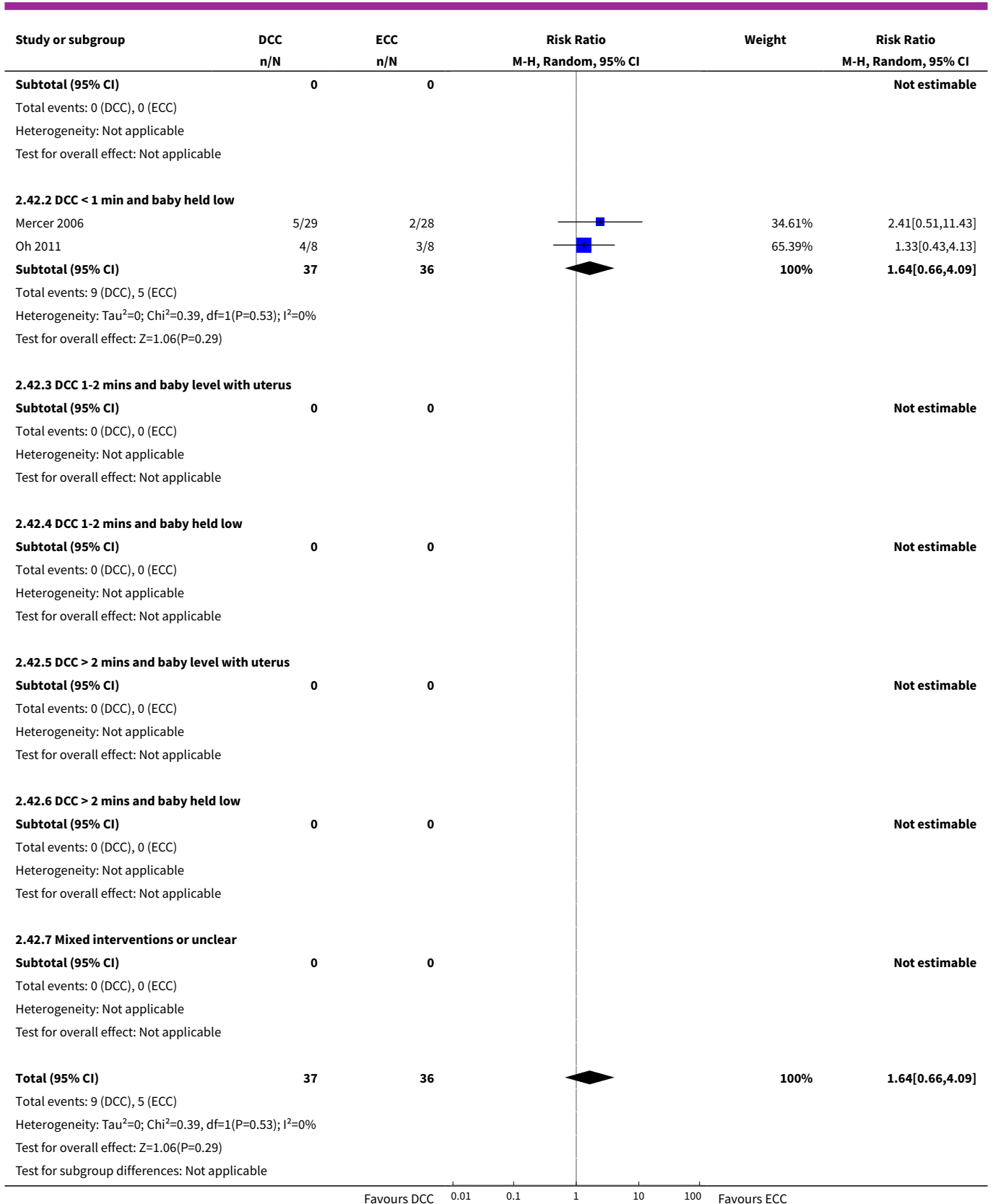
Analysis 2.33. Comparison 2 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by type of intervention), Outcome 33 Blood transfusion for mother.





Analysis 2.39. Comparison 2 DCC with immediate neonatal care after cord clamping vs ECC (subgroup analysis by type of intervention), Outcome 39 Fully breastfed or mixed feeding at infant discharge.





Comparison 3. DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by gestation)

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Death of baby (up to discharge)	1	270	Risk Ratio (M-H, Random, 95% CI)	0.47 [0.20, 1.11]
1.1 < 32-34 weeks gestation	1	270	Risk Ratio (M-H, Random, 95% CI)	0.47 [0.20, 1.11]
1.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
1.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
2 Death or neurodevelopmental impairment at age two to three years	1	218	Risk Ratio (M-H, Random, 95% CI)	0.61 [0.39, 0.96]
2.1 < 32-34 weeks gestation	1	218	Risk Ratio (M-H, Random, 95% CI)	0.61 [0.39, 0.96]
2.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
2.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
3 Severe intraventricular haemorrhage (IVH grades 3, 4)	1	266	Risk Ratio (M-H, Random, 95% CI)	0.84 [0.29, 2.45]
3.1 < 32-34 weeks gestation	1	266	Risk Ratio (M-H, Random, 95% CI)	0.84 [0.29, 2.45]
3.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
3.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
4 Intraventricular haemorrhage (IVH, all grades)	1	266	Risk Ratio (M-H, Random, 95% CI)	0.90 [0.64, 1.26]
4.1 < 32-34 weeks gestation	1	266	Risk Ratio (M-H, Random, 95% CI)	0.90 [0.64, 1.26]
4.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
4.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
5 Periventricular leukomalacia (PVL)	1	266	Risk Ratio (M-H, Random, 95% CI)	0.86 [0.32, 2.31]
5.1 < 32-34 weeks gestation	1	266	Risk Ratio (M-H, Random, 95% CI)	0.86 [0.32, 2.31]
5.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
5.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
6 Chronic lung disease (CLD) - oxygen supplement at 36 weeks (corrected for gestation)	1	249	Risk Ratio (M-H, Random, 95% CI)	0.95 [0.66, 1.37]
6.1 < 32-34 weeks gestation	1	249	Risk Ratio (M-H, Random, 95% CI)	0.95 [0.66, 1.37]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
6.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
6.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
7 Maternal blood loss of 500 mL or greater	1	254	Risk Ratio (M-H, Random, 95% CI)	0.94 [0.72, 1.22]
7.1 < 32-34 weeks gestation	1	254	Risk Ratio (M-H, Random, 95% CI)	0.94 [0.72, 1.22]
7.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
7.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
8 Intraventricular haemorrhage (IVH, grades 1 & 2)	1	266	Risk Ratio (M-H, Random, 95% CI)	0.91 [0.63, 1.33]
8.1 < 32-34 weeks gestation	1	266	Risk Ratio (M-H, Random, 95% CI)	0.91 [0.63, 1.33]
8.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
8.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
9 Necrotising enterocolitis (NEC) confirmed by X-ray or laparotomy	1	266	Risk Ratio (M-H, Random, 95% CI)	1.58 [0.53, 4.69]
9.1 < 32-34 weeks gestation	1	266	Risk Ratio (M-H, Random, 95% CI)	1.58 [0.53, 4.69]
9.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
9.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
10 Respiratory Distress Syndrome (RDS)	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
10.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
10.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
10.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
11 Respiratory support (ventilator or CPAP)	1	266	Risk Ratio (M-H, Random, 95% CI)	0.96 [0.84, 1.09]
11.1 < 32-34 weeks gestation	1	266	Risk Ratio (M-H, Random, 95% CI)	0.96 [0.84, 1.09]
11.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
11.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
12 Duration of respiratory support	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
12.1 < 32-34 weeks gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
12.2 > 32-34 weeks gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
12.3 Mixed gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
13 Surfactant treatment (for severe RDS)	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
13.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
13.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
13.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
14 Treatment for Patent Ductus Arteriosus (PDA) (medical and/or surgical)	1	266	Risk Ratio (M-H, Random, 95% CI)	0.99 [0.56, 1.74]
14.1 < 32-34 weeks gestation	1	266	Risk Ratio (M-H, Random, 95% CI)	0.99 [0.56, 1.74]
14.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
14.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
15 Treatment for Retinopathy of Prematurity (RoP)	1	249	Risk Ratio (M-H, Random, 95% CI)	0.93 [0.28, 3.13]
15.1 < 32-34 weeks gestation	1	249	Risk Ratio (M-H, Random, 95% CI)	0.93 [0.28, 3.13]
15.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
15.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
16 Hyperbilirubinemia (treated by phototherapy)	1	266	Risk Ratio (M-H, Random, 95% CI)	1.01 [0.94, 1.09]
16.1 < 32-34 weeks gestation	1	266	Risk Ratio (M-H, Random, 95% CI)	1.01 [0.94, 1.09]
16.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
16.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
17 Inotropics for low blood pressure	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
17.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
17.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
17.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
18 Low Apgar as defined by trialists (generally < 8 at 5 mins)	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
18.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
18.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
18.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
19 Blood transfusion in infant	1	266	Risk Ratio (M-H, Random, 95% CI)	0.91 [0.71, 1.17]
19.1 < 32-34 weeks gestation	1	266	Risk Ratio (M-H, Random, 95% CI)	0.91 [0.71, 1.17]
19.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
19.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
20 Volume of blood transfused (mL)	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
20.1 < 32-34 weeks gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
20.2 > 32-34 weeks gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
20.3 Mixed gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
21 Late sepsis (after 3 days or as defined by trialists)	1	266	Risk Ratio (M-H, Random, 95% CI)	0.89 [0.72, 1.09]
21.1 < 32-34 weeks gestation	1	266	Risk Ratio (M-H, Random, 95% CI)	0.89 [0.72, 1.09]
21.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
21.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
22 Hydrocephalus	1	266	Risk Ratio (M-H, Random, 95% CI)	0.99 [0.14, 6.89]
22.1 < 32-34 weeks gestation	1	266	Risk Ratio (M-H, Random, 95% CI)	0.99 [0.14, 6.89]
22.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
22.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
23 Temperature < 36.0°C within 1 hour of birth	1	266	Risk Ratio (M-H, Random, 95% CI)	1.20 [0.61, 2.33]
23.1 < 32-34 weeks gestation	1	266	Risk Ratio (M-H, Random, 95% CI)	1.20 [0.61, 2.33]
23.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
23.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
24 Hb within 1 st 24 hour of birth (g/dL)	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
24.1 < 32-34 weeks gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
24.2 > 32-34 weeks gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
24.3 Mixed gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
25 Mean arterial blood pressure (subgrouped by time after birth)	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
25.1 < 32-34 weeks gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
25.2 Mixed gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
25.3 > 32-34 weeks gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
26 Length of infant stay in NICU	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
26.1 < 32-34 weeks gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
26.2 > 32-34 weeks gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
26.3 Mixed gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
27 Home oxygen	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
27.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
27.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
27.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
28 Neurodevelopmental impairment at age two to three years	1	218	Risk Ratio (M-H, Random, 95% CI)	0.75 [0.41, 1.39]
28.1 < 32-34 weeks gestation	1	218	Risk Ratio (M-H, Random, 95% CI)	0.75 [0.41, 1.39]
28.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
28.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
29 Severe visual impairment	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
29.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
29.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
29.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
30 Cerebral palsy (CP)	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
30.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
30.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
30.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
31 Manual removal of placenta (denominator = vaginal births)	1	105	Risk Ratio (M-H, Random, 95% CI)	0.99 [0.32, 3.04]
31.1 < 32-34 weeks gestation	1	105	Risk Ratio (M-H, Random, 95% CI)	0.99 [0.32, 3.04]
31.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
31.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
32 Prolonged third stage (>30 minutes) (denominator = vaginal births)	1	105	Risk Ratio (M-H, Random, 95% CI)	0.79 [0.24, 2.64]
32.1 < 32-34 weeks gestation	1	105	Risk Ratio (M-H, Random, 95% CI)	0.79 [0.24, 2.64]
32.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
32.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
33 Blood transfusion for mother	1	254	Risk Ratio (M-H, Random, 95% CI)	1.59 [0.39, 6.51]
33.1 < 32-34 weeks gestation	1	254	Risk Ratio (M-H, Random, 95% CI)	1.59 [0.39, 6.51]
33.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
33.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
34 Postpartum infection in mother	1	254	Risk Ratio (M-H, Random, 95% CI)	1.12 [0.73, 1.72]
34.1 < 32-34 weeks gestation	1	254	Risk Ratio (M-H, Random, 95% CI)	1.12 [0.73, 1.72]
34.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
34.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
35 Rhesus isoimmunisation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
35.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
35.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
35.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
36 Psychological well being in mother	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
36.1 < 32-34 weeks gestation	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
36.2 > 32-34 weeks gestation	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
36.3 Mixed gestation	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37 Bonding	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37.1 < 32-34 weeks gestation	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37.2 > 32-34 weeks gestation	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37.3 Mixed gestation	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
38 Breastfeeding initiation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
38.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
38.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
38.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
39 Fully breastfed or mixed feeding at infant discharge	1	248	Risk Ratio (M-H, Random, 95% CI)	0.98 [0.79, 1.22]
39.1 < 32-34 weeks gestation	1	248	Risk Ratio (M-H, Random, 95% CI)	0.98 [0.79, 1.22]
39.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
39.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40 Maternal anxiety	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
41 Mothers' views	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
41.1 < 32-34 weeks gestation	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
41.2 > 32-34 weeks gestation	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
41.3 Mixed gestation	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]

Analysis 3.1. Comparison 3 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by gestation), Outcome 1 Death of baby (up to discharge).

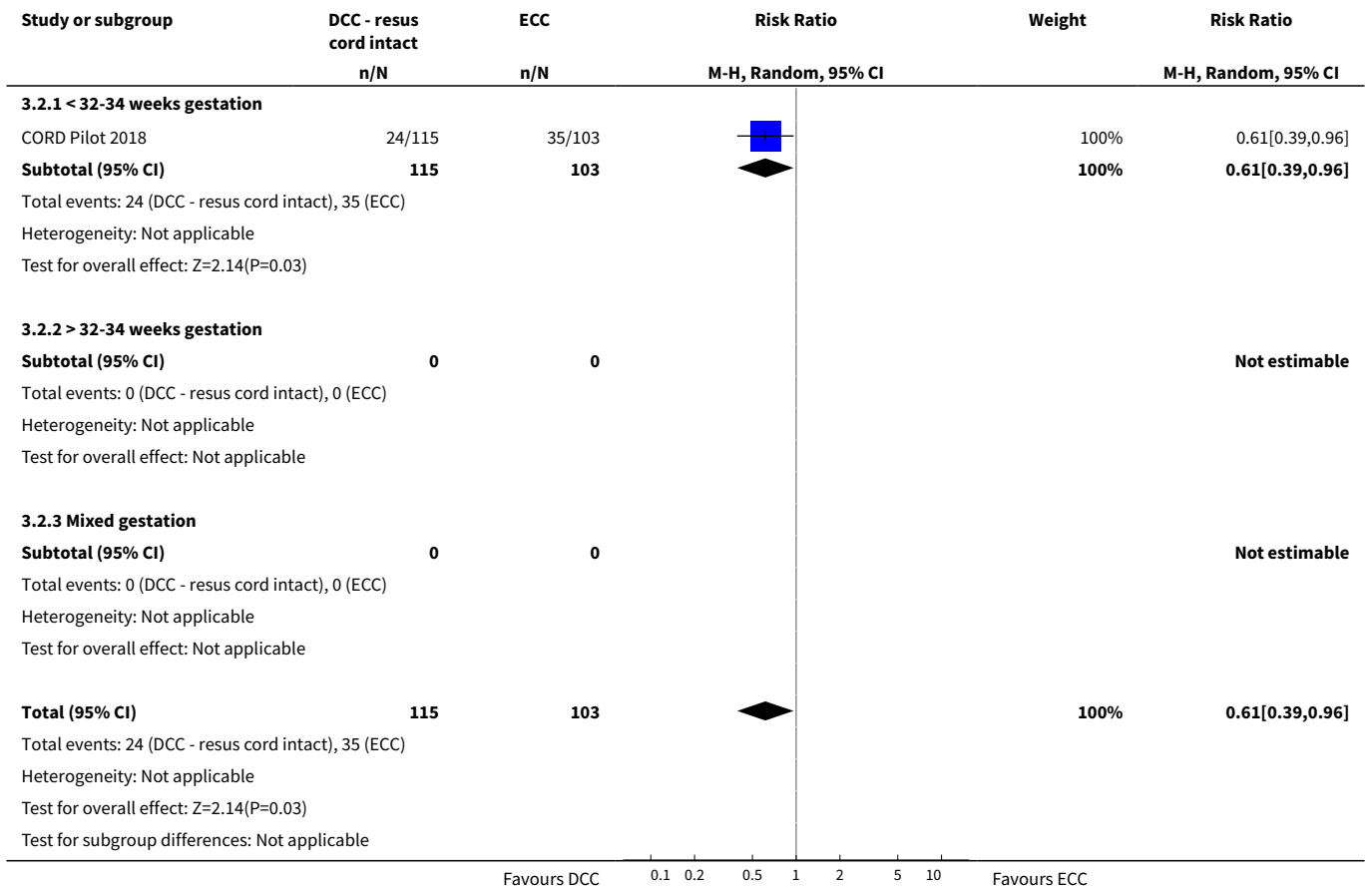
Study or subgroup	DCC - resus cord intact	ECC	Risk Ratio	Weight	Risk Ratio
	n/N	n/N	M-H, Random, 95% CI		M-H, Random, 95% CI
3.1.1 < 32-34 weeks gestation					
CORD Pilot 2018	7/135	15/135	←	100%	0.47[0.2,1.11]
Subtotal (95% CI)	135	135	←	100%	0.47[0.2,1.11]
Total events: 7 (DCC - resus cord intact), 15 (ECC)					
Heterogeneity: Not applicable					
Test for overall effect: Z=1.73(P=0.08)					
3.1.2 > 32-34 weeks gestation					
Subtotal (95% CI)	0	0			Not estimable
Total events: 0 (DCC - resus cord intact), 0 (ECC)					
Heterogeneity: Not applicable					
Test for overall effect: Not applicable					
3.1.3 Mixed gestation					
Subtotal (95% CI)	0	0			Not estimable
Total events: 0 (DCC - resus cord intact), 0 (ECC)					
Heterogeneity: Not applicable					
Test for overall effect: Not applicable					
Total (95% CI)	135	135	←	100%	0.47[0.2,1.11]
Total events: 7 (DCC - resus cord intact), 15 (ECC)					
Heterogeneity: Not applicable					
Test for overall effect: Z=1.73(P=0.08)					
Test for subgroup differences: Not applicable					

Favours DCC

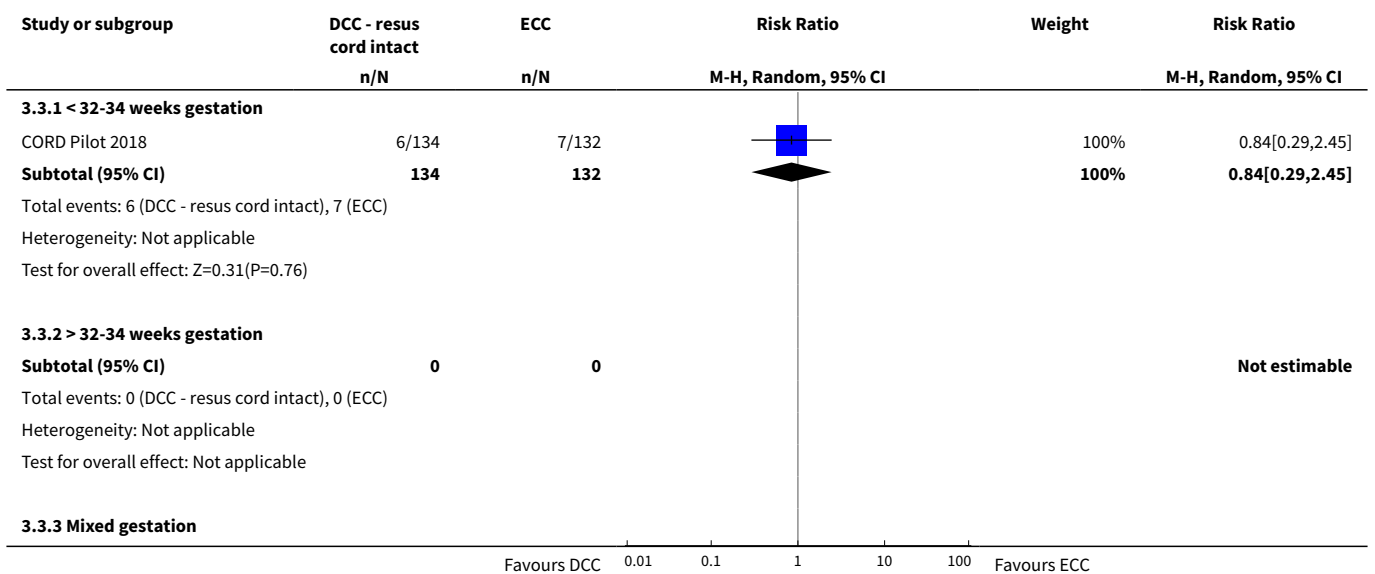
1

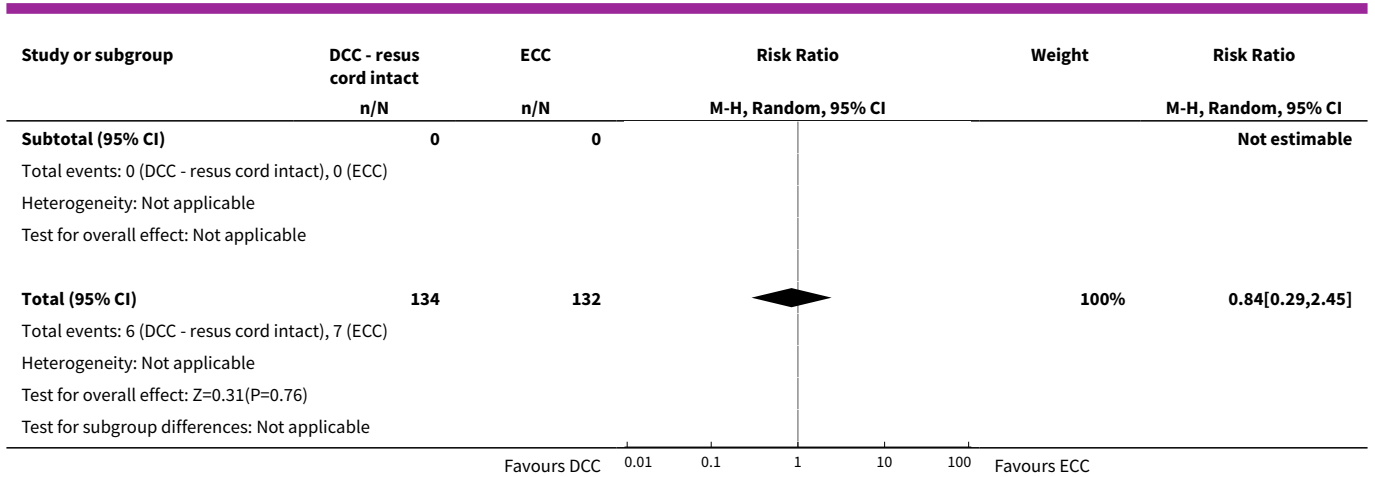
Favours ECC

Analysis 3.2. Comparison 3 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by gestation), Outcome 2 Death or neurodevelopmental impairment at age two to three years.

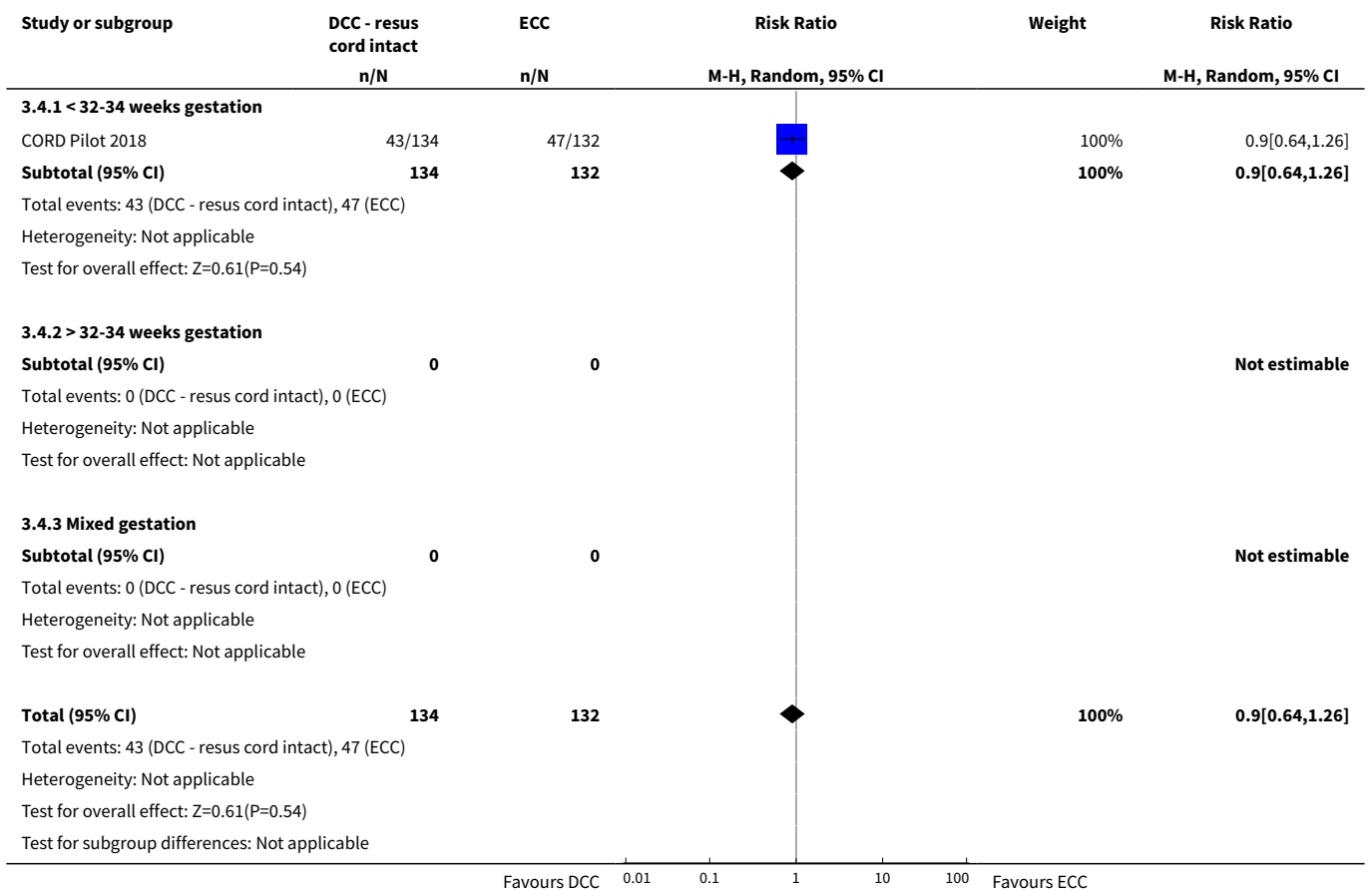


Analysis 3.3. Comparison 3 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by gestation), Outcome 3 Severe intraventricular haemorrhage (IVH grades 3, 4).

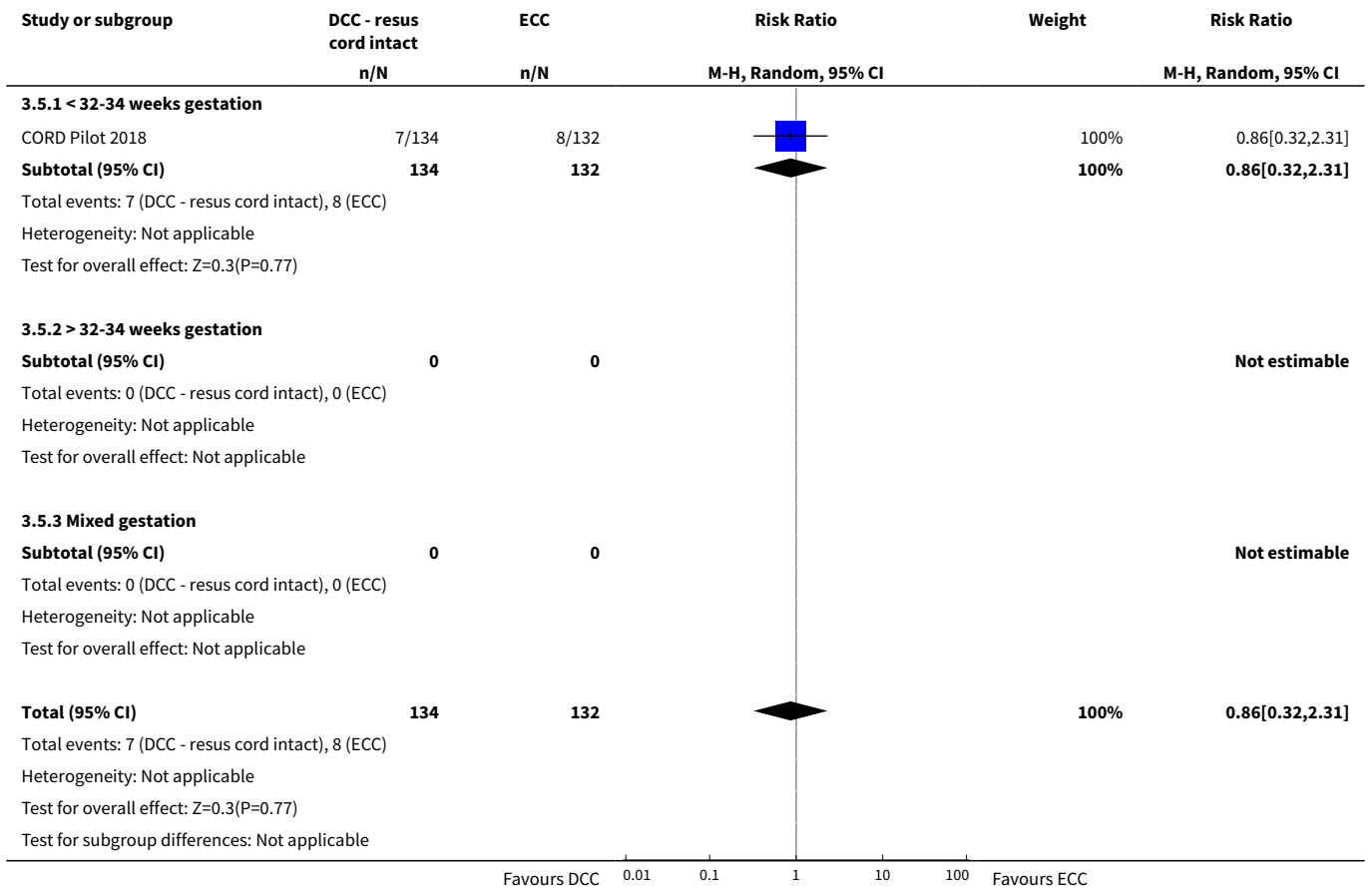




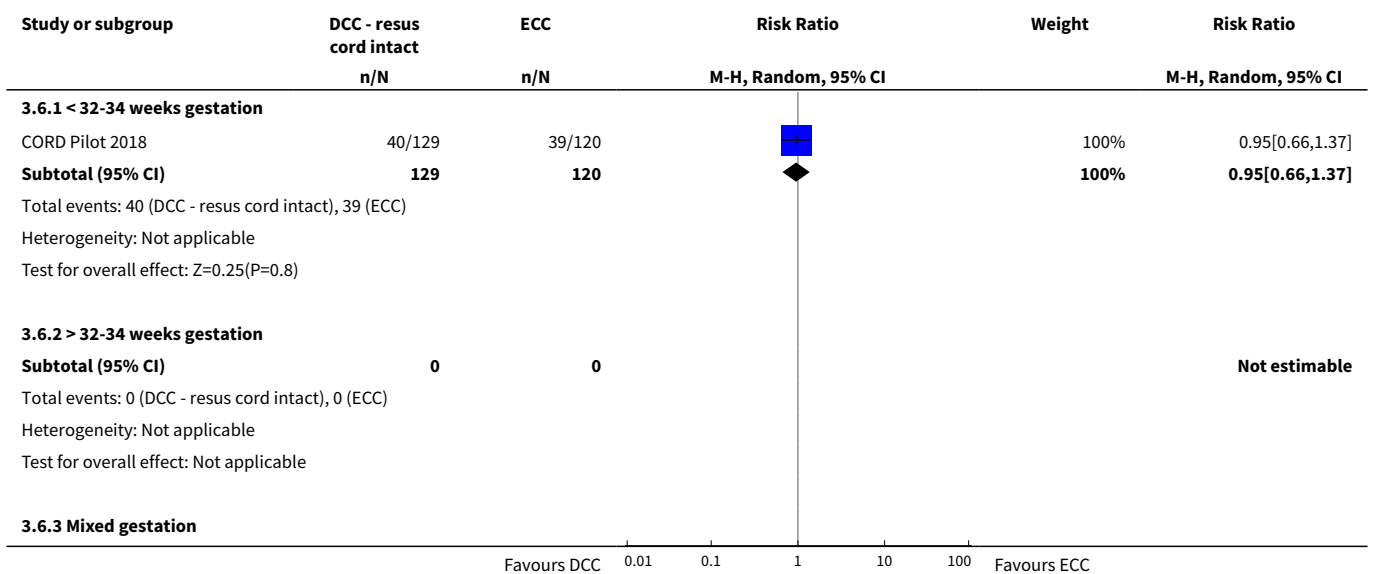
Analysis 3.4. Comparison 3 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by gestation), Outcome 4 Intraventricular haemorrhage (IVH, all grades).

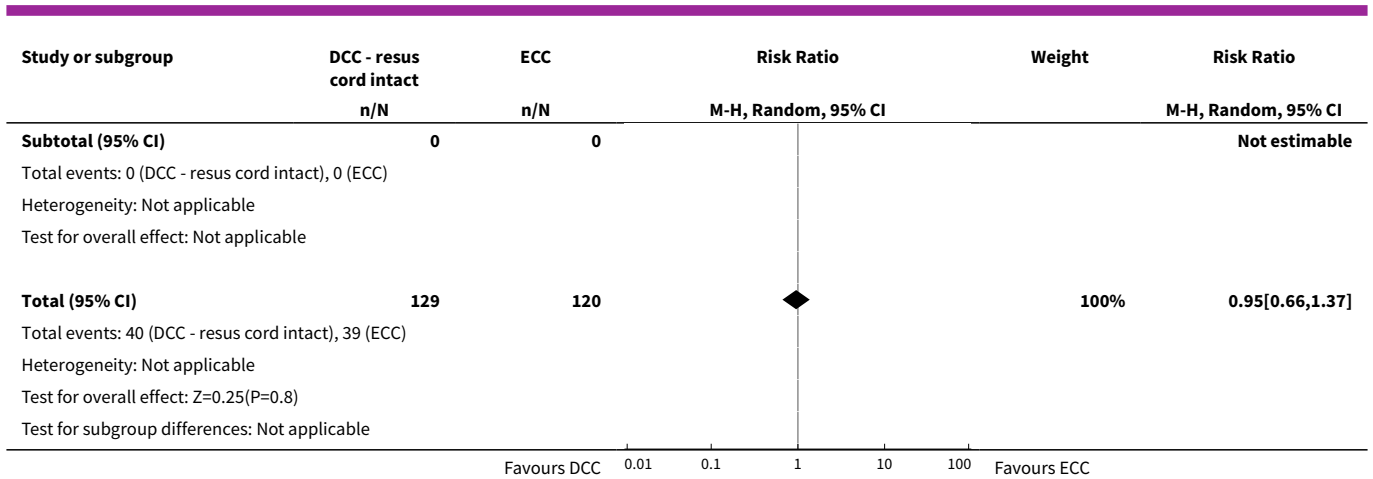


Analysis 3.5. Comparison 3 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by gestation), Outcome 5 Periventricular leukomalacia (PVL).

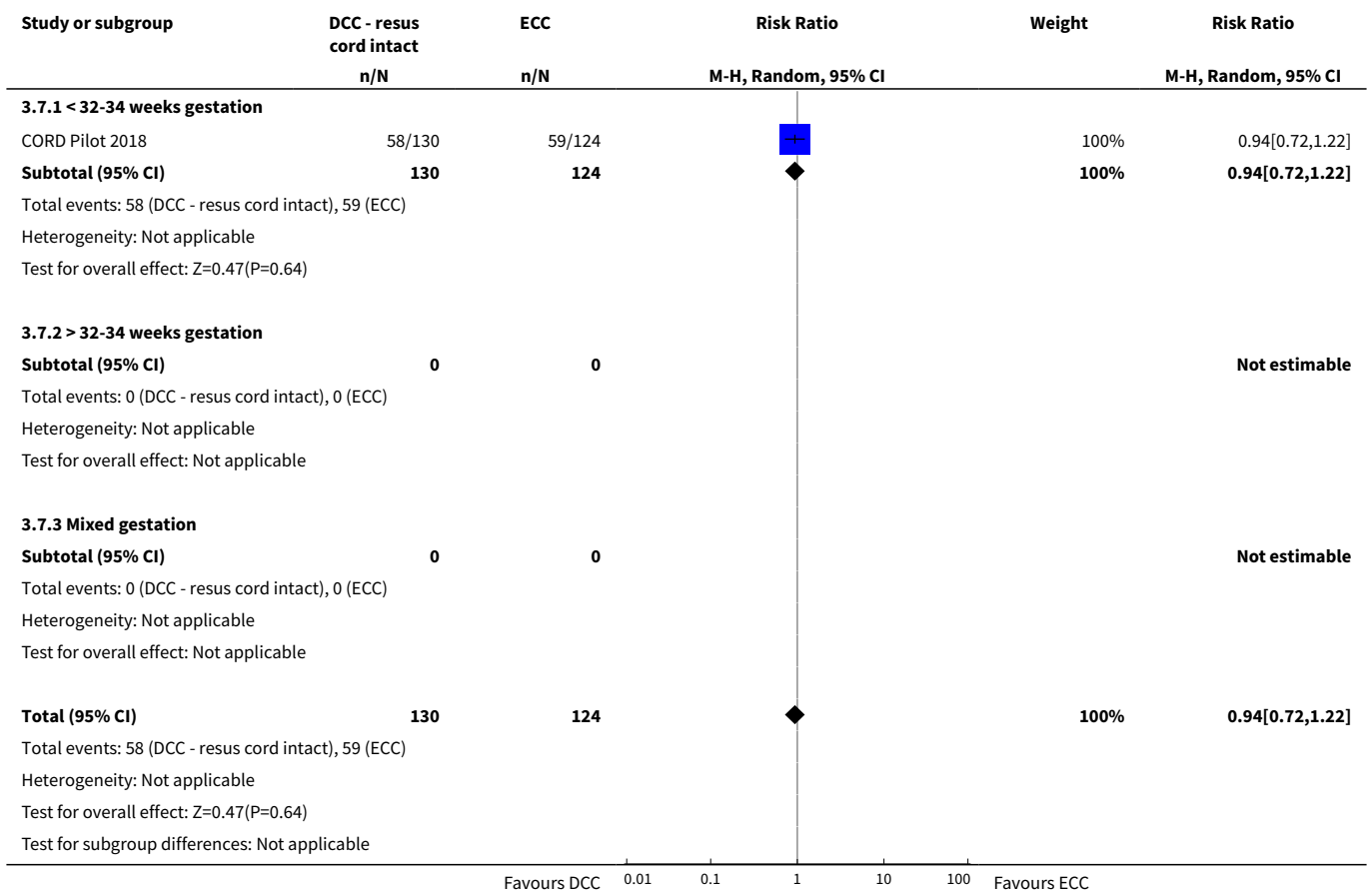


Analysis 3.6. Comparison 3 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by gestation), Outcome 6 Chronic lung disease (CLD) - oxygen supplement at 36 weeks (corrected for gestation).

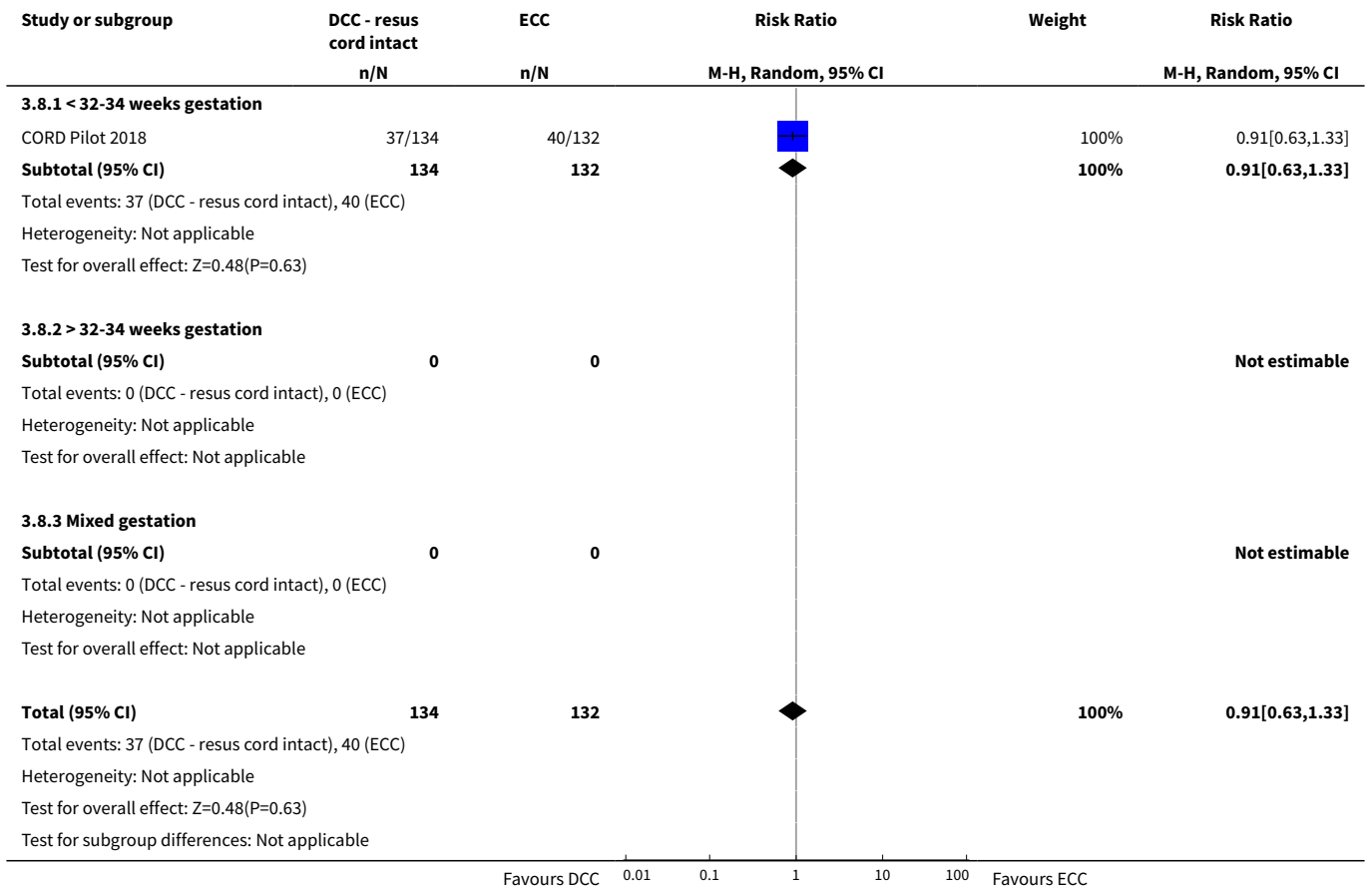




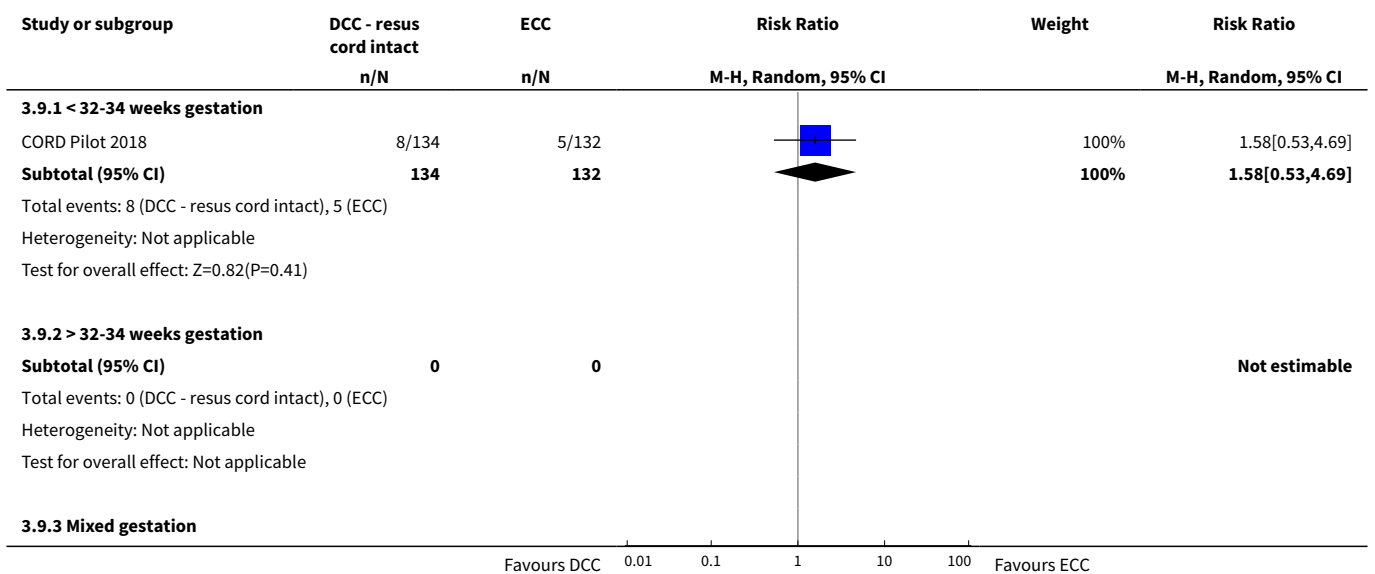
Analysis 3.7. Comparison 3 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by gestation), Outcome 7 Maternal blood loss of 500 mL or greater.

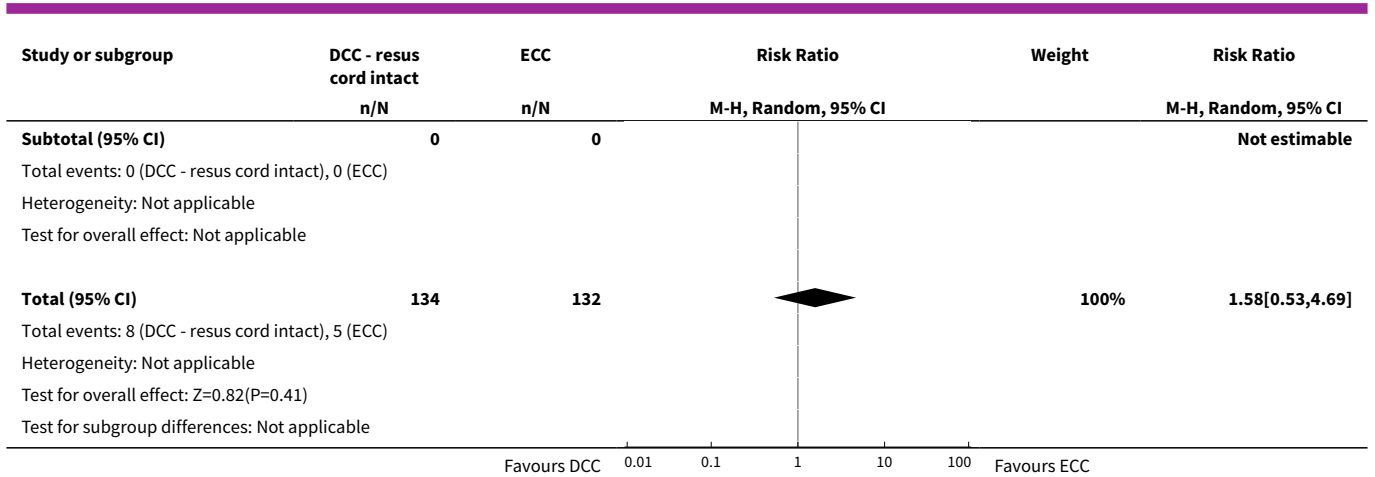


Analysis 3.8. Comparison 3 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by gestation), Outcome 8 Intraventricular haemorrhage (IVH, grades 1 & 2).

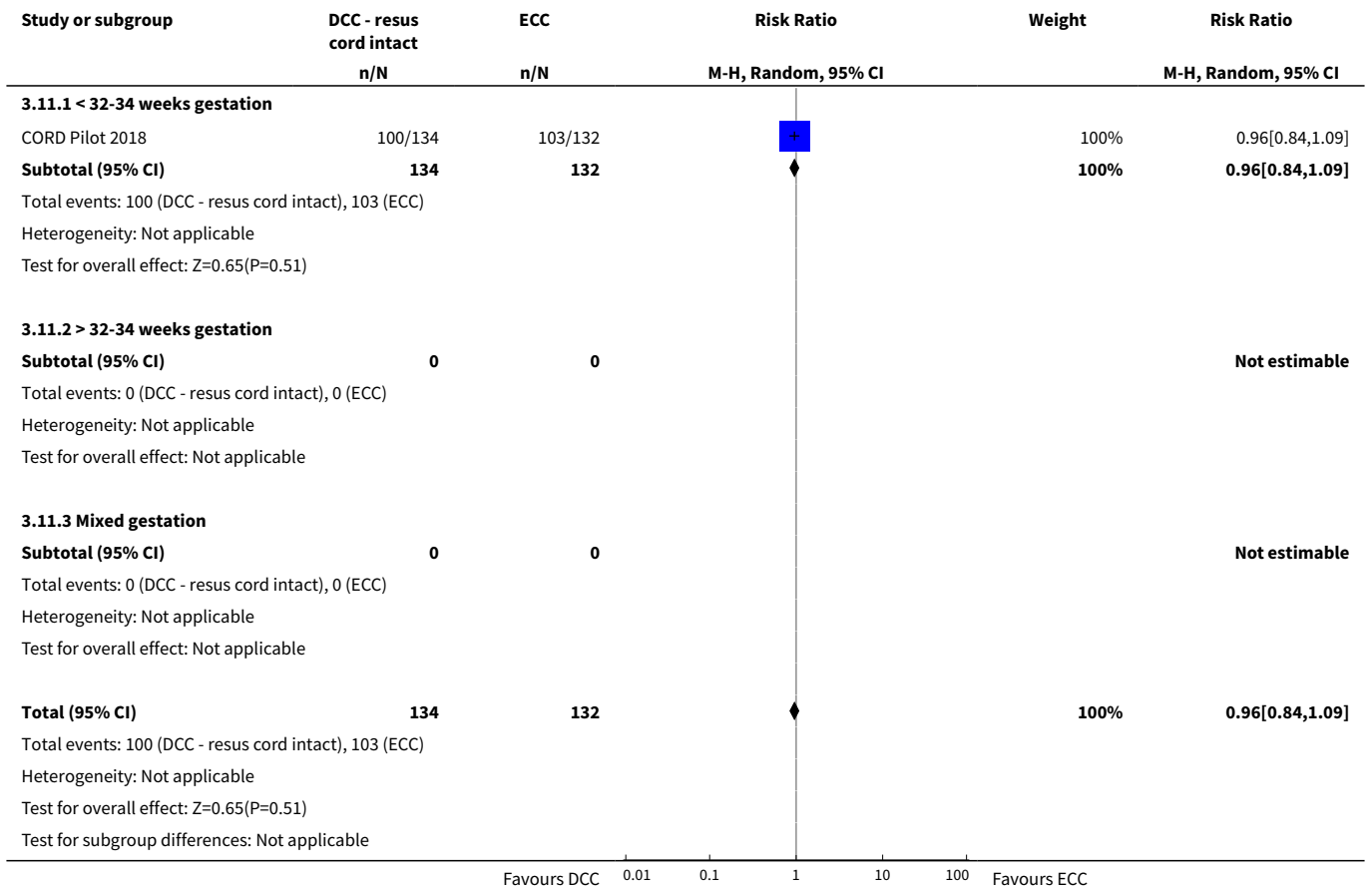


Analysis 3.9. Comparison 3 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by gestation), Outcome 9 Necrotising enterocolitis (NEC) confirmed by X-ray or laparotomy).

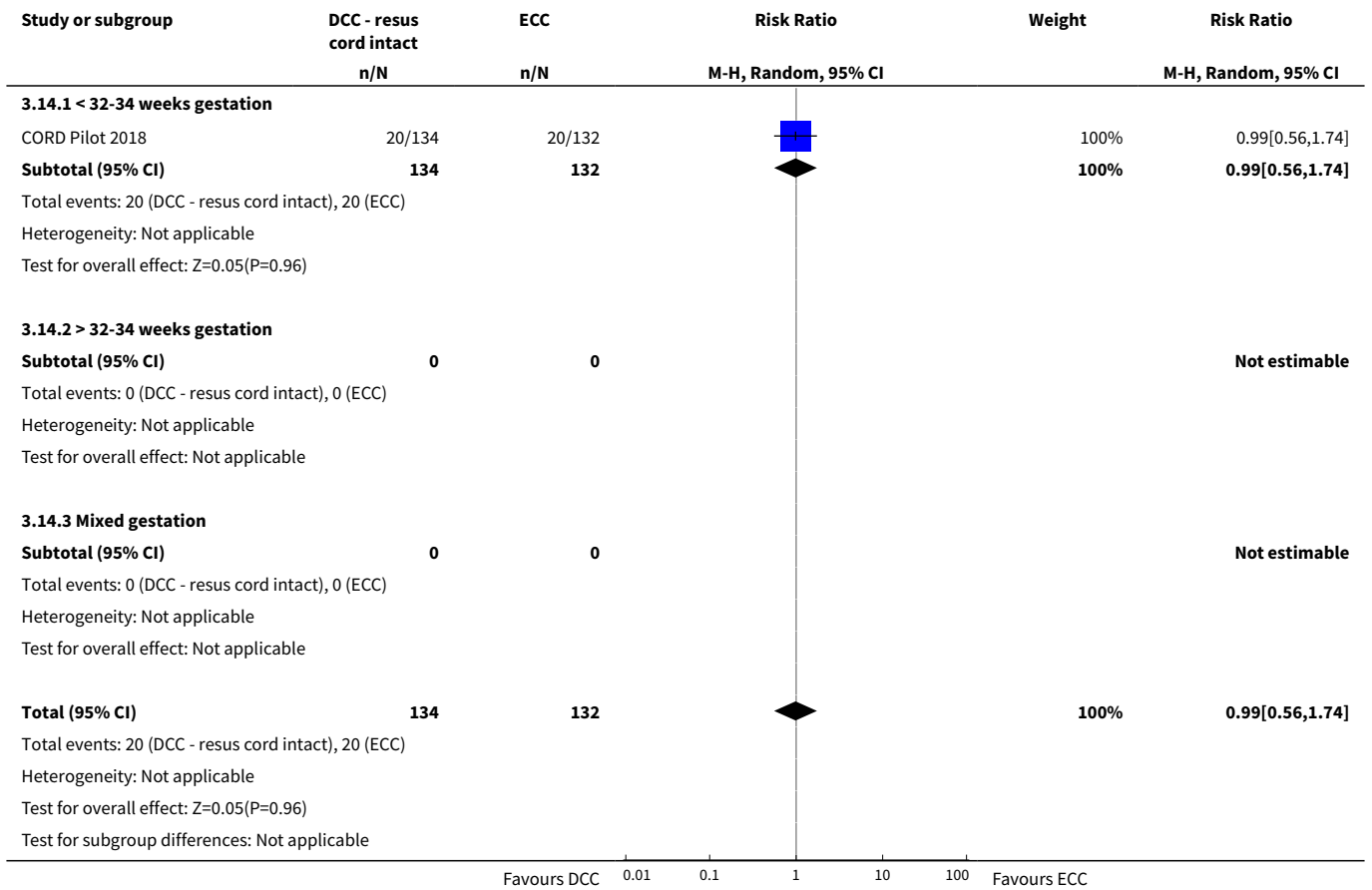




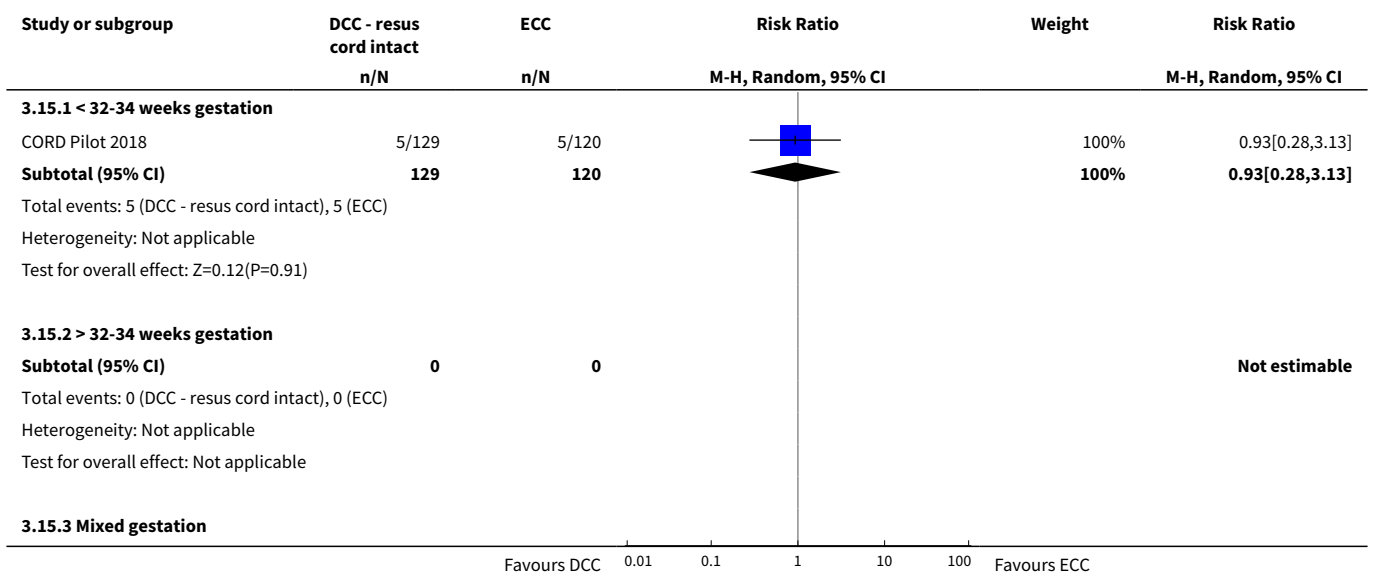
Analysis 3.11. Comparison 3 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by gestation), Outcome 11 Respiratory support (ventilator or CPAP).

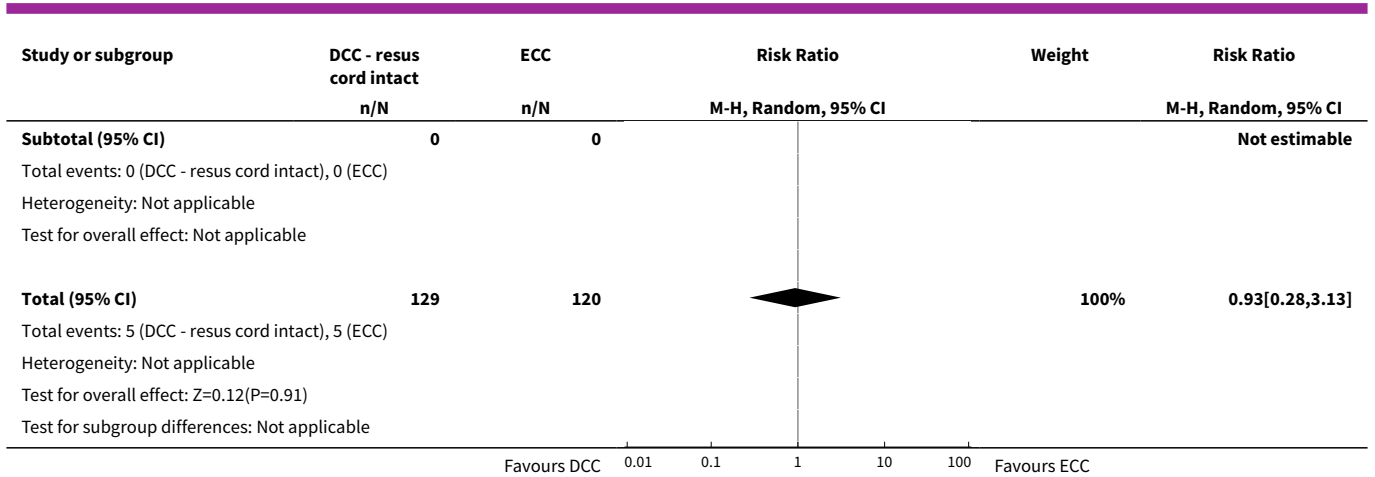


Analysis 3.14. Comparison 3 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by gestation), Outcome 14 Treatment for Patent Ductus Arteriosus (PDA) (medical and/or surgical).

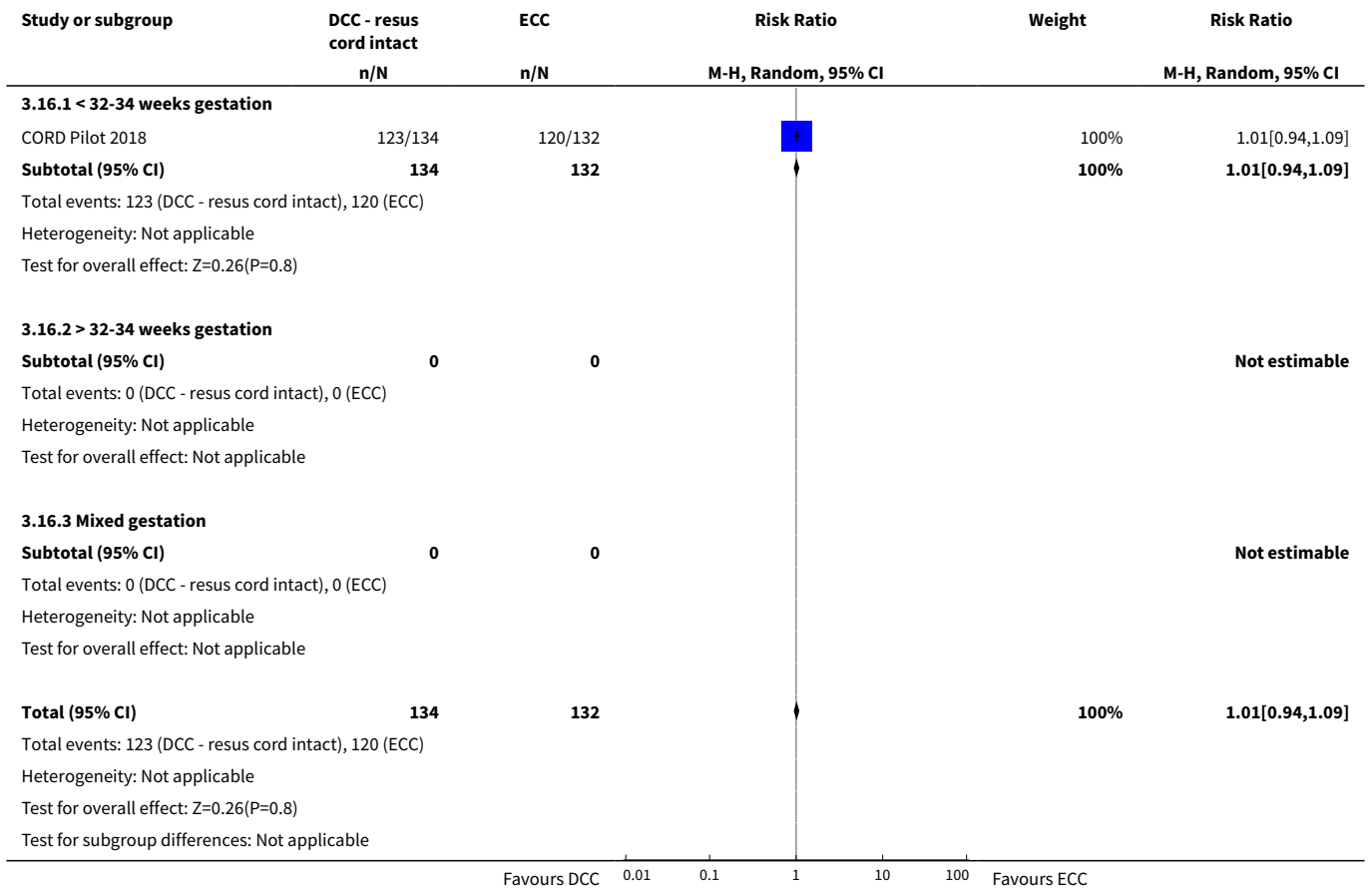


Analysis 3.15. Comparison 3 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by gestation), Outcome 15 Treatment for Retinopathy of Prematurity (RoP).

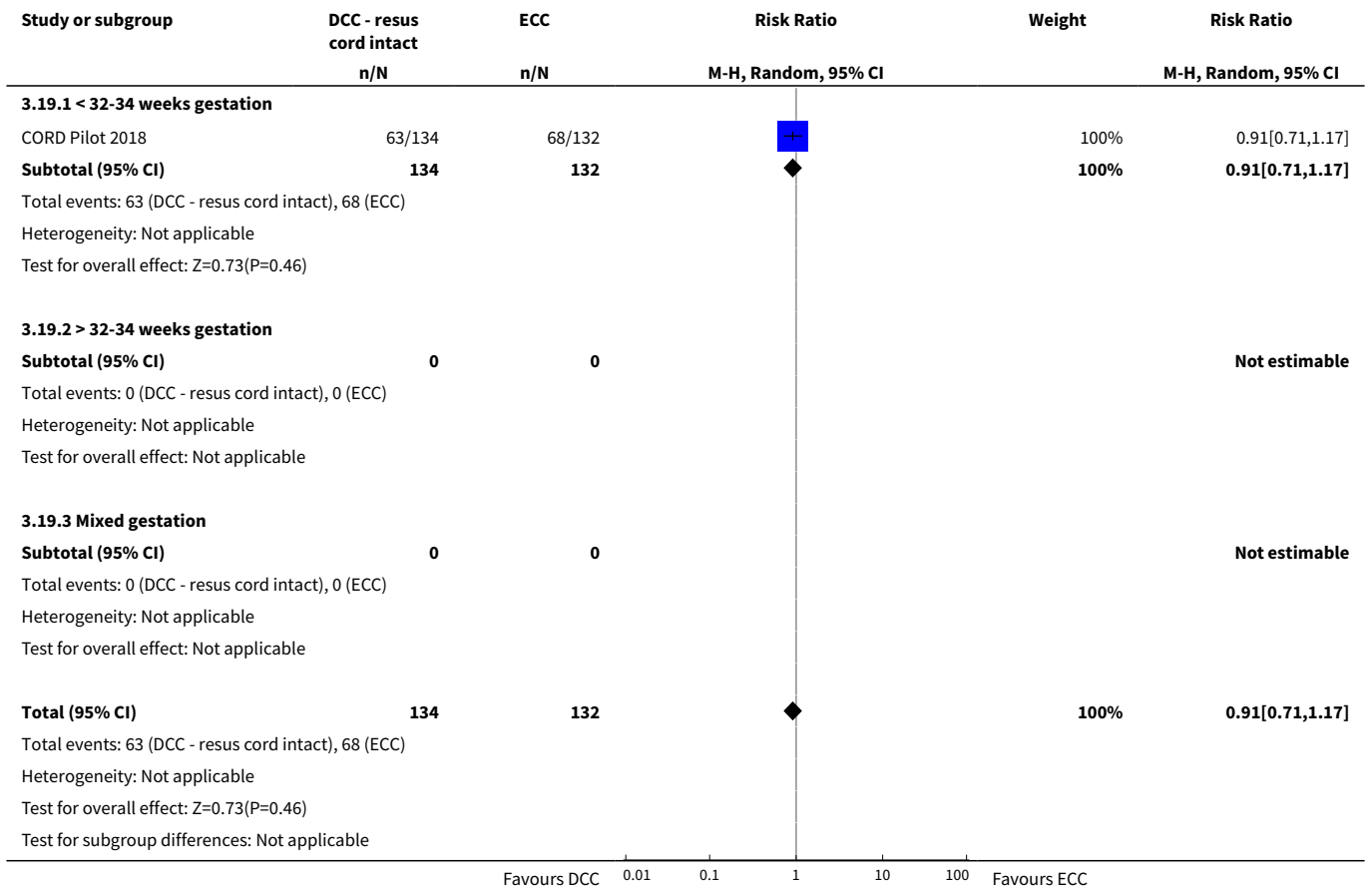




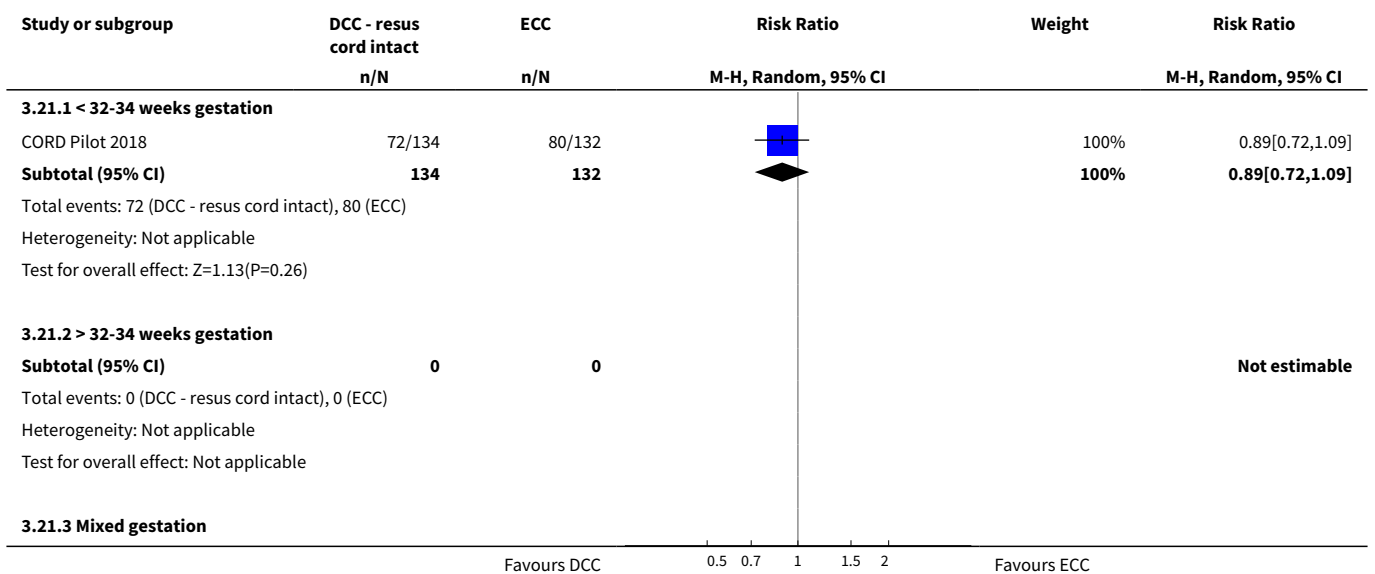
Analysis 3.16. Comparison 3 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by gestation), Outcome 16 Hyperbilirubinemia (treated by phototherapy).

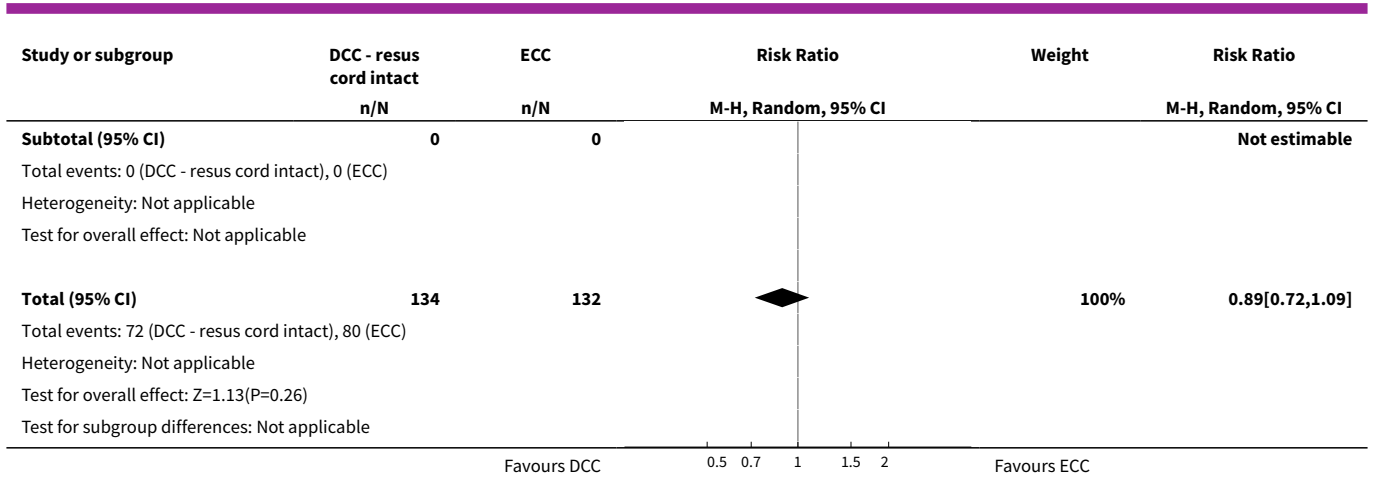


Analysis 3.19. Comparison 3 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by gestation), Outcome 19 Blood transfusion in infant.

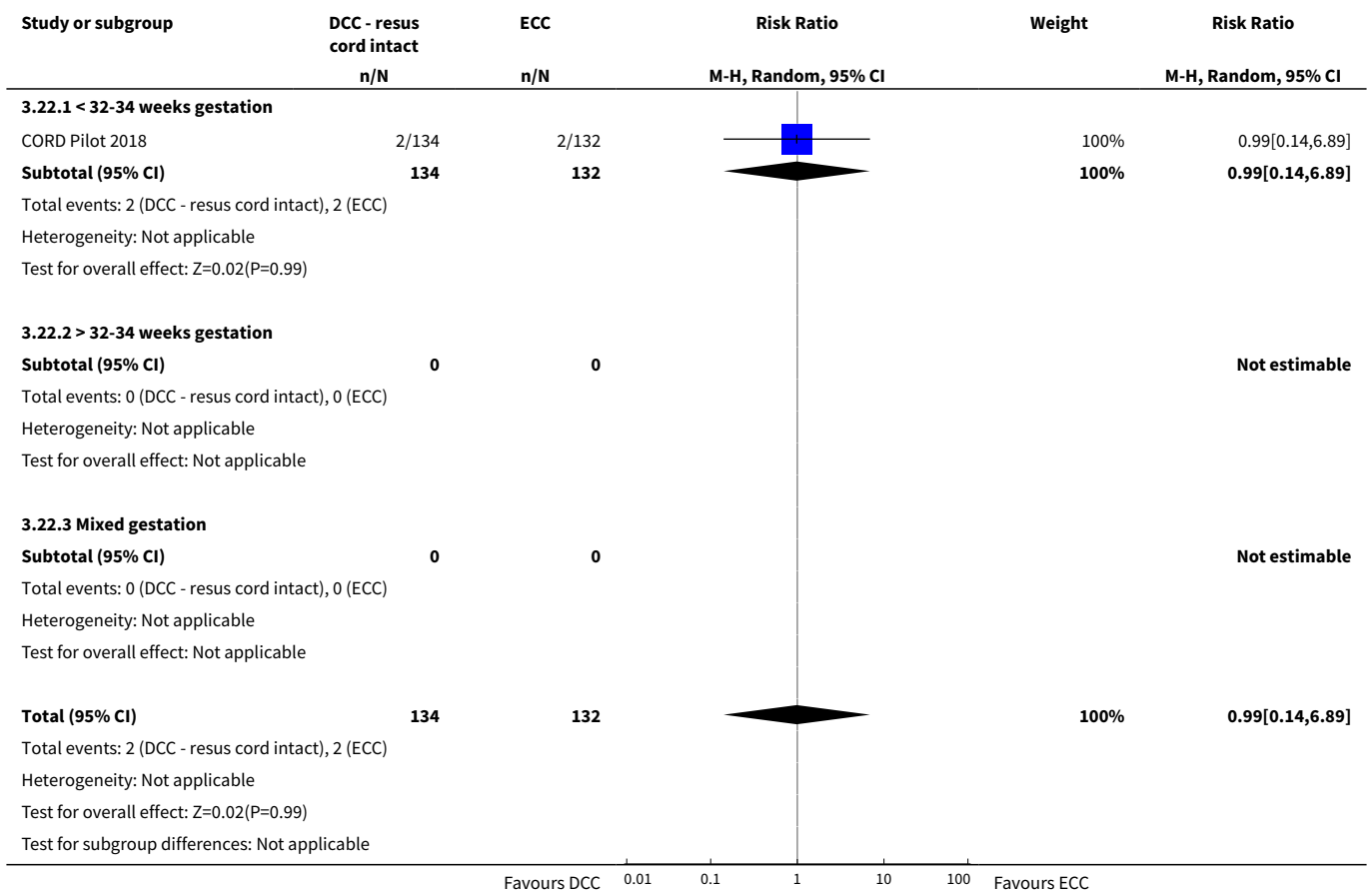


Analysis 3.21. Comparison 3 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by gestation), Outcome 21 Late sepsis (after 3 days or as defined by trialists).

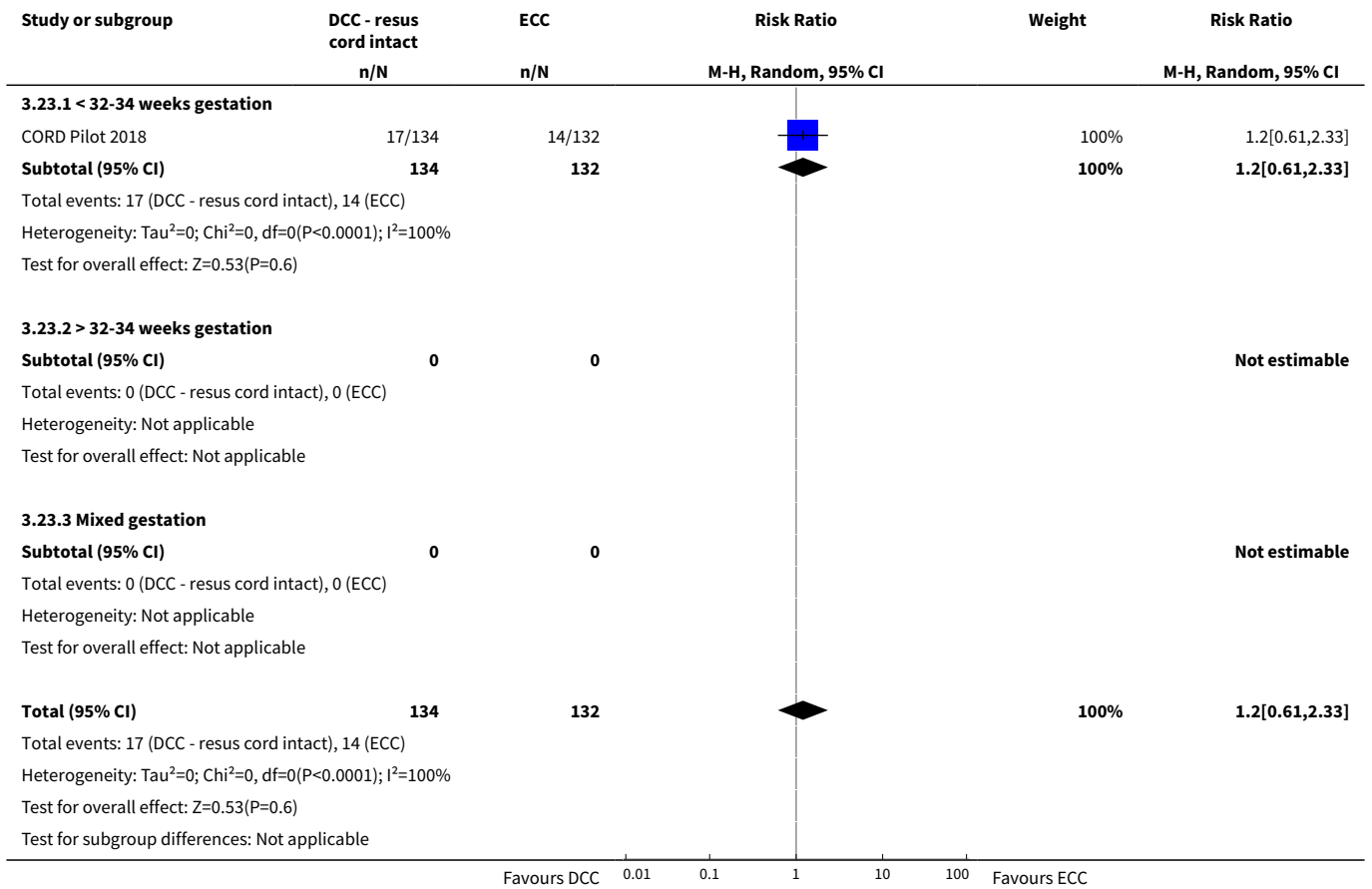




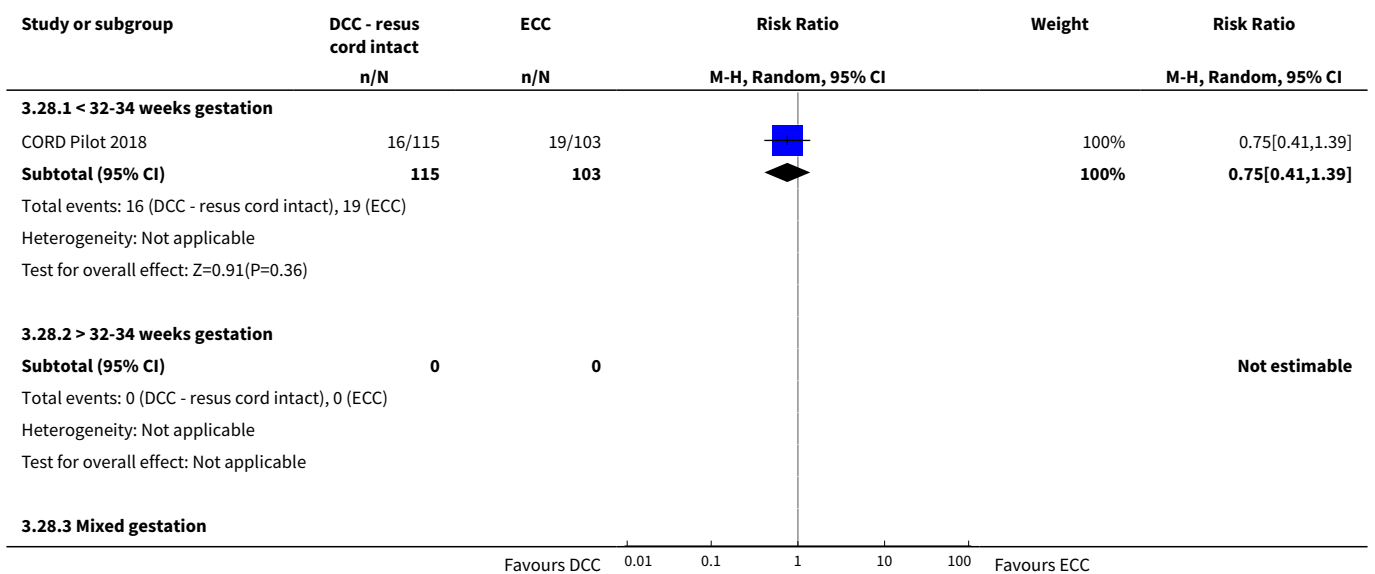
Analysis 3.22. Comparison 3 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by gestation), Outcome 22 Hydrocephalus.

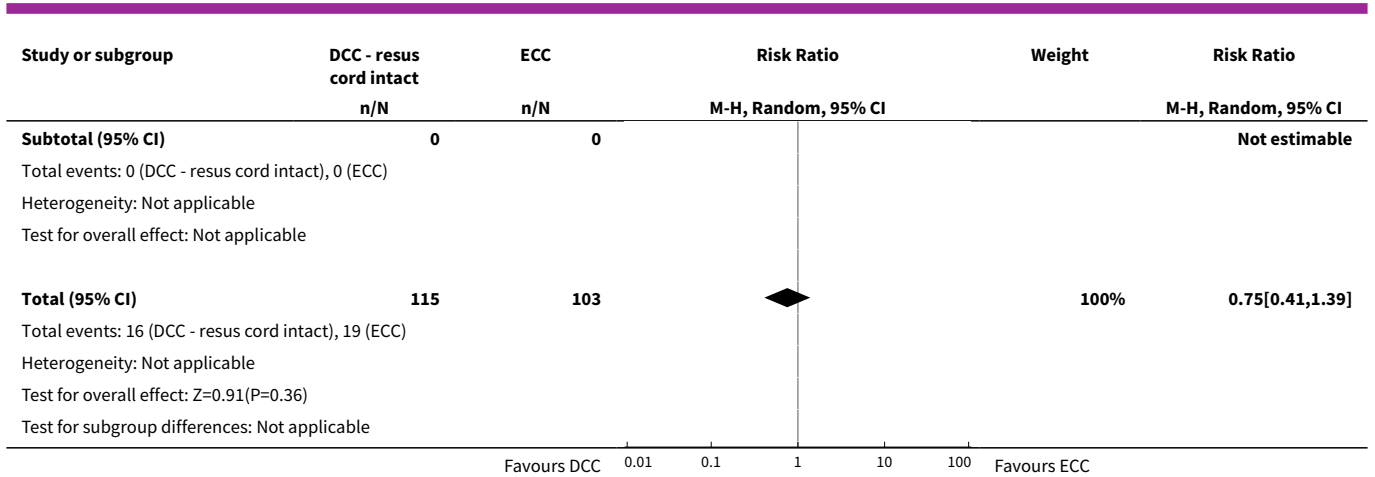


Analysis 3.23. Comparison 3 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by gestation), Outcome 23 Temperature < 36.0°C within 1 hour of birth.

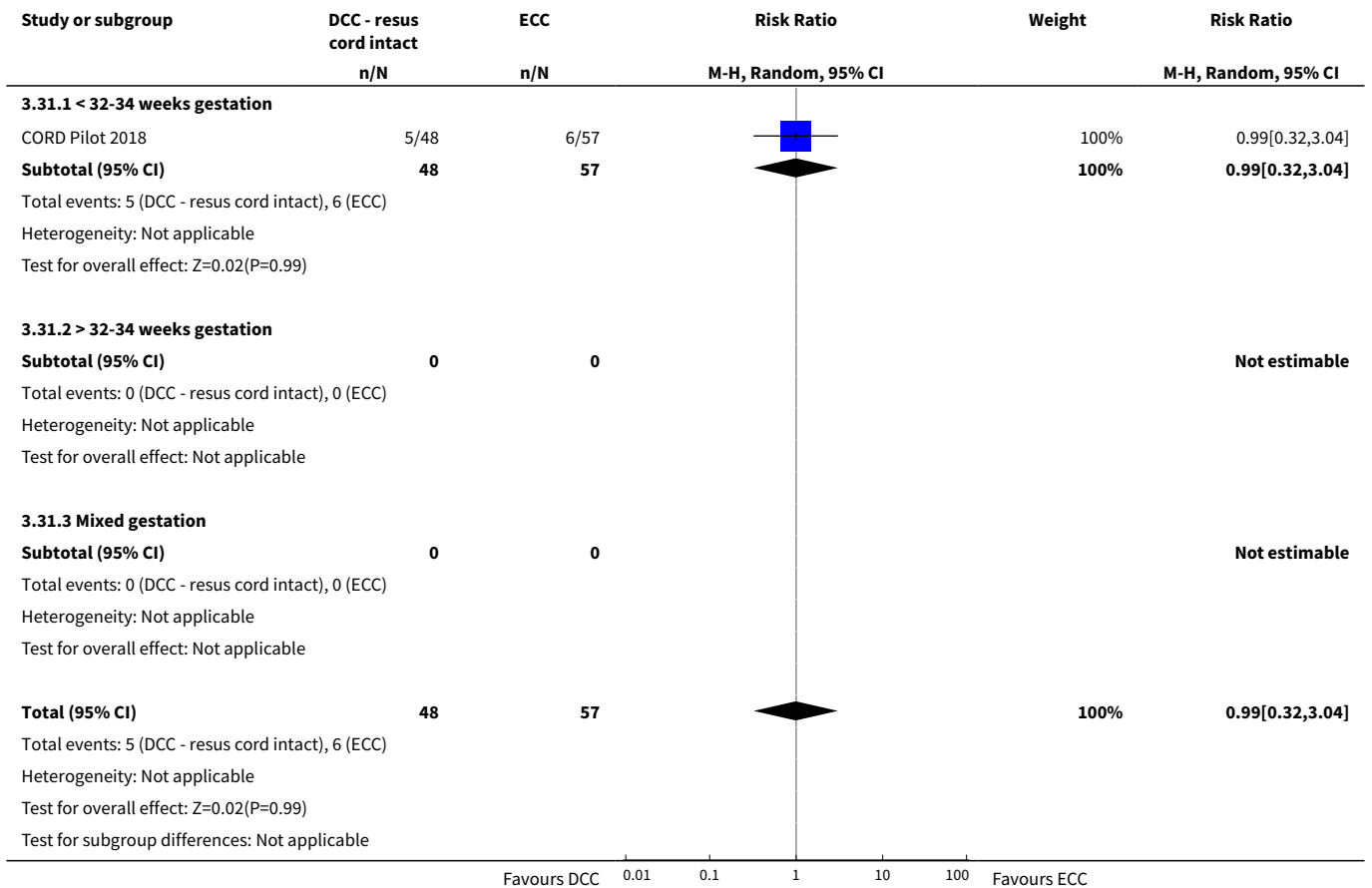


Analysis 3.28. Comparison 3 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by gestation), Outcome 28 Neurodevelopmental impairment at age two to three years.

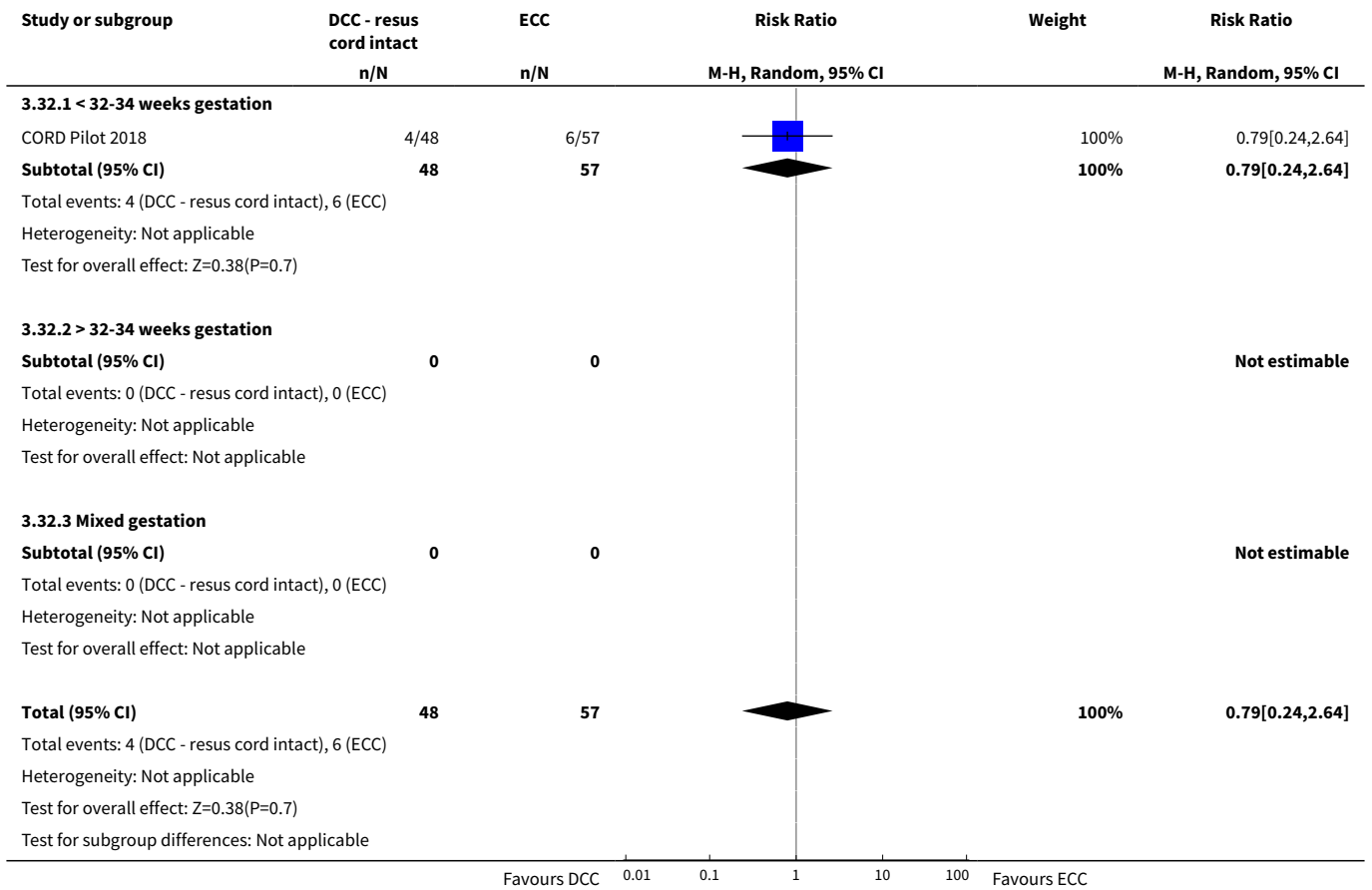




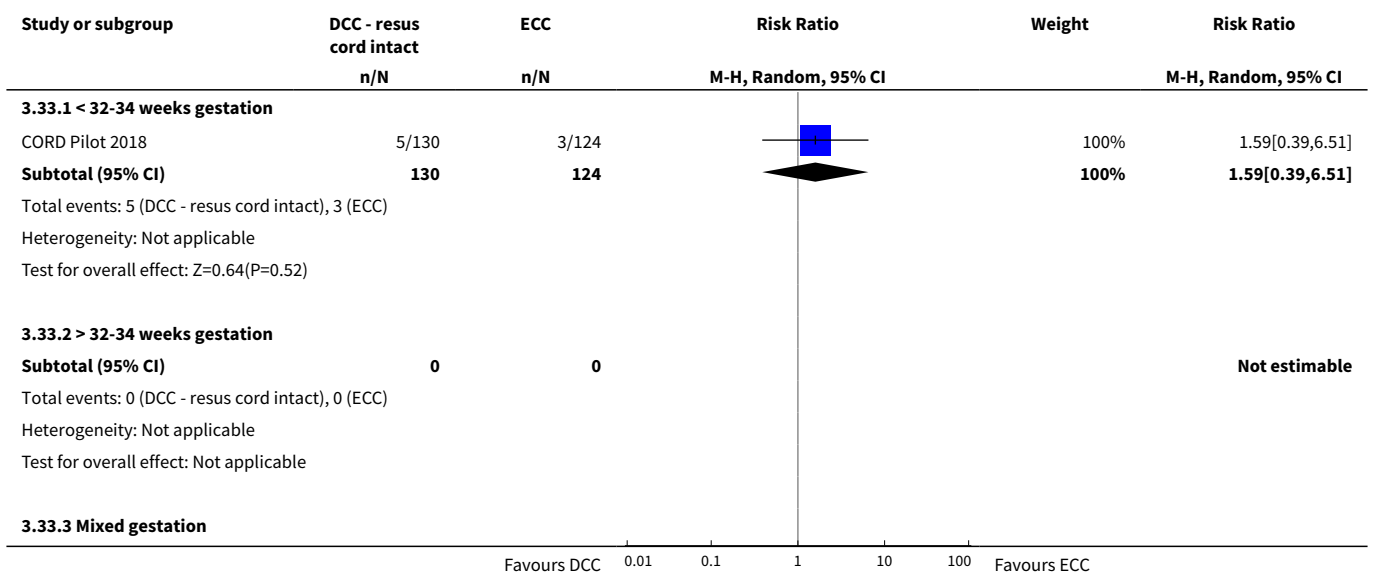
Analysis 3.31. Comparison 3 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by gestation), Outcome 31 Manual removal of placenta (denominator = vaginal births).

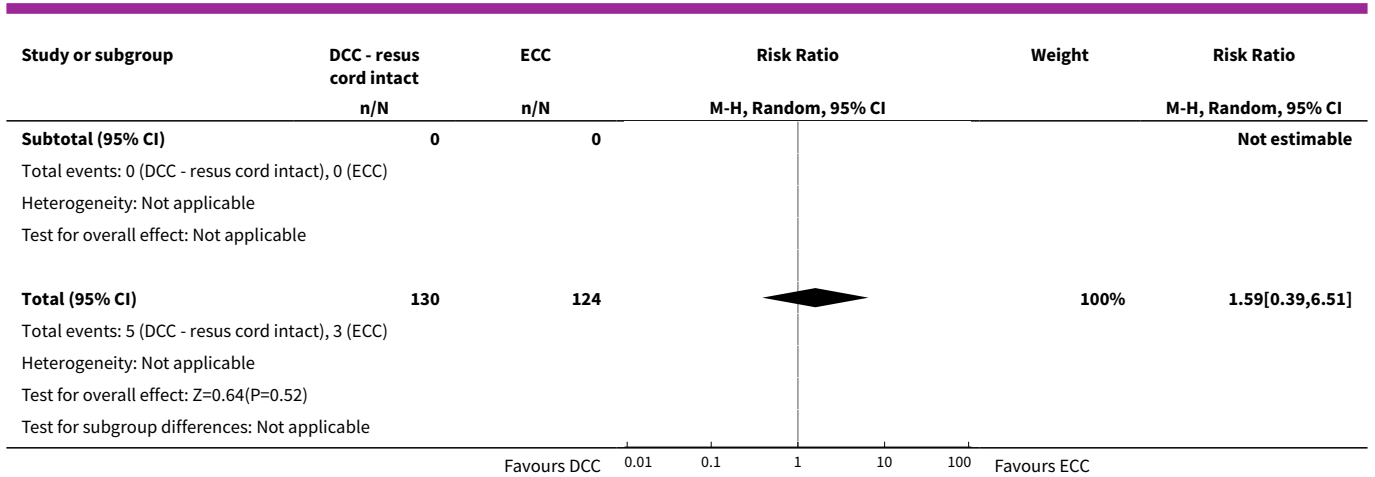


Analysis 3.32. Comparison 3 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by gestation), Outcome 32 Prolonged third stage (>30 minutes) (denominator = vaginal births).

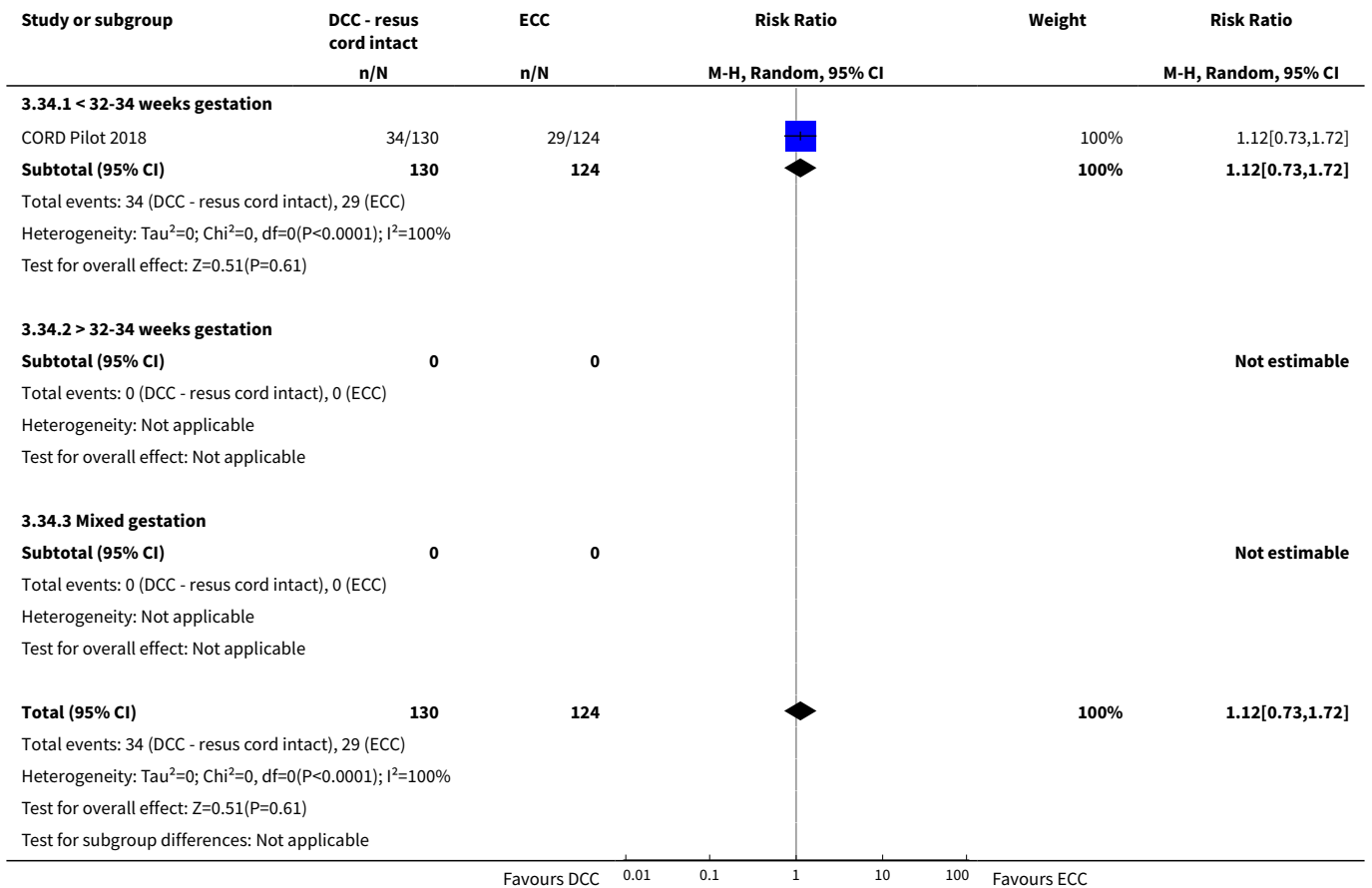


Analysis 3.33. Comparison 3 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by gestation), Outcome 33 Blood transfusion for mother.

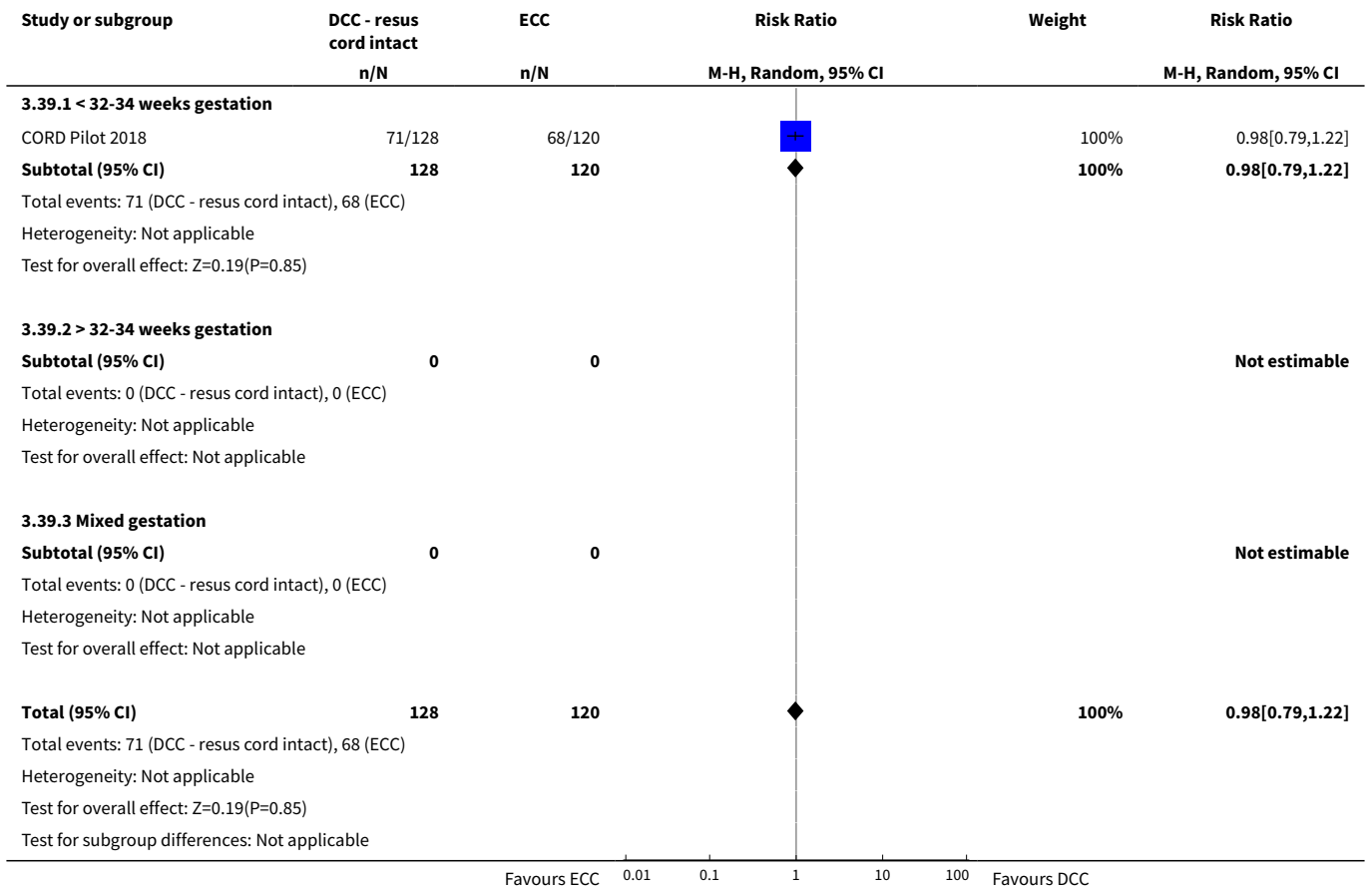




Analysis 3.34. Comparison 3 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by gestation), Outcome 34 Postpartum infection in mother.



Analysis 3.39. Comparison 3 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by gestation), Outcome 39 Fully breastfed or mixed feeding at infant discharge.



Comparison 4. DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by type of intervention)

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Death of baby (up to discharge)	1	270	Risk Ratio (M-H, Random, 95% CI)	0.47 [0.20, 1.11]
1.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
1.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
1.3 DCC at 1-2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
1.4 DCC at 1-2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1.5 DCC at > 2 mins with baby level with uterus	1	270	Risk Ratio (M-H, Random, 95% CI)	0.47 [0.20, 1.11]
1.6 DCC at > 2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
1.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
2 Death or neurodevelopmental impairment at age two to three years	1	218	Risk Ratio (M-H, Random, 95% CI)	0.61 [0.39, 0.96]
2.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
2.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
2.3 DCC at 1-2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
2.4 DCC at 1-2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
2.5 DCC at > 2 mins with baby level with uterus	1	218	Risk Ratio (M-H, Random, 95% CI)	0.61 [0.39, 0.96]
2.6 DCC at > 2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
2.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
3 Severe intraventricular haemorrhage (IVH grades 3, 4)	1	266	Risk Ratio (M-H, Random, 95% CI)	0.84 [0.29, 2.45]
3.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
3.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
3.3 DCC at 1-2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
3.4 DCC at 1-2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
3.5 DCC at > 2 mins with baby level with uterus	1	266	Risk Ratio (M-H, Random, 95% CI)	0.84 [0.29, 2.45]
3.6 DCC at > 2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
3.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
4 Intraventricular haemorrhage (IVH, all grades)	1	266	Risk Ratio (M-H, Random, 95% CI)	0.90 [0.64, 1.26]
4.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
4.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
4.3 DCC at 1-2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
4.4 DCC at 1-2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
4.5 DCC at > 2 mins with baby level with uterus	1	266	Risk Ratio (M-H, Random, 95% CI)	0.90 [0.64, 1.26]
4.6 DCC at > 2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
4.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
5 Periventricular leukomalacia (PVL)	1	266	Risk Ratio (M-H, Random, 95% CI)	0.86 [0.32, 2.31]
5.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
5.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
5.3 DCC at 1-2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
5.4 DCC at 1-2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
5.5 DCC at > 2 mins with baby level with uterus	1	266	Risk Ratio (M-H, Random, 95% CI)	0.86 [0.32, 2.31]
5.6 DCC at > 2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
5.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
6 Chronic lung disease (CLD) - oxygen supplement at 36 weeks (corrected for gestation)	1	249	Risk Ratio (M-H, Random, 95% CI)	0.95 [0.66, 1.37]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
6.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
6.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
6.3 DCC at 1-2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
6.4 DCC at 1-2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
6.5 DCC at > 2 mins with baby level with uterus	1	249	Risk Ratio (M-H, Random, 95% CI)	0.95 [0.66, 1.37]
6.6 DCC at > 2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
6.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
7 Maternal blood loss of 500 mL or greater	1	254	Risk Ratio (M-H, Random, 95% CI)	0.94 [0.72, 1.22]
7.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
7.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
7.3 DCC at 1-2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
7.4 DCC at 1-2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
7.5 DCC at > 2 mins with baby level with uterus	1	254	Risk Ratio (M-H, Random, 95% CI)	0.94 [0.72, 1.22]
7.6 DCC at > 2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
7.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
8 Intraventricular haemorrhage (IVH, grades 1 & 2)	1	266	Risk Ratio (M-H, Random, 95% CI)	0.91 [0.63, 1.33]
8.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
8.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
8.3 DCC at 1-2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
8.4 DCC at 1-2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
8.5 DCC at > 2 mins with baby level with uterus	1	266	Risk Ratio (M-H, Random, 95% CI)	0.91 [0.63, 1.33]
8.6 DCC at > 2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
8.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
9 Necrotising enterocolitis (NEC) confirmed by X-ray or laparotomy	1	266	Risk Ratio (M-H, Random, 95% CI)	1.58 [0.53, 4.69]
9.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
9.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
9.3 DCC at 1-2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
9.4 DCC at 1-2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
9.5 DCC at > 2 mins with baby level with uterus	1	266	Risk Ratio (M-H, Random, 95% CI)	1.58 [0.53, 4.69]
9.6 DCC at > 2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
9.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
10 Respiratory Distress Syndrome (RDS)	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
10.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
10.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
10.3 DCC at 1-2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
10.4 DCC at 1-2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
10.5 DCC at > 2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
10.6 DCC at > 2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
10.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
10.8 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
11 Respiratory support (ventilator or CPAP)	1	266	Risk Ratio (M-H, Random, 95% CI)	0.96 [0.84, 1.09]
11.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
11.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
11.3 DCC at 1-2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
11.4 DCC at 1-2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
11.5 DCC at > 2 mins with baby level with uterus	1	266	Risk Ratio (M-H, Random, 95% CI)	0.96 [0.84, 1.09]
11.6 DCC at > 2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
11.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
12 Duration of respiratory support	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
12.1 DCC < 1 min and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
12.2 DCC < 1 min and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
12.3 DCC 1-2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
12.4 DCC 1-2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
12.5 DCC > 2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
12.6 DCC > 2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
12.7 Mixed interventions or unclear	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
13 Surfactant treatment (for severe RDS)	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
13.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
13.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
13.3 DCC at 1-2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
13.4 DCC at 1-2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
13.5 DCC at > 2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
13.6 DCC at > 2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
13.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
14 Treatment for Patent Ductus Arteriosus (PDA) (medical and/or surgical)	1	266	Risk Ratio (M-H, Random, 95% CI)	0.99 [0.56, 1.74]
14.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
14.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
14.3 DCC at 1-2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
14.4 DCC at 1-2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
14.5 DCC at > 2 mins with baby level with uterus	1	266	Risk Ratio (M-H, Random, 95% CI)	0.99 [0.56, 1.74]
14.6 DCC at > 2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
14.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
15 Treatment for Retinopathy of Prematurity (RoP)	1	249	Risk Ratio (M-H, Random, 95% CI)	0.93 [0.28, 3.13]
15.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
15.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
15.3 DCC at 1-2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
15.4 DCC at 1-2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
15.5 DCC at > 2 mins with baby level with uterus	1	249	Risk Ratio (M-H, Random, 95% CI)	0.93 [0.28, 3.13]
15.6 DCC at > 2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
15.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
16 Hyperbilirubinemia (treated by phototherapy)	1	266	Risk Ratio (M-H, Random, 95% CI)	1.01 [0.94, 1.09]
16.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
16.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
16.3 DCC at 1-2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
16.4 DCC at 1-2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
16.5 DCC at > 2 mins with baby level with uterus	1	266	Risk Ratio (M-H, Random, 95% CI)	1.01 [0.94, 1.09]
16.6 DCC at > 2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
16.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
17 Inotropics for low blood pressure	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
17.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
17.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
17.3 DCC at 1-2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
17.4 DCC at 1-2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
17.5 DCC at > 2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
17.6 DCC at > 2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
17.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
18 Low Apgar as defined by trialists (generally < 8 at 5 mins)	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
18.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
18.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
18.3 DCC at 1-2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
18.4 DCC at 1-2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
18.5 DCC at > 2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
18.6 DCC at > 2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
18.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
19 Blood transfusion in infant	1	266	Risk Ratio (M-H, Random, 95% CI)	0.91 [0.71, 1.17]
19.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
19.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
19.3 DCC at 1-2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
19.4 DCC at 1-2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
19.5 DCC at > 2 mins with baby level with uterus	1	266	Risk Ratio (M-H, Random, 95% CI)	0.91 [0.71, 1.17]
19.6 DCC at > 2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
19.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
20 Volume of blood transfused	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
20.1 DCC < 1 min and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
20.2 DCC < 1 min and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
20.3 DCC 1-2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
20.4 DCC 1-2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
20.5 DCC > 2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
20.6 DCC > 2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
20.7 Mixed interventions or unclear	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
21 Late sepsis (after 3 days or as defined by trialists)	1	266	Risk Ratio (M-H, Random, 95% CI)	0.89 [0.72, 1.09]
21.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
21.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
21.3 DCC at 1-2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
21.4 DCC at 1-2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
21.5 DCC at > 2 mins with baby level with uterus	1	266	Risk Ratio (M-H, Random, 95% CI)	0.89 [0.72, 1.09]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
21.6 DCC at > 2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
21.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
22 Hydrocephalus	1	266	Risk Ratio (M-H, Random, 95% CI)	0.99 [0.14, 6.89]
22.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
22.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
22.3 DCC at 1-2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
22.4 DCC at 1-2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
22.5 DCC at > 2 mins with baby level with uterus	1	266	Risk Ratio (M-H, Random, 95% CI)	0.99 [0.14, 6.89]
22.6 DCC at > 2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
22.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
23 Temperature < 36.0°C within 1 hour of birth	1	266	Risk Ratio (M-H, Random, 95% CI)	1.20 [0.61, 2.33]
23.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
23.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
23.3 DCC at 1-2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
23.4 DCC at 1-2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
23.5 DCC at > 2 mins with baby level with uterus	1	266	Risk Ratio (M-H, Random, 95% CI)	1.20 [0.61, 2.33]
23.6 DCC at > 2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
23.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
24 Hb within 1 st 24 hour of birth (g/dL)	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
24.1 DCC < 1 min and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
24.2 DCC < 1 min and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
24.3 DCC 1-2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
24.4 DCC 1-2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
24.5 DCC > 2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
24.6 DCC > 2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
24.7 Mixed interventions or unclear	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
25 Mean arterial blood pressure (subgrouped by time after birth)	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
25.1 DCC < 1 min and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
25.2 DCC < 1 min and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
25.3 DCC 1-2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
25.4 DCC 1-2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
25.5 DCC > 2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
25.6 DCC > 2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
25.7 Mixed interventions or unclear	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
26 Length of infant stay in NICU	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
26.1 DCC < 1 min and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
26.2 DCC < 1 min and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
26.3 DCC 1-2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
26.4 DCC 1-2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
26.5 DCC > 2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
26.6 DCC > 2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
26.7 Mixed interventions or unclear	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
27 Home oxygen	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
27.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
27.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
27.3 DCC at 1-2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
27.4 DCC at 1-2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
27.5 DCC at > 2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
27.6 DCC at > 2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
27.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
28 Neurodevelopmental impairment at age two to three years	1	194	Risk Ratio (M-H, Random, 95% CI)	0.33 [0.06, 1.64]
28.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
28.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
28.3 DCC at 1-2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
28.4 DCC at 1-2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
28.5 DCC at > 2 mins with baby level with uterus	1	194	Risk Ratio (M-H, Random, 95% CI)	0.33 [0.06, 1.64]
28.6 DCC at > 2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
28.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
29 Severe visual impairment	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
29.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
29.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
29.3 DCC at 1-2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
29.4 DCC at 1-2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
29.5 DCC at > 2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
29.6 DCC at > 2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
29.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
30 Cerebral palsy (CP)	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
30.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
30.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
30.3 DCC at 1-2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
30.4 DCC at 1-2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
30.5 DCC at > 2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
30.6 DCC at > 2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
30.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
31 Manual removal of placenta (denominator = vaginal births)	1	105	Risk Ratio (M-H, Random, 95% CI)	0.99 [0.32, 3.04]
31.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
31.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
31.3 DCC at 1-2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
31.4 DCC at 1-2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
31.5 DCC at > 2 mins with baby level with uterus	1	105	Risk Ratio (M-H, Random, 95% CI)	0.99 [0.32, 3.04]
31.6 DCC at > 2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
31.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
32 Prolonged third stage (>30 minutes) (denominator = vaginal births)	1	105	Risk Ratio (M-H, Random, 95% CI)	0.79 [0.24, 2.64]
32.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
32.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
32.3 DCC at 1-2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
32.4 DCC at 1-2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
32.5 DCC at > 2 mins with baby level with uterus	1	105	Risk Ratio (M-H, Random, 95% CI)	0.79 [0.24, 2.64]
32.6 DCC at > 2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
32.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
33 Blood transfusion for mother	1	254	Risk Ratio (M-H, Random, 95% CI)	1.59 [0.39, 6.51]
33.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
33.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
33.3 DCC at 1-2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
33.4 DCC at 1-2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
33.5 DCC at > 2 mins with baby level with uterus	1	254	Risk Ratio (M-H, Random, 95% CI)	1.59 [0.39, 6.51]
33.6 DCC at > 2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
33.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
34 Postpartum infection in mother	1	254	Risk Ratio (M-H, Random, 95% CI)	1.12 [0.73, 1.72]
34.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
34.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
34.3 DCC at 1-2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
34.4 DCC at 1-2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
34.5 DCC at > 2 mins with baby level with uterus	1	254	Risk Ratio (M-H, Random, 95% CI)	1.12 [0.73, 1.72]
34.6 DCC at > 2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
34.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
35 Rhesus isoimmunisation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
35.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
35.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
35.3 DCC at 1-2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
35.4 DCC at 1-2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
35.5 DCC at > 2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
35.6 DCC at > 2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
35.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
36 Psychological well being in mother	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
36.1 DCC < 1 min and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
36.2 DCC < 1 min and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
36.3 DCC 1-2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
36.4 DCC 1-2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
36.5 DCC > 2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
36.6 DCC > 2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
36.7 Mixed interventions or unclear	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37 Bonding	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37.1 DCC < 1 min and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37.2 DCC < 1 min and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37.3 DCC 1-2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
37.4 DCC 1-2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37.5 DCC > 2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37.6 DCC > 2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37.7 Mixed interventions or unclear	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
38 Breastfeeding initiation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
38.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
38.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
38.3 DCC at 1-2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
38.4 DCC at 1-2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
38.5 DCC at > 2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
38.6 DCC at > 2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
38.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
39 Fully breastfed or mixed feeding at infant discharge	1	248	Risk Ratio (M-H, Random, 95% CI)	0.98 [0.79, 1.22]
39.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
39.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
39.3 DCC at 1-2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
39.4 DCC at 1-2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
39.5 DCC at > 2 mins with baby level with uterus	1	248	Risk Ratio (M-H, Random, 95% CI)	0.98 [0.79, 1.22]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
39.6 DCC at > 2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
39.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40 Maternal anxiety	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40.3 DCC at 1-2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40.4 DCC at 1-2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40.5 DCC at > 2 mins with baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40.6 DCC at > 2 mins with baby low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
41 Mothers' views	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
41.1 DCC < 1 min and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
41.2 DCC < 1 min and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
41.3 DCC 1-2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
41.4 DCC 1-2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
41.5 DCC > 2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
41.6 DCC > 2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
41.7 Mixed interventions or unclear	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]

Analysis 4.1. Comparison 4 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by type of intervention), Outcome 1 Death of baby (up to discharge).

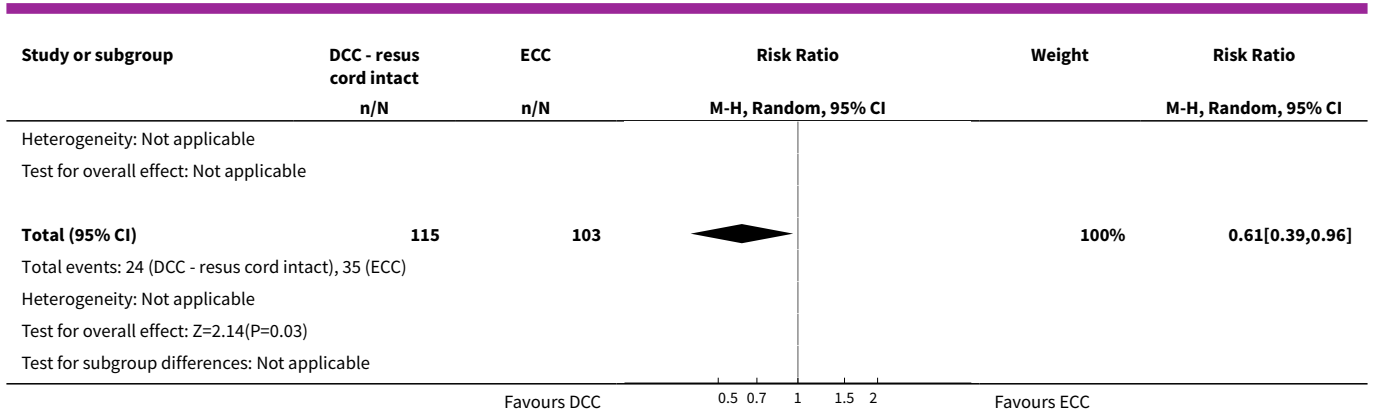
Study or subgroup	DCC - resus cord intact	ECC	Risk Ratio	Weight	Risk Ratio
	n/N	n/N	M-H, Random, 95% CI		M-H, Random, 95% CI
4.1.1 DCC < 1 min and baby level with uterus					
Subtotal (95% CI)	0	0			Not estimable
Total events: 0 (DCC - resus cord intact), 0 (ECC)					
Heterogeneity: Not applicable					
Test for overall effect: Not applicable					
4.1.2 DCC < 1 min and baby held low					
Subtotal (95% CI)	0	0			Not estimable
Total events: 0 (DCC - resus cord intact), 0 (ECC)					
Heterogeneity: Not applicable					
Test for overall effect: Not applicable					
4.1.3 DCC at 1-2 mins with baby level with uterus					
Subtotal (95% CI)	0	0			Not estimable
Total events: 0 (DCC - resus cord intact), 0 (ECC)					
Heterogeneity: Not applicable					
Test for overall effect: Not applicable					
4.1.4 DCC at 1-2 mins with baby low					
Subtotal (95% CI)	0	0			Not estimable
Total events: 0 (DCC - resus cord intact), 0 (ECC)					
Heterogeneity: Not applicable					
Test for overall effect: Not applicable					
4.1.5 DCC at > 2 mins with baby level with uterus					
CORD Pilot 2018	7/135	15/135		100%	0.47[0.2,1.11]
Subtotal (95% CI)	135	135		100%	0.47[0.2,1.11]
Total events: 7 (DCC - resus cord intact), 15 (ECC)					
Heterogeneity: Not applicable					
Test for overall effect: Z=1.73(P=0.08)					
4.1.6 DCC at > 2 mins with baby low					
Subtotal (95% CI)	0	0			Not estimable
Total events: 0 (DCC - resus cord intact), 0 (ECC)					
Heterogeneity: Not applicable					
Test for overall effect: Not applicable					
4.1.7 Mixed interventions or unclear					
Subtotal (95% CI)	0	0			Not estimable
Total events: 0 (DCC - resus cord intact), 0 (ECC)					
Heterogeneity: Not applicable					
Test for overall effect: Not applicable					
Total (95% CI)	135	135		100%	0.47[0.2,1.11]
Total events: 7 (DCC - resus cord intact), 15 (ECC)					
Heterogeneity: Not applicable					
Test for overall effect: Z=1.73(P=0.08)					

Favours DCC 0.01 0.1 1 10 100 Favours ECC

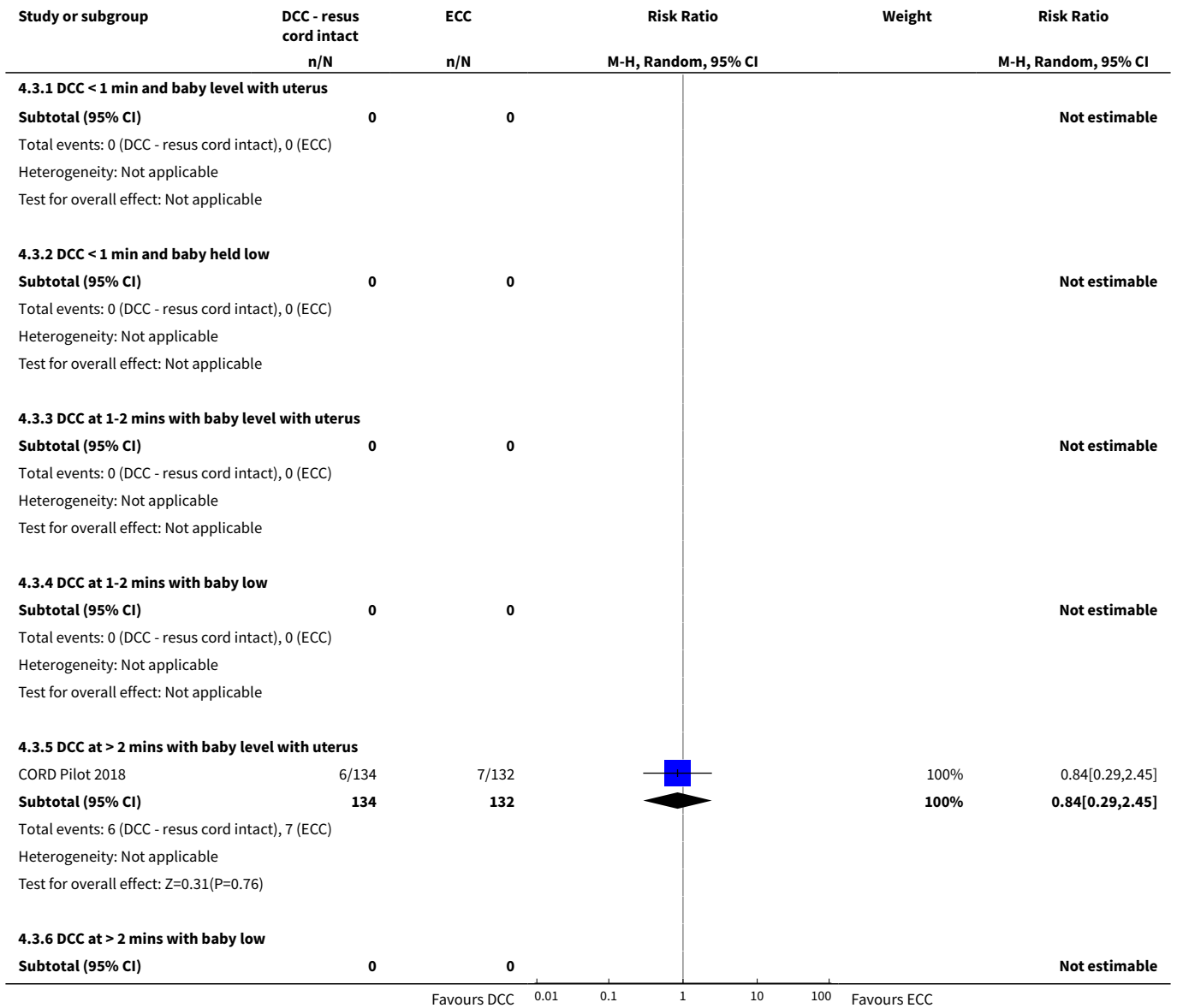
Study or subgroup	DCC - resus cord intact n/N	ECC n/N	Risk Ratio M-H, Random, 95% CI	Weight	Risk Ratio M-H, Random, 95% CI
Test for subgroup differences: Not applicable					

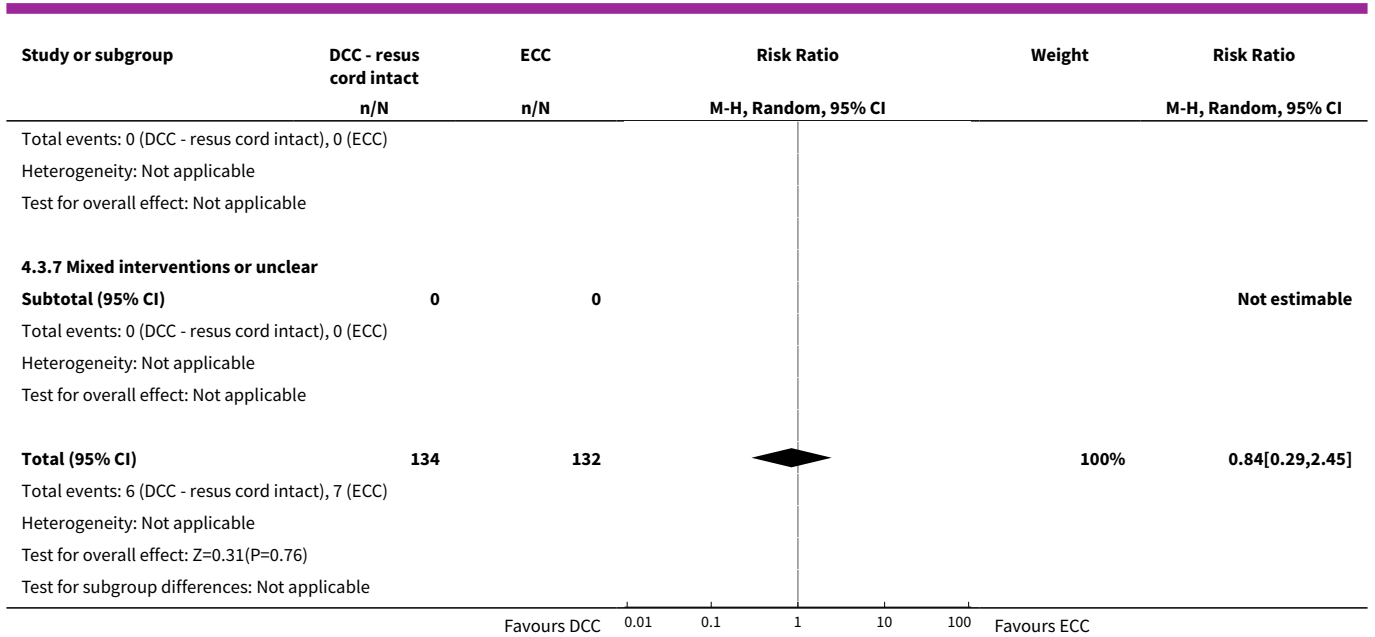
Analysis 4.2. Comparison 4 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by type of intervention), Outcome 2 Death or neurodevelopmental impairment at age two to three years.

Study or subgroup	DCC - resus cord intact n/N	ECC n/N	Risk Ratio M-H, Random, 95% CI	Weight	Risk Ratio M-H, Random, 95% CI
4.2.1 DCC < 1 min and baby level with uterus					
Subtotal (95% CI)	0	0			Not estimable
Total events: 0 (DCC - resus cord intact), 0 (ECC)					
Heterogeneity: Not applicable					
Test for overall effect: Not applicable					
4.2.2 DCC < 1 min and baby held low					
Subtotal (95% CI)	0	0			Not estimable
Total events: 0 (DCC - resus cord intact), 0 (ECC)					
Heterogeneity: Not applicable					
Test for overall effect: Not applicable					
4.2.3 DCC at 1-2 mins with baby level with uterus					
Subtotal (95% CI)	0	0			Not estimable
Total events: 0 (DCC - resus cord intact), 0 (ECC)					
Heterogeneity: Not applicable					
Test for overall effect: Not applicable					
4.2.4 DCC at 1-2 mins with baby low					
Subtotal (95% CI)	0	0			Not estimable
Total events: 0 (DCC - resus cord intact), 0 (ECC)					
Heterogeneity: Not applicable					
Test for overall effect: Not applicable					
4.2.5 DCC at > 2 mins with baby level with uterus					
CORD Pilot 2018	24/115	35/103		100%	0.61[0.39,0.96]
Subtotal (95% CI)	115	103		100%	0.61[0.39,0.96]
Total events: 24 (DCC - resus cord intact), 35 (ECC)					
Heterogeneity: Not applicable					
Test for overall effect: Z=2.14(P=0.03)					
4.2.6 DCC at > 2 mins with baby low					
Subtotal (95% CI)	0	0			Not estimable
Total events: 0 (DCC - resus cord intact), 0 (ECC)					
Heterogeneity: Not applicable					
Test for overall effect: Not applicable					
4.2.7 Mixed interventions or unclear					
Subtotal (95% CI)	0	0			Not estimable
Total events: 0 (DCC - resus cord intact), 0 (ECC)					

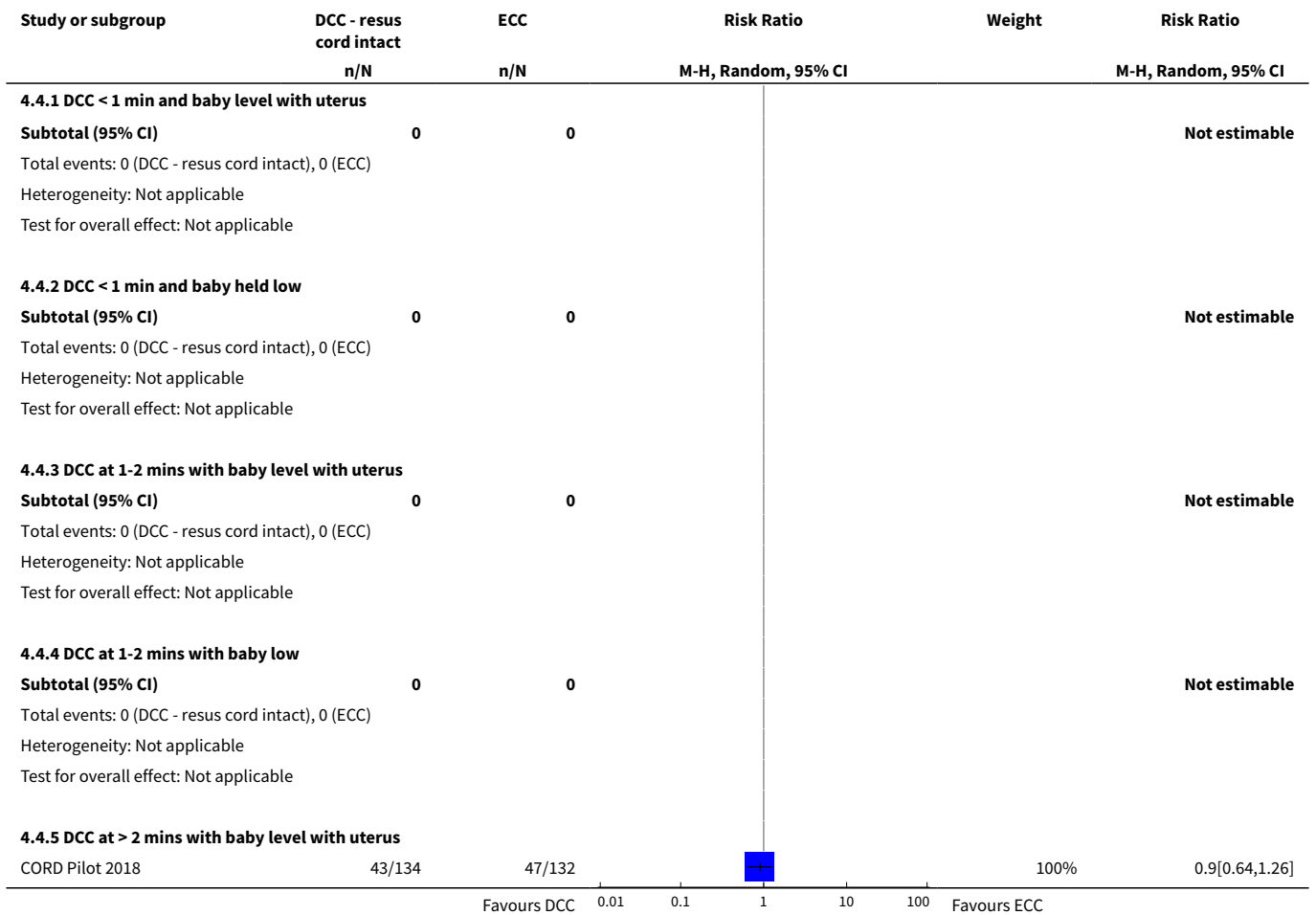


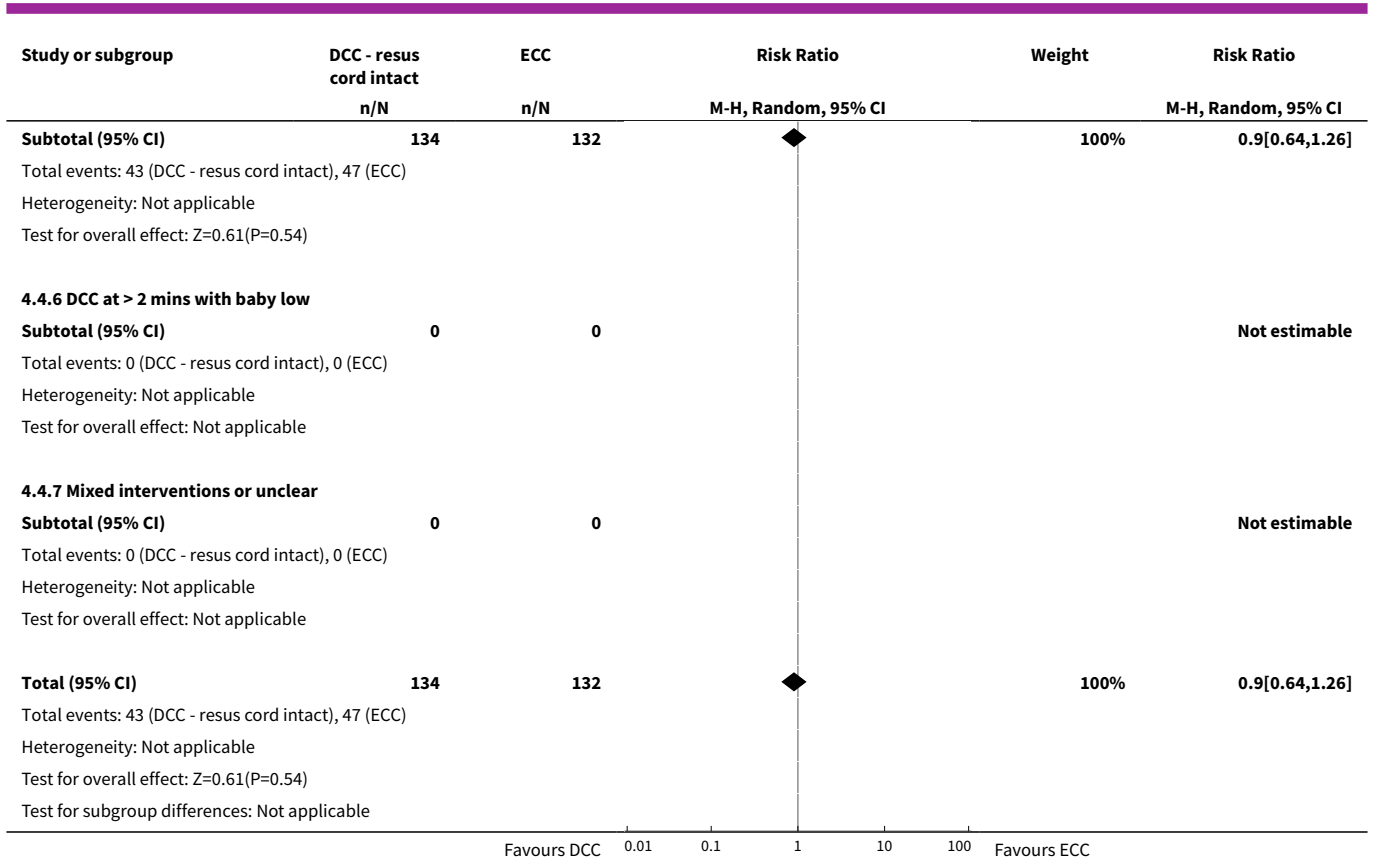
Analysis 4.3. Comparison 4 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by type of intervention), Outcome 3 Severe intraventricular haemorrhage (IVH grades 3, 4).



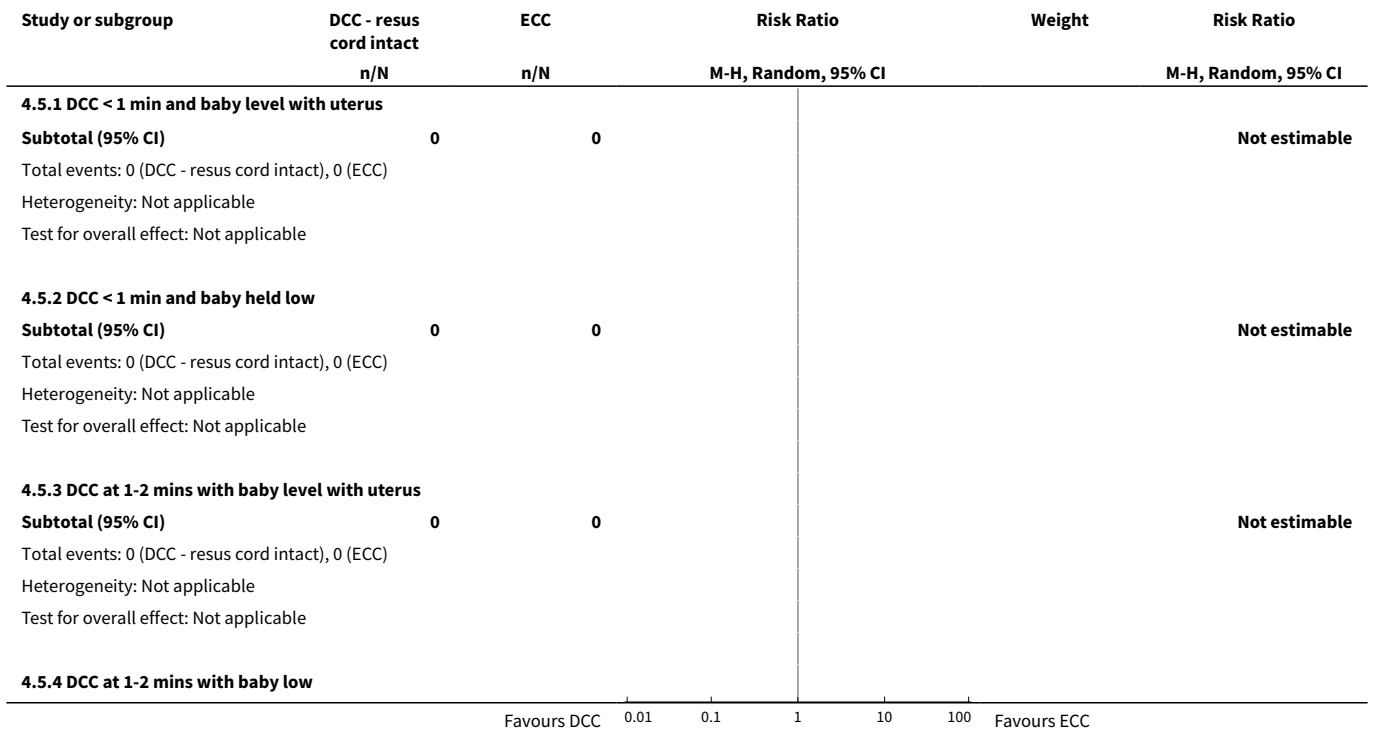


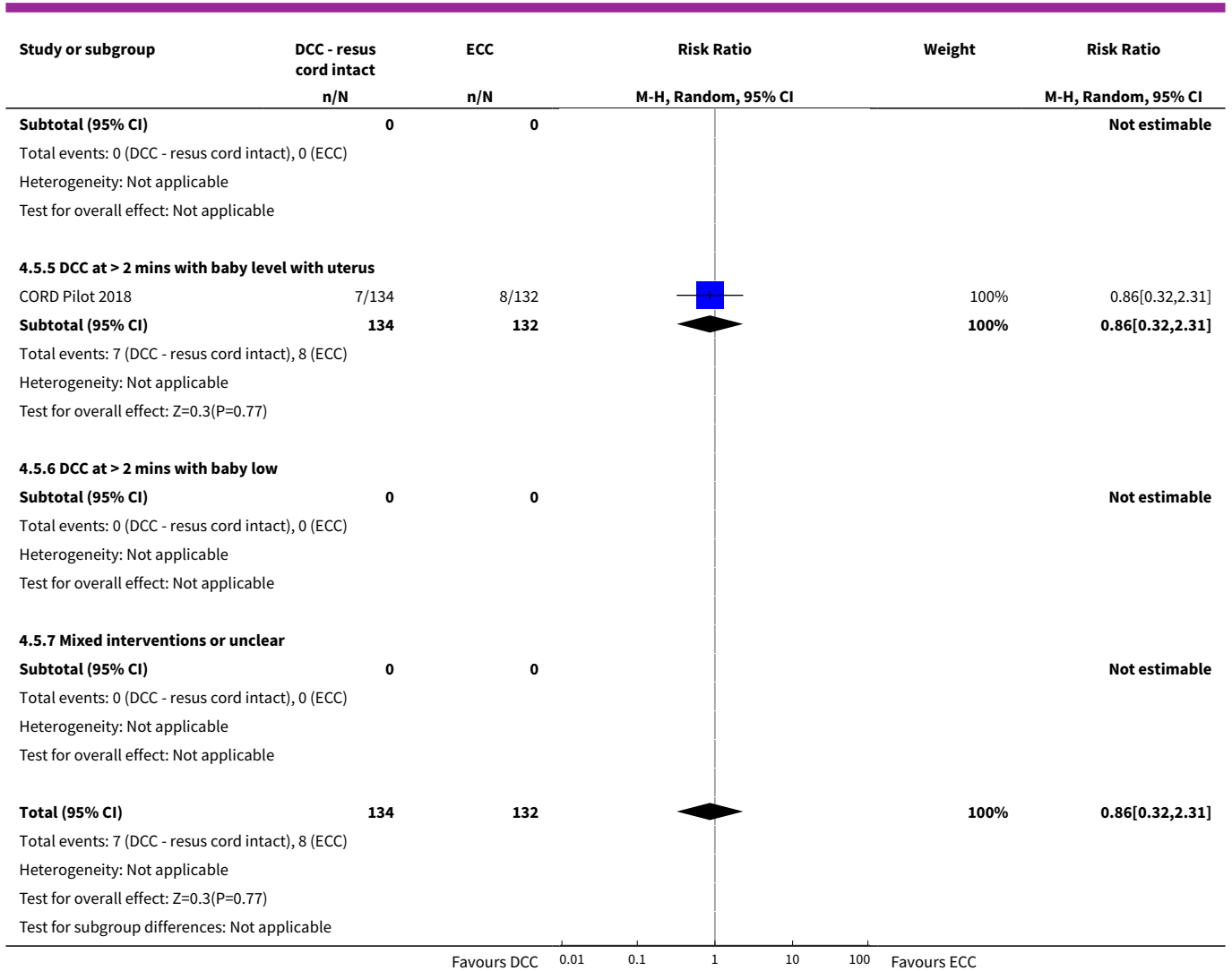
Analysis 4.4. Comparison 4 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by type of intervention), Outcome 4 Intraventricular haemorrhage (IVH, all grades).



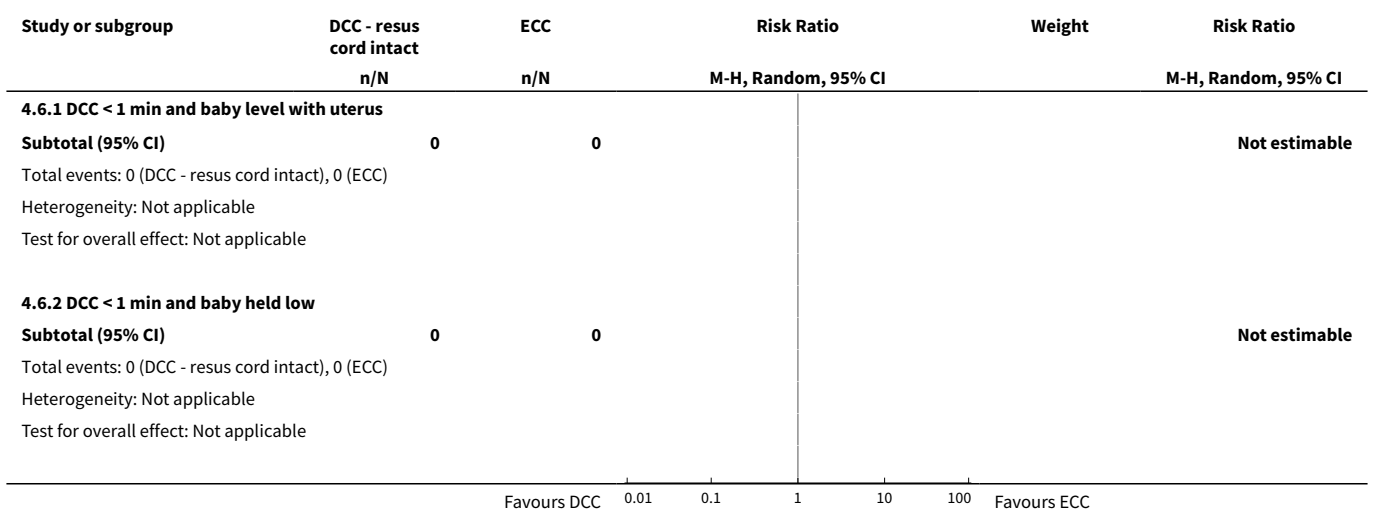


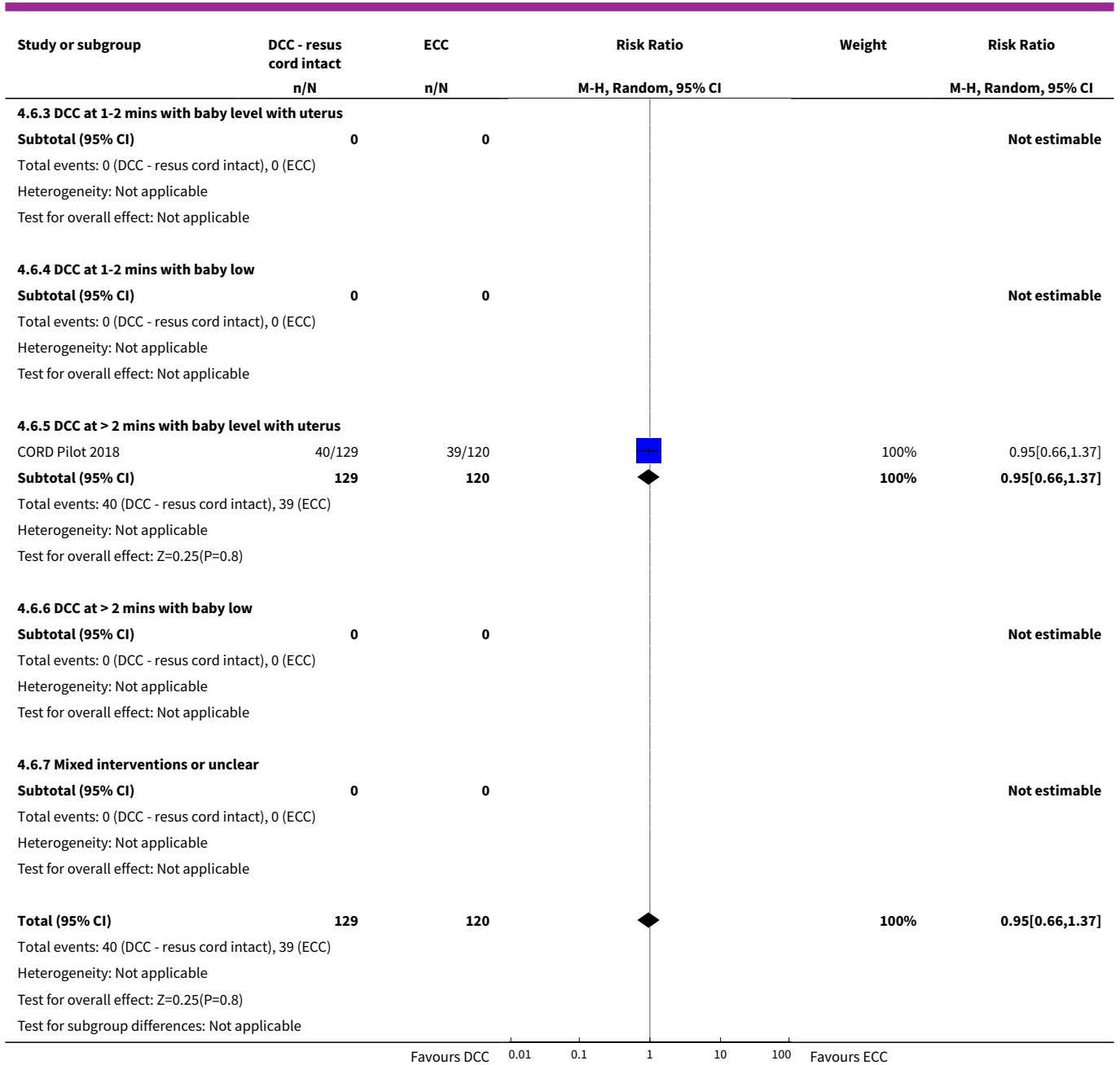
Analysis 4.5. Comparison 4 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by type of intervention), Outcome 5 Periventricular leukomalacia (PVL).



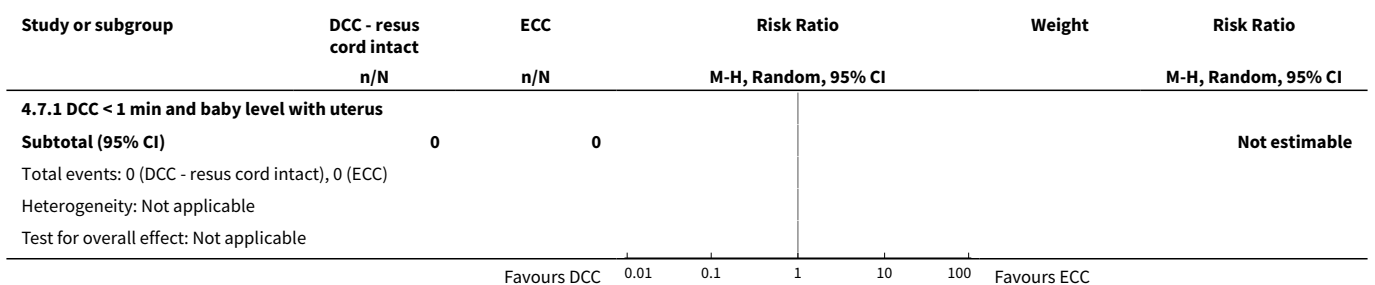


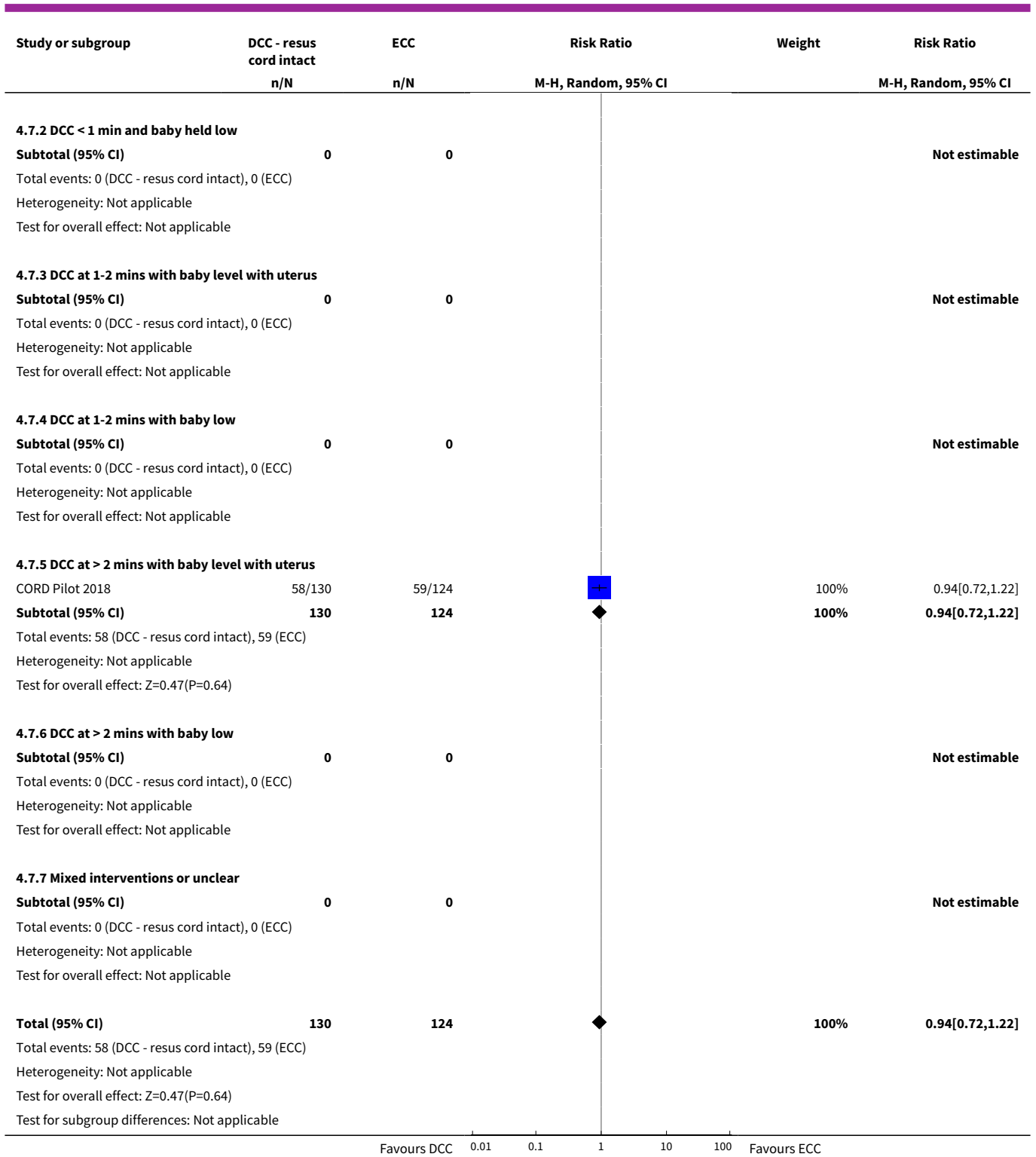
Analysis 4.6. Comparison 4 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by type of intervention), Outcome 6 Chronic lung disease (CLD) - oxygen supplement at 36 weeks (corrected for gestation).





Analysis 4.7. Comparison 4 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by type of intervention), Outcome 7 Maternal blood loss of 500 mL or greater.

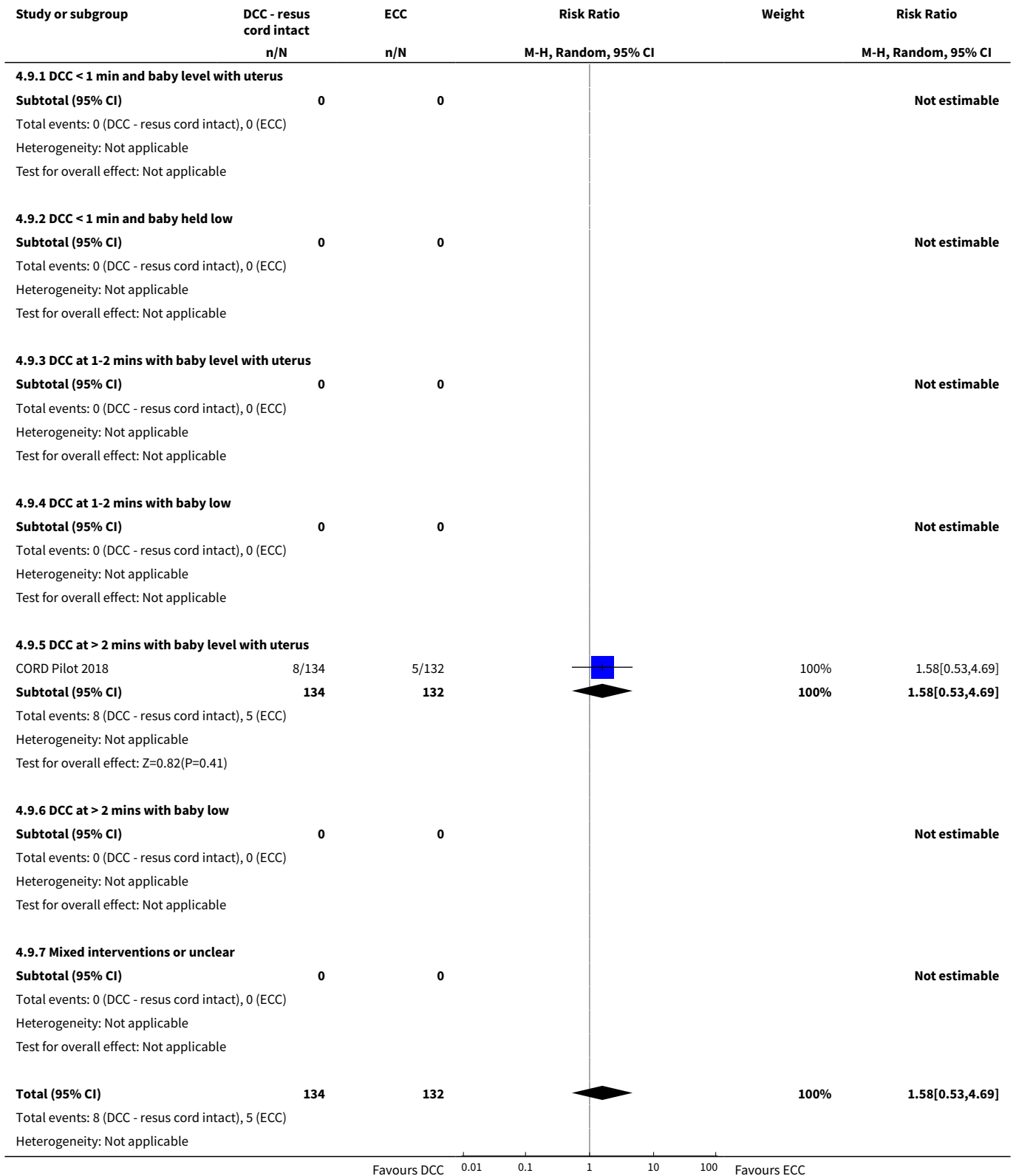


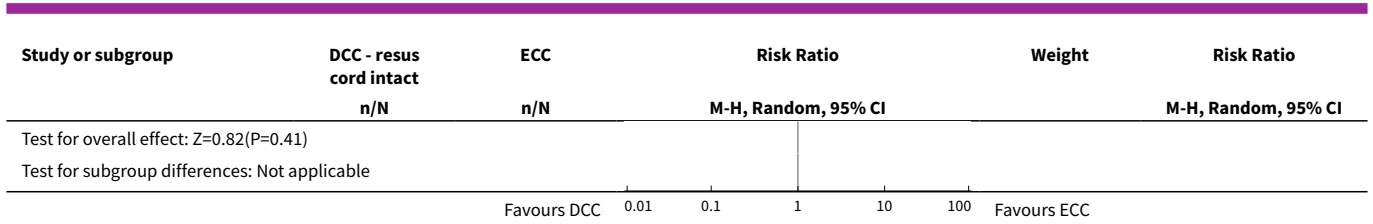


Analysis 4.8. Comparison 4 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by type of intervention), Outcome 8 Intraventricular haemorrhage (IVH, grades 1 & 2).

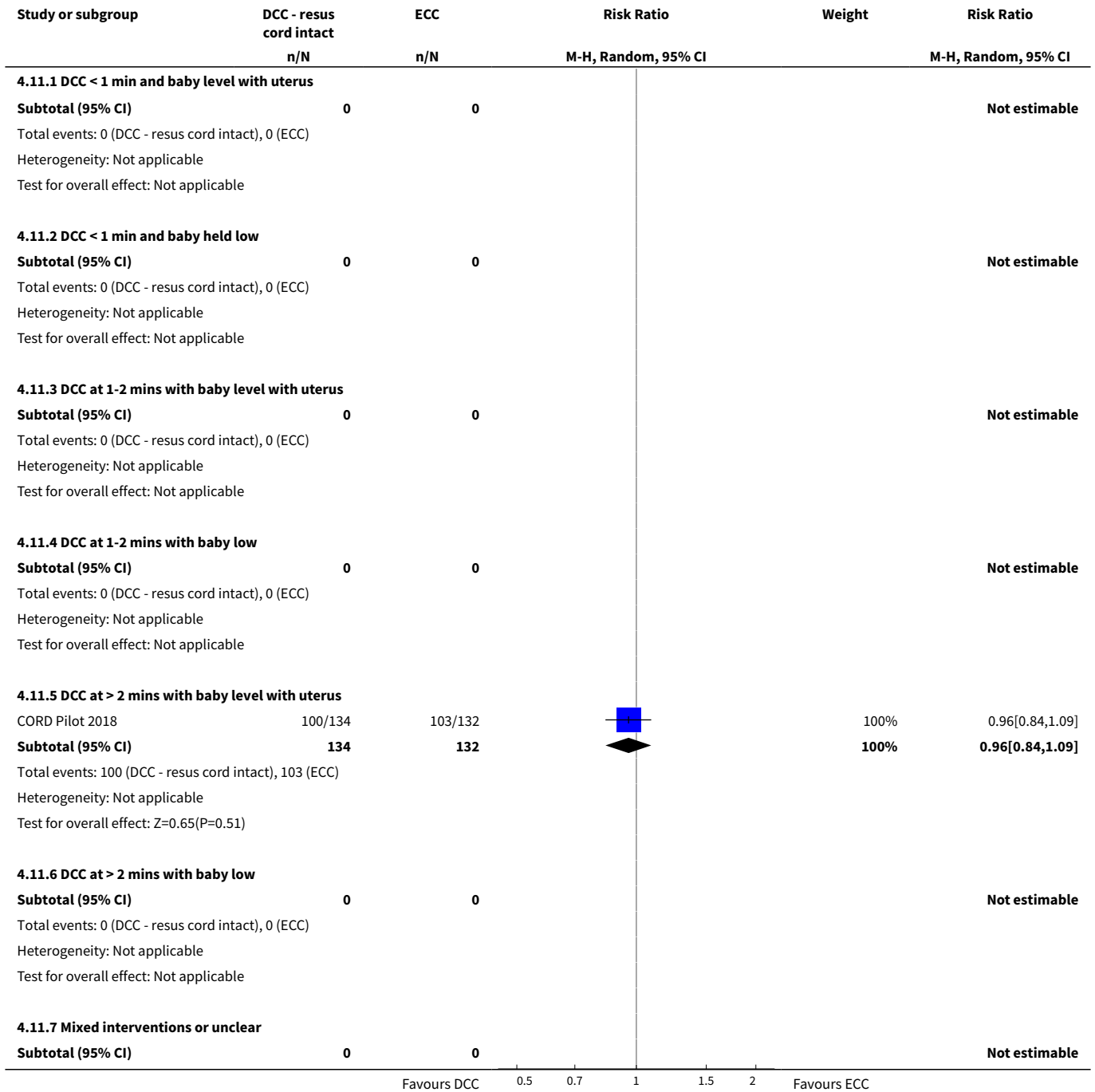


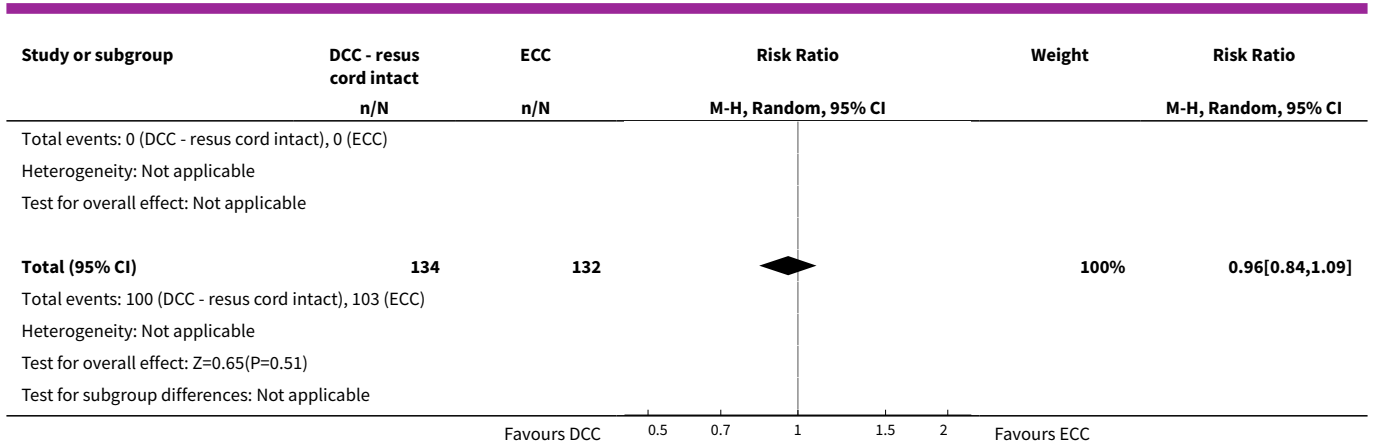
Analysis 4.9. Comparison 4 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by type of intervention), Outcome 9 Necrotising enterocolitis (NEC) confirmed by X-ray or laparotomy).



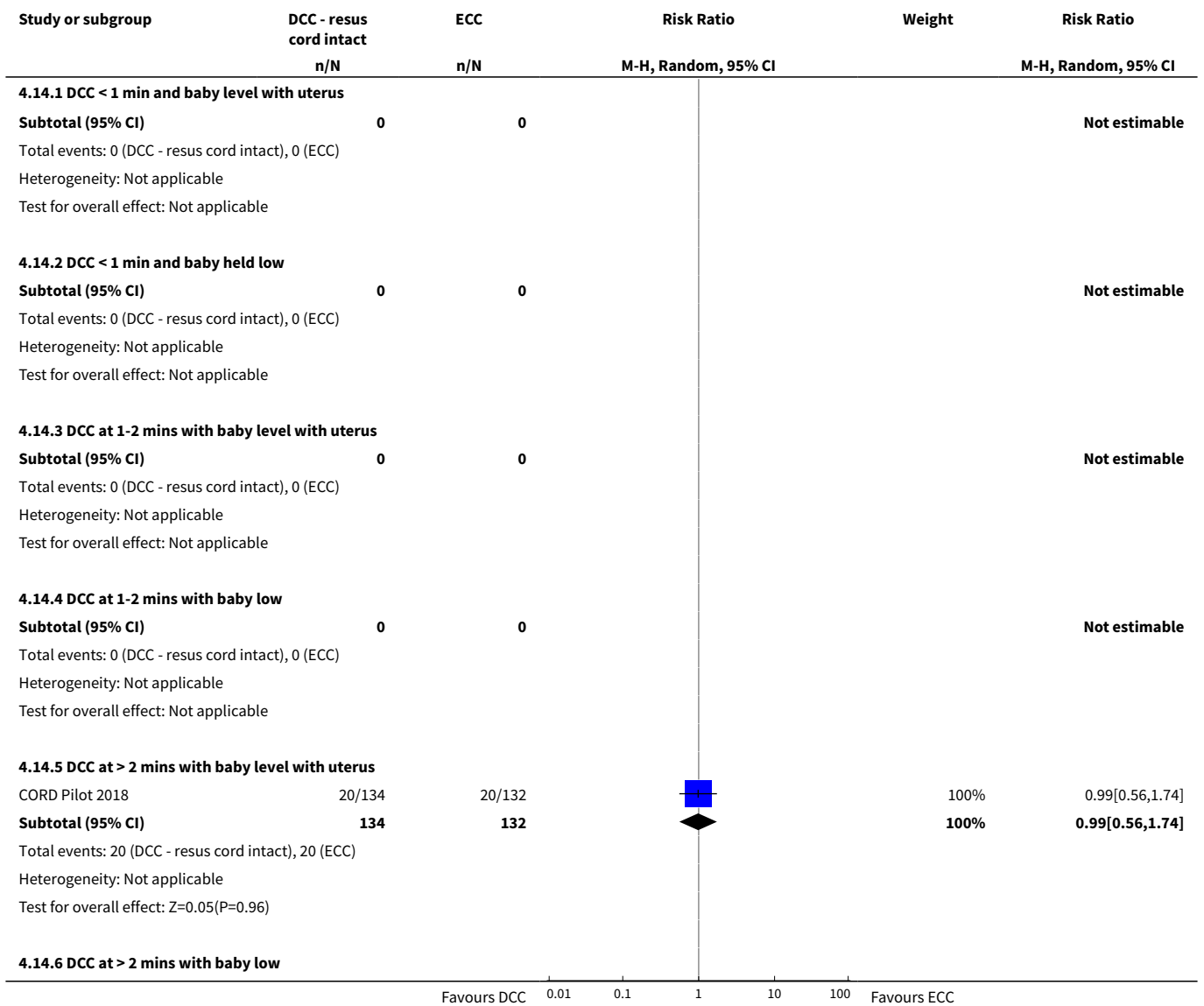


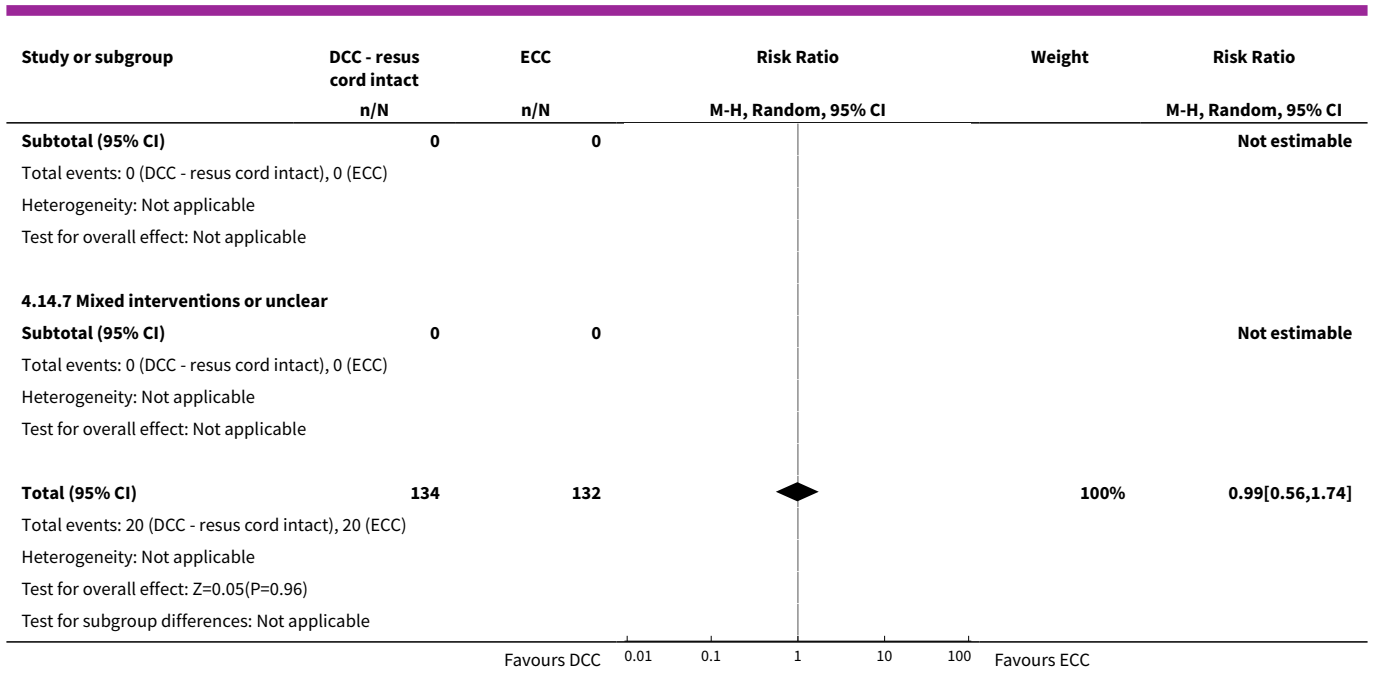
Analysis 4.11. Comparison 4 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by type of intervention), Outcome 11 Respiratory support (ventilator or CPAP).



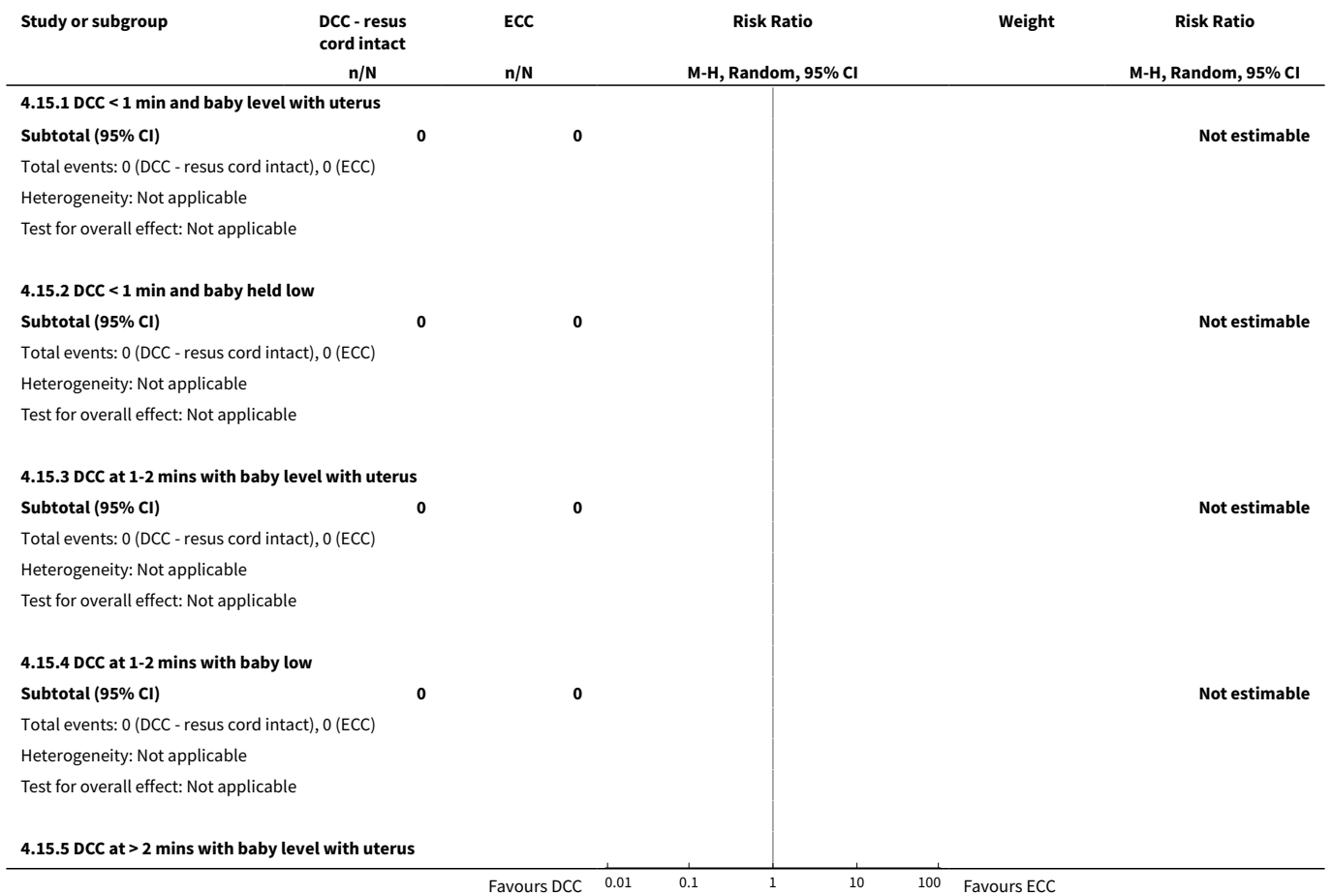


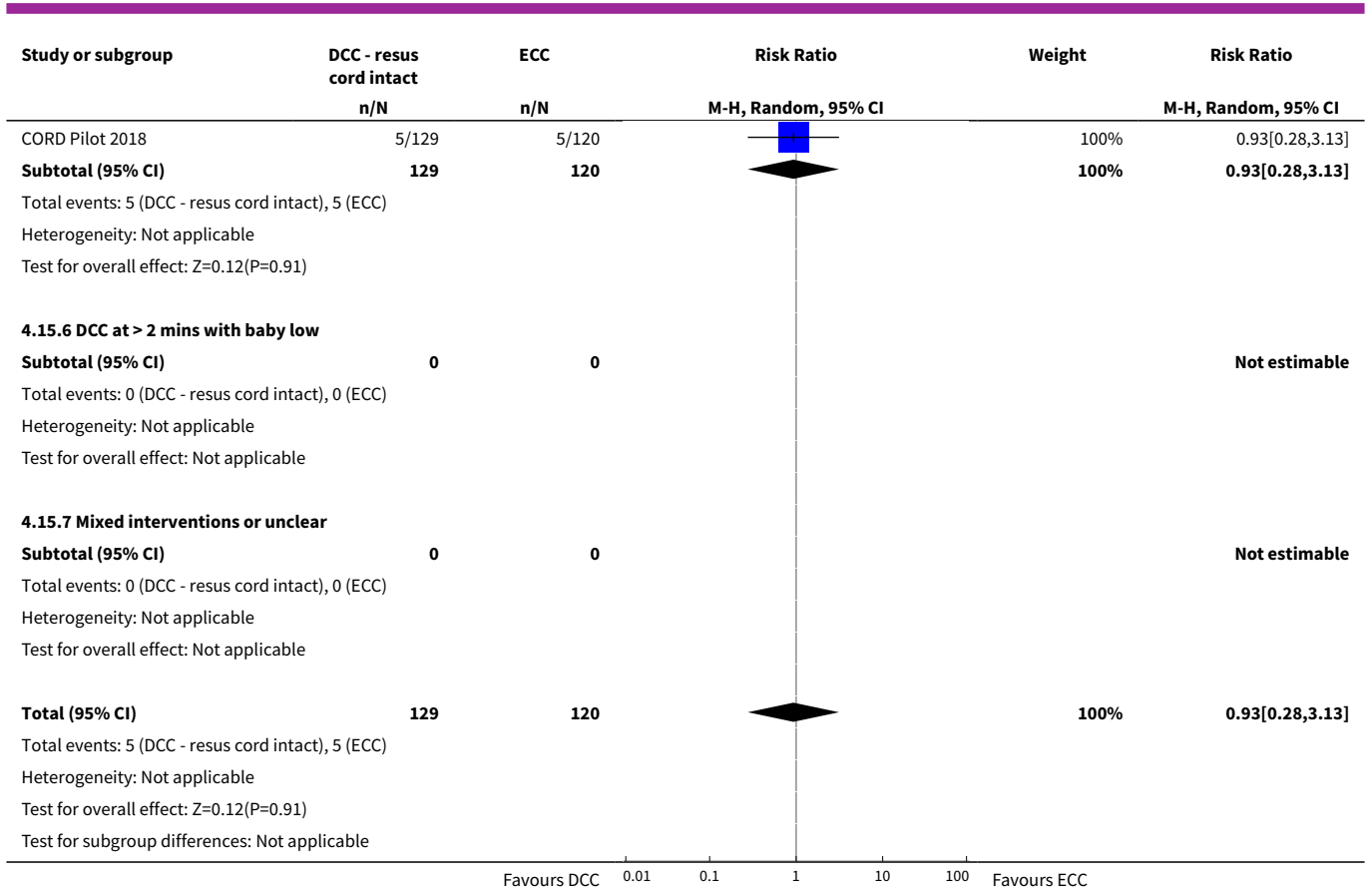
Analysis 4.14. Comparison 4 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by type of intervention), Outcome 14 Treatment for Patent Ductus Arteriosus (PDA) (medical and/or surgical).



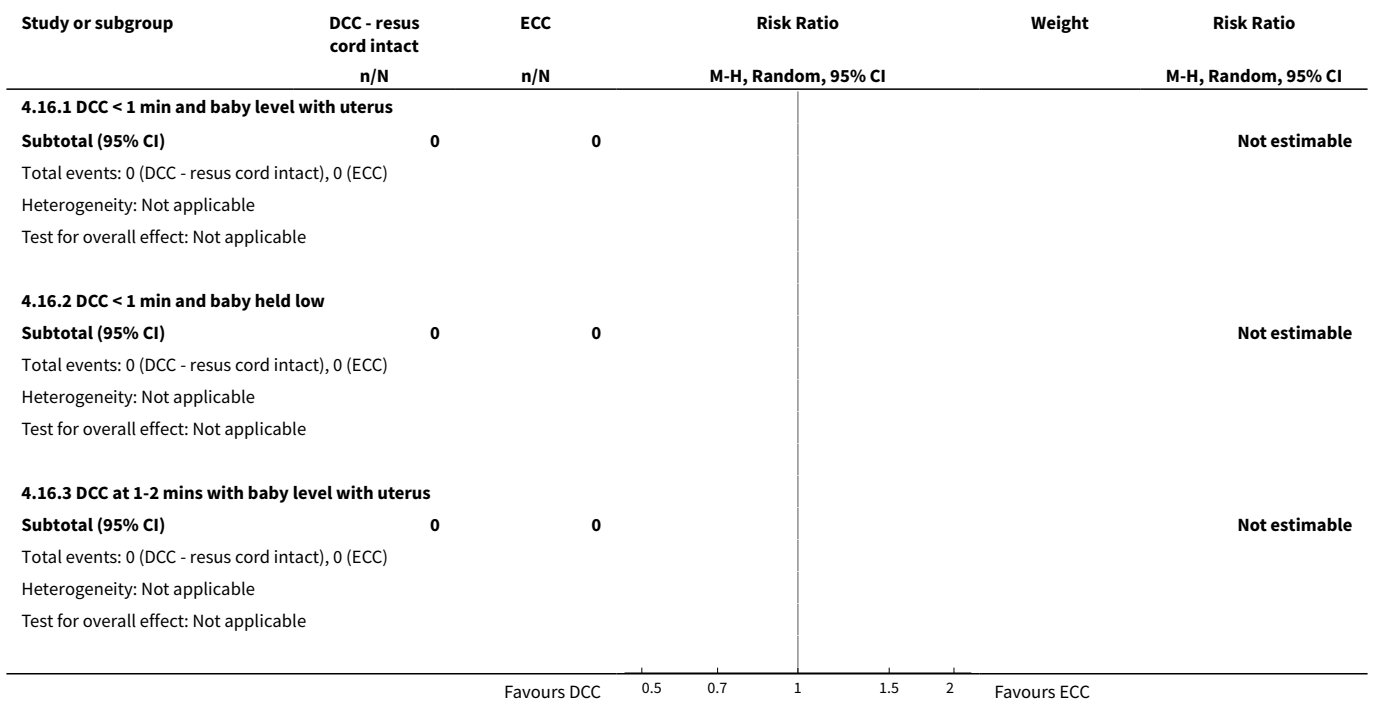


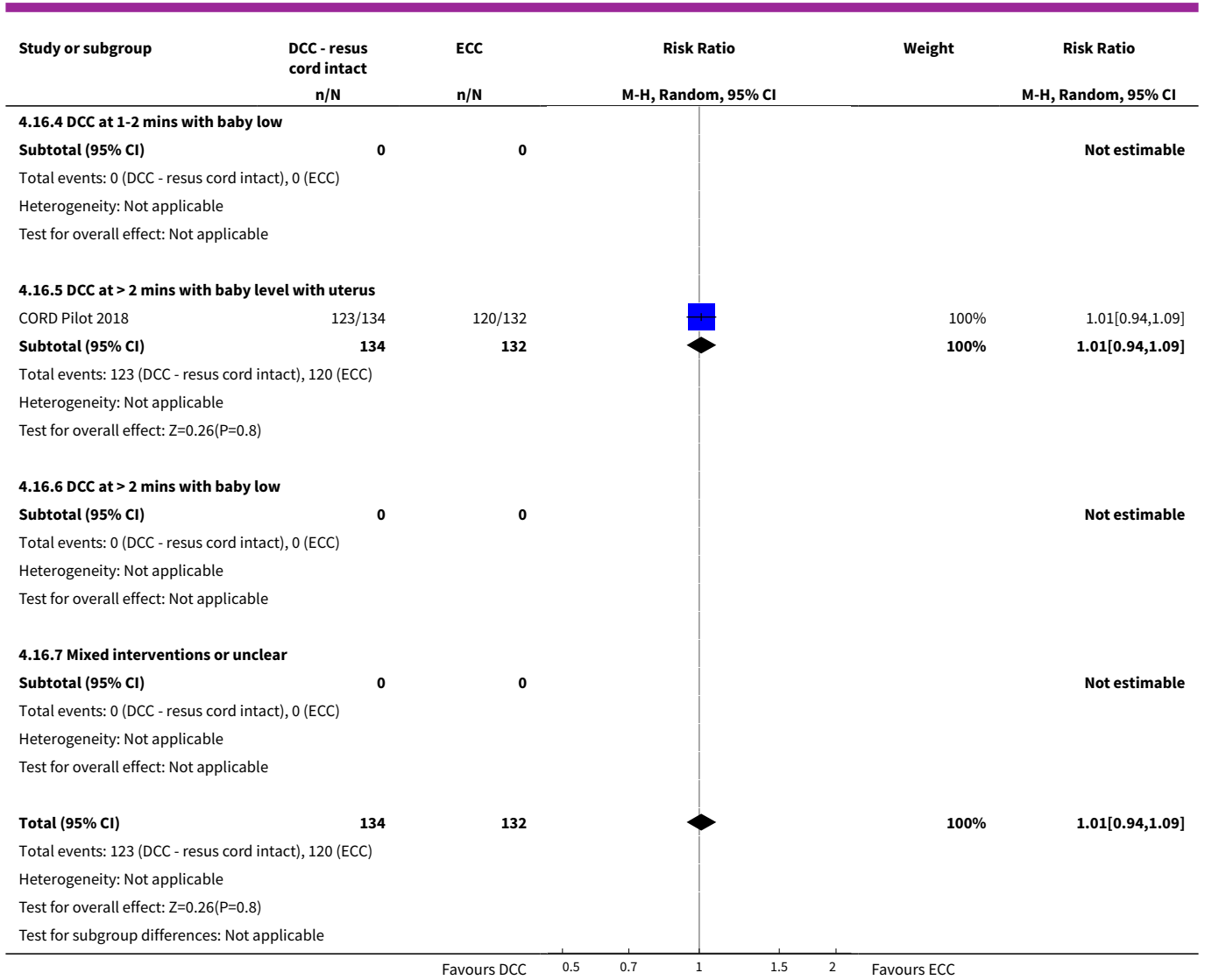
Analysis 4.15. Comparison 4 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by type of intervention), Outcome 15 Treatment for Retinopathy of Prematurity (RoP).



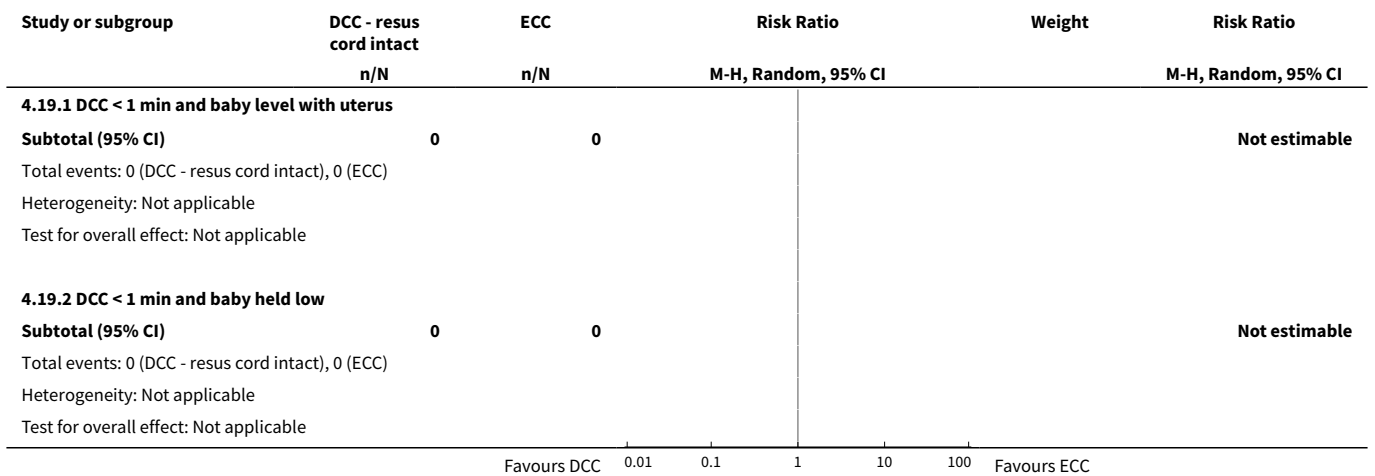


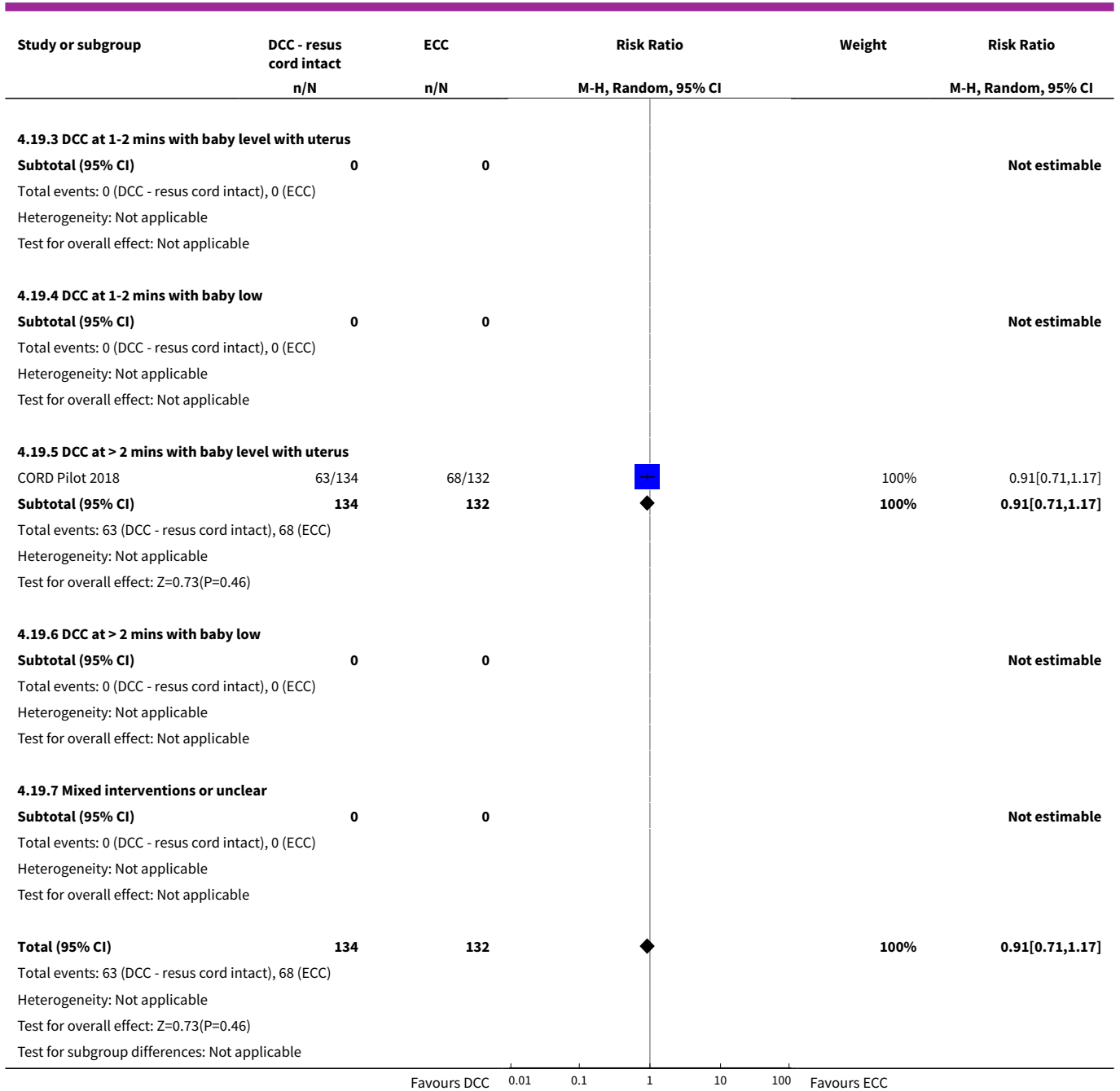
Analysis 4.16. Comparison 4 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by type of intervention), Outcome 16 Hyperbilirubinemia (treated by phototherapy).



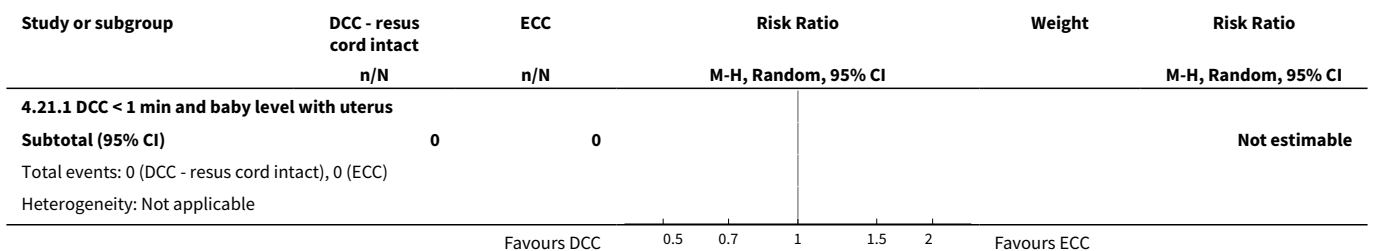


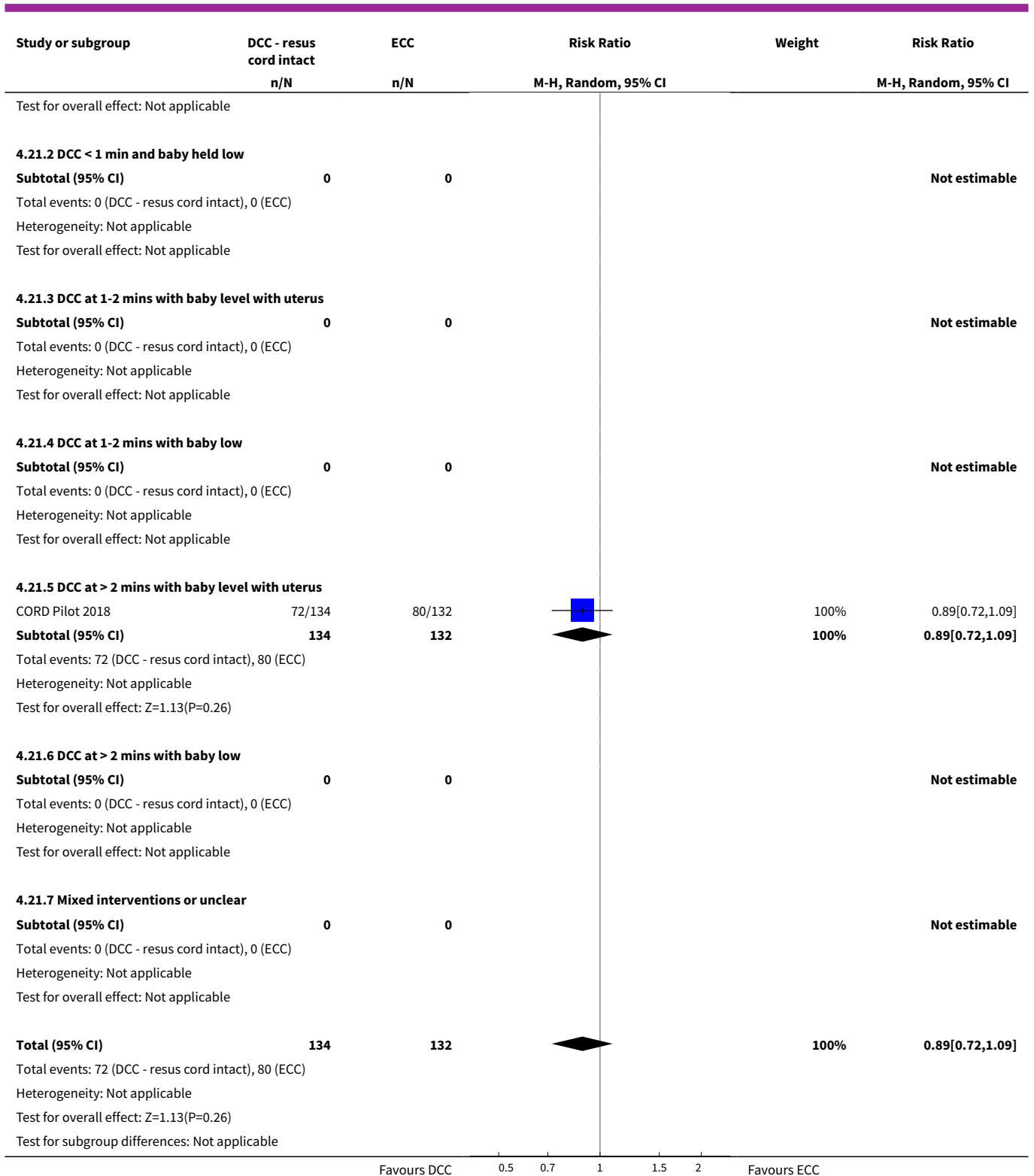
Analysis 4.19. Comparison 4 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by type of intervention), Outcome 19 Blood transfusion in infant.



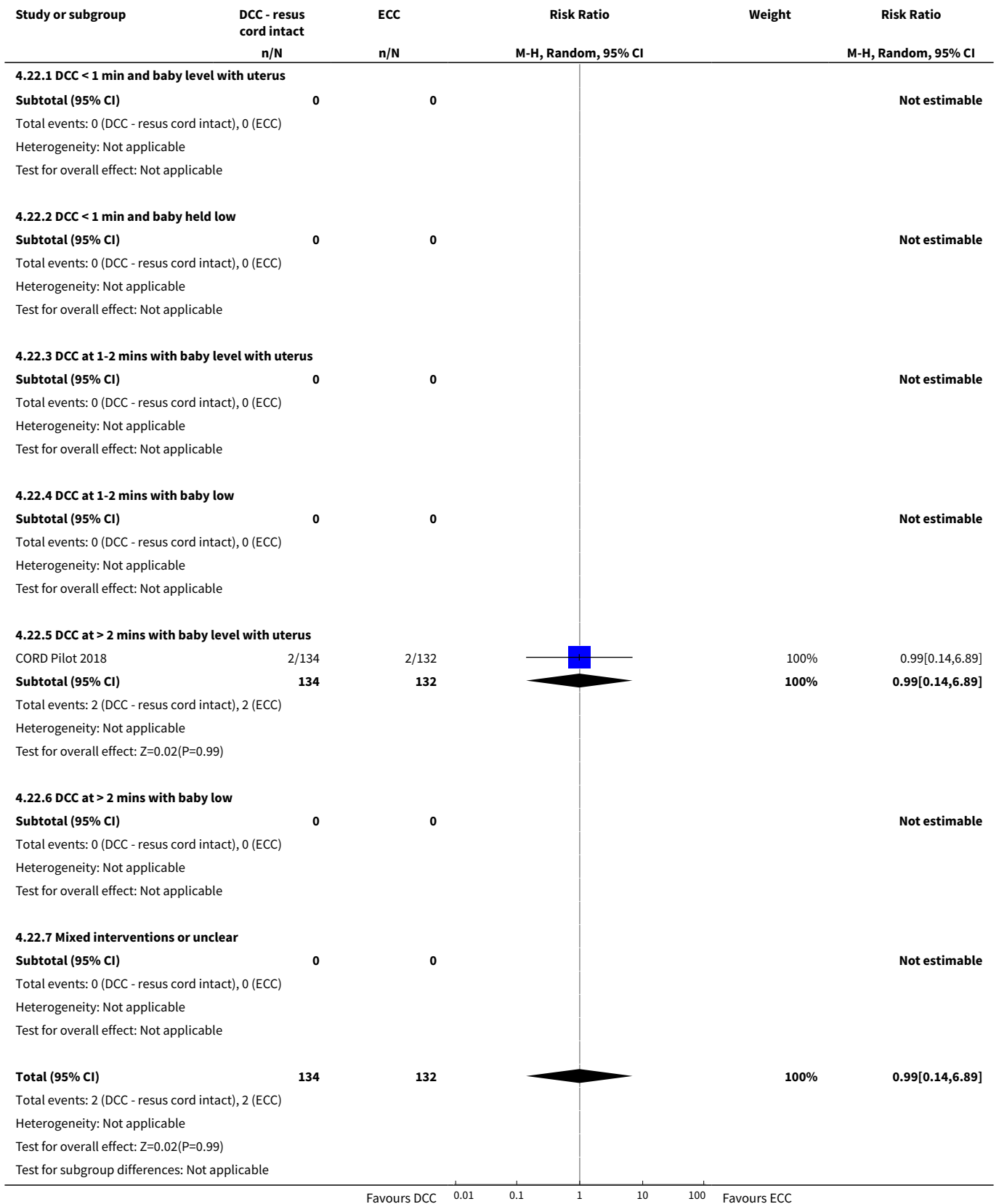


Analysis 4.21. Comparison 4 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by type of intervention), Outcome 21 Late sepsis (after 3 days or as defined by trialists).





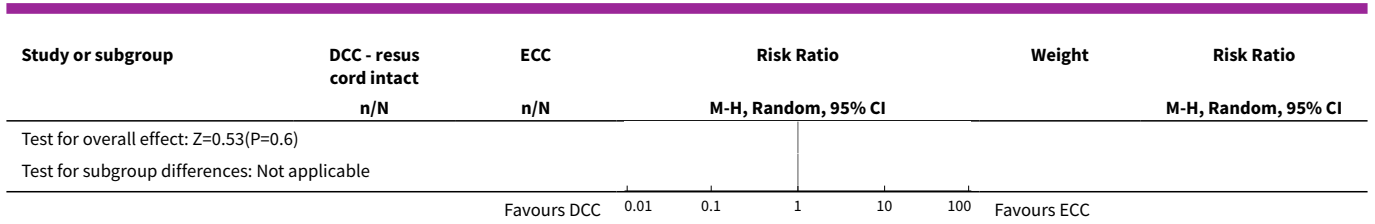
Analysis 4.22. Comparison 4 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by type of intervention), Outcome 22 Hydrocephalus.



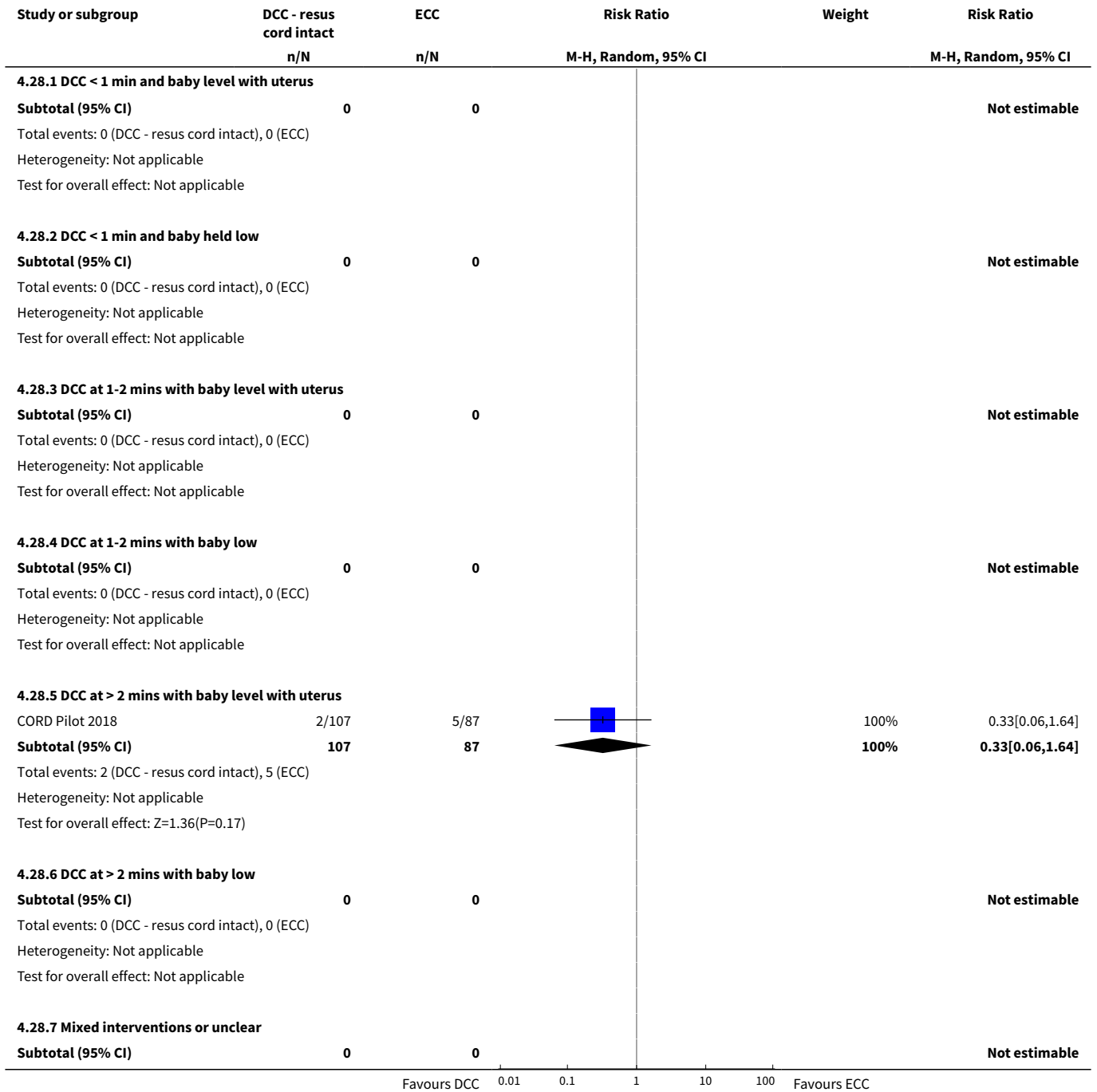
Analysis 4.23. Comparison 4 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by type of intervention), Outcome 23 Temperature < 36.0°C within 1 hour of birth.

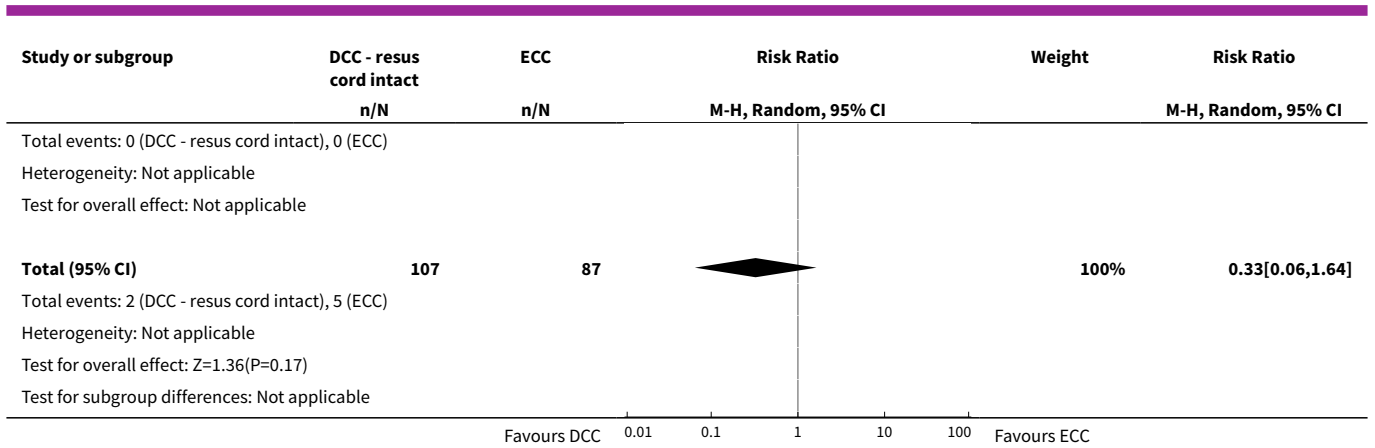
Study or subgroup	DCC - resus cord intact n/N	ECC n/N	Risk Ratio M-H, Random, 95% CI	Weight	Risk Ratio M-H, Random, 95% CI
4.23.1 DCC < 1 min and baby level with uterus					
Subtotal (95% CI)	0	0			Not estimable
Total events: 0 (DCC - resus cord intact), 0 (ECC)					
Heterogeneity: Not applicable					
Test for overall effect: Not applicable					
4.23.2 DCC < 1 min and baby held low					
Subtotal (95% CI)	0	0			Not estimable
Total events: 0 (DCC - resus cord intact), 0 (ECC)					
Heterogeneity: Not applicable					
Test for overall effect: Not applicable					
4.23.3 DCC at 1-2 mins with baby level with uterus					
Subtotal (95% CI)	0	0			Not estimable
Total events: 0 (DCC - resus cord intact), 0 (ECC)					
Heterogeneity: Not applicable					
Test for overall effect: Not applicable					
4.23.4 DCC at 1-2 mins with baby low					
Subtotal (95% CI)	0	0			Not estimable
Total events: 0 (DCC - resus cord intact), 0 (ECC)					
Heterogeneity: Not applicable					
Test for overall effect: Not applicable					
4.23.5 DCC at > 2 mins with baby level with uterus					
CORD Pilot 2018	17/134	14/132		100%	1.2[0.61,2.33]
Subtotal (95% CI)	134	132		100%	1.2[0.61,2.33]
Total events: 17 (DCC - resus cord intact), 14 (ECC)					
Heterogeneity: Tau ² =0; Chi ² =0, df=0(P<0.0001); I ² =100%					
Test for overall effect: Z=0.53(P=0.6)					
4.23.6 DCC at > 2 mins with baby low					
Subtotal (95% CI)	0	0			Not estimable
Total events: 0 (DCC - resus cord intact), 0 (ECC)					
Heterogeneity: Not applicable					
Test for overall effect: Not applicable					
4.23.7 Mixed interventions or unclear					
Subtotal (95% CI)	0	0			Not estimable
Total events: 0 (DCC - resus cord intact), 0 (ECC)					
Heterogeneity: Not applicable					
Test for overall effect: Not applicable					
Total (95% CI)	134	132		100%	1.2[0.61,2.33]
Total events: 17 (DCC - resus cord intact), 14 (ECC)					
Heterogeneity: Tau ² =0; Chi ² =0, df=0(P<0.0001); I ² =100%					

Favours DCC 0.01 0.1 1 10 100 Favours ECC

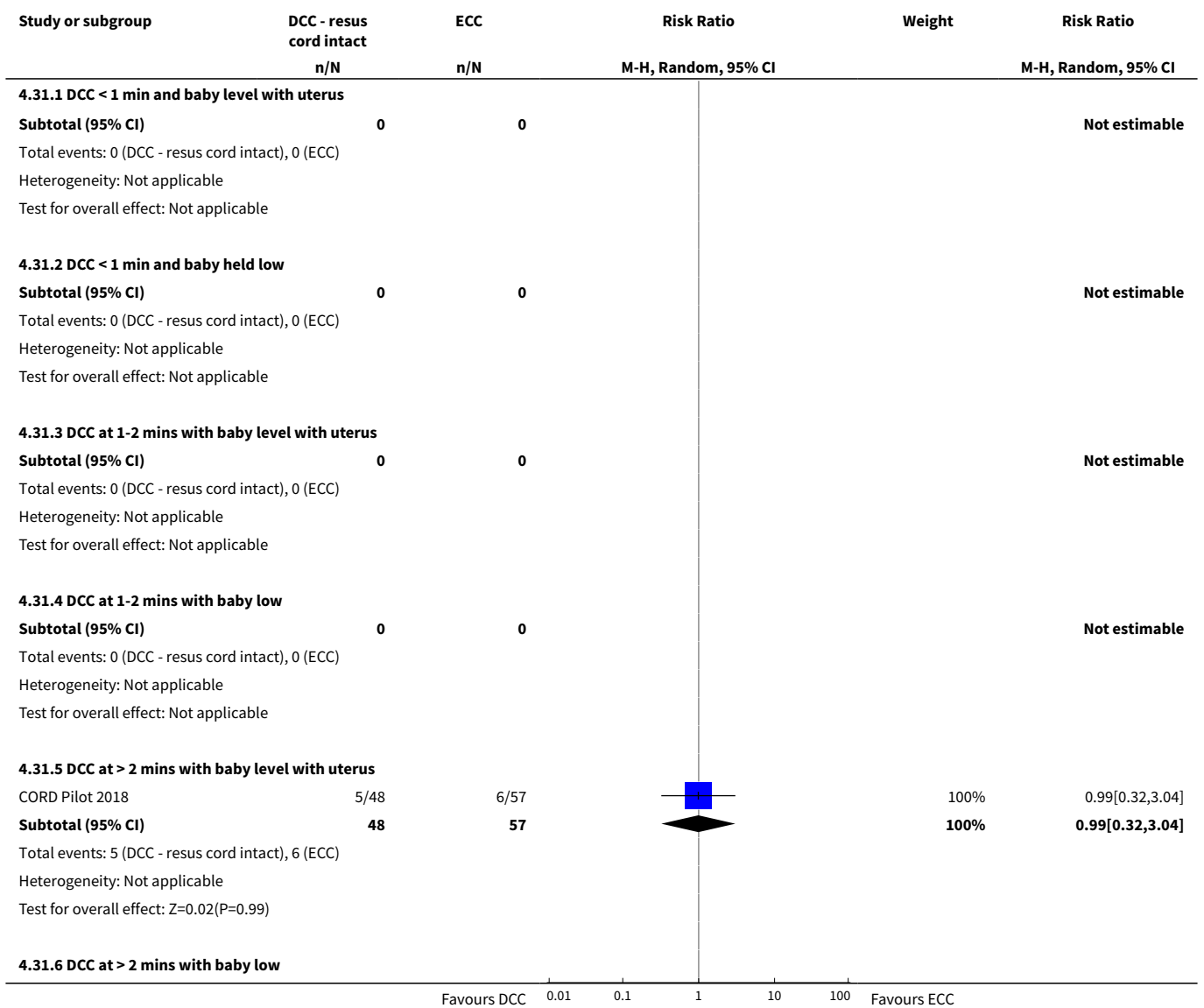


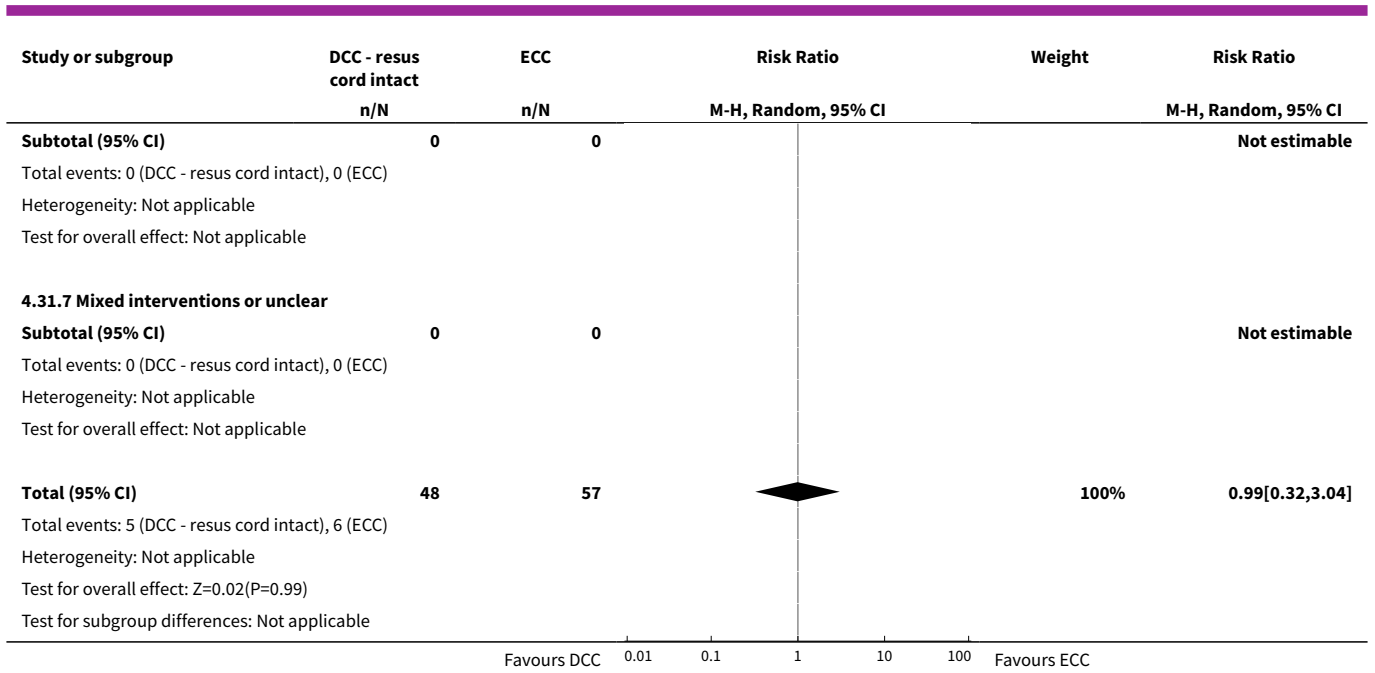
Analysis 4.28. Comparison 4 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by type of intervention), Outcome 28 Neurodevelopmental impairment at age two to three years.



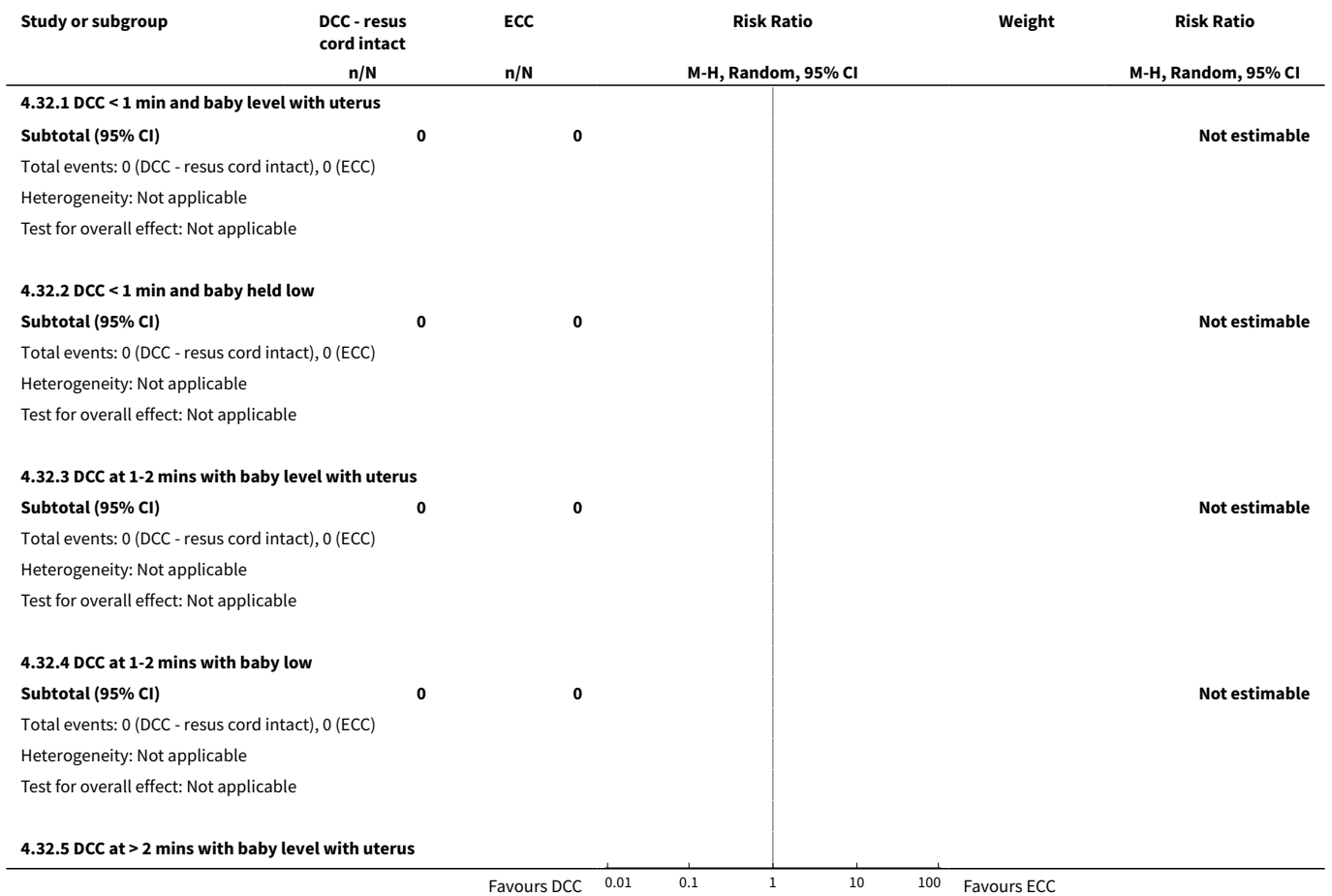


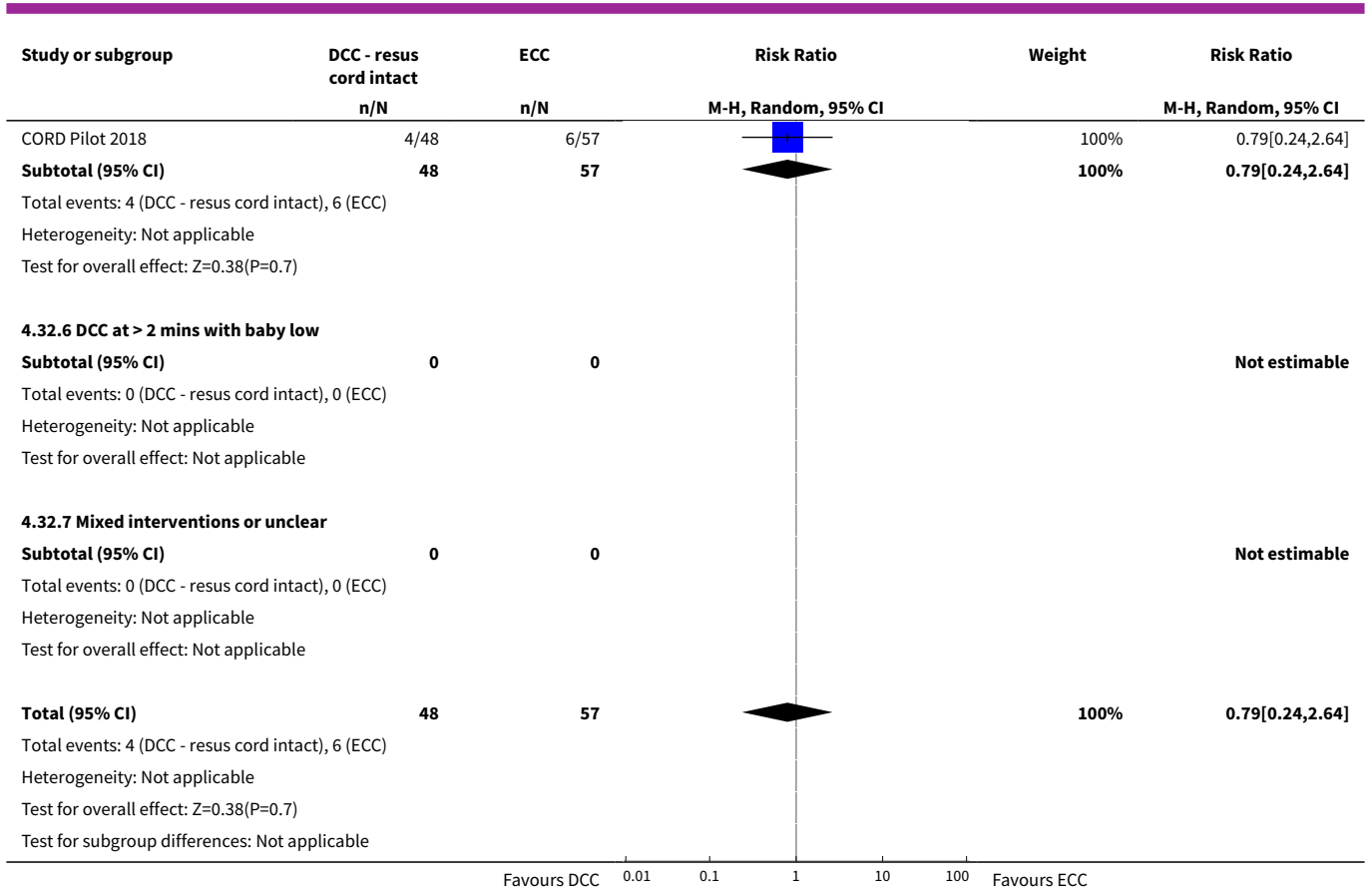
Analysis 4.31. Comparison 4 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by type of intervention), Outcome 31 Manual removal of placenta (denominator = vaginal births).



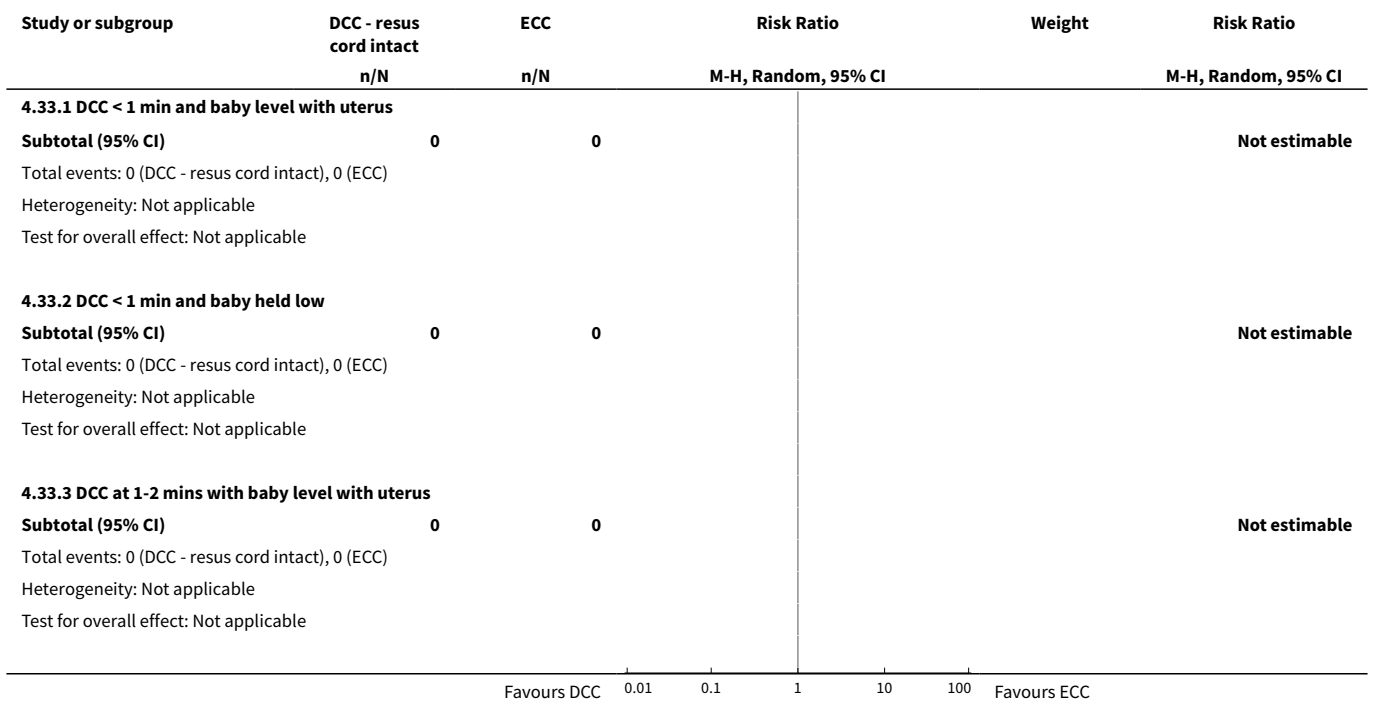


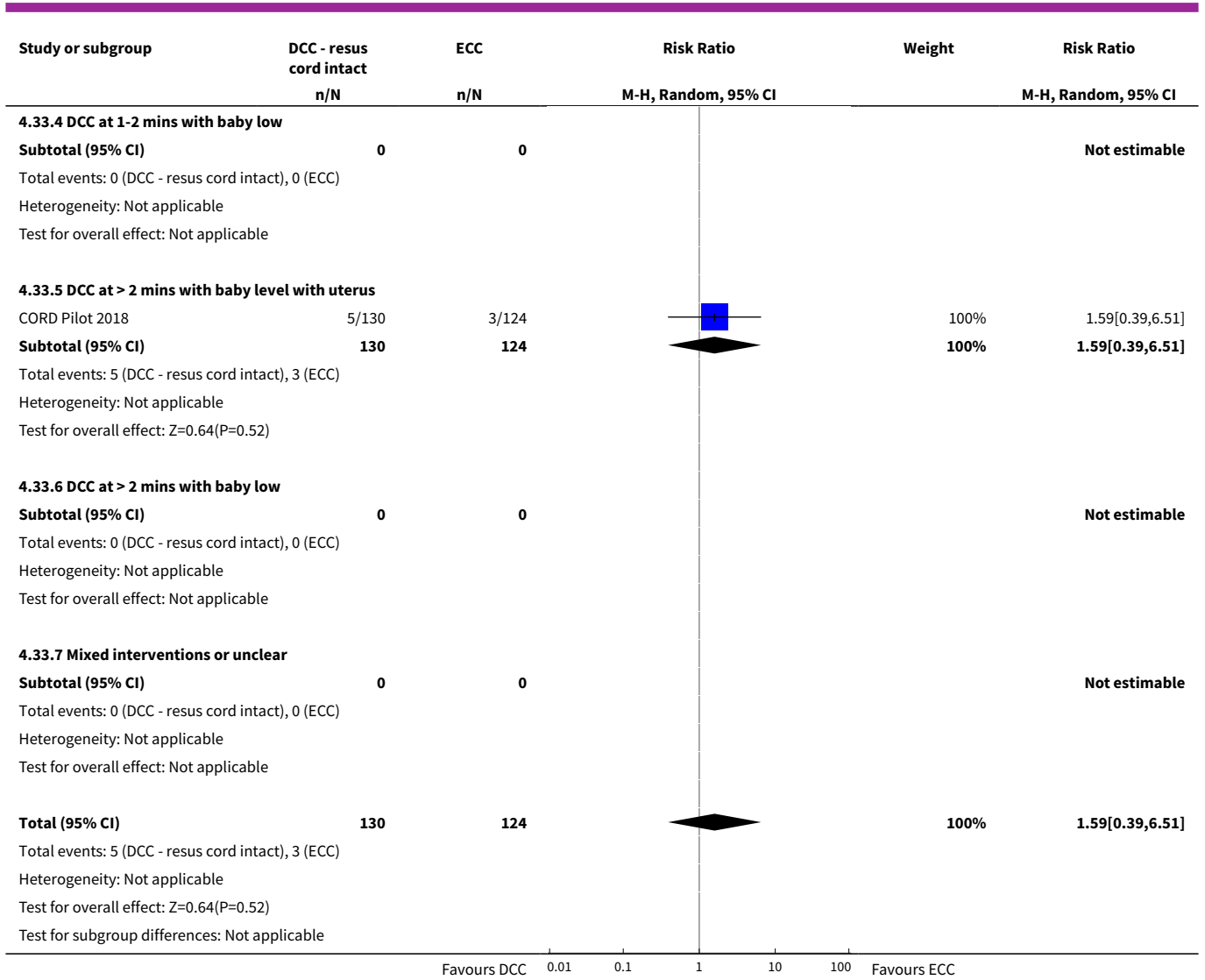
Analysis 4.32. Comparison 4 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by type of intervention), Outcome 32 Prolonged third stage (>30 minutes) (denominator = vaginal births).



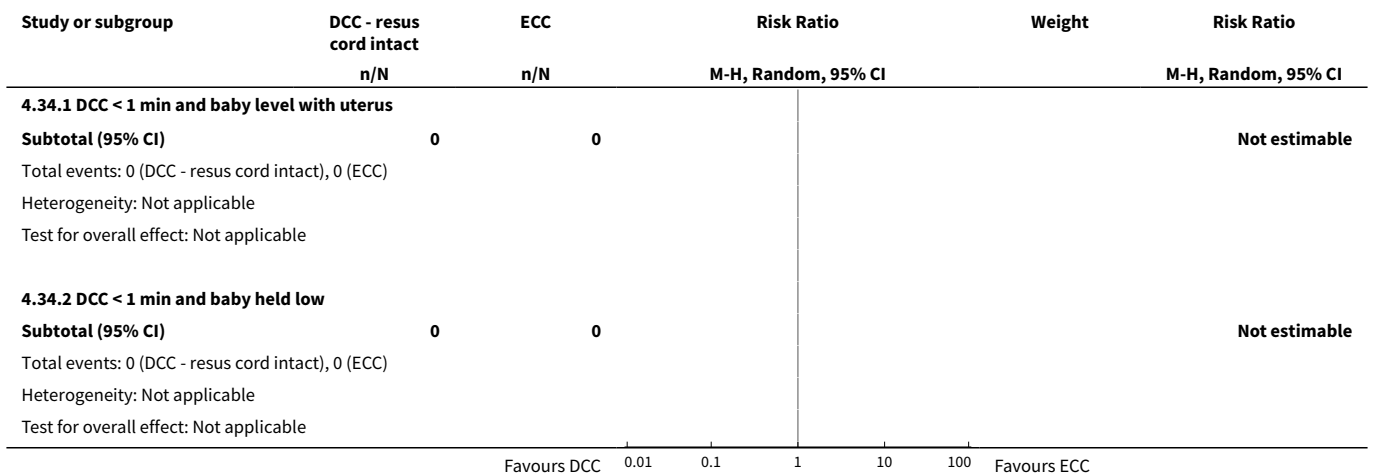


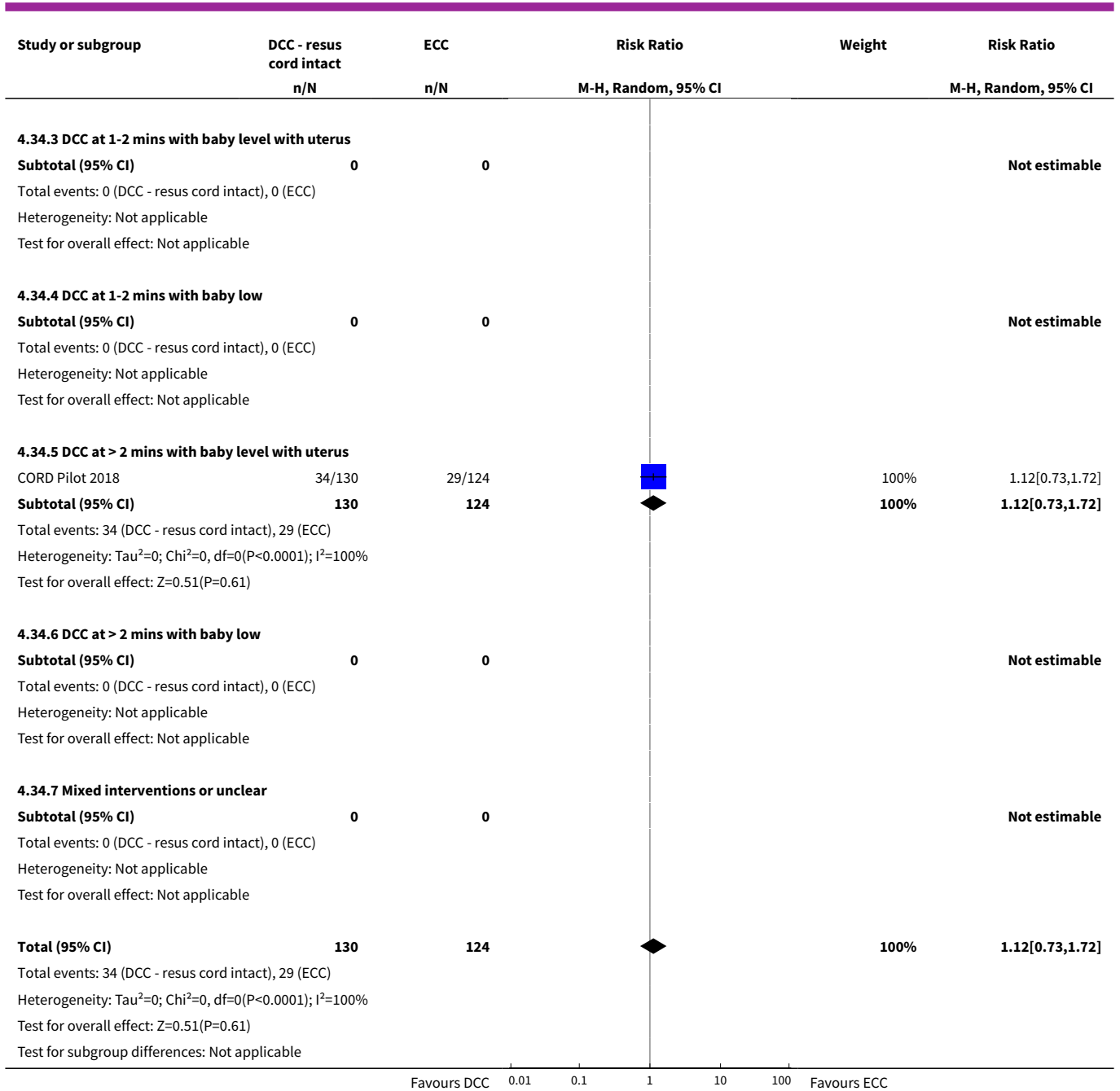
Analysis 4.33. Comparison 4 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by type of intervention), Outcome 33 Blood transfusion for mother.



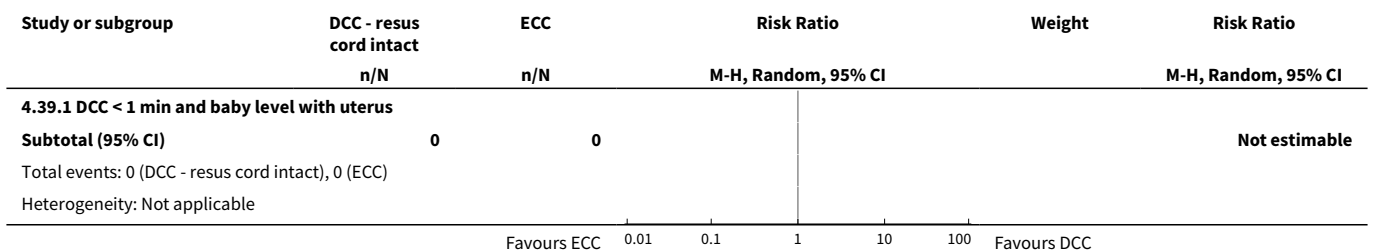


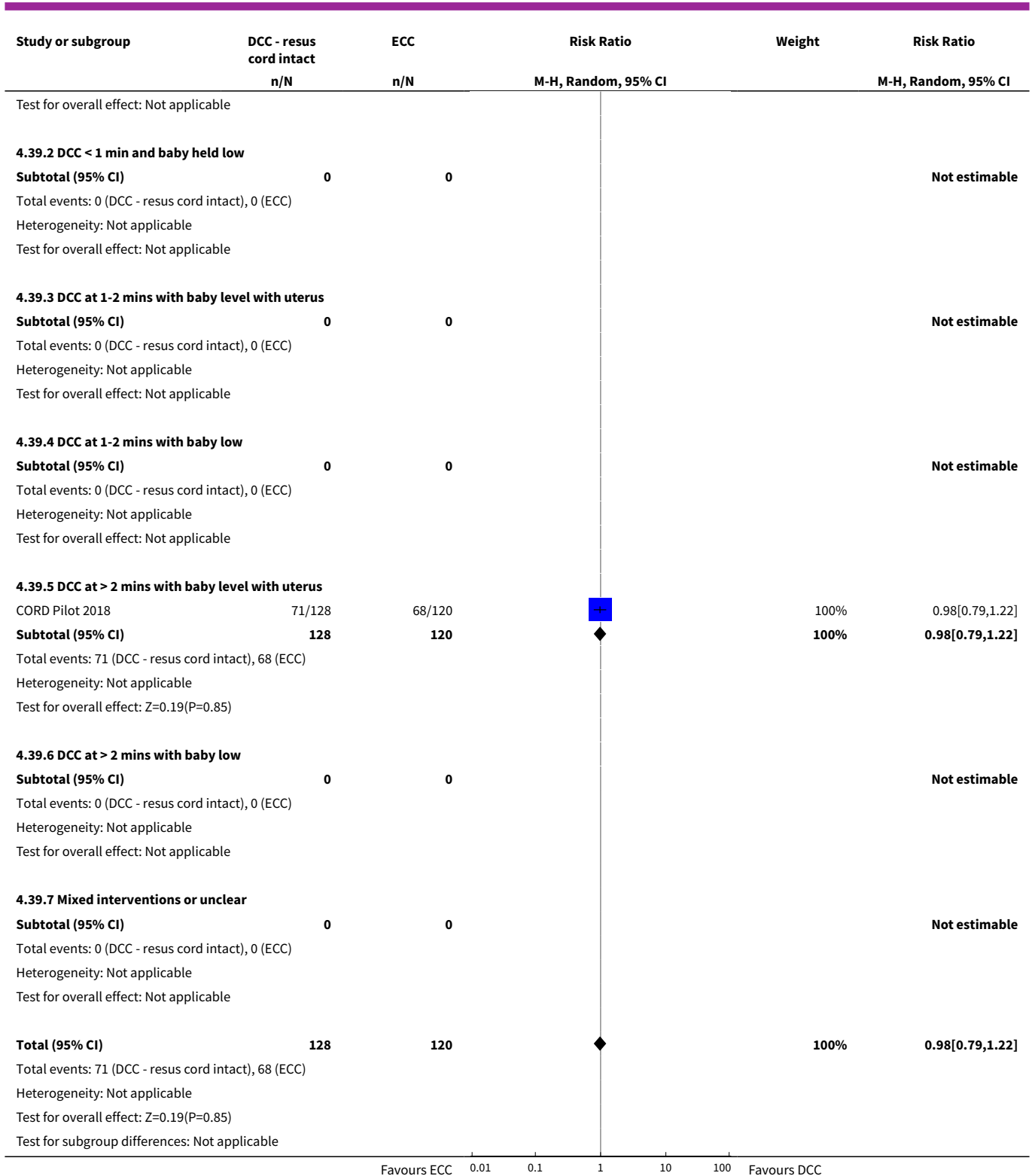
Analysis 4.34. Comparison 4 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by type of intervention), Outcome 34 Postpartum infection in mother.





Analysis 4.39. Comparison 4 DCC with immediate neonatal care with cord intact vs ECC (subgroup analysis by type of intervention), Outcome 39 Fully breastfed or mixed feeding at infant discharge.





Comparison 5. DCC with immediate neonatal care after cord clamping vs UCM (subgroup analysis by gestation)

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Death of baby (up to discharge)	3	322	Risk Ratio (M-H, Random, 95% CI)	2.14 [0.93, 4.93]
1.1 < 32-34 weeks gestation	3	322	Risk Ratio (M-H, Random, 95% CI)	2.14 [0.93, 4.93]
1.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
1.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
2 Death or neurodevelopmental impairment at age two to three years	2	195	Risk Ratio (M-H, Random, 95% CI)	1.67 [0.78, 3.57]
2.1 < 32-34 weeks gestation	2	195	Risk Ratio (M-H, Random, 95% CI)	1.67 [0.78, 3.57]
2.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
2.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
3 Severe intraventricular haemorrhage (IVH grades 3, 4)	1	58	Risk Ratio (M-H, Random, 95% CI)	2.63 [0.11, 61.88]
3.1 < 32-34 weeks gestation	1	58	Risk Ratio (M-H, Random, 95% CI)	2.63 [0.11, 61.88]
3.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
3.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
4 Intraventricular haemorrhage (IVH, all grades)	2	125	Risk Ratio (M-H, Random, 95% CI)	1.32 [0.55, 3.17]
4.1 < 32-34 weeks gestation	2	125	Risk Ratio (M-H, Random, 95% CI)	1.32 [0.55, 3.17]
4.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
4.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
5 Periventricular leukomalacia (PVL)	1	58	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
5.1 < 32-34 weeks gestation	1	58	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
5.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
5.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
6 Chronic lung disease (CLD) - oxygen supplement at 36 weeks (corrected for gestation)	2	125	Risk Ratio (M-H, Random, 95% CI)	1.53 [0.43, 5.48]
6.1 < 32-34 weeks gestation	2	125	Risk Ratio (M-H, Random, 95% CI)	1.53 [0.43, 5.48]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
6.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
6.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
7 Maternal blood loss of 500 mL or greater	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
7.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
7.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
7.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
8 Intraventricular haemorrhage (IVH, grades 1 & 2)	1	58	Risk Ratio (M-H, Random, 95% CI)	1.74 [0.48, 6.30]
8.1 < 32-34 weeks gestation	1	58	Risk Ratio (M-H, Random, 95% CI)	1.74 [0.48, 6.30]
8.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
8.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
9 Necrotising enterocolitis (NEC) confirmed by X-ray or laparotomy	1	58	Risk Ratio (M-H, Random, 95% CI)	3.48 [0.41, 29.31]
9.1 < 32-34 weeks gestation	1	58	Risk Ratio (M-H, Random, 95% CI)	3.48 [0.41, 29.31]
9.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
9.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
10 Respiratory Distress Syndrome (RDS)	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
10.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
10.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
10.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
11 Respiratory support (ventilator or CPAP)	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
11.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
11.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
11.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
12 Duration of respiratory support (days)	1	67	Mean Difference (IV, Random, 95% CI)	1.80 [-2.01, 5.61]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
12.1 < 32-34 weeks gestation	1	67	Mean Difference (IV, Random, 95% CI)	1.80 [-2.01, 5.61]
12.2 > 32-34 weeks gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
12.3 Mixed gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
13 Surfactant treatment (for severe RDS)	1	58	Risk Ratio (M-H, Random, 95% CI)	1.19 [0.66, 2.13]
13.1 < 32-34 weeks gestation	1	58	Risk Ratio (M-H, Random, 95% CI)	1.19 [0.66, 2.13]
13.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
13.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
14 Treatment for Patent Ductus Arteriosus (PDA) (medical and/or surgical)	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
14.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
14.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
14.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
15 Treatment for Retinopathy of Prematurity (RoP)	1	67	Risk Ratio (M-H, Random, 95% CI)	0.73 [0.23, 2.35]
15.1 < 32-34 weeks gestation	1	67	Risk Ratio (M-H, Random, 95% CI)	0.73 [0.23, 2.35]
15.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
15.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
16 Hyperbilirubinemia (treated by phototherapy)	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
16.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
16.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
16.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
17 Inotropics for low blood pressure	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
17.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
17.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
17.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
18 Low Apgar as defined by trialists (generally < 8 at 5 mins)	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
18.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
18.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
18.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
19 Blood transfusion in infant	1	58	Risk Ratio (M-H, Random, 95% CI)	0.77 [0.48, 1.22]
19.1 < 32-34 weeks gestation	1	58	Risk Ratio (M-H, Random, 95% CI)	0.77 [0.48, 1.22]
19.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
19.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
20 Volume of blood transfused	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
20.1 < 32-34 weeks gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
20.2 > 32-34 weeks gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
20.3 Mixed gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
21 Late sepsis (after 3 days or as defined by trialists)	1	58	Risk Ratio (M-H, Random, 95% CI)	0.87 [0.06, 13.27]
21.1 < 32-34 weeks gestation	1	58	Risk Ratio (M-H, Random, 95% CI)	0.87 [0.06, 13.27]
21.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
21.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
22 Hydrocephalus	1	58	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
22.1 < 32-34 weeks gestation	1	58	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
22.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
22.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
23 Temperature < 36.0°C within 1 hour of birth	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
23.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
23.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
23.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

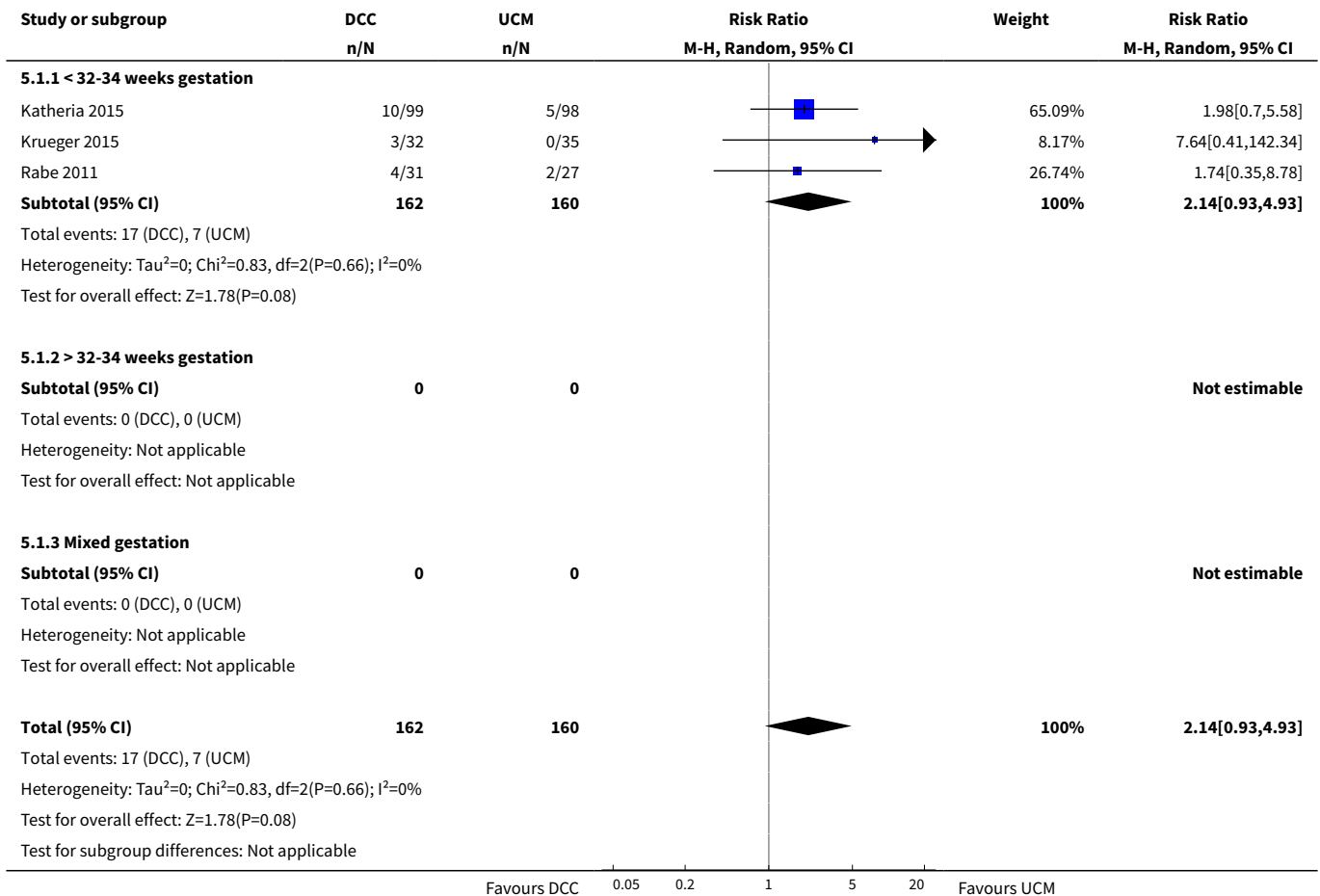
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
24 Hb within 1st 24 hour of birth (g/dL)	1	58	Mean Difference (IV, Random, 95% CI)	-0.20 [-1.57, 1.17]
24.1 < 32-34 weeks gestation	1	58	Mean Difference (IV, Random, 95% CI)	-0.20 [-1.57, 1.17]
24.2 > 32-34 weeks gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
24.3 Mixed gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
25 Mean arterial blood pressure (subgrouped by time after birth)	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
25.1 < 32-34 weeks gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
25.2 > 32-34 weeks gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
25.3 Mixed gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
26 Length of infant stay in NICU	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
26.1 < 32-34 weeks gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
26.2 > 32-34 weeks gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
26.3 Mixed gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
27 Home oxygen	1	58	Risk Ratio (M-H, Random, 95% CI)	0.29 [0.01, 6.88]
27.1 < 32-34 weeks gestation	1	58	Risk Ratio (M-H, Random, 95% CI)	0.29 [0.01, 6.88]
27.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
27.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
28 Neurodevelopmental impairment at age two to three years	2	174	Risk Ratio (M-H, Random, 95% CI)	1.18 [0.04, 32.88]
28.1 < 32-34 weeks gestation	2	174	Risk Ratio (M-H, Random, 95% CI)	1.18 [0.04, 32.88]
28.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
28.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
29 Severe visual impairment	1	39	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
29.1 < 32-34 weeks gestation	1	39	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
29.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
29.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
30 Cerebral palsy (CP)	1	39	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
30.1 < 32-34 weeks gestation	1	39	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
30.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
30.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
31 Manual removal of placenta (denominator = vaginal births)	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
31.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
31.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
31.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
32 Prolonged third stage (> 30 minutes) (denominator = vaginal births)	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
32.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
32.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
32.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
33 Blood transfusion for mother	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
33.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
33.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
33.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
34 Postpartum infection in mother	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
34.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
34.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
34.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
35 Rhesus isoimmunisation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

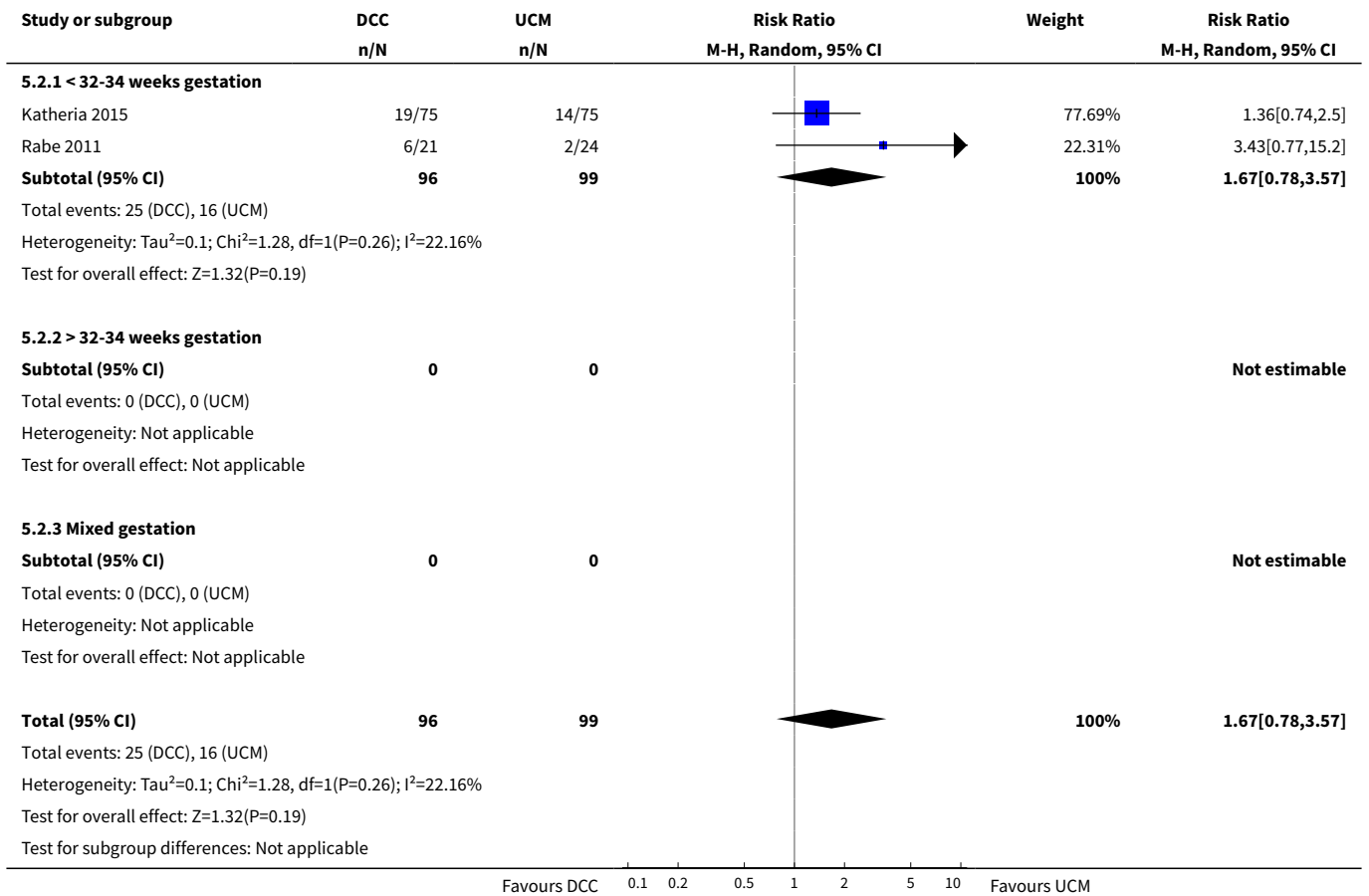
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
35.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
35.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
35.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
36 Psychological well being in mother	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
36.1 < 32-34 weeks gestation	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
36.2 > 32-34 weeks gestation	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
36.3 Mixed gestation	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37 Bonding	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37.1 < 32-34 weeks gestation	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37.2 > 32-34 weeks gestation	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37.3 Mixed gestation	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
38 Breastfeeding initiation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
38.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
38.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
38.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
39 Fully breastfed or mixed feeding at infant discharge	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
39.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
39.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
39.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40 Maternal anxiety	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
41 Mothers' views	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
41.1 < 32-34 weeks gestation	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
41.2 > 32-34 weeks gestation	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
41.3 Mixed gestation	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]

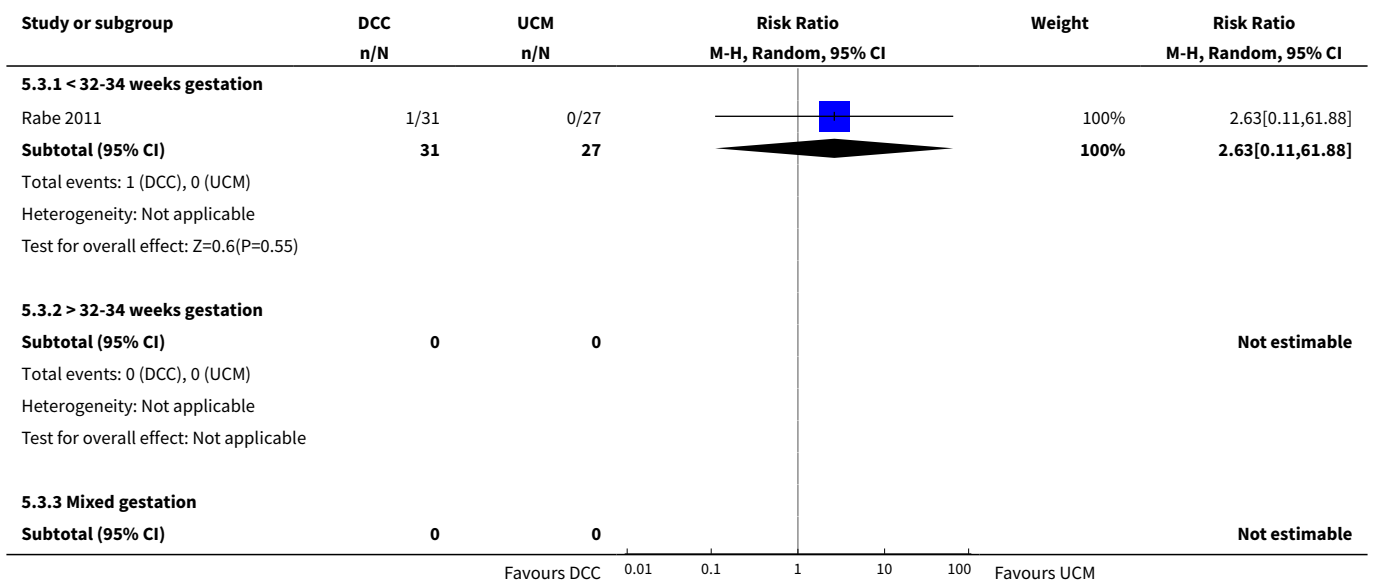
Analysis 5.1. Comparison 5 DCC with immediate neonatal care after cord clamping vs UCM (subgroup analysis by gestation), Outcome 1 Death of baby (up to discharge).

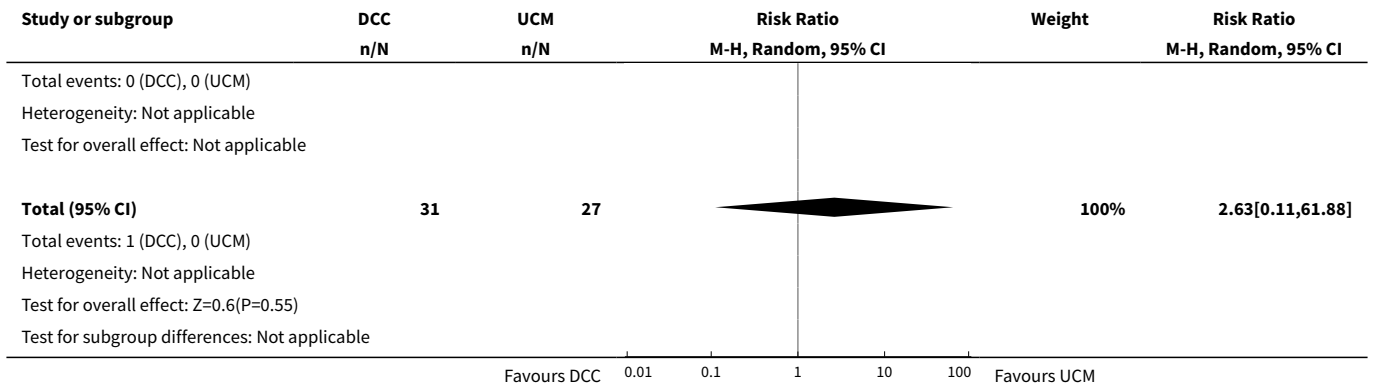


Analysis 5.2. Comparison 5 DCC with immediate neonatal care after cord clamping vs UCM (subgroup analysis by gestation), Outcome 2 Death or neurodevelopmental impairment at age two to three years.

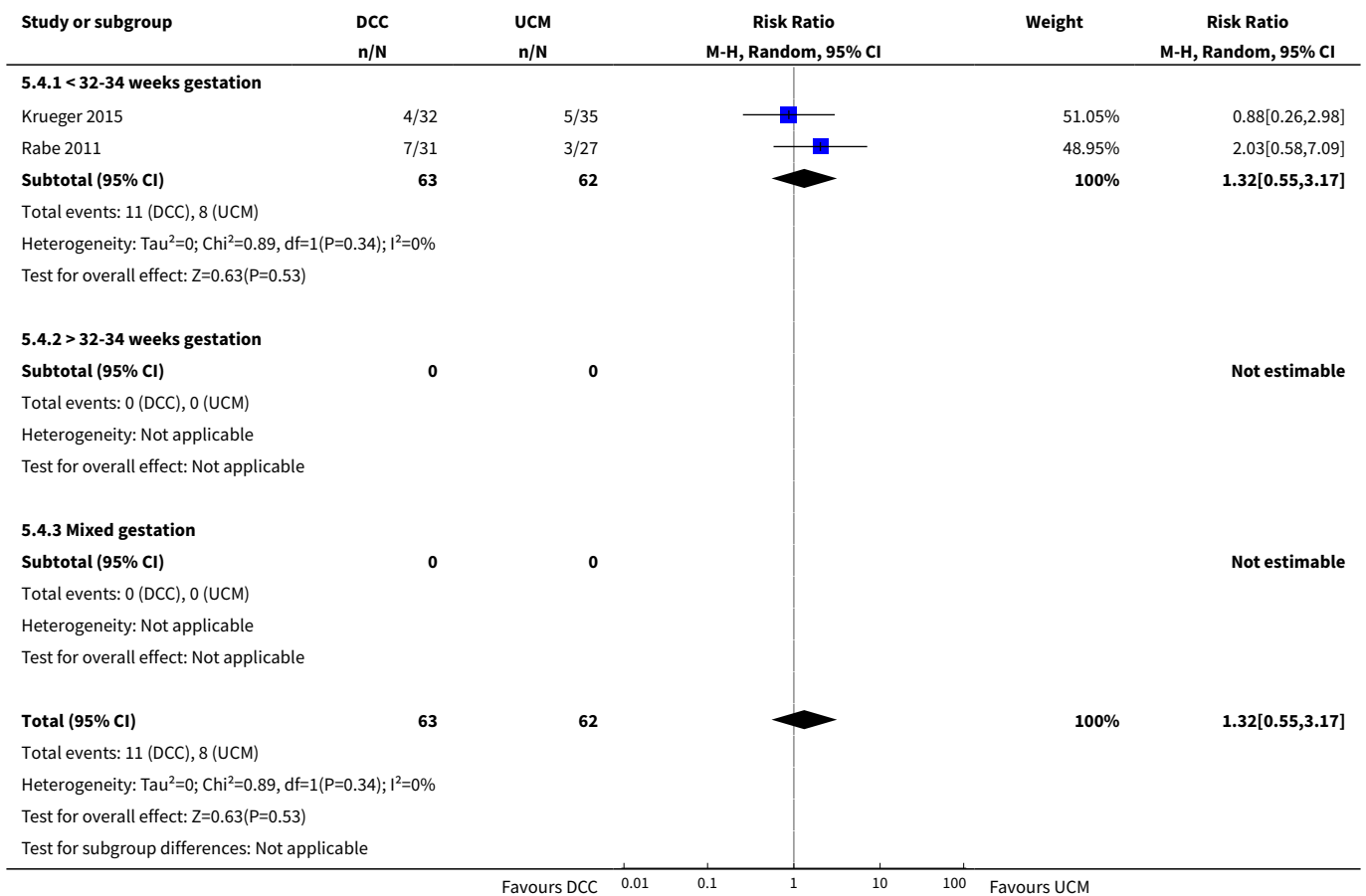


Analysis 5.3. Comparison 5 DCC with immediate neonatal care after cord clamping vs UCM (subgroup analysis by gestation), Outcome 3 Severe intraventricular haemorrhage (IVH grades 3, 4).





Analysis 5.4. Comparison 5 DCC with immediate neonatal care after cord clamping vs UCM (subgroup analysis by gestation), Outcome 4 Intraventricular haemorrhage (IVH, all grades).



Analysis 5.5. Comparison 5 DCC with immediate neonatal care after cord clamping vs UCM (subgroup analysis by gestation), Outcome 5 Periventricular leukomalacia (PVL).

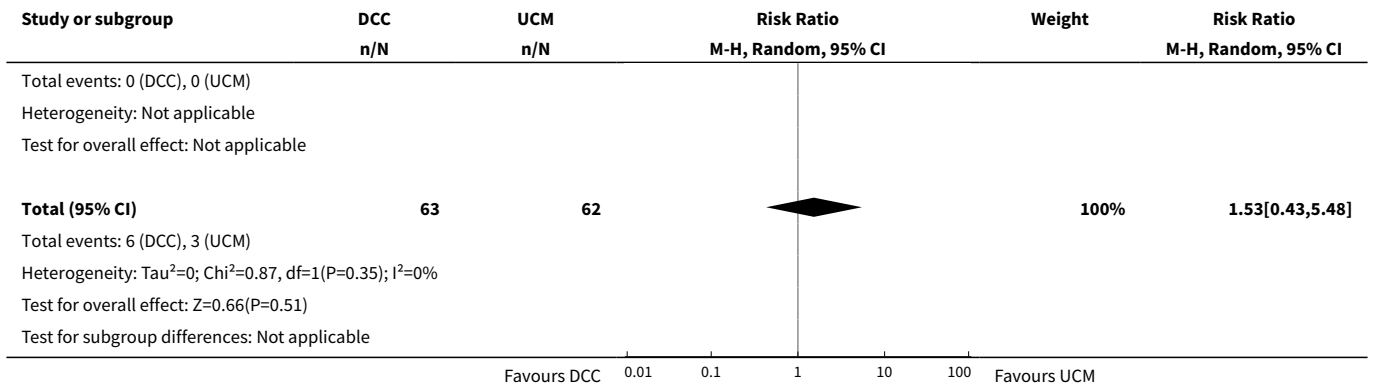
Study or subgroup	DCC n/N	UCM n/N	Risk Ratio M-H, Random, 95% CI	Weight	Risk Ratio M-H, Random, 95% CI
5.5.1 < 32-34 weeks gestation					
Rabe 2011	0/31	0/27			Not estimable
Subtotal (95% CI)	31	27			Not estimable
Total events: 0 (DCC), 0 (UCM)					
Heterogeneity: Not applicable					
Test for overall effect: Not applicable					
5.5.2 > 32-34 weeks gestation					
Subtotal (95% CI)	0	0			Not estimable
Total events: 0 (DCC), 0 (UCM)					
Heterogeneity: Not applicable					
Test for overall effect: Not applicable					
5.5.3 Mixed gestation					
Subtotal (95% CI)	0	0			Not estimable
Total events: 0 (DCC), 0 (UCM)					
Heterogeneity: Not applicable					
Test for overall effect: Not applicable					
Total (95% CI)	31	27			Not estimable
Total events: 0 (DCC), 0 (UCM)					
Heterogeneity: Not applicable					
Test for overall effect: Not applicable					
Test for subgroup differences: Not applicable					

Favours DCC 0.01 0.1 1 10 100 Favours UCM

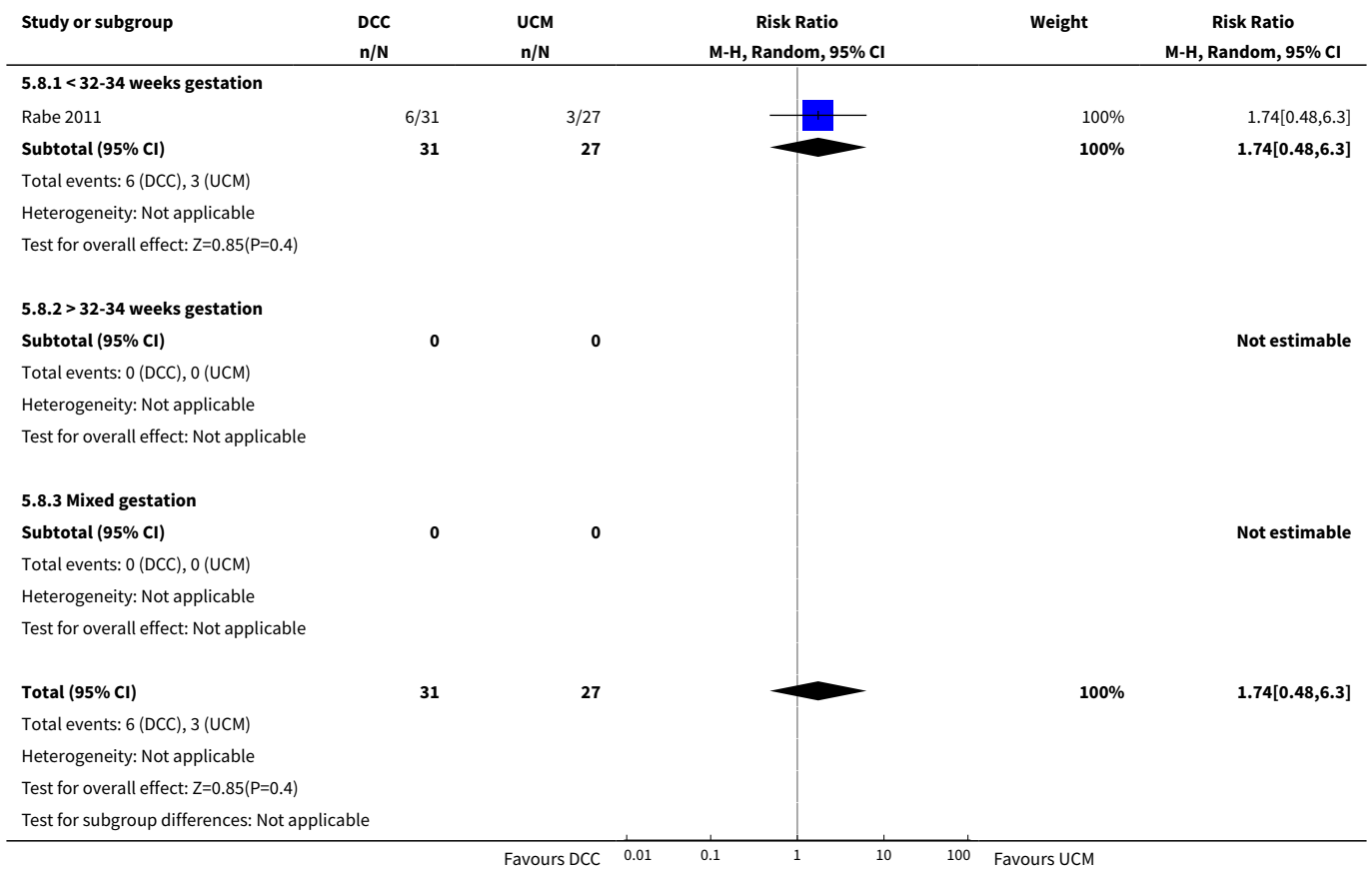
Analysis 5.6. Comparison 5 DCC with immediate neonatal care after cord clamping vs UCM (subgroup analysis by gestation), Outcome 6 Chronic lung disease (CLD) - oxygen supplement at 36 weeks (corrected for gestation).

Study or subgroup	DCC n/N	UCM n/N	Risk Ratio M-H, Random, 95% CI	Weight	Risk Ratio M-H, Random, 95% CI
5.6.1 < 32-34 weeks gestation					
Krueger 2015	2/32	0/35		18%	5.45[0.27,109.49]
Rabe 2011	4/31	3/27		82%	1.16[0.28,4.73]
Subtotal (95% CI)	63	62		100%	1.53[0.43,5.48]
Total events: 6 (DCC), 3 (UCM)					
Heterogeneity: Tau ² =0; Chi ² =0.87, df=1(P=0.35); I ² =0%					
Test for overall effect: Z=0.66(P=0.51)					
5.6.2 > 32-34 weeks gestation					
Subtotal (95% CI)	0	0			Not estimable
Total events: 0 (DCC), 0 (UCM)					
Heterogeneity: Not applicable					
Test for overall effect: Not applicable					
5.6.3 Mixed gestation					
Subtotal (95% CI)	0	0			Not estimable

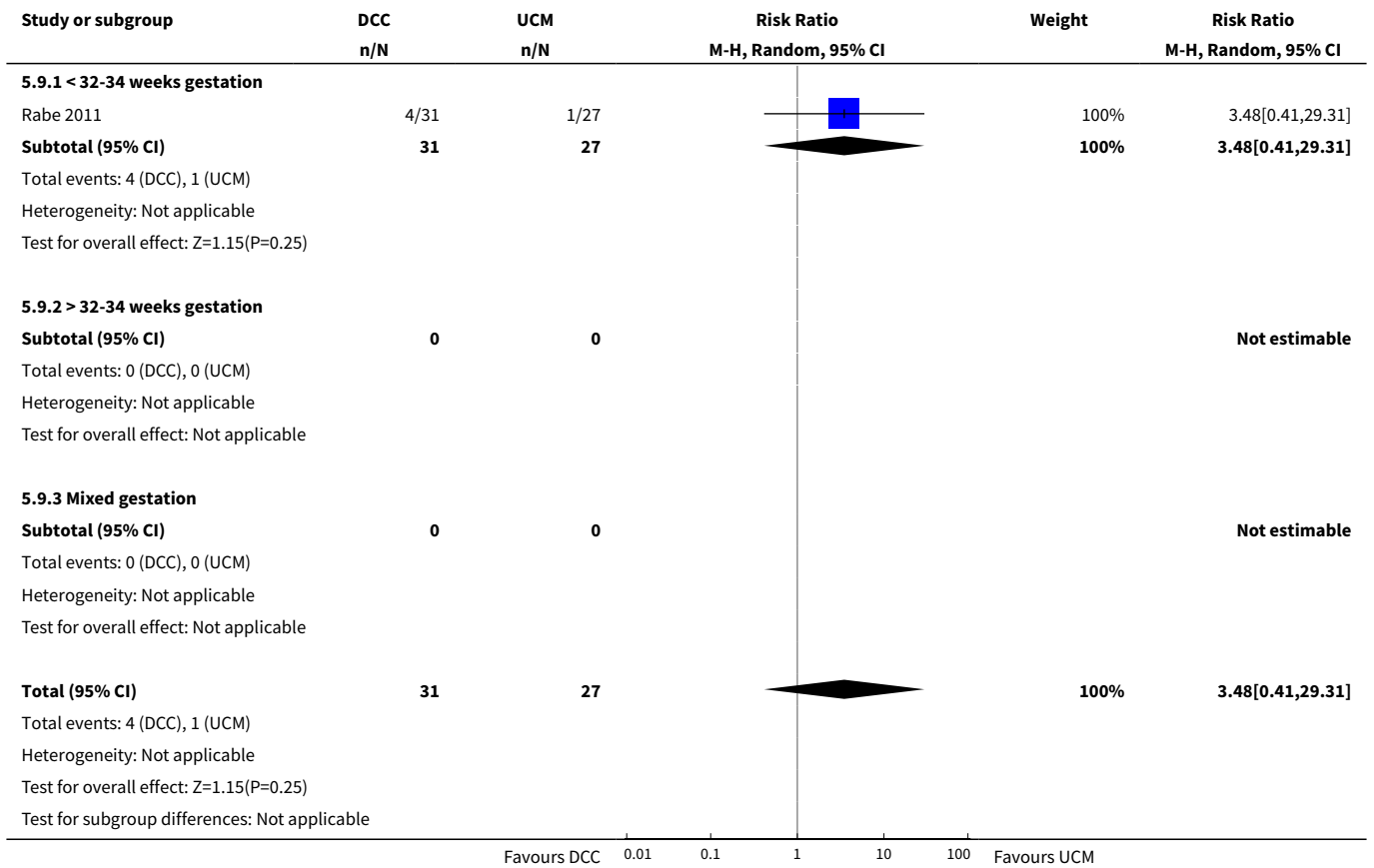
Favours DCC 0.01 0.1 1 10 100 Favours UCM



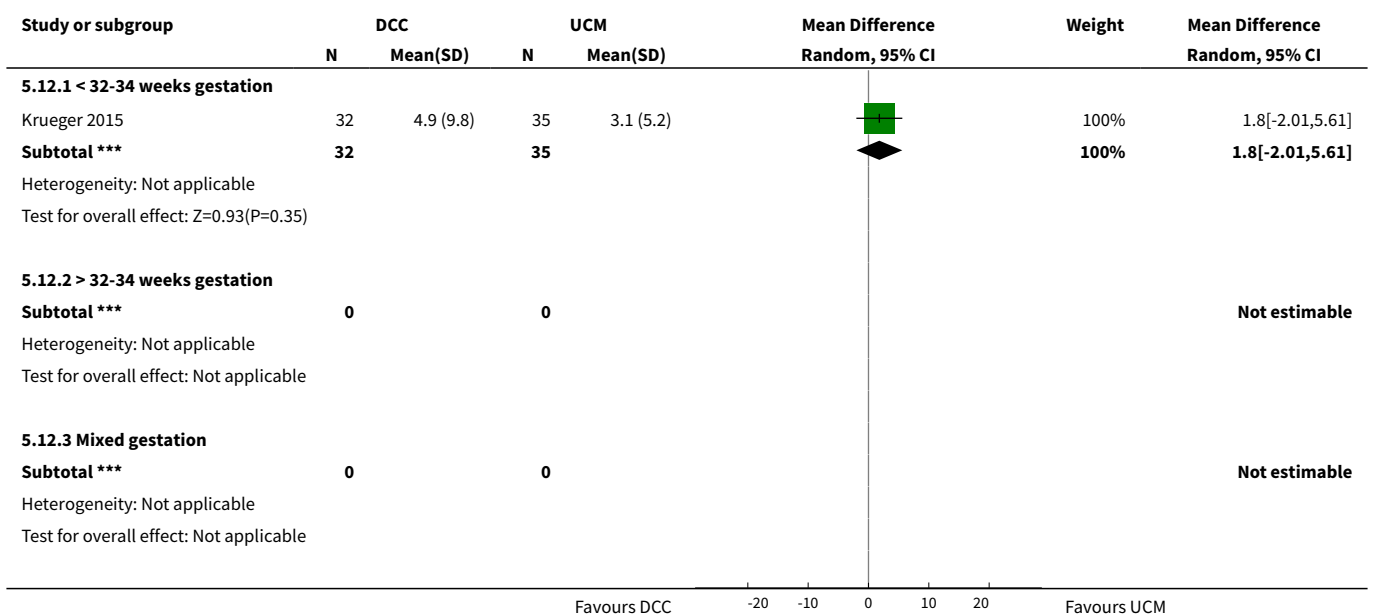
Analysis 5.8. Comparison 5 DCC with immediate neonatal care after cord clamping vs UCM (subgroup analysis by gestation), Outcome 8 Intraventricular haemorrhage (IVH, grades 1 & 2).

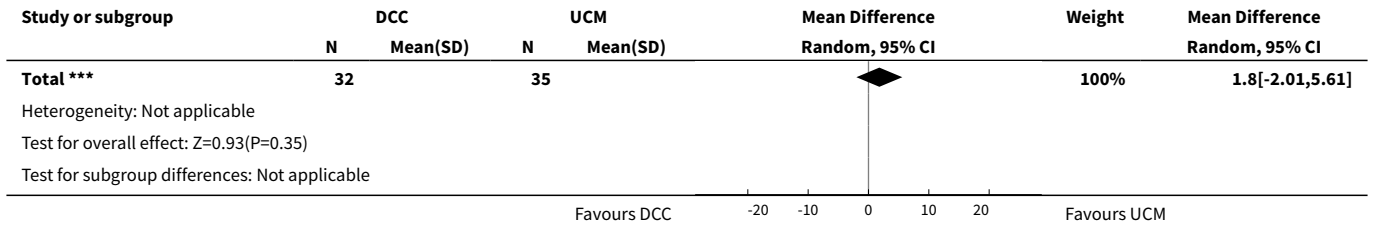


Analysis 5.9. Comparison 5 DCC with immediate neonatal care after cord clamping vs UCM (subgroup analysis by gestation), Outcome 9 Necrotising enterocolitis (NEC) confirmed by X-ray or laparotomy).

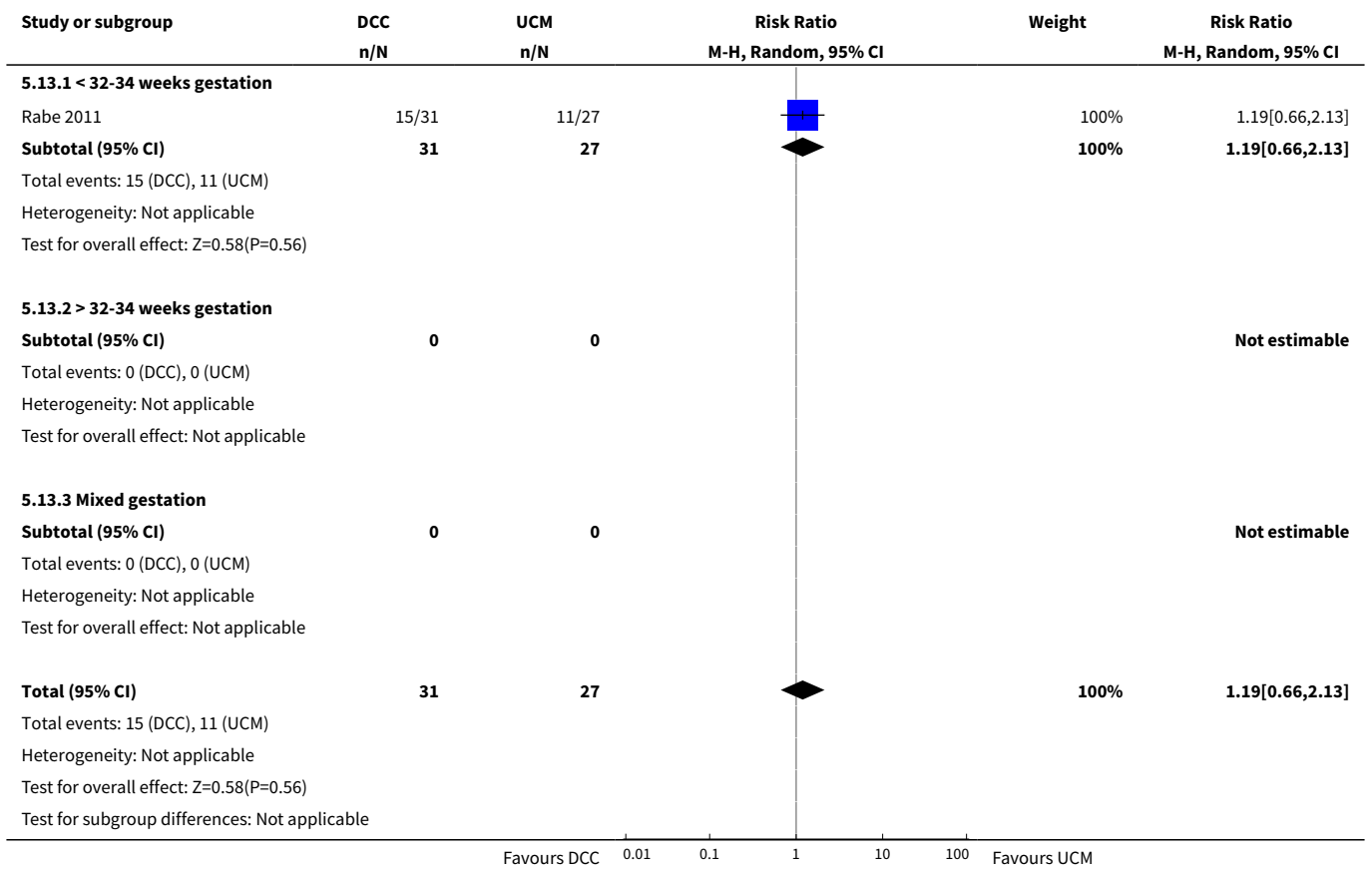


Analysis 5.12. Comparison 5 DCC with immediate neonatal care after cord clamping vs UCM (subgroup analysis by gestation), Outcome 12 Duration of respiratory support (days).

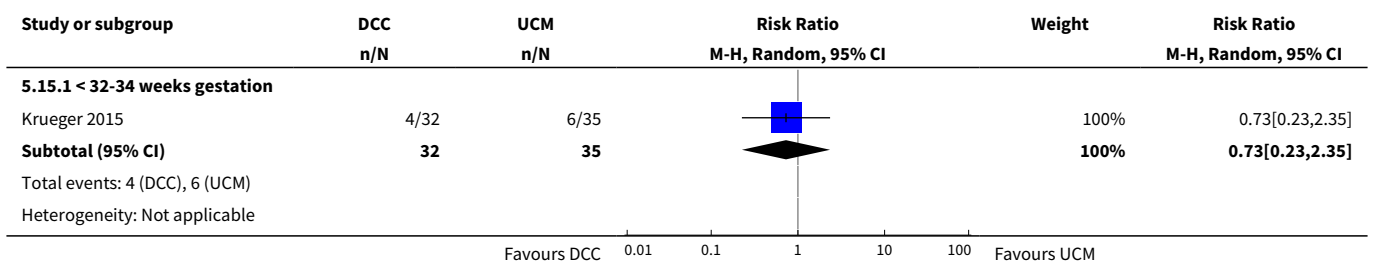


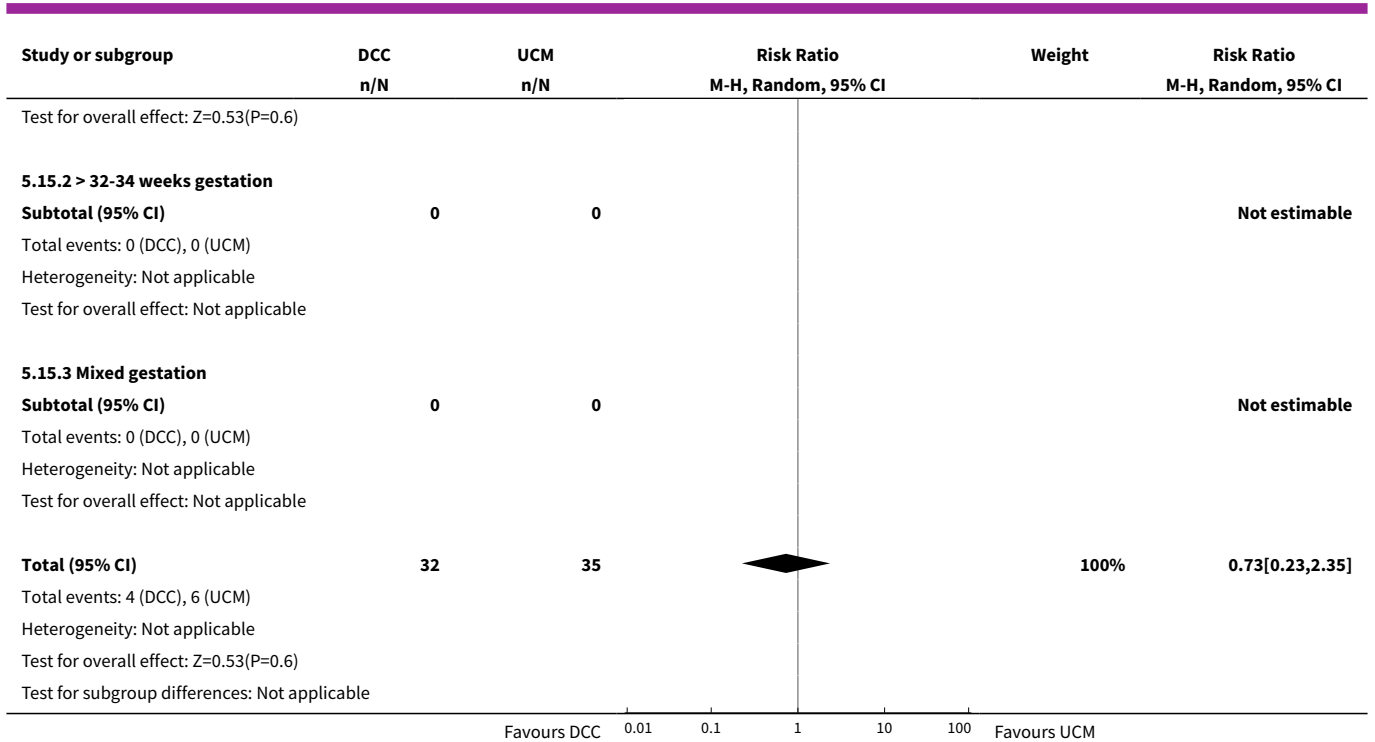


Analysis 5.13. Comparison 5 DCC with immediate neonatal care after cord clamping vs UCM (subgroup analysis by gestation), Outcome 13 Surfactant treatment (for severe RDS).

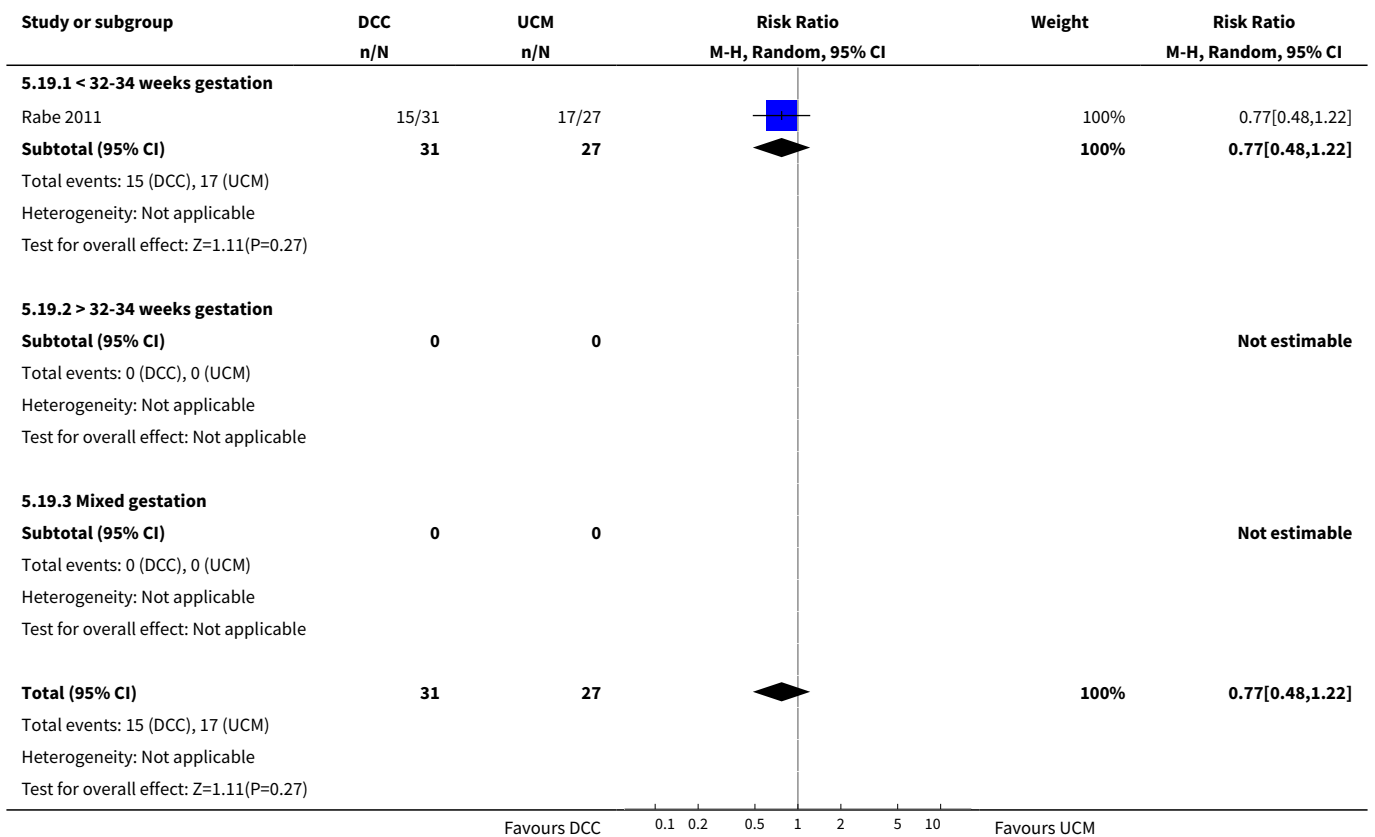


Analysis 5.15. Comparison 5 DCC with immediate neonatal care after cord clamping vs UCM (subgroup analysis by gestation), Outcome 15 Treatment for Retinopathy of Prematurity (RoP).





Analysis 5.19. Comparison 5 DCC with immediate neonatal care after cord clamping vs UCM (subgroup analysis by gestation), Outcome 19 Blood transfusion in infant.



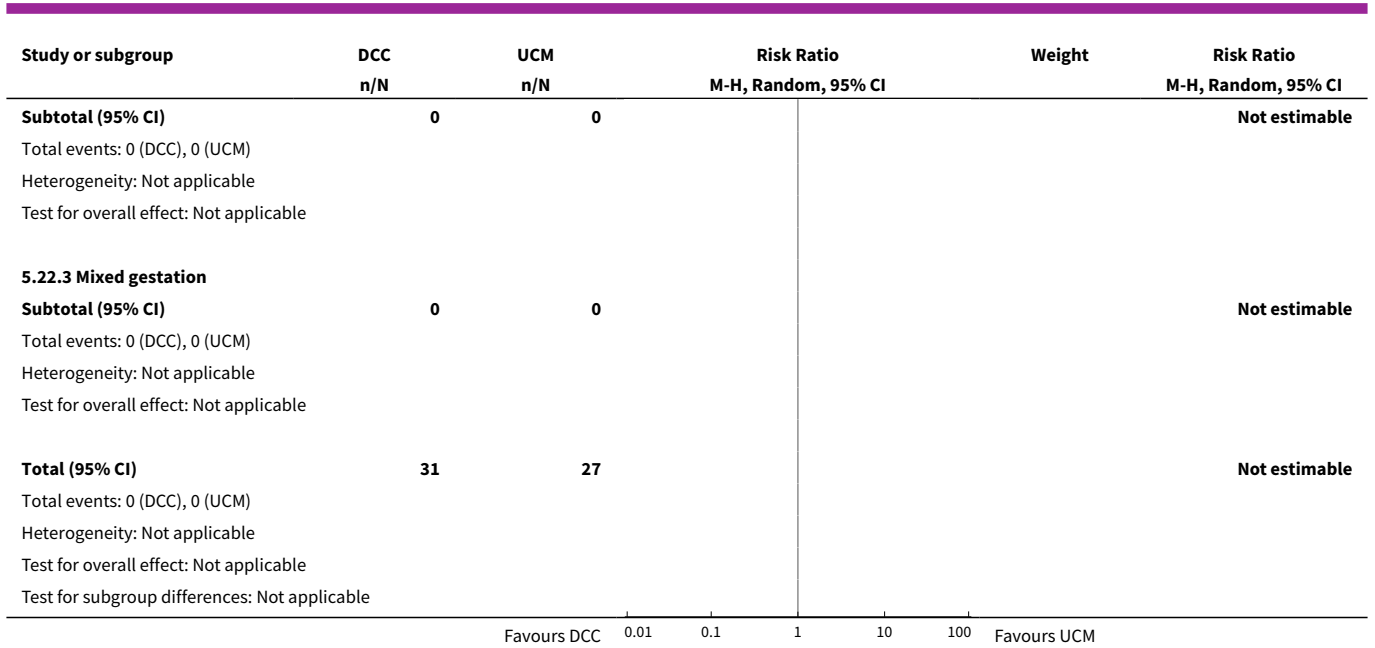
Study or subgroup	DCC n/N	UCM n/N	Risk Ratio M-H, Random, 95% CI	Weight	Risk Ratio M-H, Random, 95% CI
Test for subgroup differences: Not applicable					
Favours DCC 0.1 0.2 0.5 1 2 5 10 Favours UCM					

Analysis 5.21. Comparison 5 DCC with immediate neonatal care after cord clamping vs UCM (subgroup analysis by gestation), Outcome 21 Late sepsis (after 3 days or as defined by trialists).

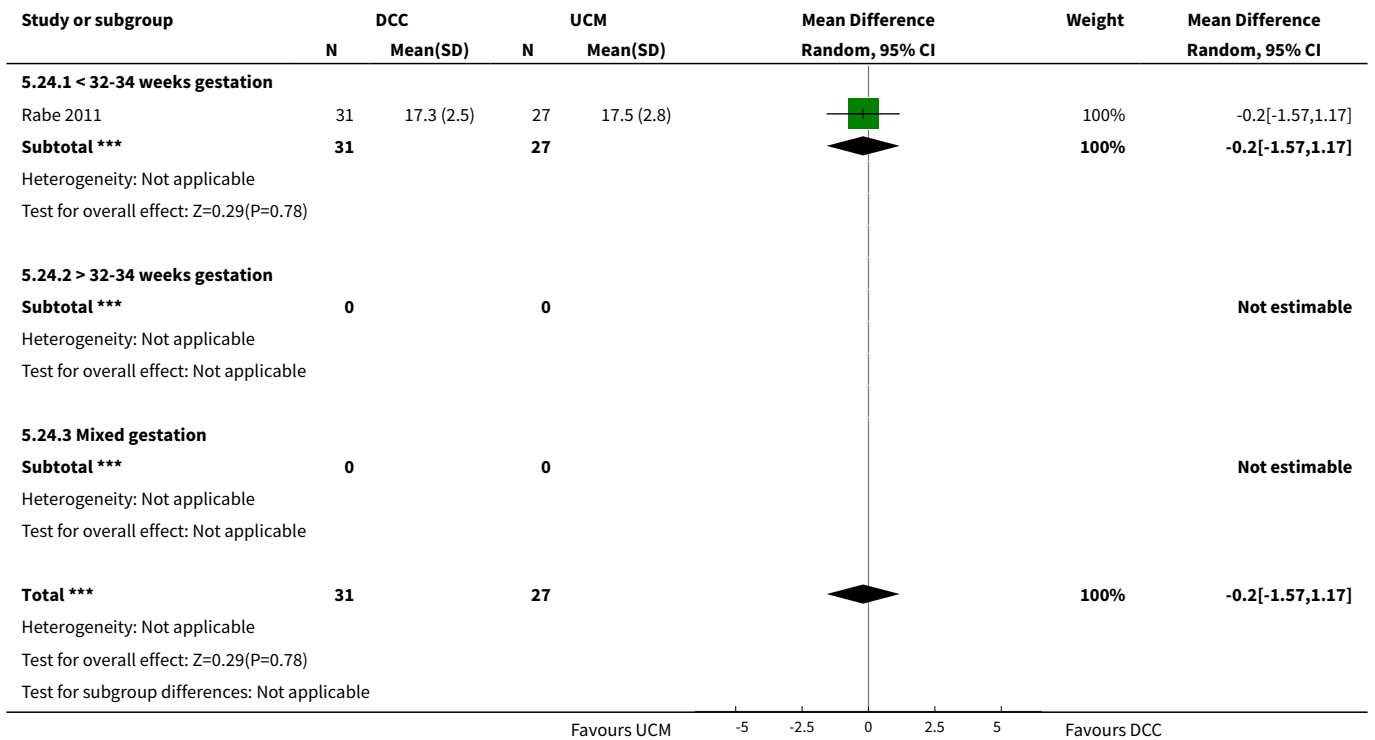
Study or subgroup	DCC n/N	UCM n/N	Risk Ratio M-H, Random, 95% CI	Weight	Risk Ratio M-H, Random, 95% CI
5.21.1 < 32-34 weeks gestation					
Rabe 2011	1/31	1/27		100%	0.87[0.06,13.27]
Subtotal (95% CI)	31	27		100%	0.87[0.06,13.27]
Total events: 1 (DCC), 1 (UCM)					
Heterogeneity: Not applicable					
Test for overall effect: Z=0.1(P=0.92)					
5.21.2 > 32-34 weeks gestation					
Subtotal (95% CI)	0	0			Not estimable
Total events: 0 (DCC), 0 (UCM)					
Heterogeneity: Not applicable					
Test for overall effect: Not applicable					
5.21.3 Mixed gestation					
Subtotal (95% CI)	0	0			Not estimable
Total events: 0 (DCC), 0 (UCM)					
Heterogeneity: Not applicable					
Test for overall effect: Not applicable					
Total (95% CI)	31	27		100%	0.87[0.06,13.27]
Total events: 1 (DCC), 1 (UCM)					
Heterogeneity: Not applicable					
Test for overall effect: Z=0.1(P=0.92)					
Test for subgroup differences: Not applicable					
Favours DCC 0.01 0.1 1 10 100 Favours UCM					

Analysis 5.22. Comparison 5 DCC with immediate neonatal care after cord clamping vs UCM (subgroup analysis by gestation), Outcome 22 Hydrocephalus.

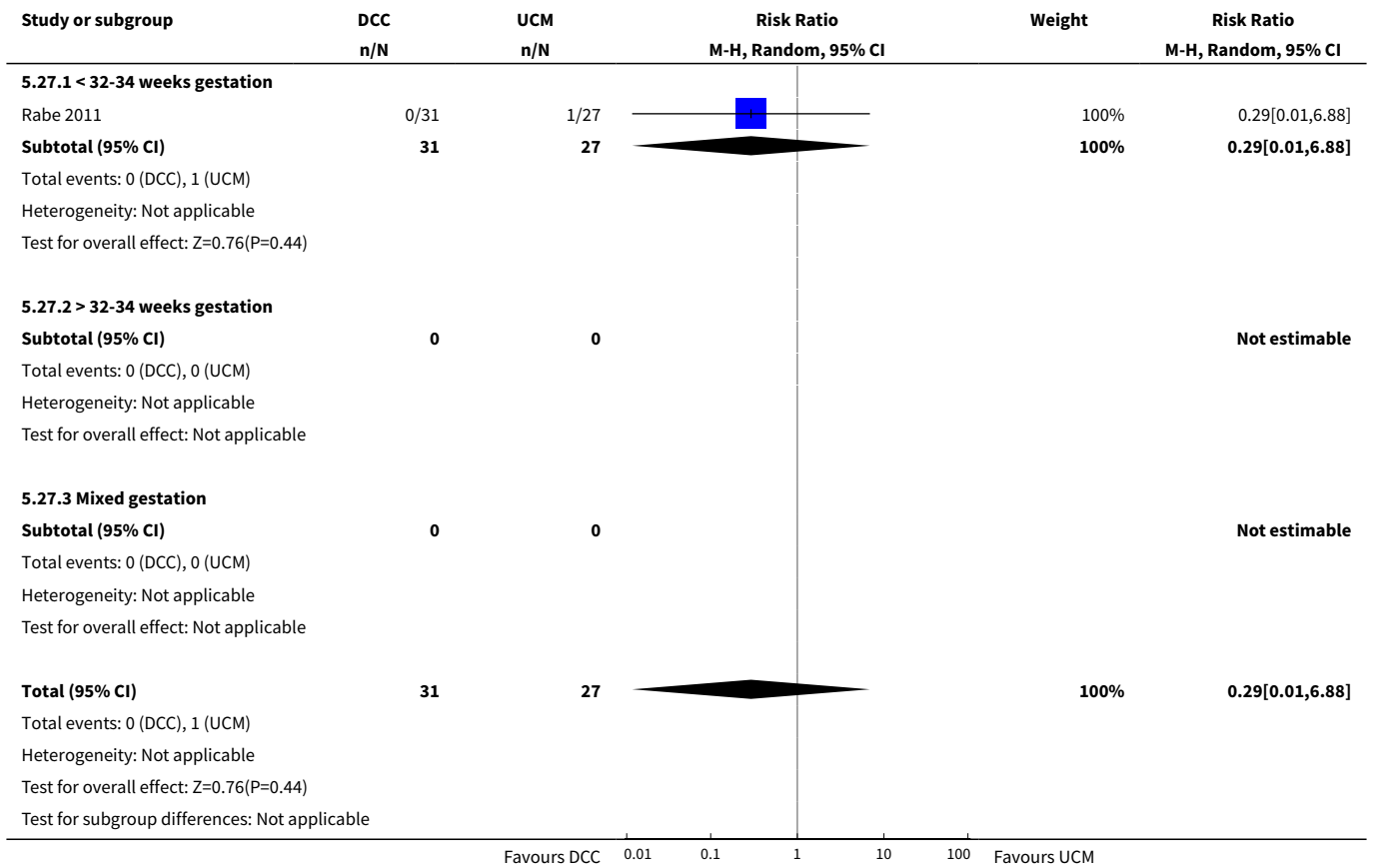
Study or subgroup	DCC n/N	UCM n/N	Risk Ratio M-H, Random, 95% CI	Weight	Risk Ratio M-H, Random, 95% CI
5.22.1 < 32-34 weeks gestation					
Rabe 2011	0/31	0/27			Not estimable
Subtotal (95% CI)	31	27			Not estimable
Total events: 0 (DCC), 0 (UCM)					
Heterogeneity: Not applicable					
Test for overall effect: Not applicable					
5.22.2 > 32-34 weeks gestation					
Favours DCC 0.01 0.1 1 10 100 Favours UCM					



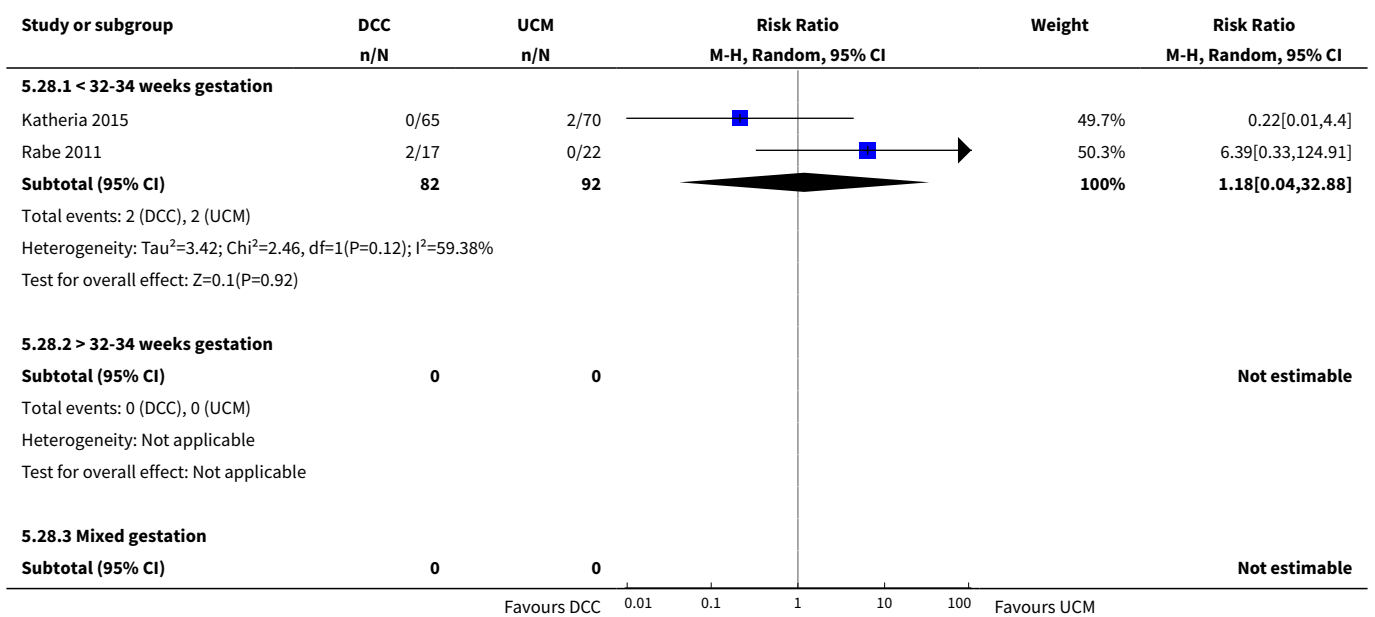
Analysis 5.24. Comparison 5 DCC with immediate neonatal care after cord clamping vs UCM (subgroup analysis by gestation), Outcome 24 Hb within 1st 24 hour of birth (g/dL).

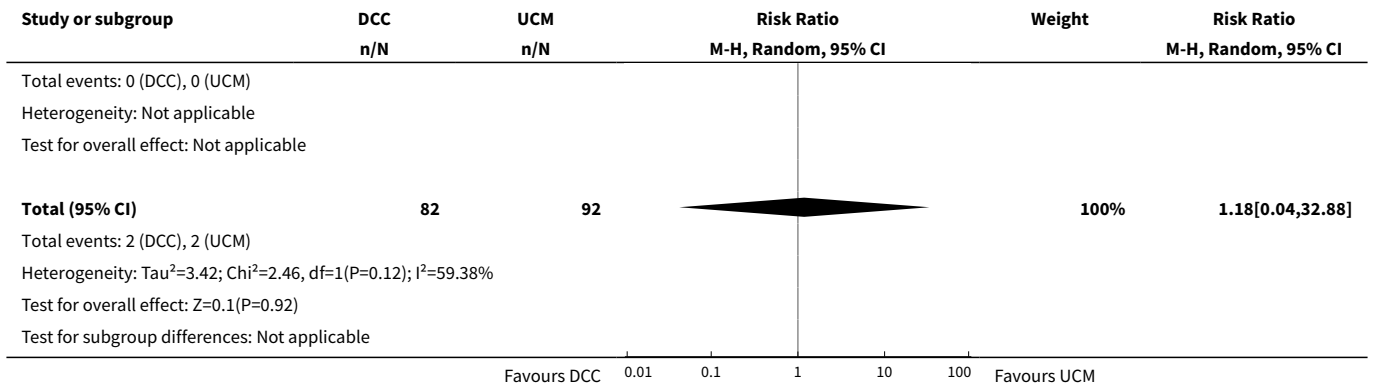


Analysis 5.27. Comparison 5 DCC with immediate neonatal care after cord clamping vs UCM (subgroup analysis by gestation), Outcome 27 Home oxygen.

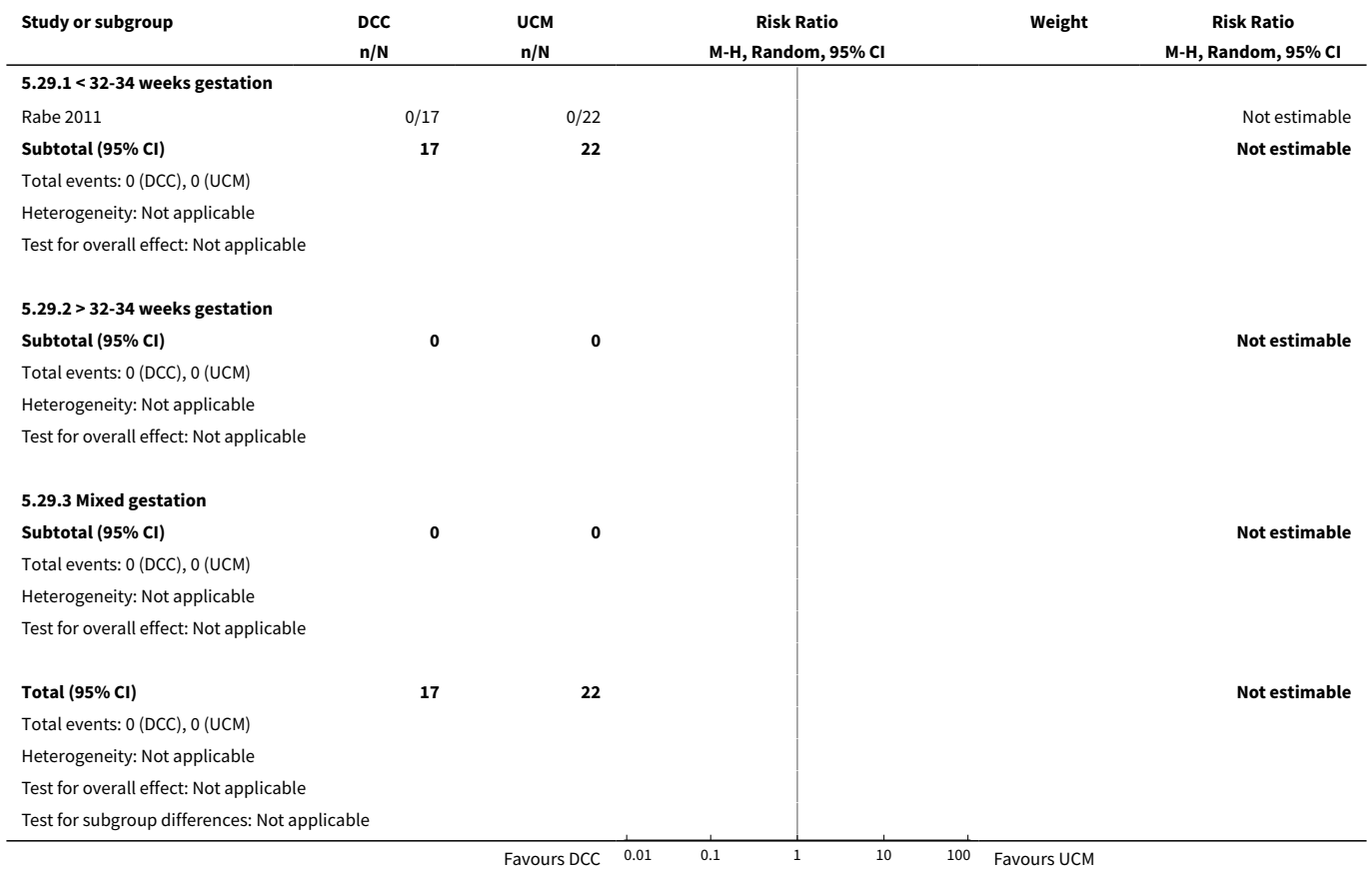


Analysis 5.28. Comparison 5 DCC with immediate neonatal care after cord clamping vs UCM (subgroup analysis by gestation), Outcome 28 Neurodevelopmental impairment at age two to three years.





Analysis 5.29. Comparison 5 DCC with immediate neonatal care after cord clamping vs UCM (subgroup analysis by gestation), Outcome 29 Severe visual impairment.



Analysis 5.30. Comparison 5 DCC with immediate neonatal care after cord clamping vs UCM (subgroup analysis by gestation), Outcome 30 Cerebral palsy (CP).

Study or subgroup	DCC n/N	UCM n/N	Risk Ratio M-H, Random, 95% CI	Weight	Risk Ratio M-H, Random, 95% CI
5.30.1 < 32-34 weeks gestation					
Rabe 2011	0/17	0/22			Not estimable
Subtotal (95% CI)	17	22			Not estimable
Total events: 0 (DCC), 0 (UCM)					
Heterogeneity: Not applicable					
Test for overall effect: Not applicable					
5.30.2 > 32-34 weeks gestation					
Subtotal (95% CI)	0	0			Not estimable
Total events: 0 (DCC), 0 (UCM)					
Heterogeneity: Not applicable					
Test for overall effect: Not applicable					
5.30.3 Mixed gestation					
Subtotal (95% CI)	0	0			Not estimable
Total events: 0 (DCC), 0 (UCM)					
Heterogeneity: Not applicable					
Test for overall effect: Not applicable					
Total (95% CI)	17	22			Not estimable
Total events: 0 (DCC), 0 (UCM)					
Heterogeneity: Not applicable					
Test for overall effect: Not applicable					
Test for subgroup differences: Not applicable					

Favours DCC 0.01 0.1 1 10 100 Favours UCM

Comparison 6. DCC with immediate neonatal care after cord clamping vs UCM (subgroup analysis by type of intervention)

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Death of baby (up to discharge)	3	322	Risk Ratio (M-H, Random, 95% CI)	2.14 [0.93, 4.93]
1.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
1.2 DCC < 1 min and baby held low	3	322	Risk Ratio (M-H, Random, 95% CI)	2.14 [0.93, 4.93]
1.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
1.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
1.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
1.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
2 Death or neurodevelopmental impairment at age two to three years	2	195	Risk Ratio (M-H, Random, 95% CI)	1.67 [0.78, 3.57]
2.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
2.2 DCC < 1 min and baby held low	2	195	Risk Ratio (M-H, Random, 95% CI)	1.67 [0.78, 3.57]
2.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
2.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
2.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
2.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
2.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
3 Severe intraventricular haemorrhage (IVH grades 3, 4)	1	58	Risk Ratio (M-H, Random, 95% CI)	2.63 [0.11, 61.88]
3.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
3.2 DCC < 1 min and baby held low	1	58	Risk Ratio (M-H, Random, 95% CI)	2.63 [0.11, 61.88]
3.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
3.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
3.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
3.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
3.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
4 Intraventricular haemorrhage (IVH, all grades)	2	125	Risk Ratio (M-H, Random, 95% CI)	1.32 [0.55, 3.17]
4.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
4.2 DCC < 1 min and baby held low	2	125	Risk Ratio (M-H, Random, 95% CI)	1.32 [0.55, 3.17]
4.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
4.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
4.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
4.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
4.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
5 Periventricular leukomalacia (PVL)	1	58	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
5.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
5.2 DCC < 1 min and baby held low	1	58	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
5.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
5.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
5.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
5.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
5.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
6 Chronic lung disease (CLD) - oxygen supplement at 36 weeks (corrected for gestation)	2	125	Risk Ratio (M-H, Random, 95% CI)	1.53 [0.43, 5.48]
6.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
6.2 DCC < 1 min and baby held low	2	125	Risk Ratio (M-H, Random, 95% CI)	1.53 [0.43, 5.48]
6.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
6.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
6.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
6.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
6.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
7 Maternal blood loss of 500 mL or greater	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
7.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
7.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
7.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
7.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
7.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
7.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
7.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
8 Intraventricular haemorrhage (IVH, grades 1 & 2)	1	58	Risk Ratio (M-H, Random, 95% CI)	1.74 [0.48, 6.30]
8.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
8.2 DCC < 1 min and baby held low	1	58	Risk Ratio (M-H, Random, 95% CI)	1.74 [0.48, 6.30]
8.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
8.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
8.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
8.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
8.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
9 Necrotising enterocolitis (NEC) confirmed by X ray or laparotomy)	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
9.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
9.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
9.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
9.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
9.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
9.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
9.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
10 Respiratory Distress Syndrome (RDS)	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
10.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
10.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
10.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
10.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
10.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
10.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
10.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
11 Respiratory support (ventilator or CPAP)	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
11.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
11.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
11.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
11.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
11.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
11.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
11.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
12 Duration of respiratory support (days)	1	67	Mean Difference (IV, Random, 95% CI)	1.80 [-2.01, 5.61]
12.1 DCC < 1 min and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
12.2 DCC < 1 min and baby held low	1	67	Mean Difference (IV, Random, 95% CI)	1.80 [-2.01, 5.61]
12.3 DCC 1-2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
12.4 DCC 1-2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
12.5 DCC > 2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
12.6 DCC > 2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
12.7 Mixed interventions or unclear	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
13 Surfactant treatment (for severe RDS)	1	58	Risk Ratio (M-H, Random, 95% CI)	1.19 [0.66, 2.13]
13.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
13.2 DCC < 1 min and baby held low	1	58	Risk Ratio (M-H, Random, 95% CI)	1.19 [0.66, 2.13]
13.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
13.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
13.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
13.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
13.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
14 Treatment for Patent Ductus Arteriosus (PDA) (medical and/or surgical)	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
14.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
14.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
14.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
14.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
14.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
14.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
14.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
15 Treatment for Retinopathy of Prematurity (RoP)	1	67	Risk Ratio (M-H, Random, 95% CI)	0.73 [0.23, 2.35]
15.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
15.2 DCC < 1 min and baby held low	1	67	Risk Ratio (M-H, Random, 95% CI)	0.73 [0.23, 2.35]
15.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
15.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
15.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
15.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
15.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
16 Hyperbilirubinemia (treated by phototherapy)	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
16.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
16.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
16.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
16.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
16.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
16.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
16.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
17 Inotropics for low blood pressure	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
17.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
17.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
17.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
17.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
17.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
17.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
17.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
18 Low Apgar as defined by trialists (generally < 8 at 5 mins)	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
18.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
18.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
18.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
18.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
18.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
18.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
18.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
19 Blood transfusion in infant	1	58	Risk Ratio (M-H, Random, 95% CI)	0.77 [0.48, 1.22]
19.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
19.2 DCC < 1 min and baby held low	1	58	Risk Ratio (M-H, Random, 95% CI)	0.77 [0.48, 1.22]
19.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
19.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
19.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
19.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
19.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
20 Volume of blood transfused	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
20.1 DCC < 1 min and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
20.2 DCC < 1 min and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
20.3 DCC 1-2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
20.4 DCC 1-2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
20.5 DCC > 2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
20.6 DCC > 2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
20.7 Mixed interventions or unclear	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
21 Late sepsis (after 3 days or as defined by trialists)	1	58	Risk Ratio (M-H, Random, 95% CI)	0.87 [0.06, 13.27]
21.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
21.2 DCC < 1 min and baby held low	1	58	Risk Ratio (M-H, Random, 95% CI)	0.87 [0.06, 13.27]
21.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
21.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
21.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
21.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
21.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
22 Hydrocephalus	2	116	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
22.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
22.2 DCC < 1 min and baby held low	2	116	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
22.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
22.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
22.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
22.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
22.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
23 Temperature < 36.0°C within 1 hour of birth	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
23.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
23.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
23.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
23.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
23.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
23.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
23.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
24 Hb within 1 st 24 hour of birth (g/dL)	1	58	Mean Difference (IV, Random, 95% CI)	-0.20 [-1.57, 1.17]
24.1 DCC < 1 min and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
24.2 DCC < 1 min and baby held low	1	58	Mean Difference (IV, Random, 95% CI)	-0.20 [-1.57, 1.17]
24.3 DCC 1-2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
24.4 DCC 1-2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
24.5 DCC > 2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
24.6 DCC > 2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
24.7 Mixed interventions or unclear	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
25 Mean arterial blood pressure (subgrouped by time after birth)	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
25.1 DCC < 1 min and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
25.2 DCC < 1 min and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
25.3 DCC 1-2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
25.4 DCC 1-2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
25.5 DCC > 2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
25.6 DCC > 2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
25.7 Mixed interventions or unclear	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
26 Length of infant stay in NICU	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
26.1 DCC < 1 min and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
26.2 DCC < 1 min and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
26.3 DCC 1-2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
26.4 DCC 1-2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
26.5 DCC > 2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
26.6 DCC > 2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
26.7 Mixed interventions or unclear	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
27 Home oxygen	1	58	Risk Ratio (M-H, Random, 95% CI)	0.29 [0.01, 6.88]
27.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
27.2 DCC < 1 min and baby held low	1	58	Risk Ratio (M-H, Random, 95% CI)	0.29 [0.01, 6.88]
27.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
27.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
27.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
27.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
27.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
28 Neurodevelopmental impairment at age two to three years	2	174	Risk Ratio (M-H, Random, 95% CI)	1.18 [0.04, 32.88]
28.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
28.2 DCC < 1 min and baby held low	2	174	Risk Ratio (M-H, Random, 95% CI)	1.18 [0.04, 32.88]
28.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
28.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
28.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
28.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
28.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
29 Severe visual impairment	1	39	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
29.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
29.2 DCC < 1 min and baby held low	1	39	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
29.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
29.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
29.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
29.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
29.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
30 Cerebral palsy (CP)	1	39	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
30.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
30.2 DCC < 1 min and baby held low	1	39	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
30.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
30.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
30.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
30.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
30.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
31 Manual removal of placenta (denominator = vaginal births)	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
31.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
31.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
31.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
31.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
31.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
31.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
31.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
32 Prolonged third stage (>30 minutes) (denominator = vaginal births)	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
32.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
32.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
32.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
32.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
32.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
32.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
32.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
33 Blood transfusion for mother	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
33.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

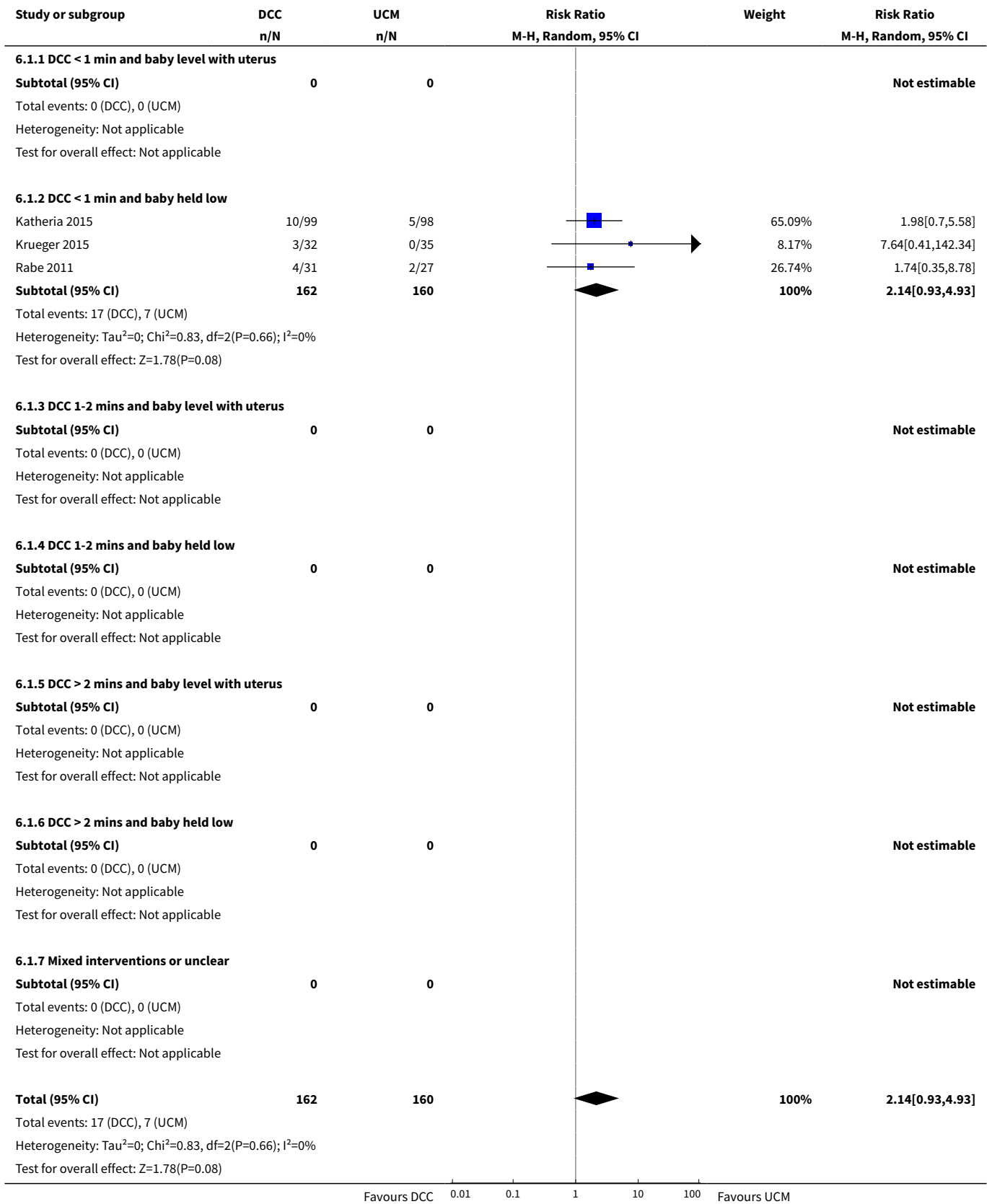
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
33.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
33.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
33.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
33.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
33.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
33.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
34 Postpartum infection in mother	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
34.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
34.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
34.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
34.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
34.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
34.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
34.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
35 Rhesus isoimmunisation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
35.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
35.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
35.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

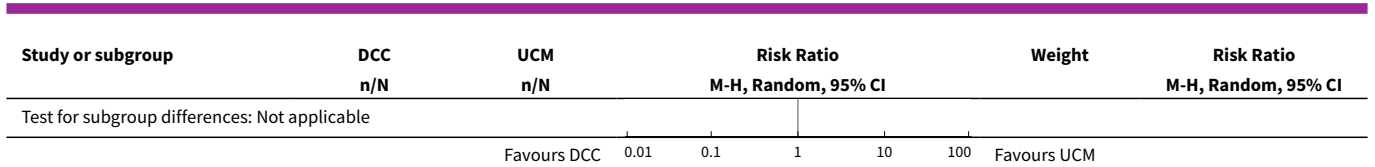
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
35.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
35.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
35.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
35.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
36 Psychological well being in mother	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
36.1 DCC < 1 min and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
36.2 DCC < 1 min and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
36.3 DCC 1-2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
36.4 DCC 1-2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
36.5 DCC > 2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
36.6 DCC > 2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
36.7 Mixed interventions or unclear	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37 Bonding	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37.1 DCC < 1 min and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37.2 DCC < 1 min and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37.3 DCC 1-2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37.4 DCC 1-2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37.5 DCC > 2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
37.6 DCC > 2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37.7 Mixed interventions or unclear	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
38 Breastfeeding initiation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
38.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
38.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
38.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
38.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
38.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
38.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
38.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
39 Fully breastfed or mixed feeding at infant discharge	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
39.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
39.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
39.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
39.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
39.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
39.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
39.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

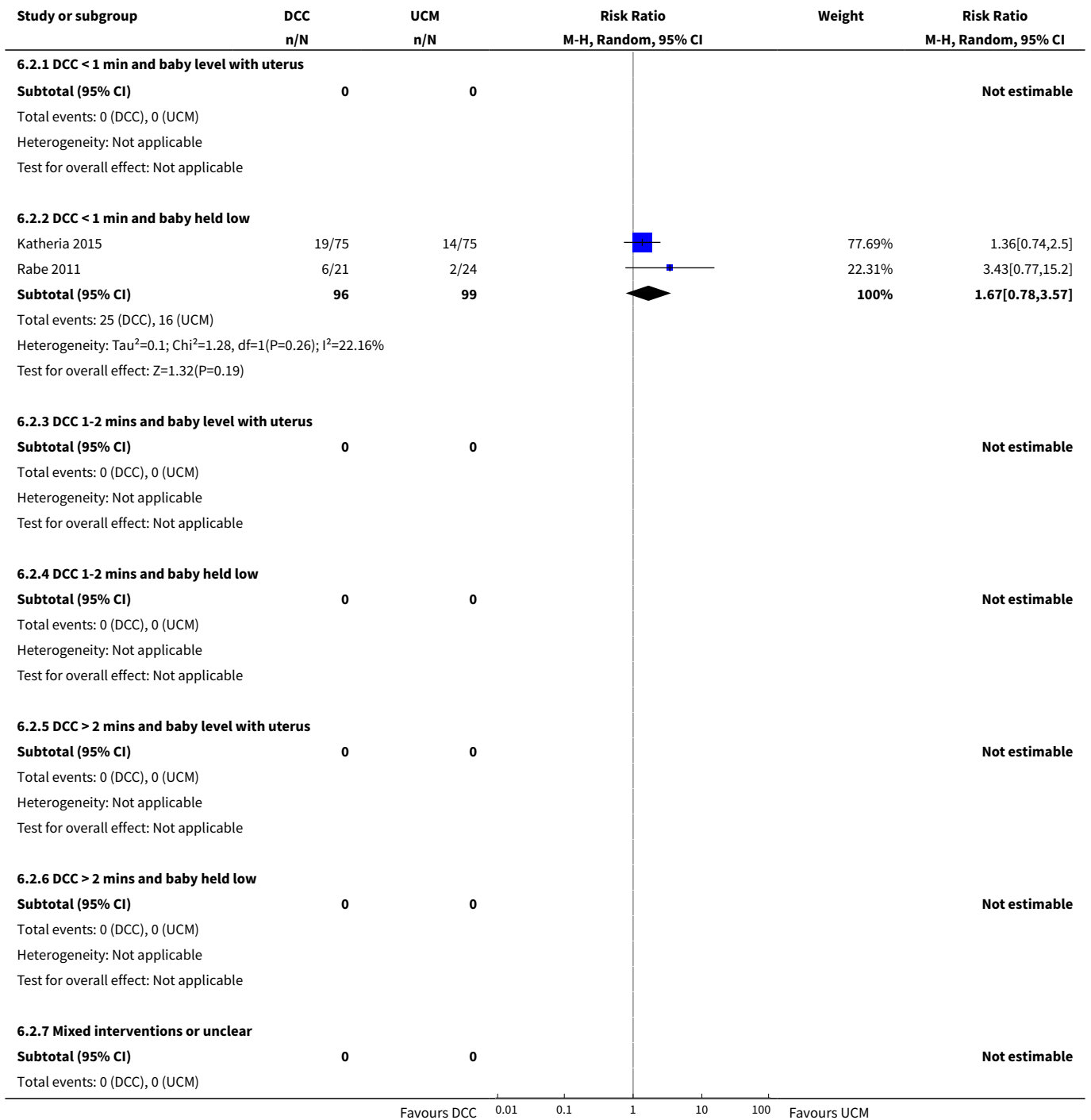
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
40 Maternal anxiety	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40.1 DCC < 1 min and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40.2 DCC < 1 min and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40.3 DCC 1-2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40.4 DCC 1-2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40.5 DCC > 2 mins and baby level with uterus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40.6 DCC > 2 mins and baby held low	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40.7 Mixed interventions or unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
41 Mothers' views	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
41.1 DCC < 1 min and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
41.2 DCC < 1 min and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
41.3 DCC 1-2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
41.4 DCC 1-2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
41.5 DCC > 2 mins and baby level with uterus	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
41.6 DCC > 2 mins and baby held low	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
41.7 Mixed interventions or unclear	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]

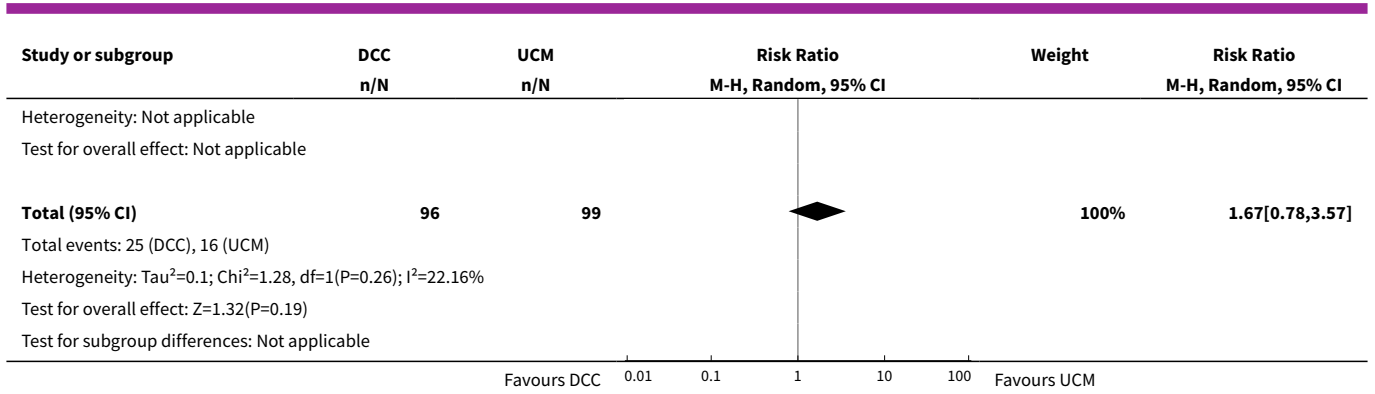
Analysis 6.1. Comparison 6 DCC with immediate neonatal care after cord clamping vs UCM (subgroup analysis by type of intervention), Outcome 1 Death of baby (up to discharge).



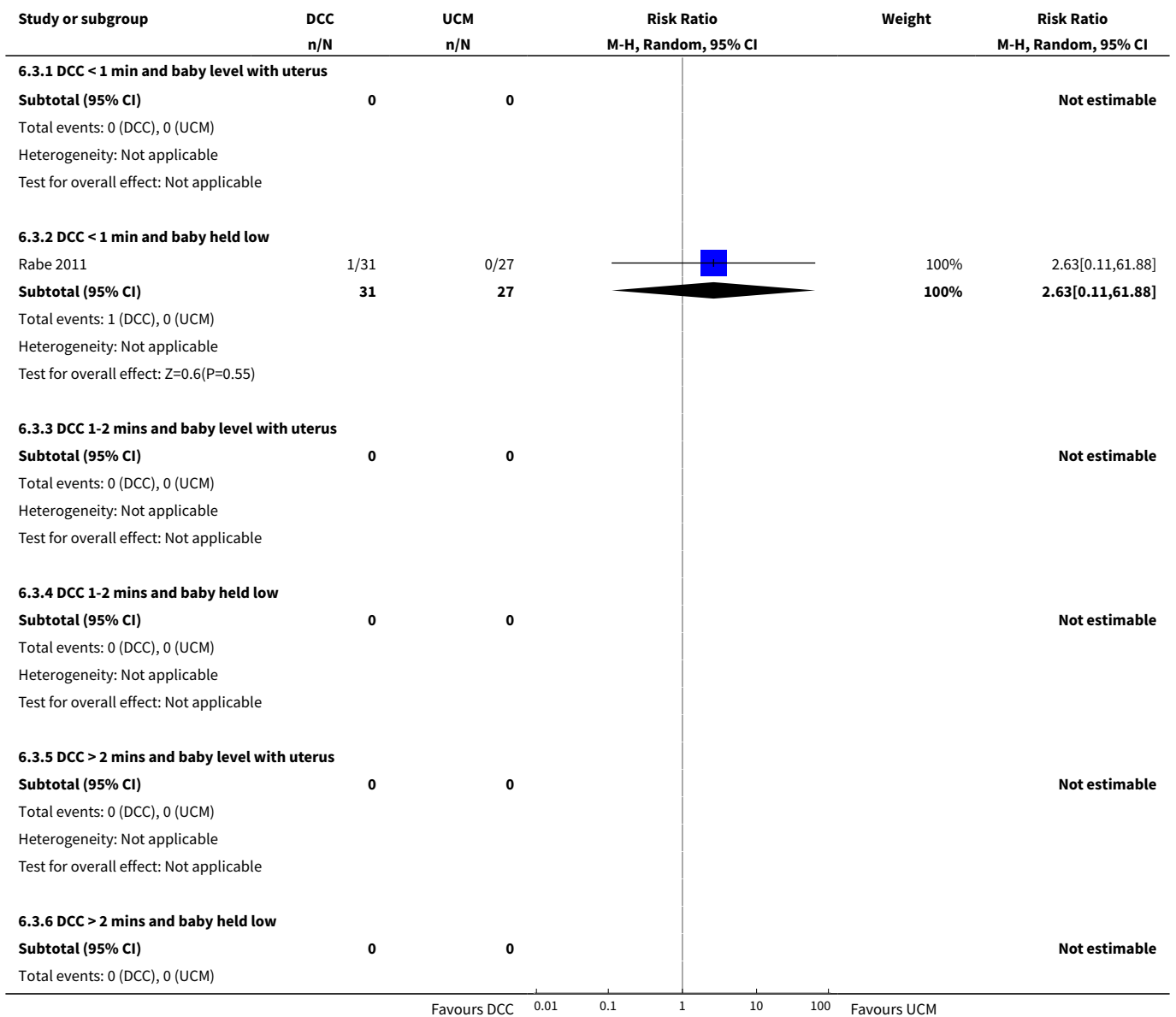


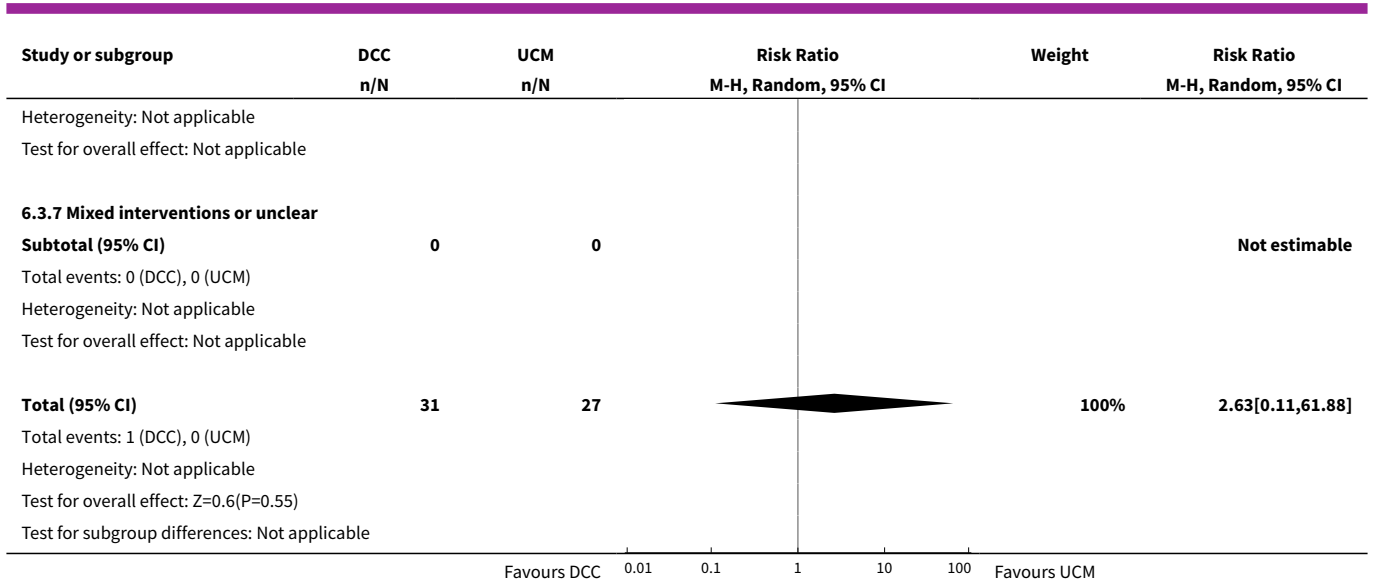
Analysis 6.2. Comparison 6 DCC with immediate neonatal care after cord clamping vs UCM (subgroup analysis by type of intervention), Outcome 2 Death or neurodevelopmental impairment at age two to three years.



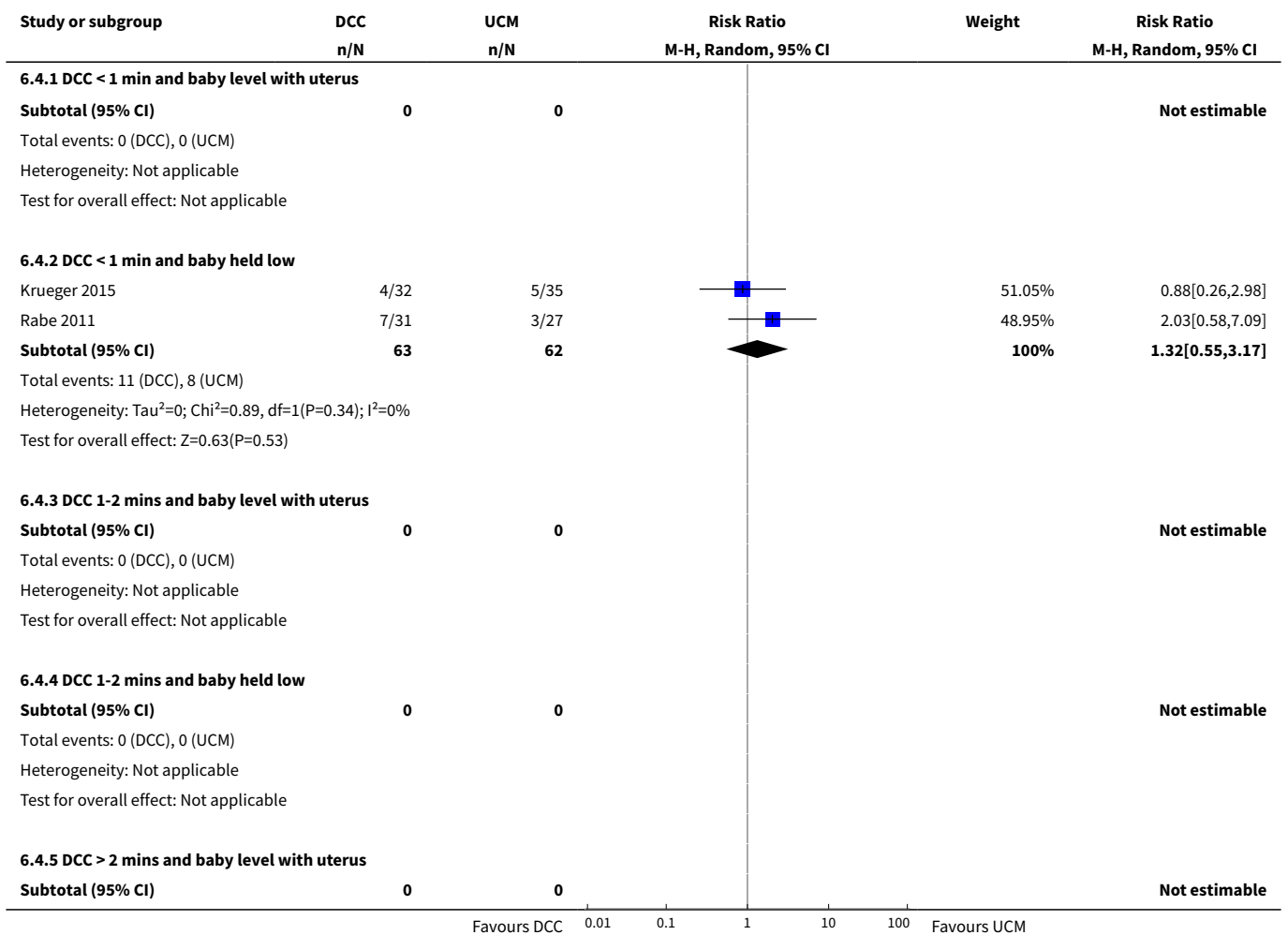


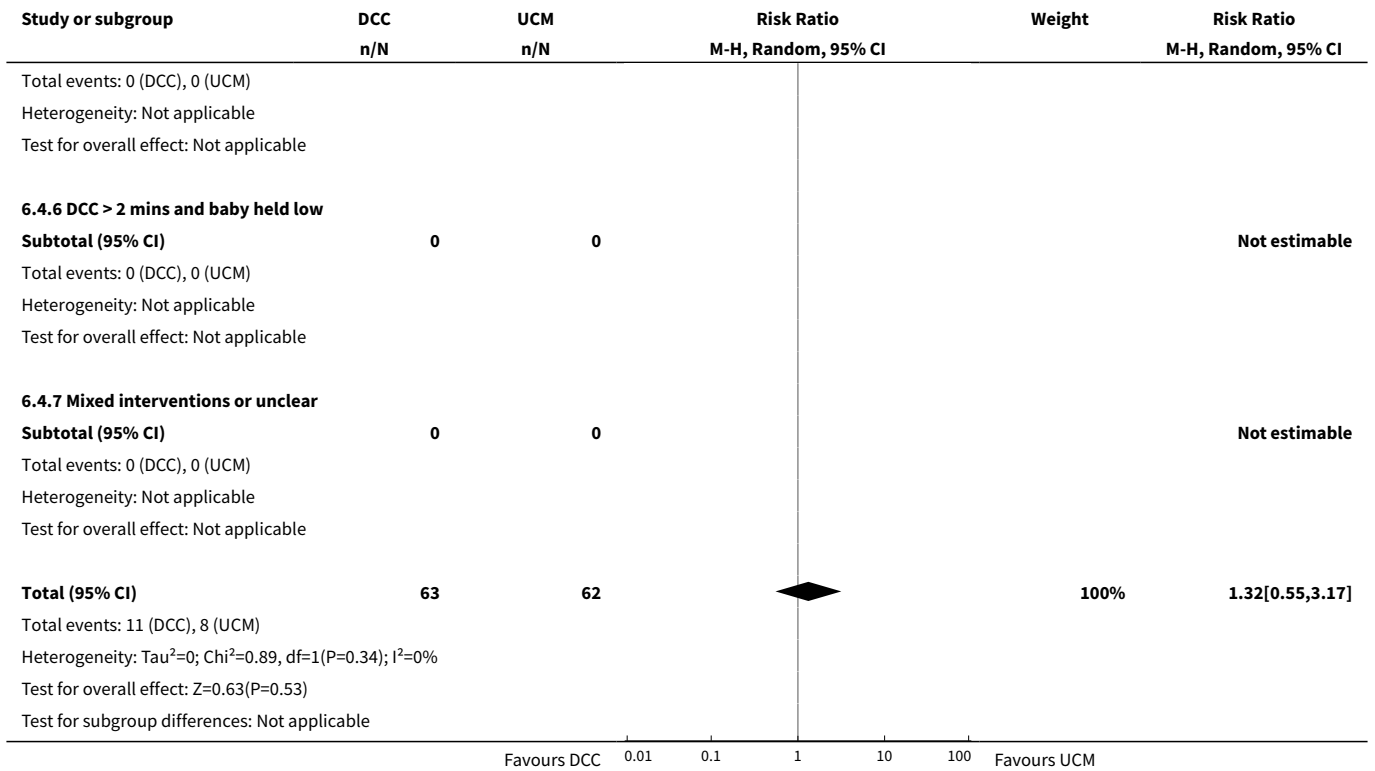
Analysis 6.3. Comparison 6 DCC with immediate neonatal care after cord clamping vs UCM (subgroup analysis by type of intervention), Outcome 3 Severe intraventricular haemorrhage (IVH grades 3, 4).



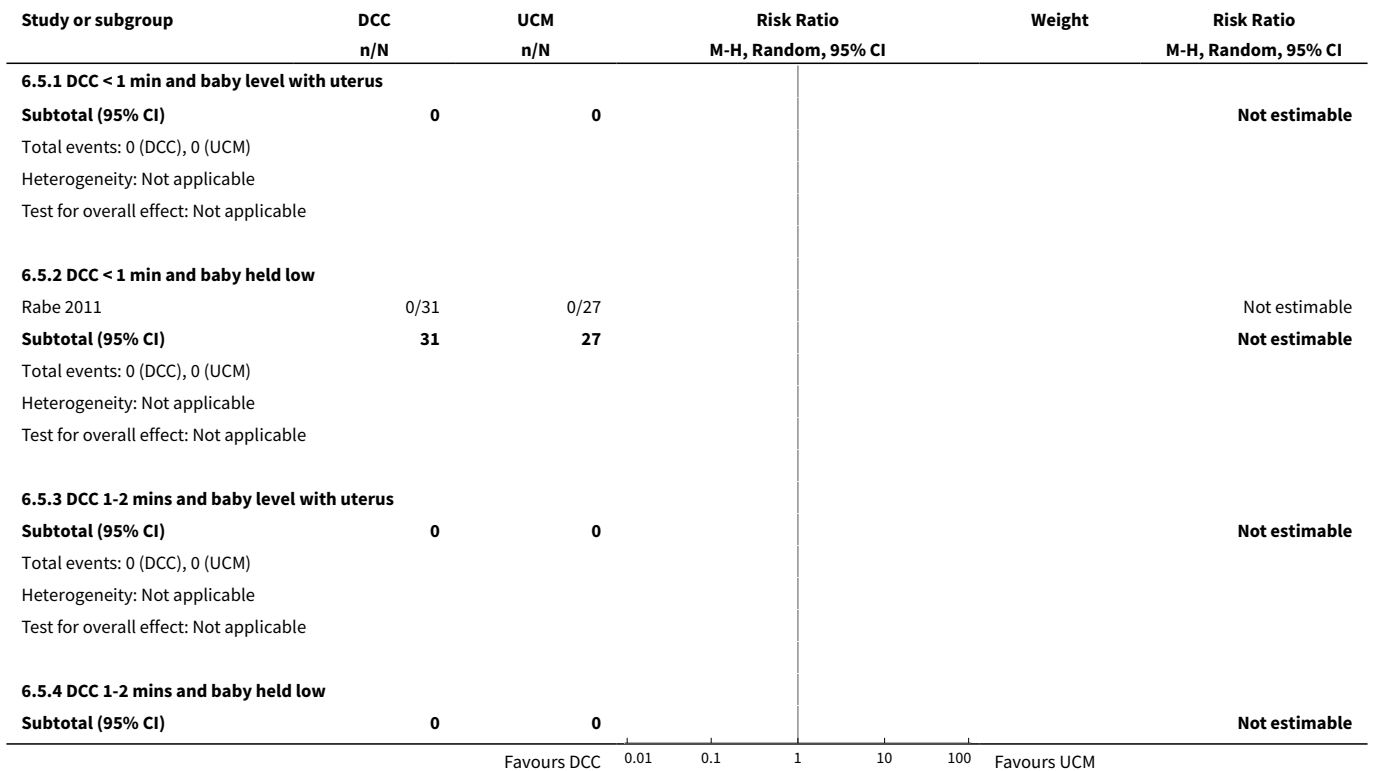


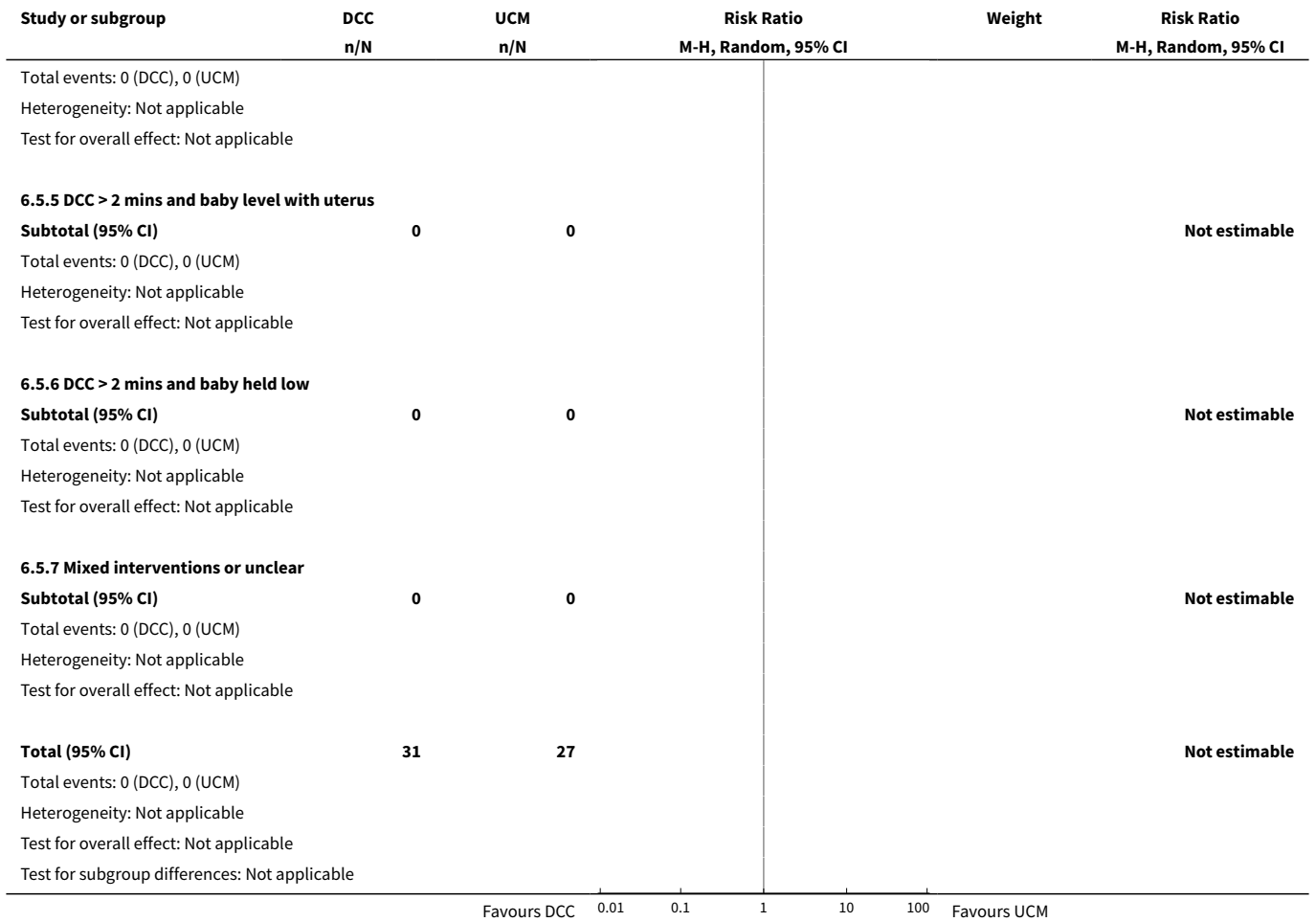
Analysis 6.4. Comparison 6 DCC with immediate neonatal care after cord clamping vs UCM (subgroup analysis by type of intervention), Outcome 4 Intraventricular haemorrhage (IVH, all grades).



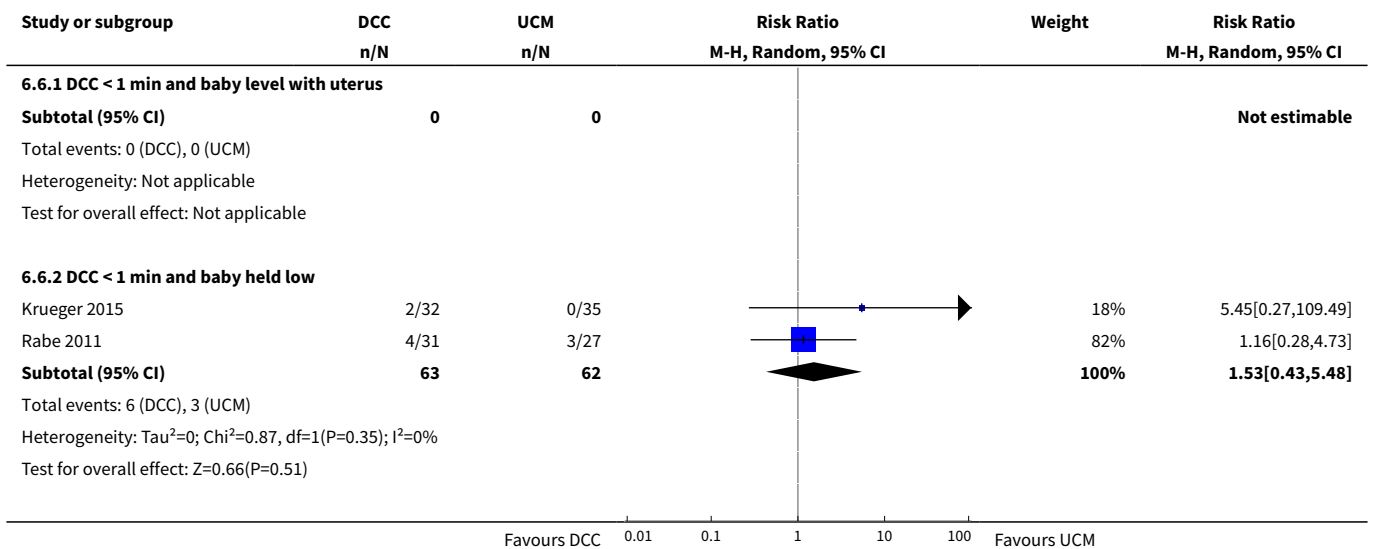


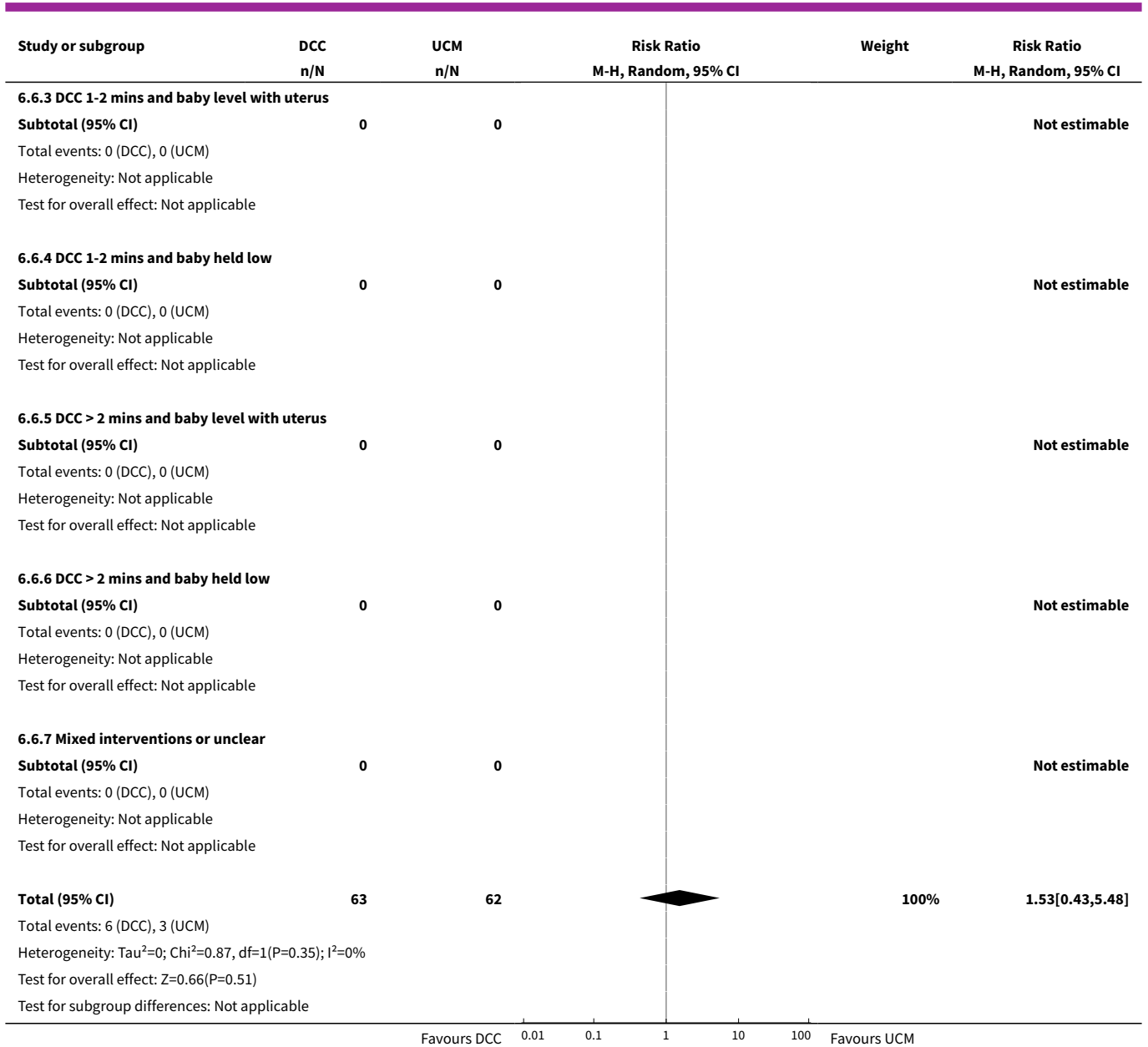
Analysis 6.5. Comparison 6 DCC with immediate neonatal care after cord clamping vs UCM (subgroup analysis by type of intervention), Outcome 5 Periventricular leukomalacia (PVL).



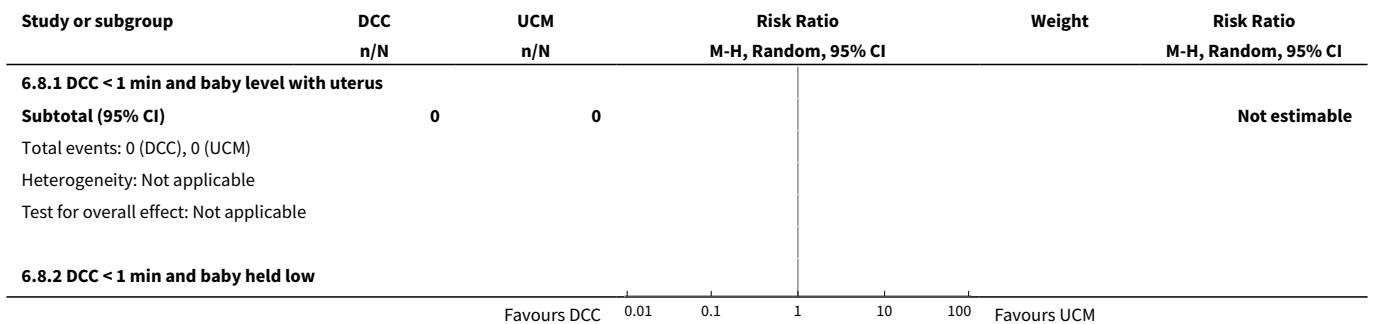


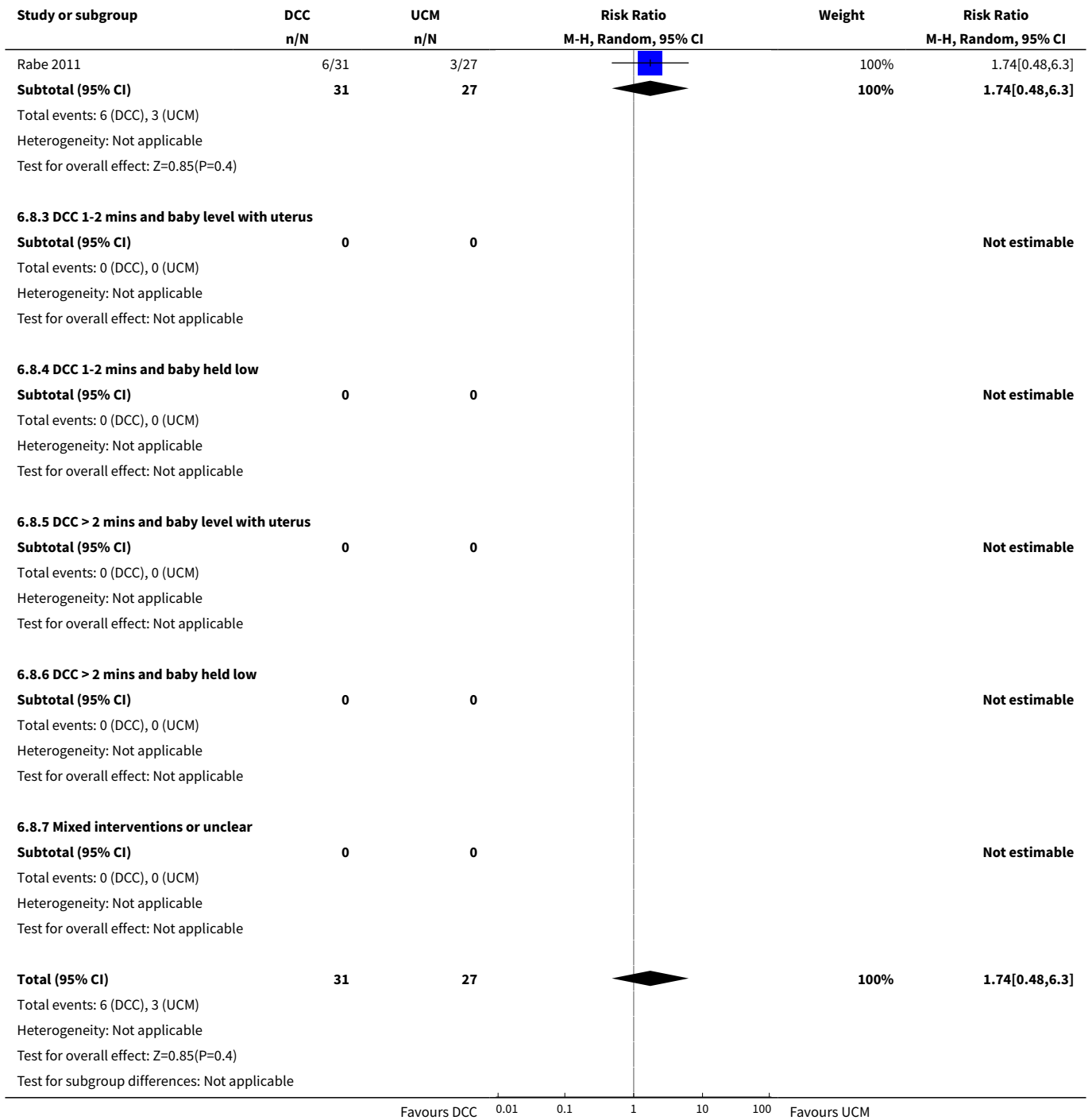
Analysis 6.6. Comparison 6 DCC with immediate neonatal care after cord clamping vs UCM (subgroup analysis by type of intervention), Outcome 6 Chronic lung disease (CLD) - oxygen supplement at 36 weeks (corrected for gestation).



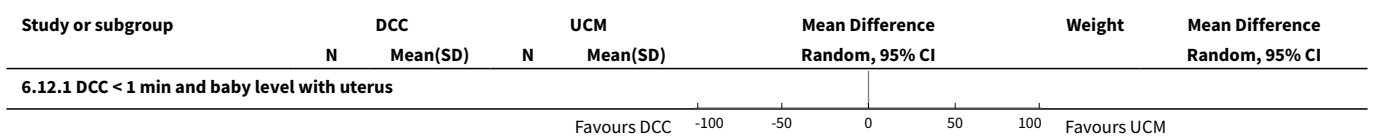


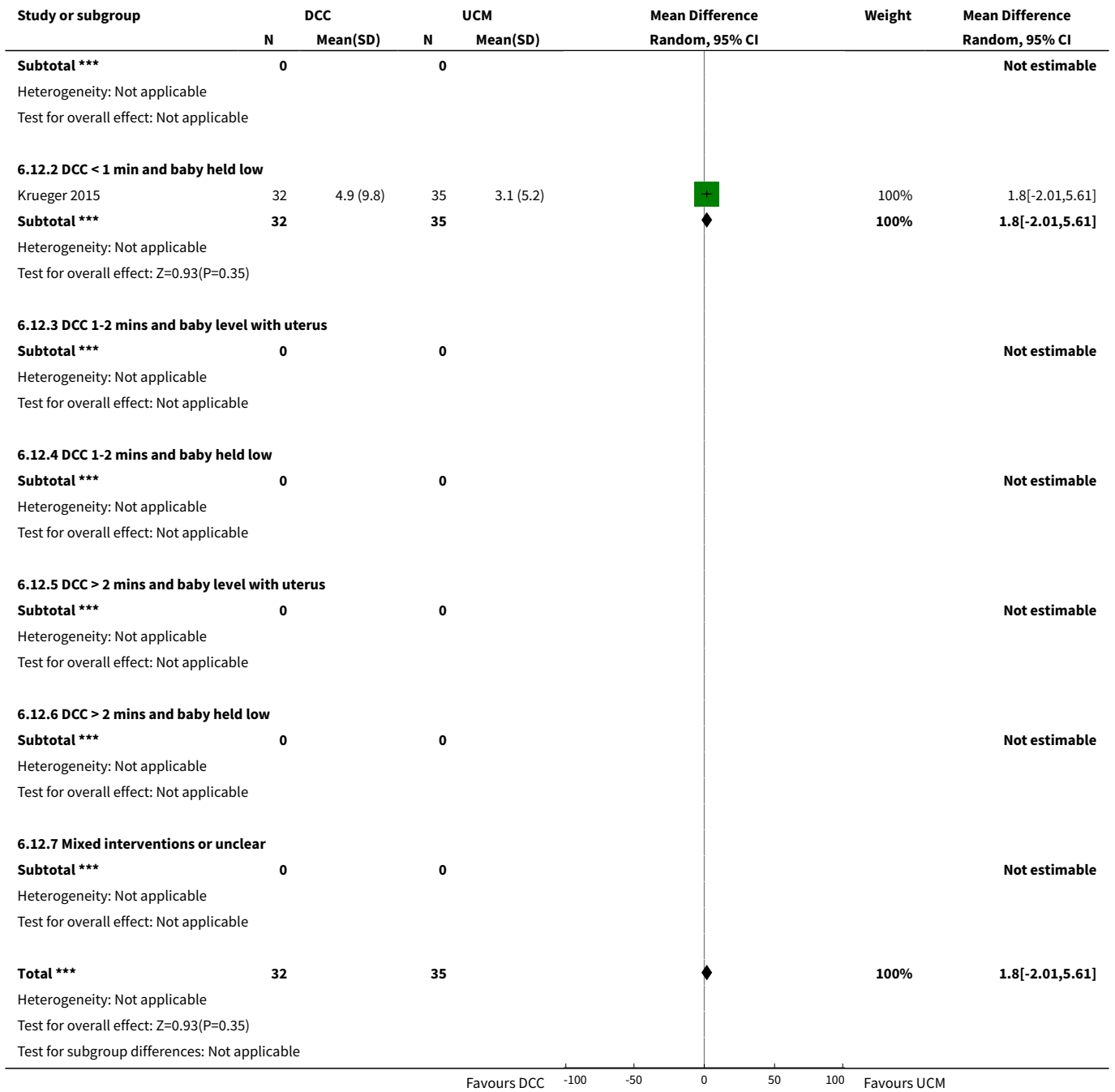
Analysis 6.8. Comparison 6 DCC with immediate neonatal care after cord clamping vs UCM (subgroup analysis by type of intervention), Outcome 8 Intraventricular haemorrhage (IVH, grades 1 & 2).



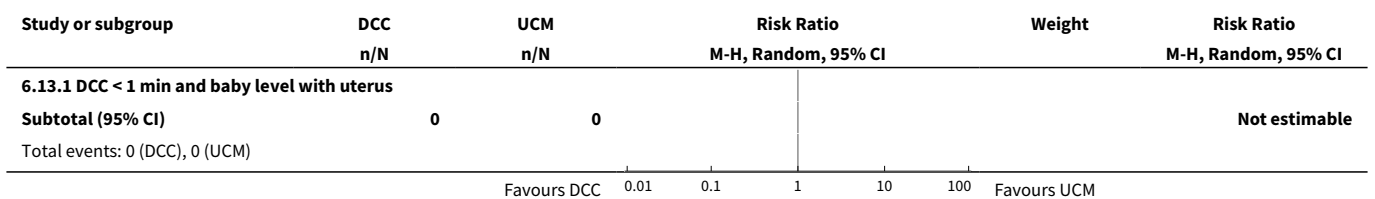


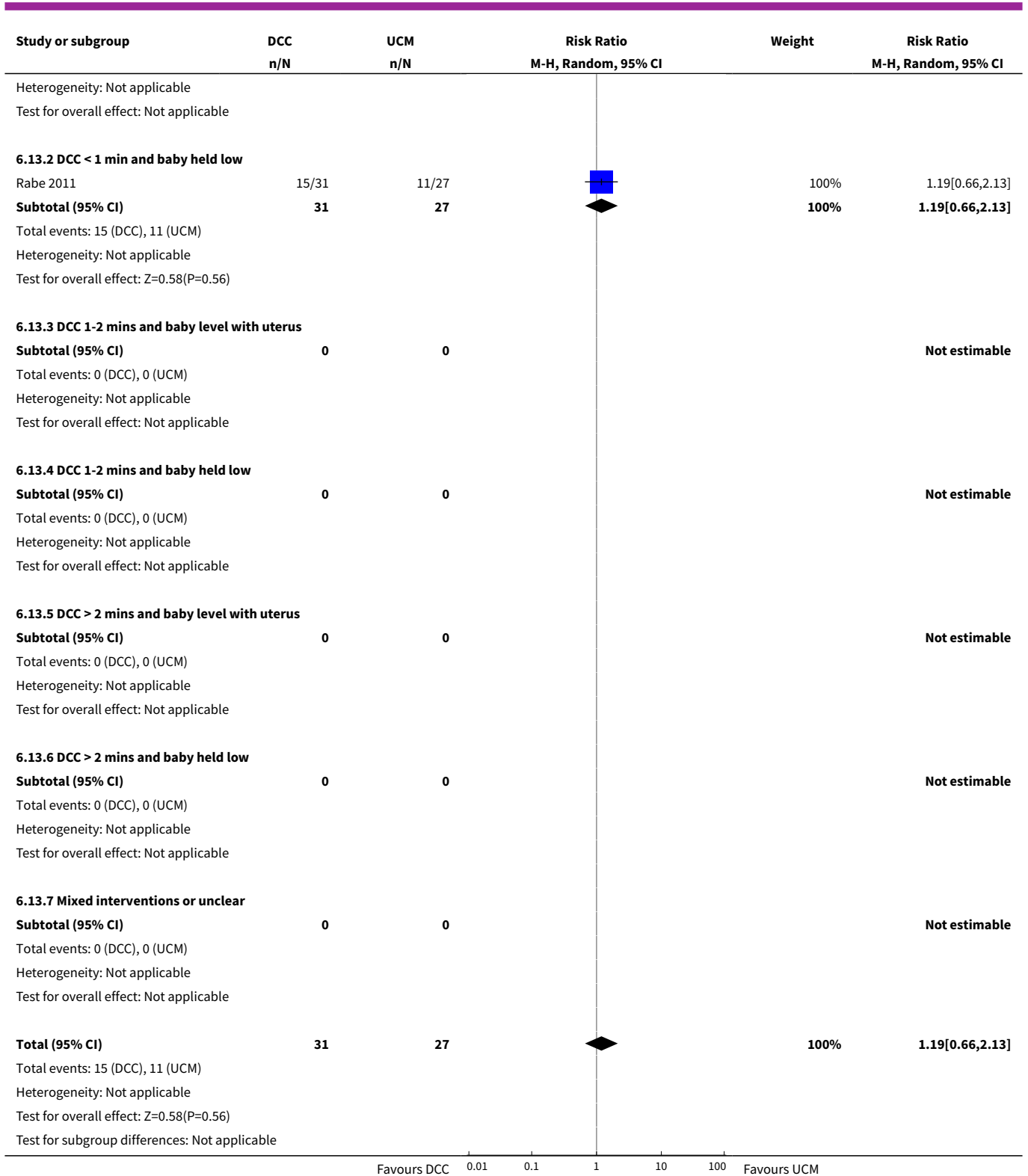
Analysis 6.12. Comparison 6 DCC with immediate neonatal care after cord clamping vs UCM (subgroup analysis by type of intervention), Outcome 12 Duration of respiratory support (days).



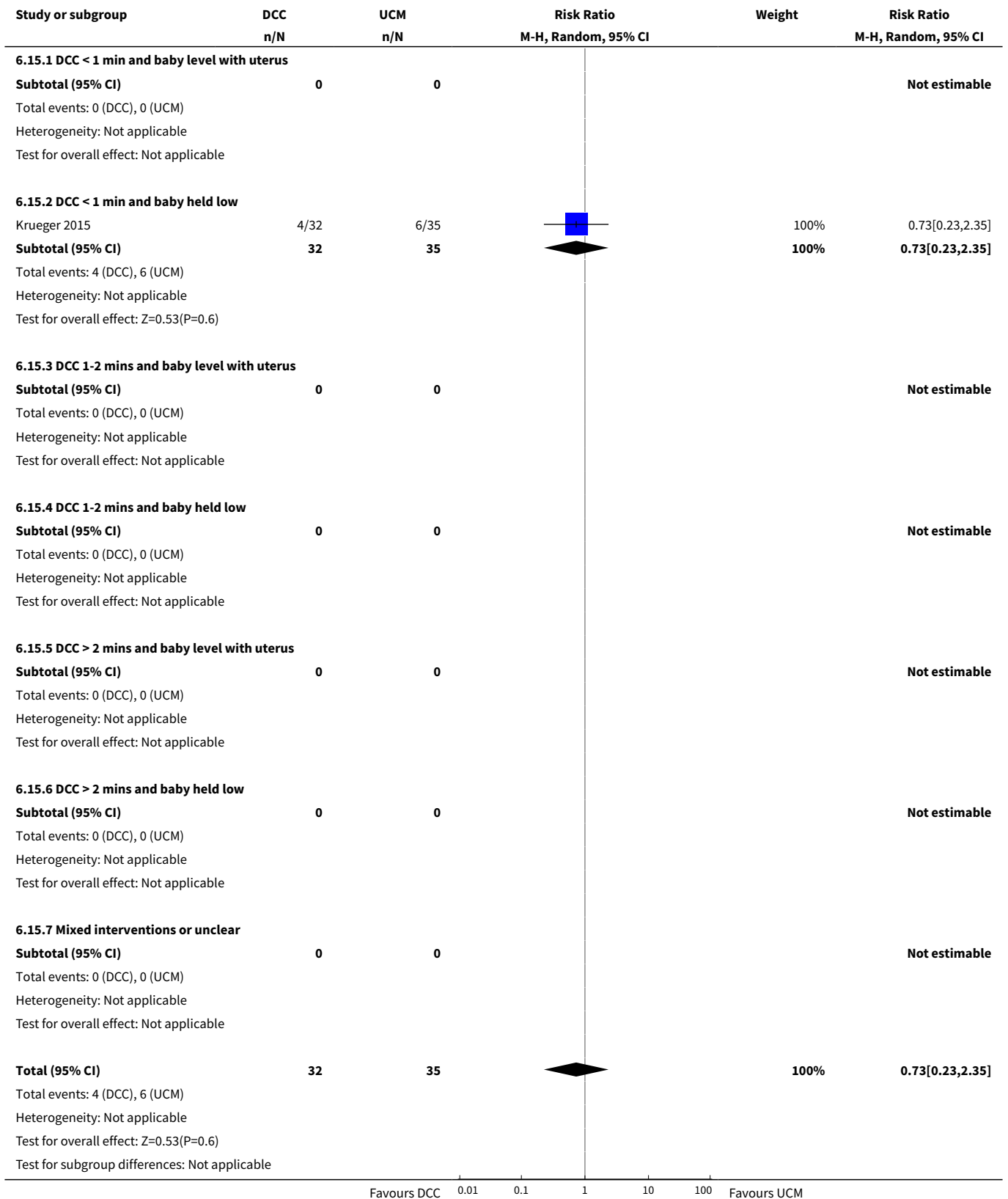


Analysis 6.13. Comparison 6 DCC with immediate neonatal care after cord clamping vs UCM (subgroup analysis by type of intervention), Outcome 13 Surfactant treatment (for severe RDS).

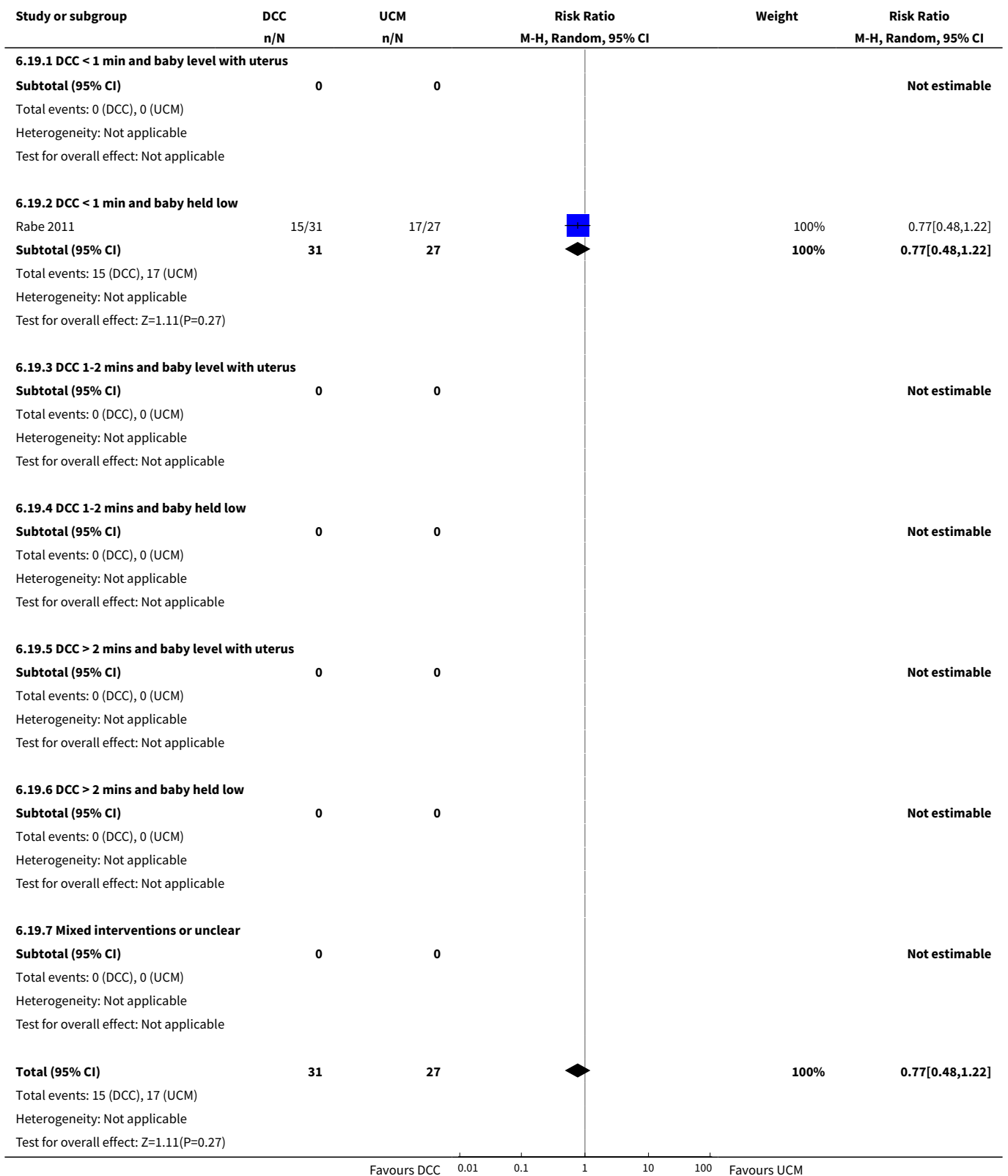


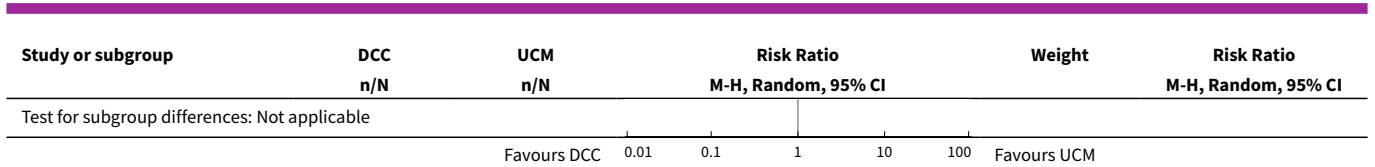


Analysis 6.15. Comparison 6 DCC with immediate neonatal care after cord clamping vs UCM (subgroup analysis by type of intervention), Outcome 15 Treatment for Retinopathy of Prematurity (RoP).

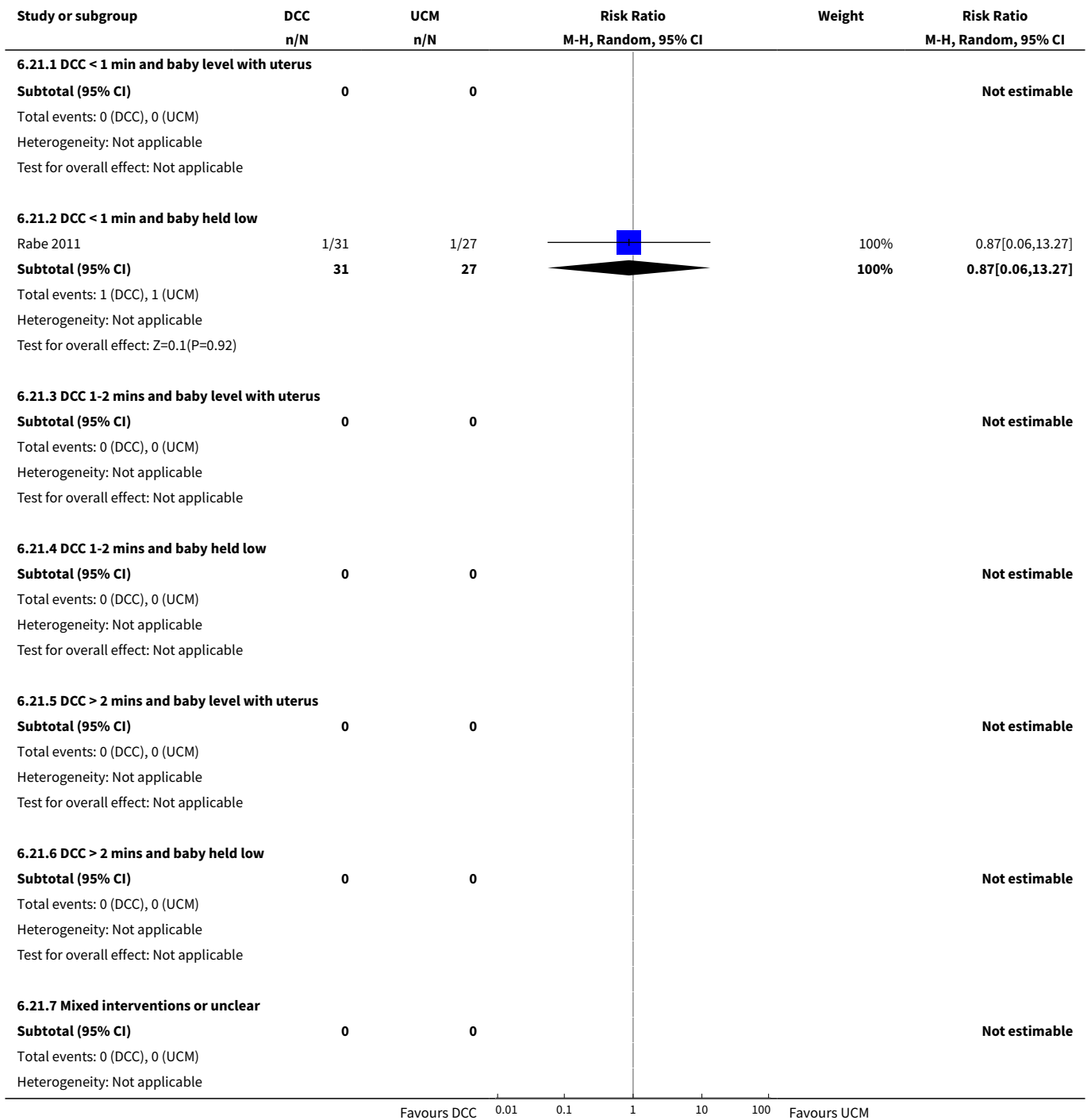


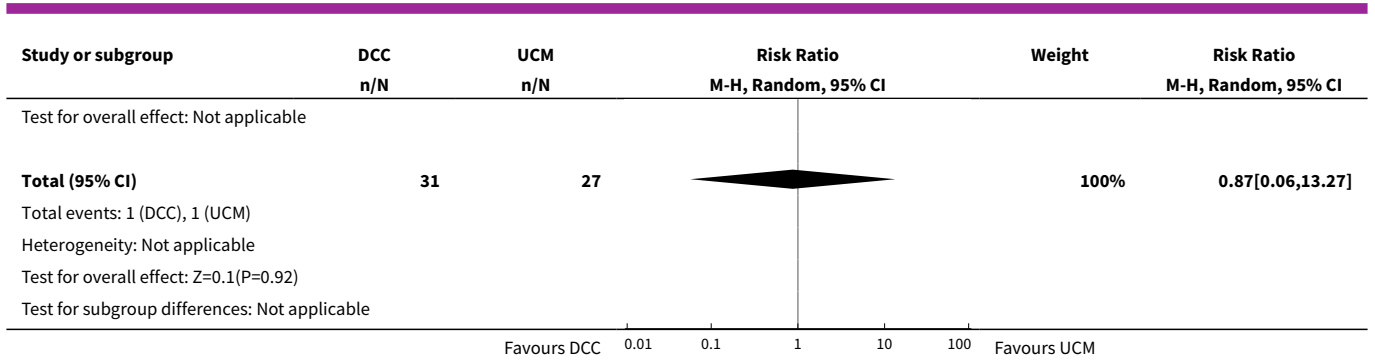
Analysis 6.19. Comparison 6 DCC with immediate neonatal care after cord clamping vs UCM (subgroup analysis by type of intervention), Outcome 19 Blood transfusion in infant.



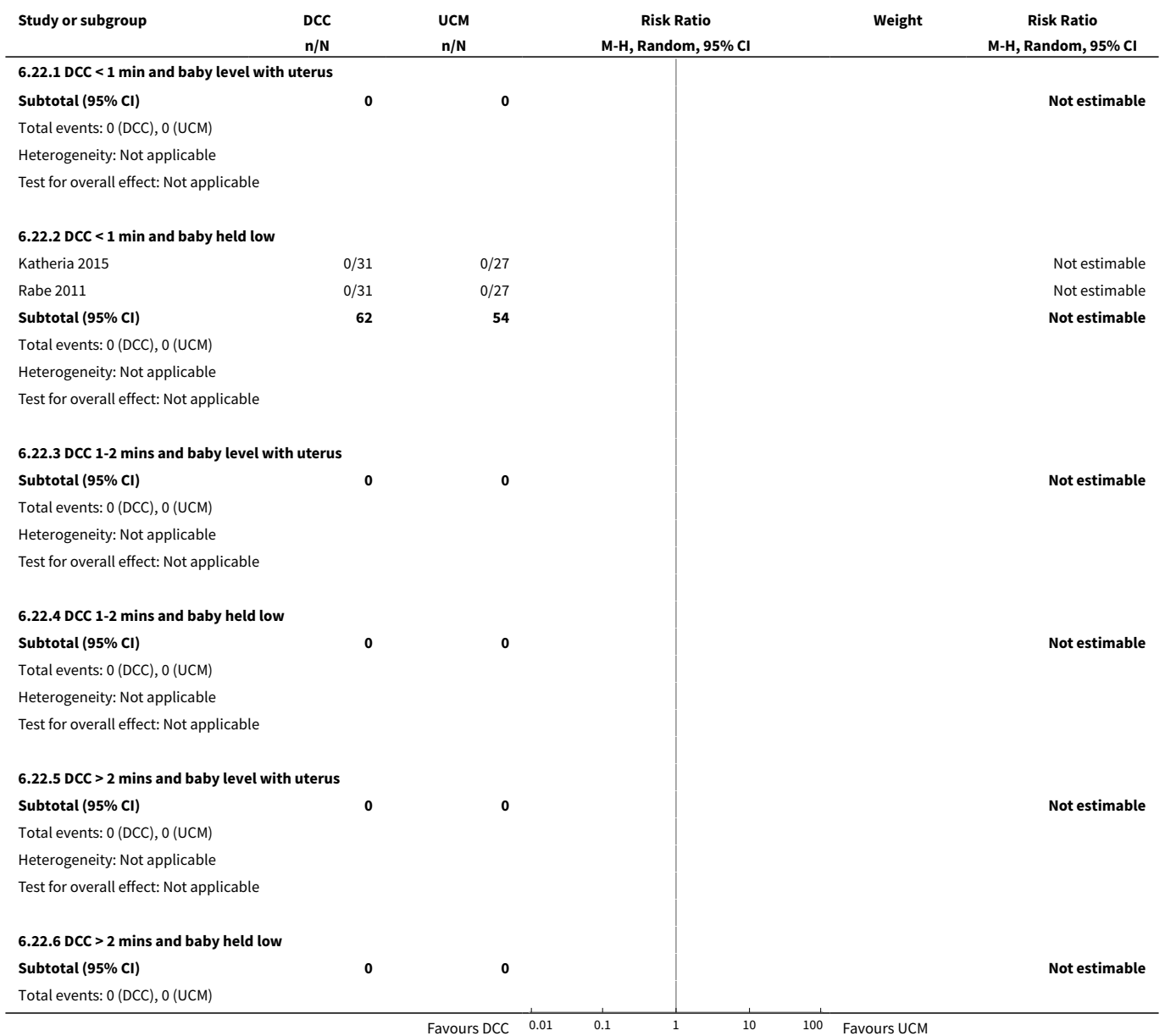


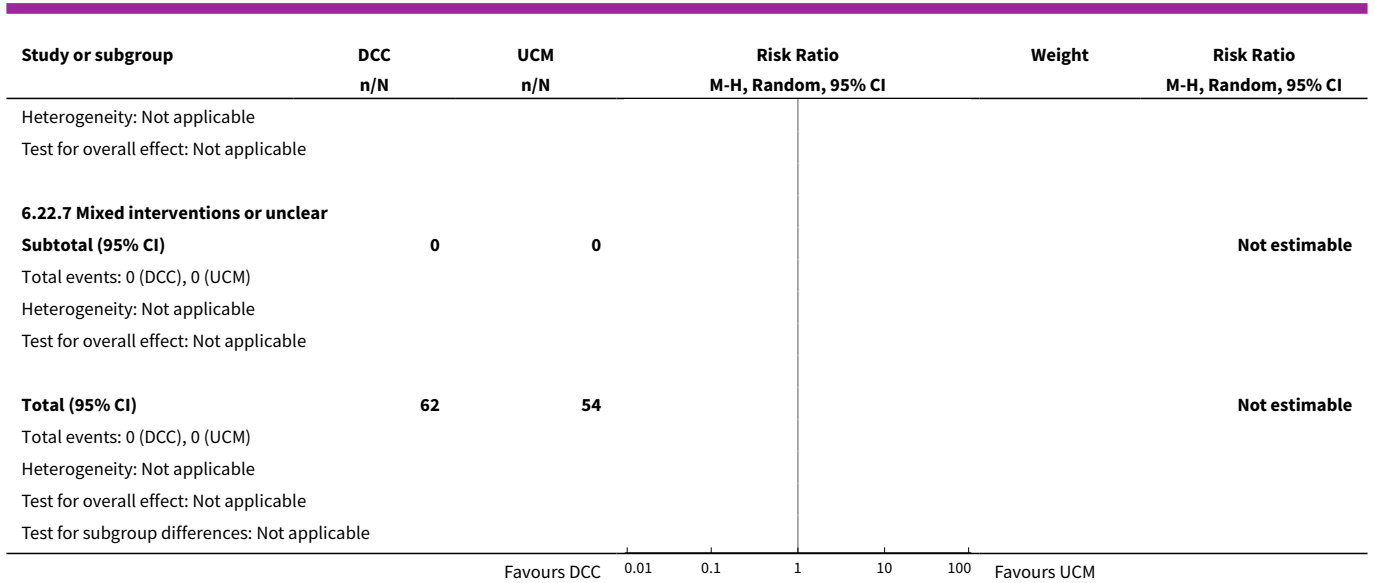
Analysis 6.21. Comparison 6 DCC with immediate neonatal care after cord clamping vs UCM (subgroup analysis by type of intervention), Outcome 21 Late sepsis (after 3 days or as defined by trialists).



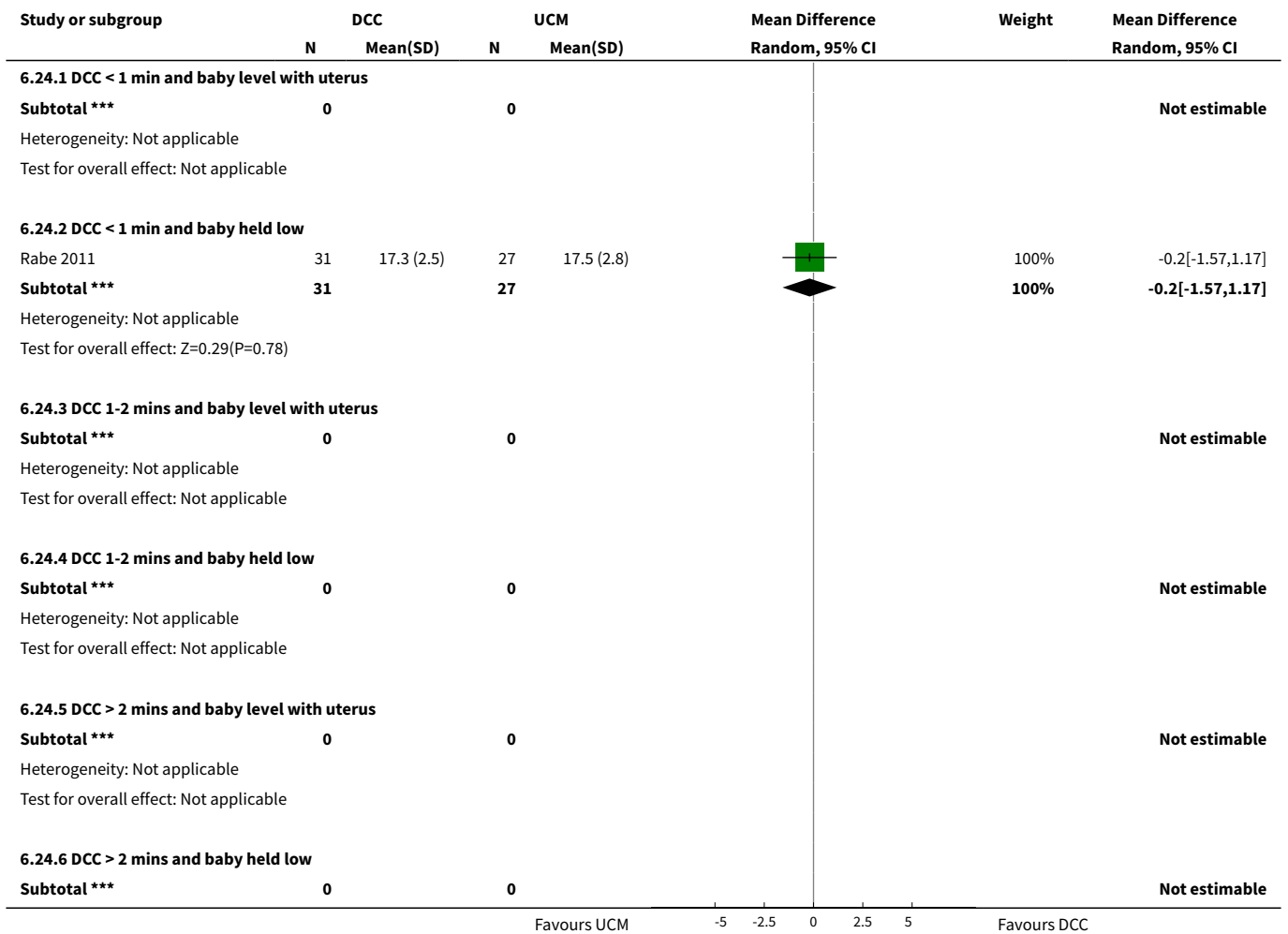


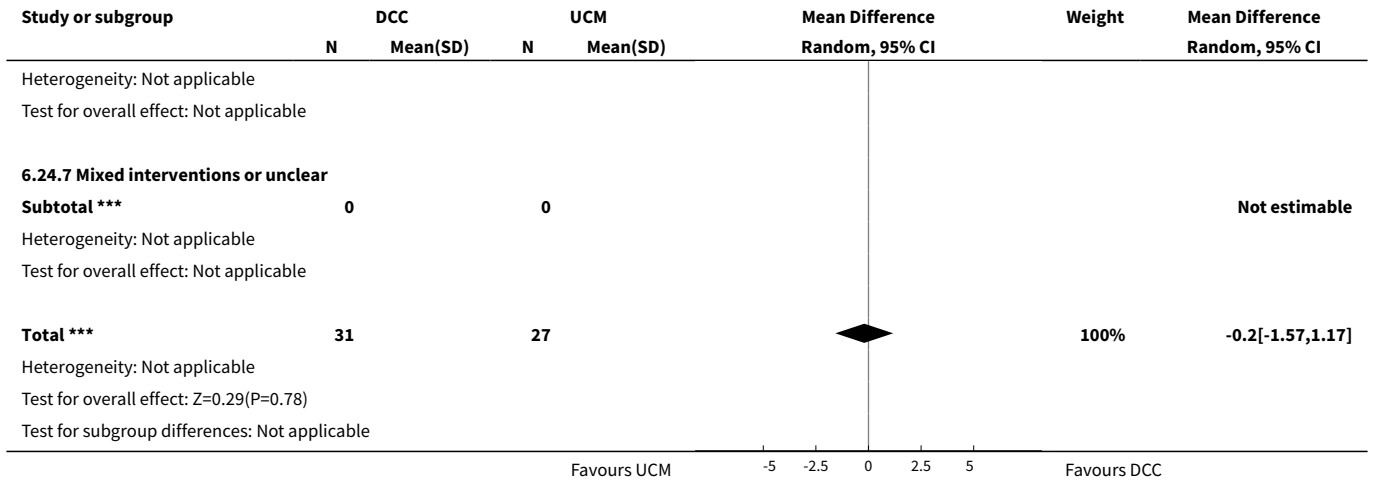
Analysis 6.22. Comparison 6 DCC with immediate neonatal care after cord clamping vs UCM (subgroup analysis by type of intervention), Outcome 22 Hydrocephalus.



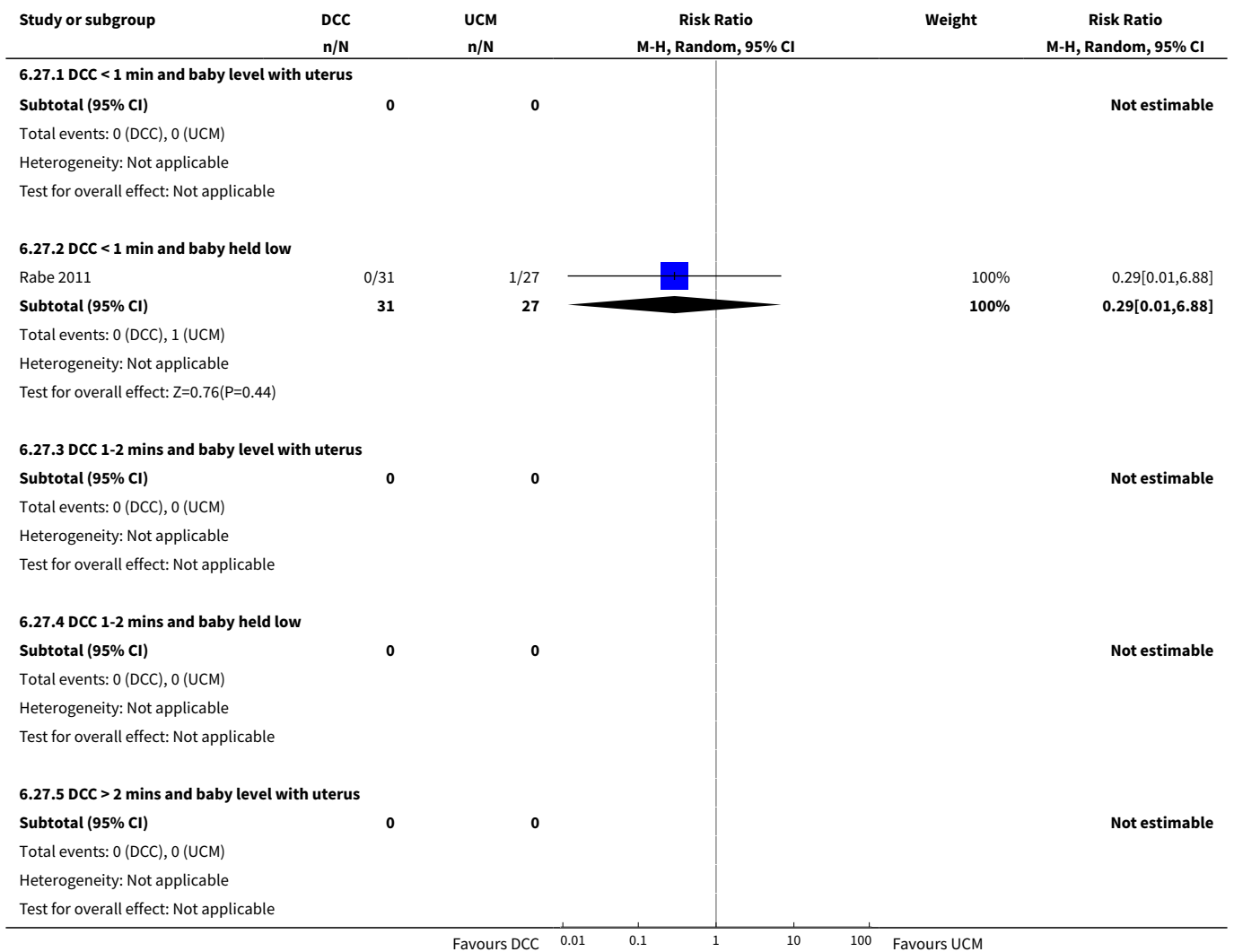


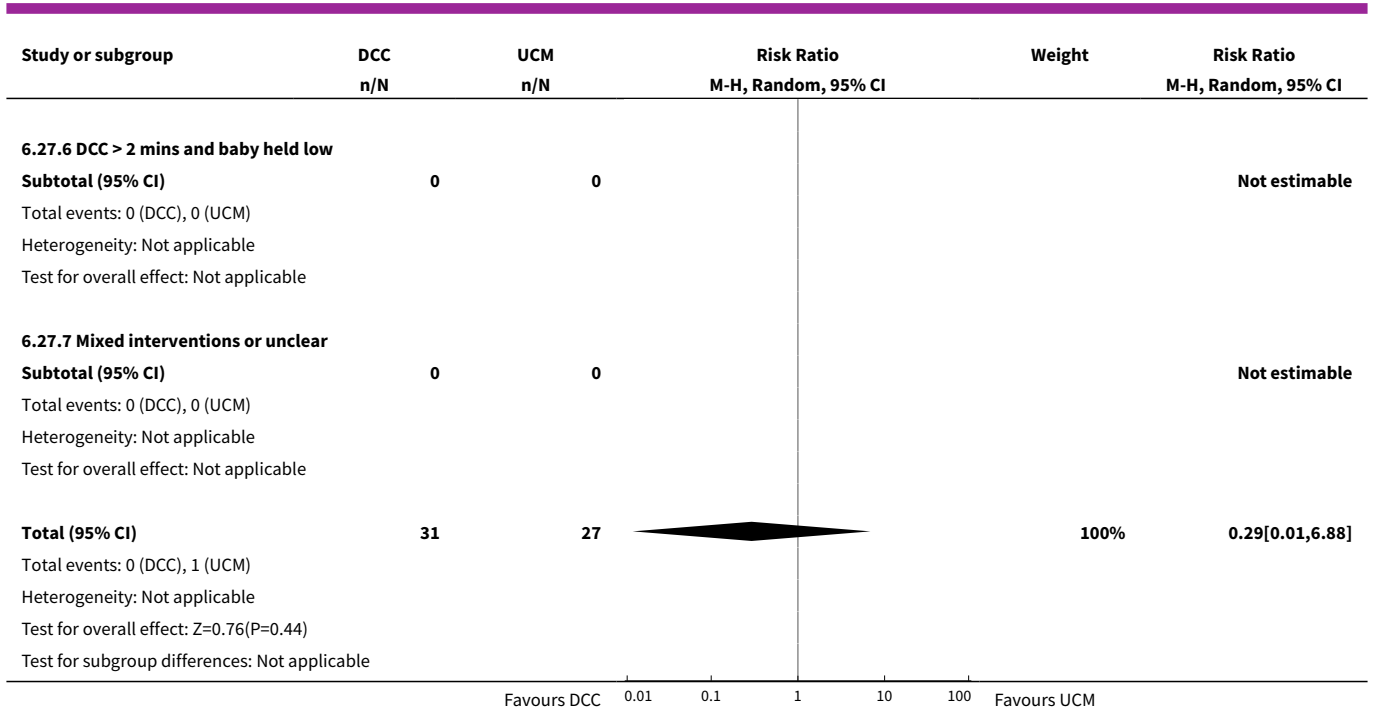
Analysis 6.24. Comparison 6 DCC with immediate neonatal care after cord clamping vs UCM (subgroup analysis by type of intervention), Outcome 24 Hb within 1st 24 hour of birth (g/dL).



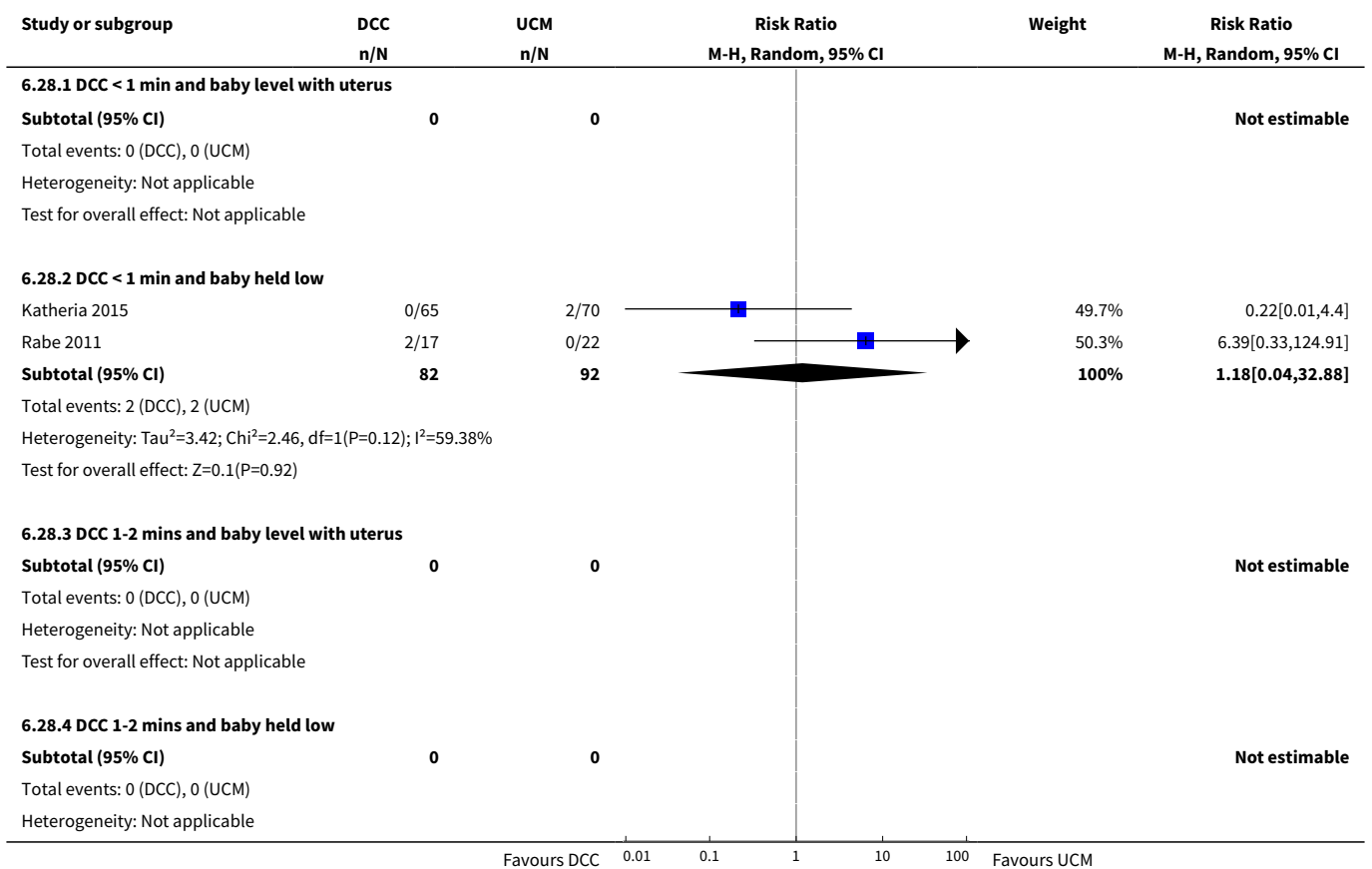


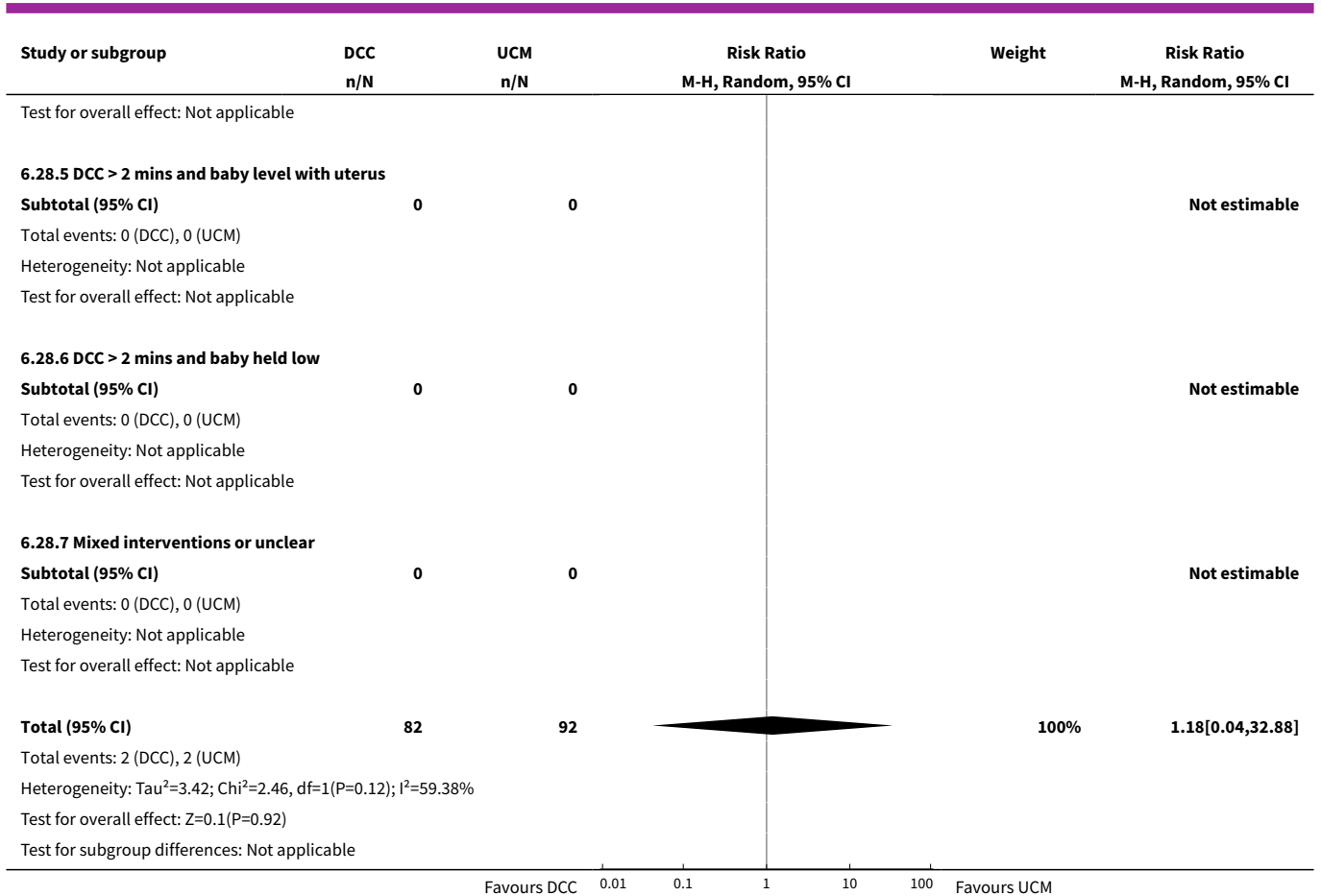
Analysis 6.27. Comparison 6 DCC with immediate neonatal care after cord clamping vs UCM (subgroup analysis by type of intervention), Outcome 27 Home oxygen.



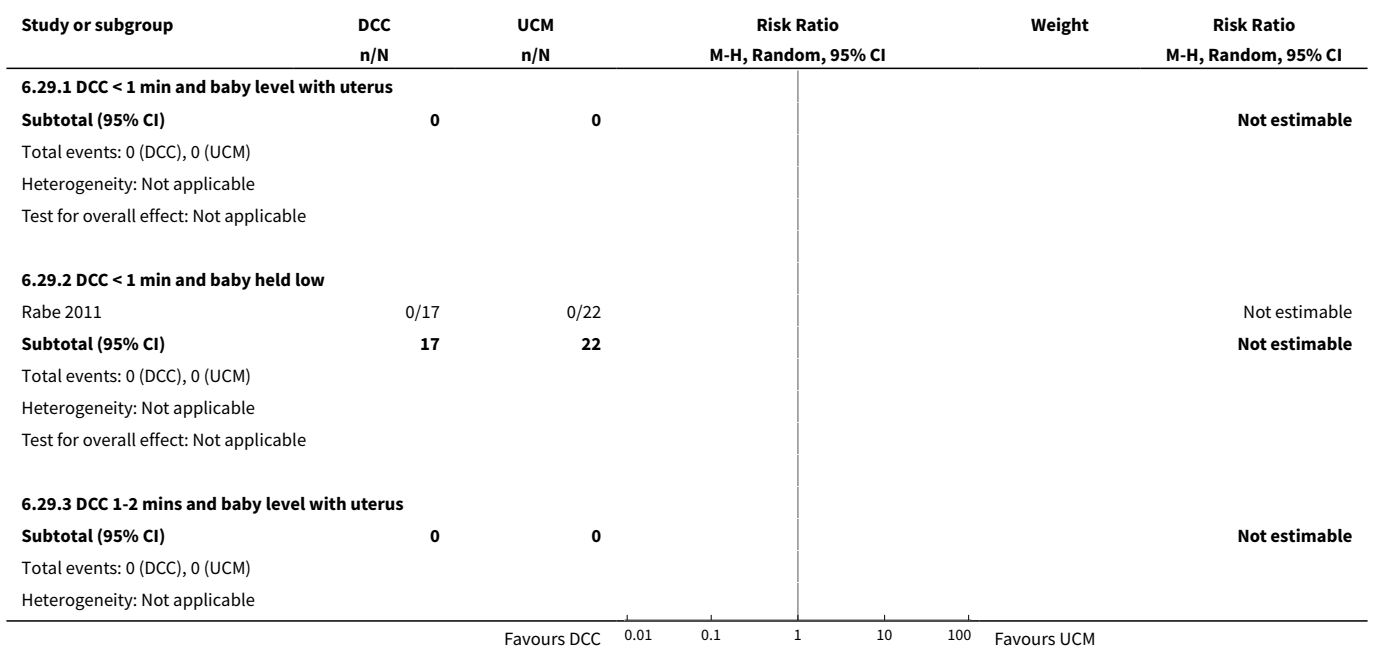


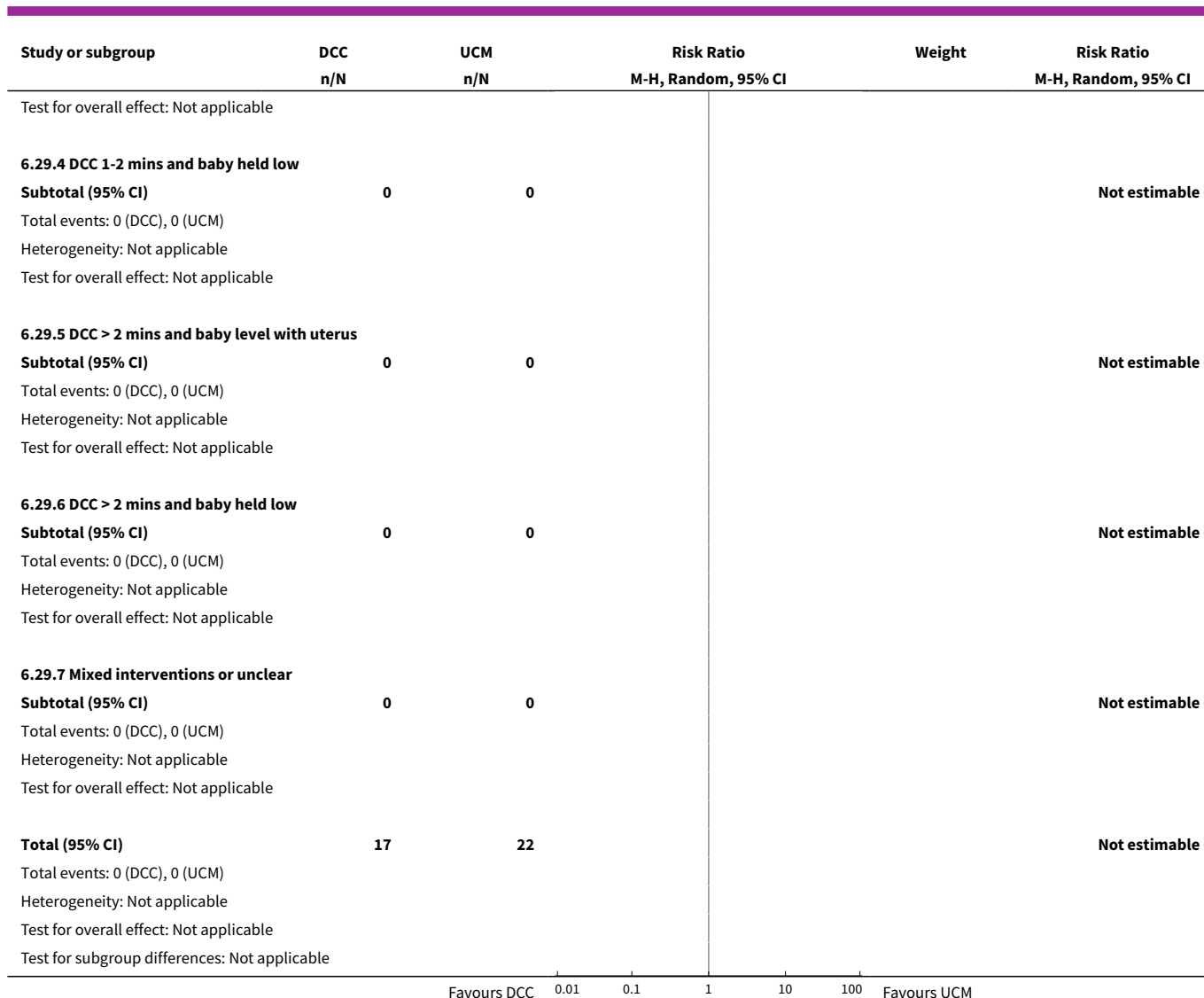
Analysis 6.28. Comparison 6 DCC with immediate neonatal care after cord clamping vs UCM (subgroup analysis by type of intervention), Outcome 28 Neurodevelopmental impairment at age two to three years.



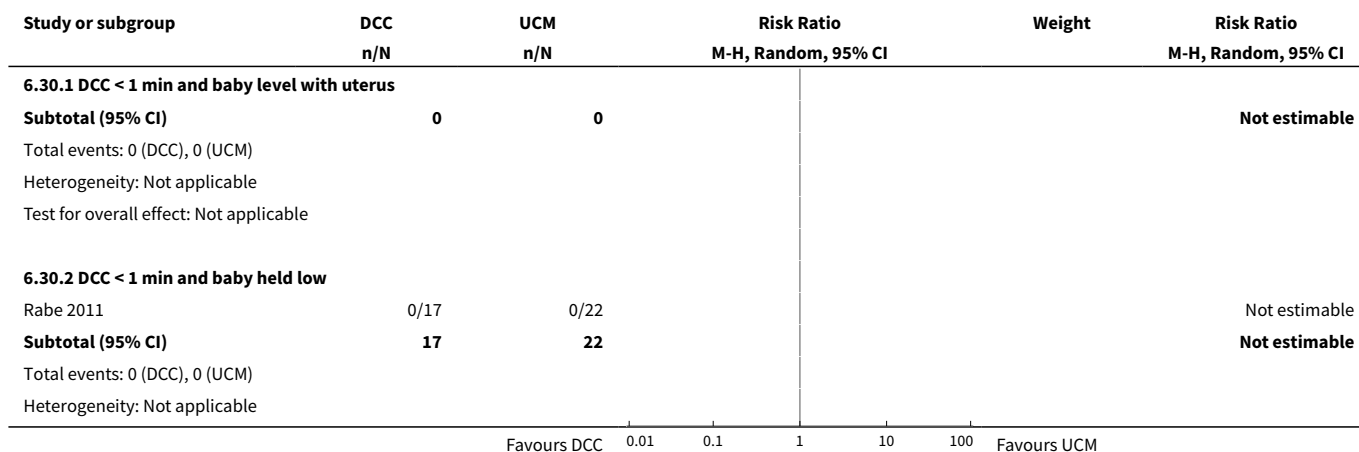


Analysis 6.29. Comparison 6 DCC with immediate neonatal care after cord clamping vs UCM (subgroup analysis by type of intervention), Outcome 29 Severe visual impairment.





Analysis 6.30. Comparison 6 DCC with immediate neonatal care after cord clamping vs UCM (subgroup analysis by type of intervention), Outcome 30 Cerebral palsy (CP).



Study or subgroup	DCC n/N	UCM n/N	Risk Ratio M-H, Random, 95% CI	Weight	Risk Ratio M-H, Random, 95% CI
Test for overall effect: Not applicable					
6.30.3 DCC 1-2 mins and baby level with uterus					
Subtotal (95% CI)	0	0			Not estimable
Total events: 0 (DCC), 0 (UCM)					
Heterogeneity: Not applicable					
Test for overall effect: Not applicable					
6.30.4 DCC 1-2 mins and baby held low					
Subtotal (95% CI)	0	0			Not estimable
Total events: 0 (DCC), 0 (UCM)					
Heterogeneity: Not applicable					
Test for overall effect: Not applicable					
6.30.5 DCC > 2 mins and baby level with uterus					
Subtotal (95% CI)	0	0			Not estimable
Total events: 0 (DCC), 0 (UCM)					
Heterogeneity: Not applicable					
Test for overall effect: Not applicable					
6.30.6 DCC > 2 mins and baby held low					
Subtotal (95% CI)	0	0			Not estimable
Total events: 0 (DCC), 0 (UCM)					
Heterogeneity: Not applicable					
Test for overall effect: Not applicable					
6.30.7 Mixed interventions or unclear					
Subtotal (95% CI)	0	0			Not estimable
Total events: 0 (DCC), 0 (UCM)					
Heterogeneity: Not applicable					
Test for overall effect: Not applicable					
Total (95% CI)	17	22			Not estimable
Total events: 0 (DCC), 0 (UCM)					
Heterogeneity: Not applicable					
Test for overall effect: Not applicable					
Test for subgroup differences: Not applicable					

Favours DCC 0.01 0.1 1 10 100 Favours UCM

Comparison 7. UCM vs ECC (subgroup analysis by gestation)

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Death of baby (up to discharge)	9	931	Risk Ratio (M-H, Random, 95% CI)	0.81 [0.47, 1.41]
1.1 < 32-34 weeks gestation	8	731	Risk Ratio (M-H, Random, 95% CI)	0.70 [0.38, 1.29]
1.2 > 32-34 weeks gestation	1	200	Risk Ratio (M-H, Random, 95% CI)	1.5 [0.44, 5.15]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
2 Death or neurodevelopmental impairment at age two to three years	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
2.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
2.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
2.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
3 Severe intraventricular haemorrhage (IVH grades 3, 4)	6	618	Risk Ratio (M-H, Random, 95% CI)	0.75 [0.39, 1.45]
3.1 < 32-34 weeks gestation	6	618	Risk Ratio (M-H, Random, 95% CI)	0.75 [0.39, 1.45]
3.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
3.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
4 Intraventricular haemorrhage (IVH, all grades)	8	716	Risk Ratio (M-H, Random, 95% CI)	0.85 [0.62, 1.18]
4.1 < 32-34 weeks gestation	8	716	Risk Ratio (M-H, Random, 95% CI)	0.85 [0.62, 1.18]
4.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
4.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
5 Periventricular leukomalacia (PVL)	3	315	Risk Ratio (M-H, Random, 95% CI)	0.63 [0.15, 2.63]
5.1 < 32-34 weeks gestation	3	315	Risk Ratio (M-H, Random, 95% CI)	0.63 [0.15, 2.63]
5.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
5.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
6 Chronic lung disease (CLD) - oxygen supplement at 36 weeks (corrected for gestation)	7	682	Risk Ratio (M-H, Random, 95% CI)	1.03 [0.64, 1.66]
6.1 < 32-34 weeks gestation	7	682	Risk Ratio (M-H, Random, 95% CI)	1.03 [0.64, 1.66]
6.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
6.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
7 Maternal blood loss of 500 mL or greater	1	200	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
7.1 < 32-34 weeks gestation	1	200	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
7.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
7.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
8 Intraventricular haemorrhage (IVH, grades 1 & 2)	6	618	Risk Ratio (M-H, Random, 95% CI)	0.74 [0.44, 1.25]
8.1 < 32-34 weeks gestation	6	618	Risk Ratio (M-H, Random, 95% CI)	0.74 [0.44, 1.25]
8.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
8.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
9 Necrotising enterocolitis (NEC) confirmed by X-ray or laparotomy)	6	616	Risk Ratio (M-H, Random, 95% CI)	0.75 [0.41, 1.38]
9.1 < 32-34 weeks gestation	6	616	Risk Ratio (M-H, Random, 95% CI)	0.75 [0.41, 1.38]
9.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
9.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
10 Respiratory Distress Syndrome (RDS)	4	515	Risk Ratio (M-H, Random, 95% CI)	1.05 [0.83, 1.32]
10.1 < 32-34 weeks gestation	3	315	Risk Ratio (M-H, Random, 95% CI)	1.00 [0.95, 1.05]
10.2 > 32-34 weeks gestation	1	200	Risk Ratio (M-H, Random, 95% CI)	2.0 [0.71, 5.64]
10.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
11 Respiratory support (ventilator or CPAP)	2	129	Risk Ratio (M-H, Random, 95% CI)	1.04 [0.74, 1.47]
11.1 < 32-34 weeks gestation	2	129	Risk Ratio (M-H, Random, 95% CI)	1.04 [0.74, 1.47]
11.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
11.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
12 Duration of respiratory support (days)	1	199	Mean Difference (IV, Random, 95% CI)	2.80 [-9.78, 15.38]
12.1 < 32-34 weeks gestation	1	199	Mean Difference (IV, Random, 95% CI)	2.80 [-9.78, 15.38]
12.2 > 32-34 weeks gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
12.3 Mixed gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
13 Surfactant treatment (for severe RDS)	5	433	Risk Ratio (M-H, Random, 95% CI)	1.13 [0.81, 1.58]
13.1 < 32-34 weeks gestation	5	433	Risk Ratio (M-H, Random, 95% CI)	1.13 [0.81, 1.58]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
13.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
13.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
14 Treatment for Patent Ductus Arteriosus (PDA) (medical and/or surgical)	5	411	Risk Ratio (M-H, Random, 95% CI)	1.00 [0.73, 1.38]
14.1 < 32-34 weeks gestation	5	411	Risk Ratio (M-H, Random, 95% CI)	1.00 [0.73, 1.38]
14.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
14.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
15 Treatment for Retinopathy of Prematurity (RoP)	5	274	Risk Ratio (M-H, Random, 95% CI)	0.95 [0.76, 1.19]
15.1 < 32-34 weeks gestation	5	274	Risk Ratio (M-H, Random, 95% CI)	0.95 [0.76, 1.19]
15.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
15.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
16 Hyperbilirubinemia (treated by phototherapy)	3	475	Risk Ratio (M-H, Random, 95% CI)	1.39 [0.73, 2.63]
16.1 < 32-34 weeks gestation	2	275	Risk Ratio (M-H, Random, 95% CI)	0.95 [0.86, 1.06]
16.2 > 32-34 weeks gestation	1	200	Risk Ratio (M-H, Random, 95% CI)	3.67 [1.85, 7.26]
16.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
17 Inotropics for low blood pressure	3	300	Risk Ratio (M-H, Random, 95% CI)	0.61 [0.36, 1.04]
17.1 < 32-34 weeks gestation	3	300	Risk Ratio (M-H, Random, 95% CI)	0.61 [0.36, 1.04]
17.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
17.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
18 Low Apgar as defined by trialists (generally < 8 at 5 mins)	2	398	Risk Ratio (M-H, Random, 95% CI)	1.03 [0.67, 1.60]
18.1 < 32-34 weeks gestation	2	398	Risk Ratio (M-H, Random, 95% CI)	1.03 [0.67, 1.60]
18.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
18.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
19 Blood transfusion in infant	6	567	Risk Ratio (M-H, Random, 95% CI)	0.71 [0.57, 0.89]
19.1 < 32-34 weeks gestation	6	567	Risk Ratio (M-H, Random, 95% CI)	0.71 [0.57, 0.89]

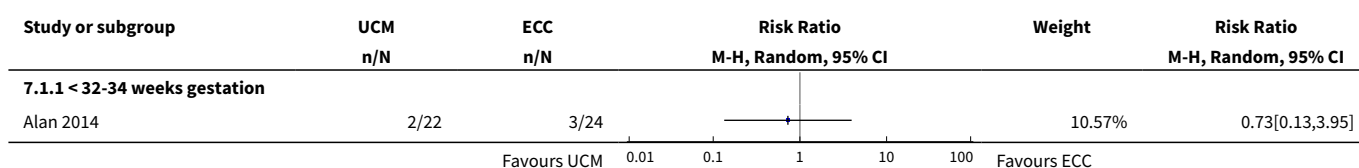
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
19.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
19.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
20 Volume of blood transfused (mL)	1	199	Mean Difference (IV, Random, 95% CI)	-19.0 [-39.61, 1.61]
20.1 < 32-34 weeks gestation	1	199	Mean Difference (IV, Random, 95% CI)	-19.0 [-39.61, 1.61]
20.2 > 32-34 weeks gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
20.3 Mixed gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
21 Late sepsis (after 3 days or as defined by trialists)	4	385	Risk Ratio (M-H, Random, 95% CI)	0.87 [0.64, 1.19]
21.1 < 32-34 weeks gestation	4	385	Risk Ratio (M-H, Random, 95% CI)	0.87 [0.64, 1.19]
21.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
21.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
22 Hydrocephalus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
22.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
22.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
22.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
23 Temperature < 36.0°C within 1 hour of birth	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
23.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
23.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
23.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
24 Hb within 1st 24 hour of birth (g/dL)	7	905	Mean Difference (IV, Random, 95% CI)	0.84 [0.54, 1.14]
24.1 < 32-34 weeks gestation	6	705	Mean Difference (IV, Random, 95% CI)	0.87 [0.54, 1.20]
24.2 > 32-34 weeks gestation	1	200	Mean Difference (IV, Random, 95% CI)	0.70 [0.00, 1.40]
24.3 Mixed gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
25 Mean arterial blood pressure	2	408	Mean Difference (IV, Random, 95% CI)	0.38 [-1.33, 2.09]
25.1 < 32-34 weeks gestation	1	208	Mean Difference (IV, Random, 95% CI)	0.0 [-2.17, 2.17]
25.2 > 32-34 weeks gestation	1	200	Mean Difference (IV, Random, 95% CI)	1.0 [-1.76, 3.76]

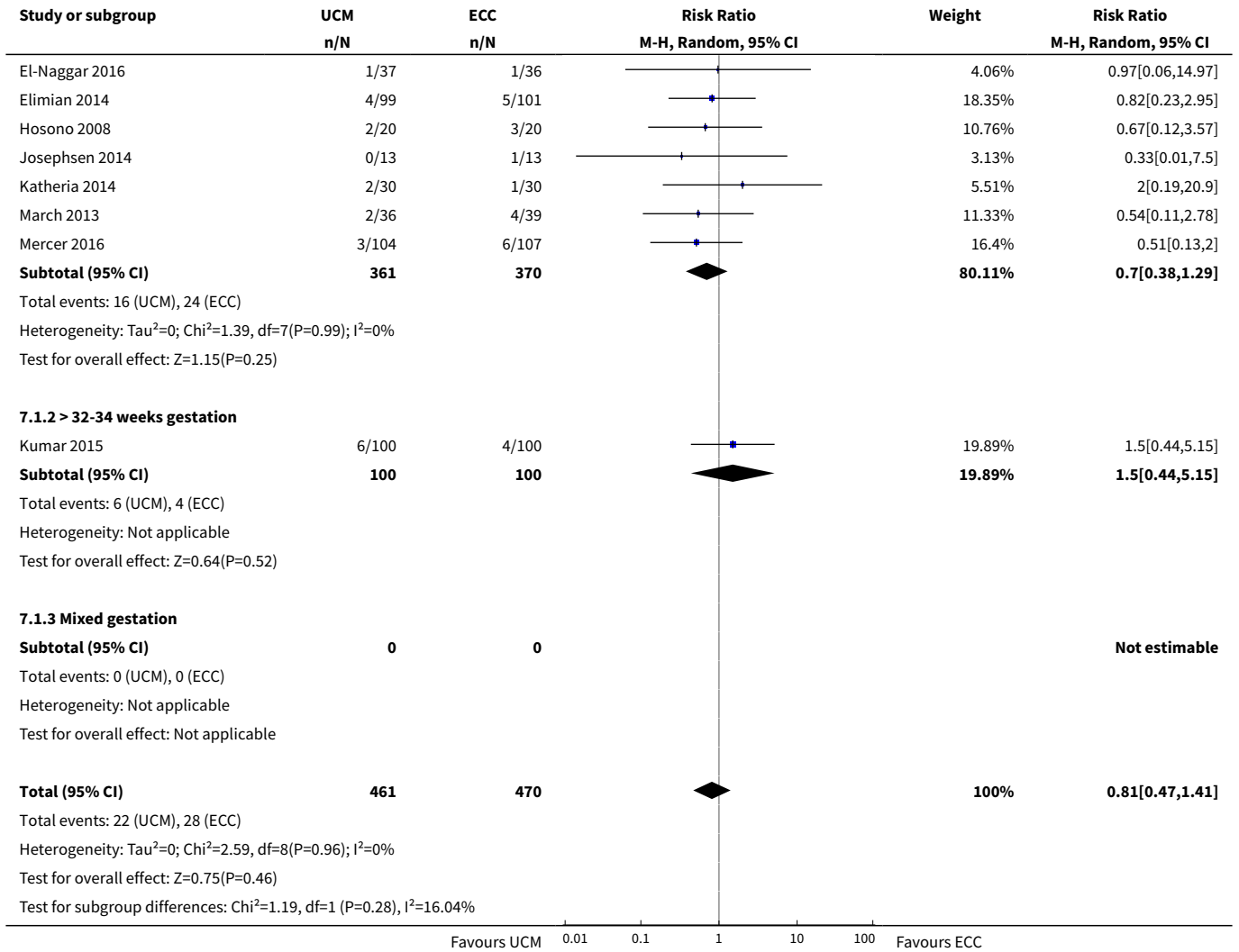
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
25.3 Mixed gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
26 Length of infant stay in NICU (in weeks)	1	199	Mean Difference (IV, Random, 95% CI)	5.30 [-5.49, 16.09]
26.1 < 32-34 weeks gestation	1	199	Mean Difference (IV, Random, 95% CI)	5.30 [-5.49, 16.09]
26.2 > 32-34 weeks gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
26.3 Mixed gestation	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
27 Home oxygen	1	199	Risk Ratio (M-H, Random, 95% CI)	0.89 [0.38, 2.10]
27.1 < 32-34 weeks gestation	1	199	Risk Ratio (M-H, Random, 95% CI)	0.89 [0.38, 2.10]
27.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
27.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
28 Neurodevelopmental impairment at age two to three years	2	187	Risk Ratio (M-H, Random, 95% CI)	1.25 [0.49, 3.17]
28.1 < 32-34 weeks gestation	2	187	Risk Ratio (M-H, Random, 95% CI)	1.25 [0.49, 3.17]
28.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
28.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
29 Severe visual impairment	1	125	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
29.1 < 32-34 weeks gestation	1	125	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
29.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
29.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
30 Cerebral palsy (CP)	2	286	Risk Ratio (M-H, Random, 95% CI)	0.70 [0.05, 10.63]
30.1 < 32-34 weeks gestation	2	286	Risk Ratio (M-H, Random, 95% CI)	0.70 [0.05, 10.63]
30.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
30.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
31 Manual removal of placenta (denominator = vaginal births)	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
31.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
31.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
31.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
32 Prolonged third stage (> 30 minutes) (denominator = vaginal births)	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
32.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
32.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
32.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
33 Blood transfusion for mother	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
33.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
33.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
33.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
34 Postpartum infection in mother	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
34.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
34.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
34.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
35 Rhesus isoimmunisation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
35.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
35.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
35.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
36 Psychological well being in mother	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
36.1 < 32-34 weeks gestation	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
36.2 > 32-34 weeks gestation	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
36.3 Mixed gestation	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37 Bonding	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37.1 < 32-34 weeks gestation	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]

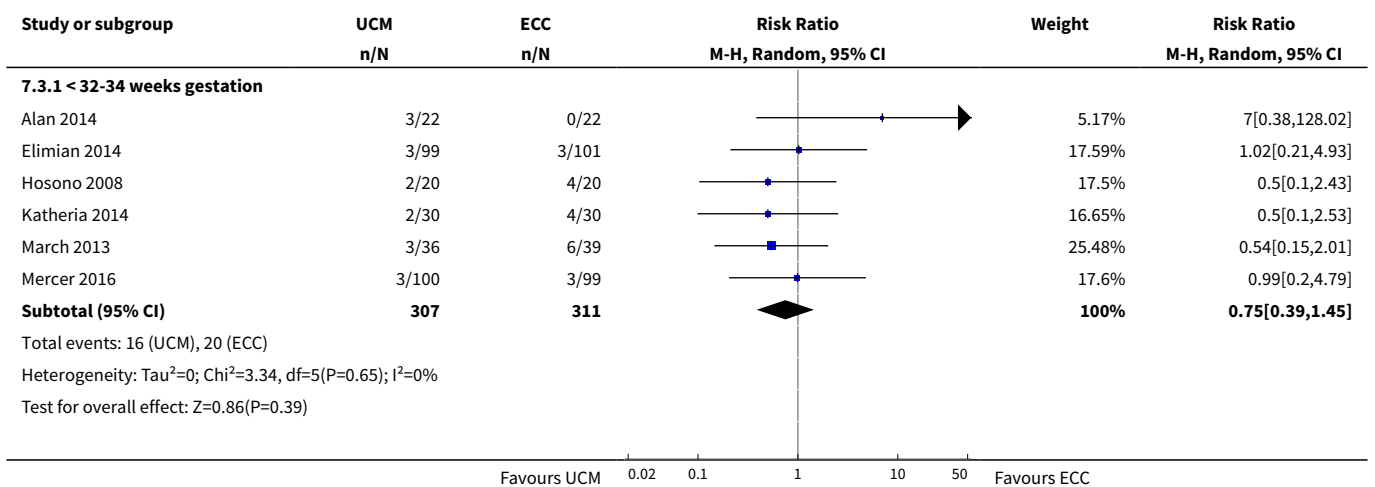
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
37.2 > 32-34 weeks gestation	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37.3 Mixed gestation	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
38 Breastfeeding initiation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
38.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
38.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
38.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
39 Fully breastfed or mixed feeding at infant discharge	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
39.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
39.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
39.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40 Maternal anxiety	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40.1 < 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40.2 > 32-34 weeks gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40.3 Mixed gestation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
41 Mothers' views	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
41.1 < 32-34 weeks gestation	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
41.2 > 32-34 weeks gestation	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
41.3 Mixed gestation	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]

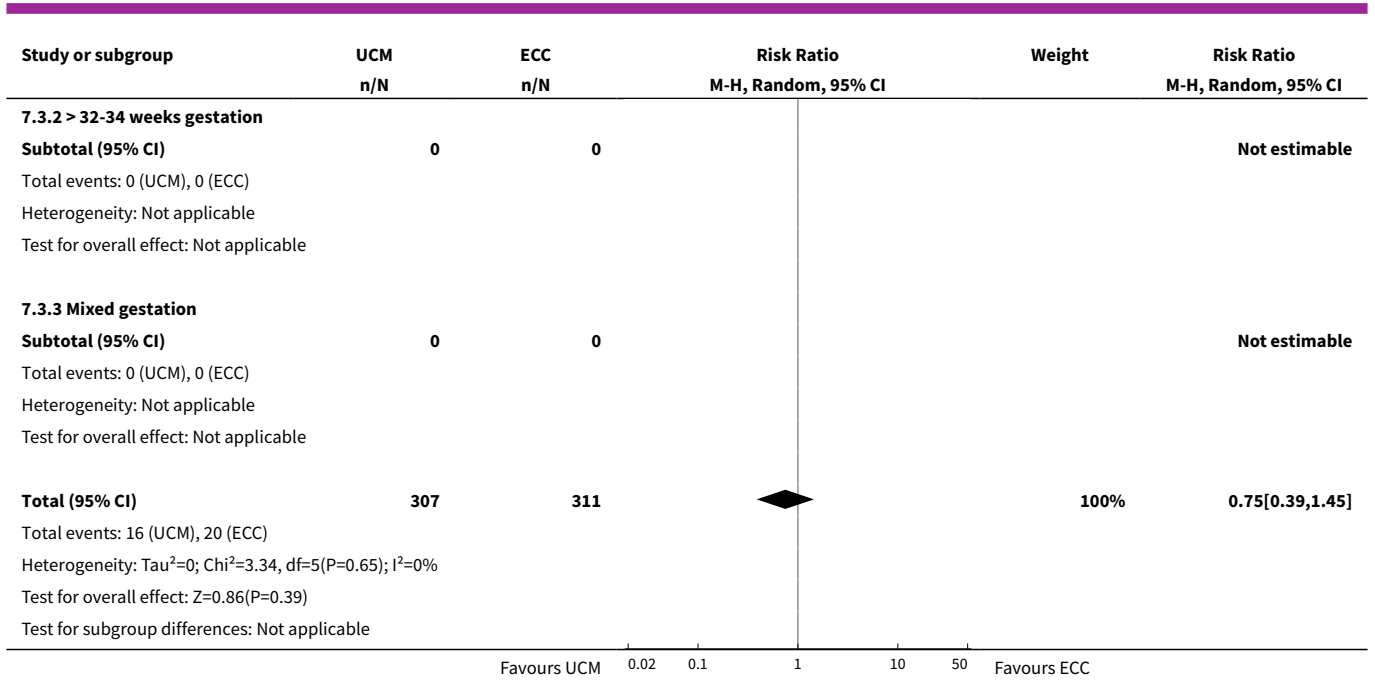
Analysis 7.1. Comparison 7 UCM vs ECC (subgroup analysis by gestation), Outcome 1 Death of baby (up to discharge).



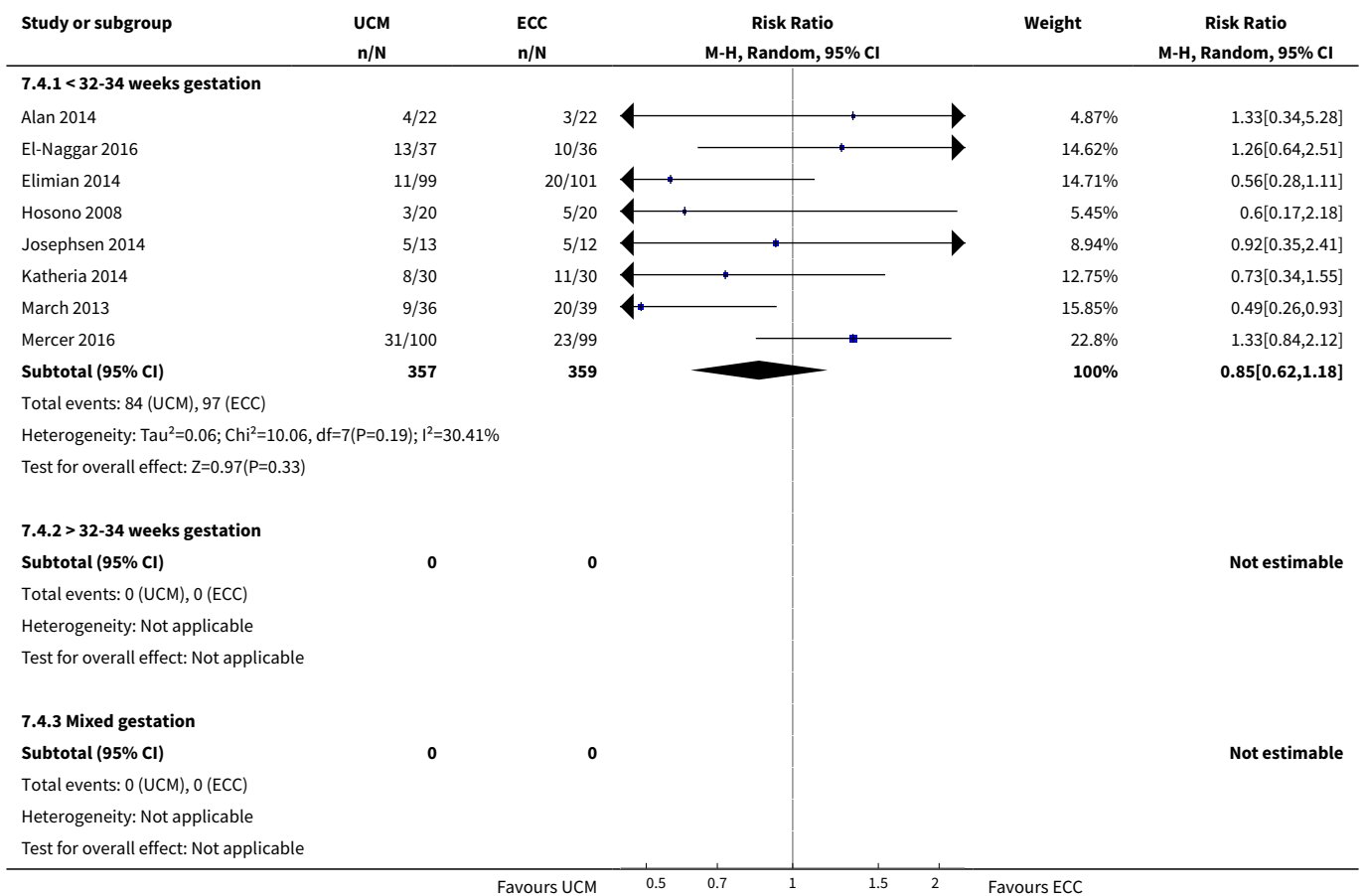


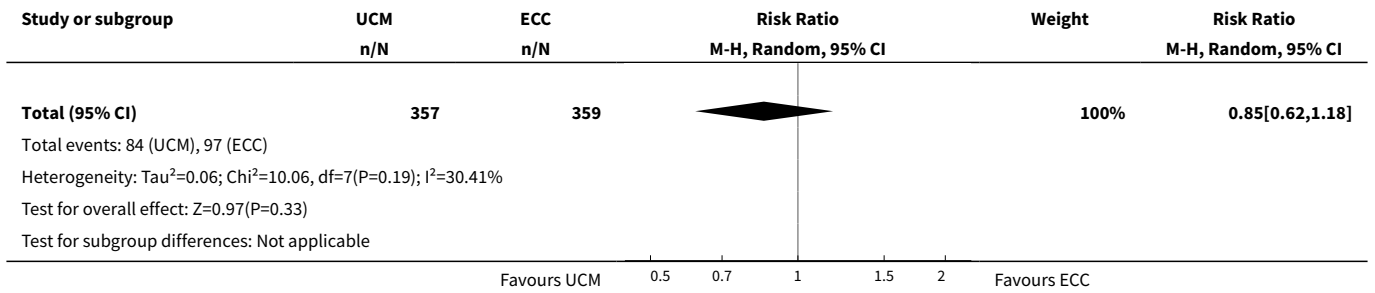
Analysis 7.3. Comparison 7 UCM vs ECC (subgroup analysis by gestation), Outcome 3 Severe intraventricular haemorrhage (IVH grades 3, 4).



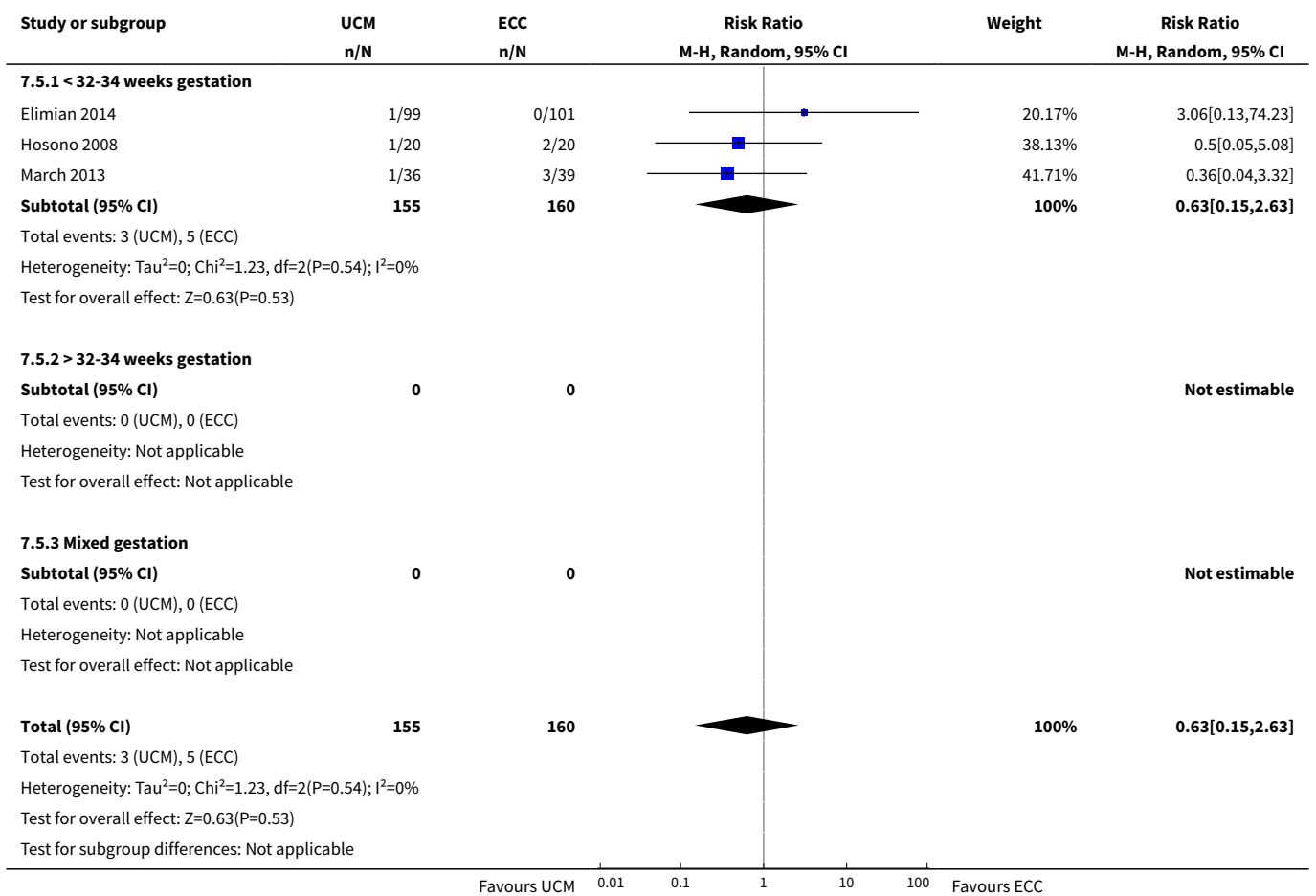


Analysis 7.4. Comparison 7 UCM vs ECC (subgroup analysis by gestation), Outcome 4 Intraventricular haemorrhage (IVH, all grades).

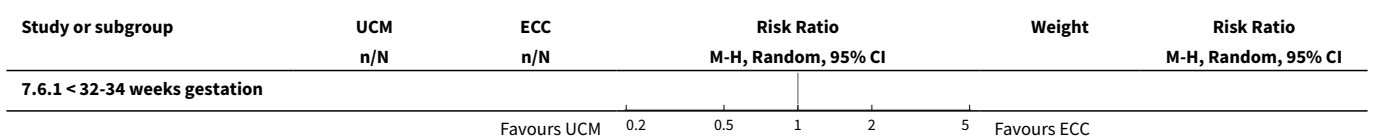


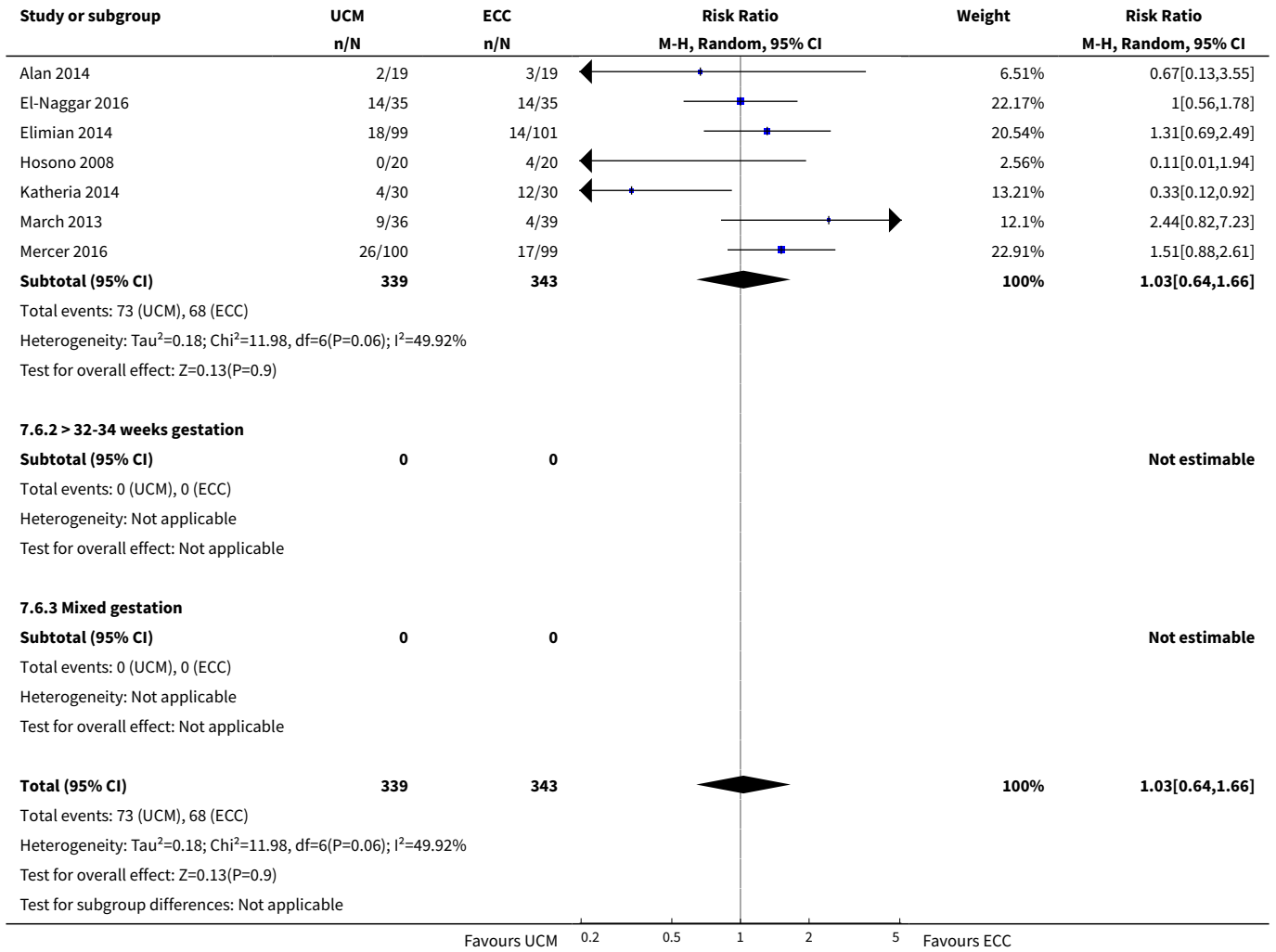


Analysis 7.5. Comparison 7 UCM vs ECC (subgroup analysis by gestation), Outcome 5 Periventricular leukomalacia (PVL).

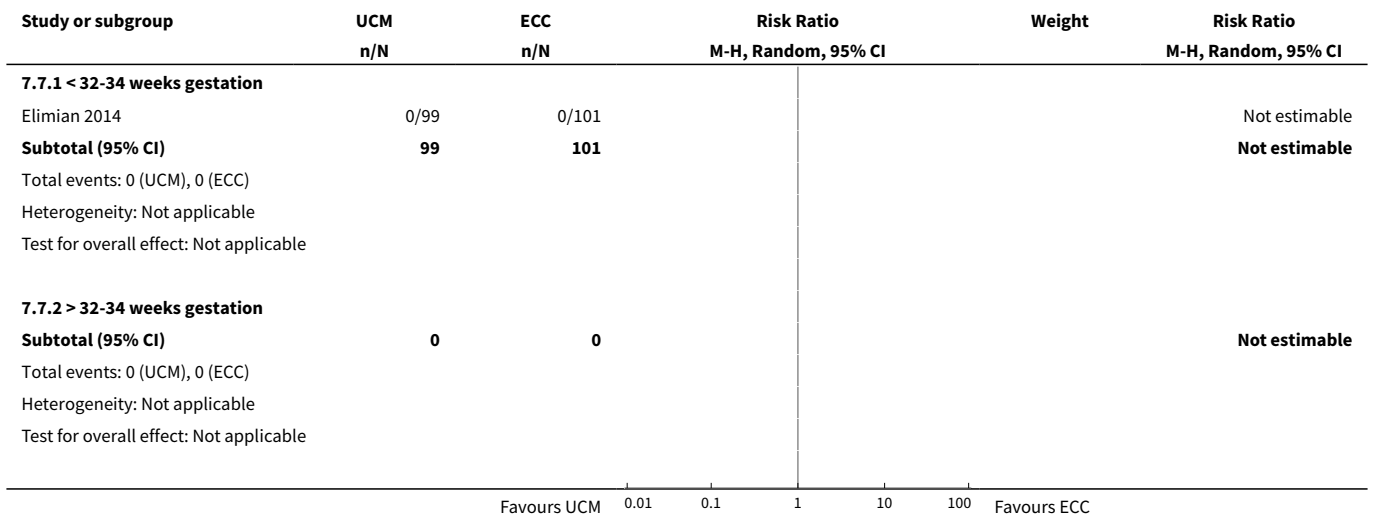


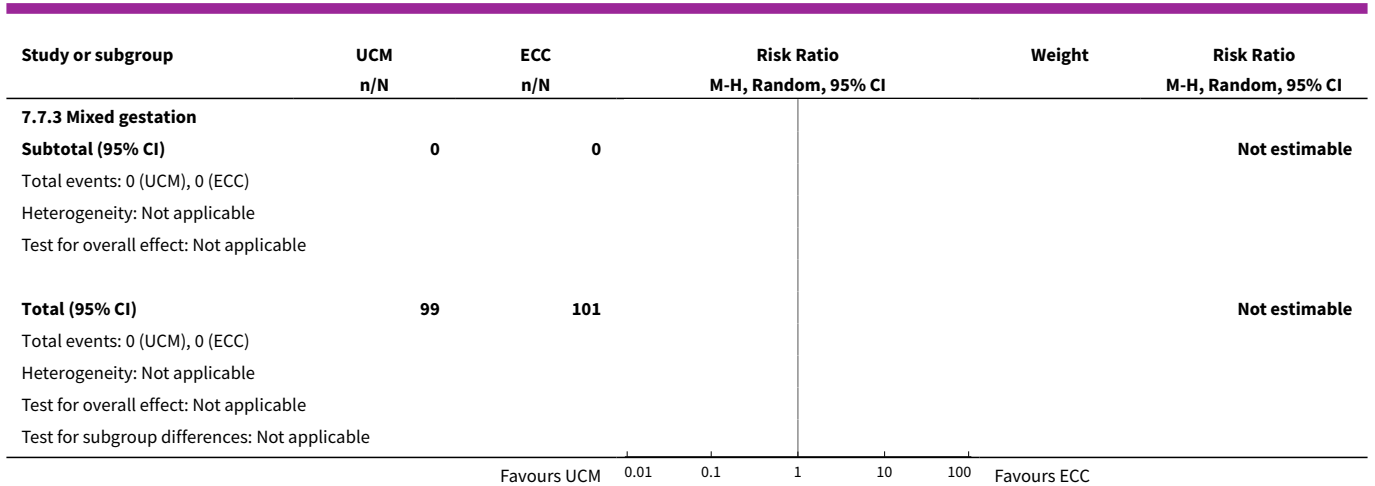
Analysis 7.6. Comparison 7 UCM vs ECC (subgroup analysis by gestation), Outcome 6 Chronic lung disease (CLD) - oxygen supplement at 36 weeks (corrected for gestation).



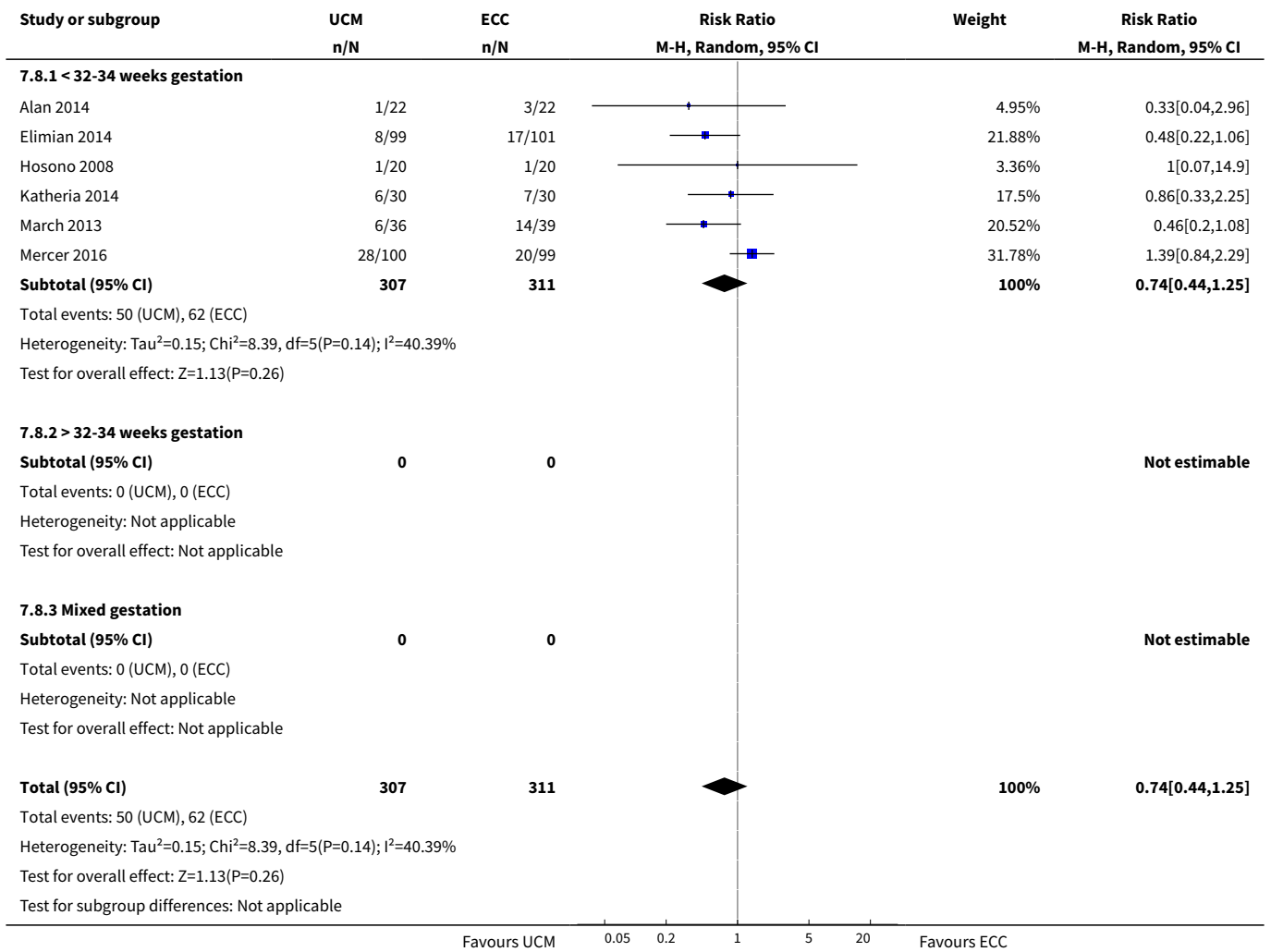


Analysis 7.7. Comparison 7 UCM vs ECC (subgroup analysis by gestation), Outcome 7 Maternal blood loss of 500 mL or greater.

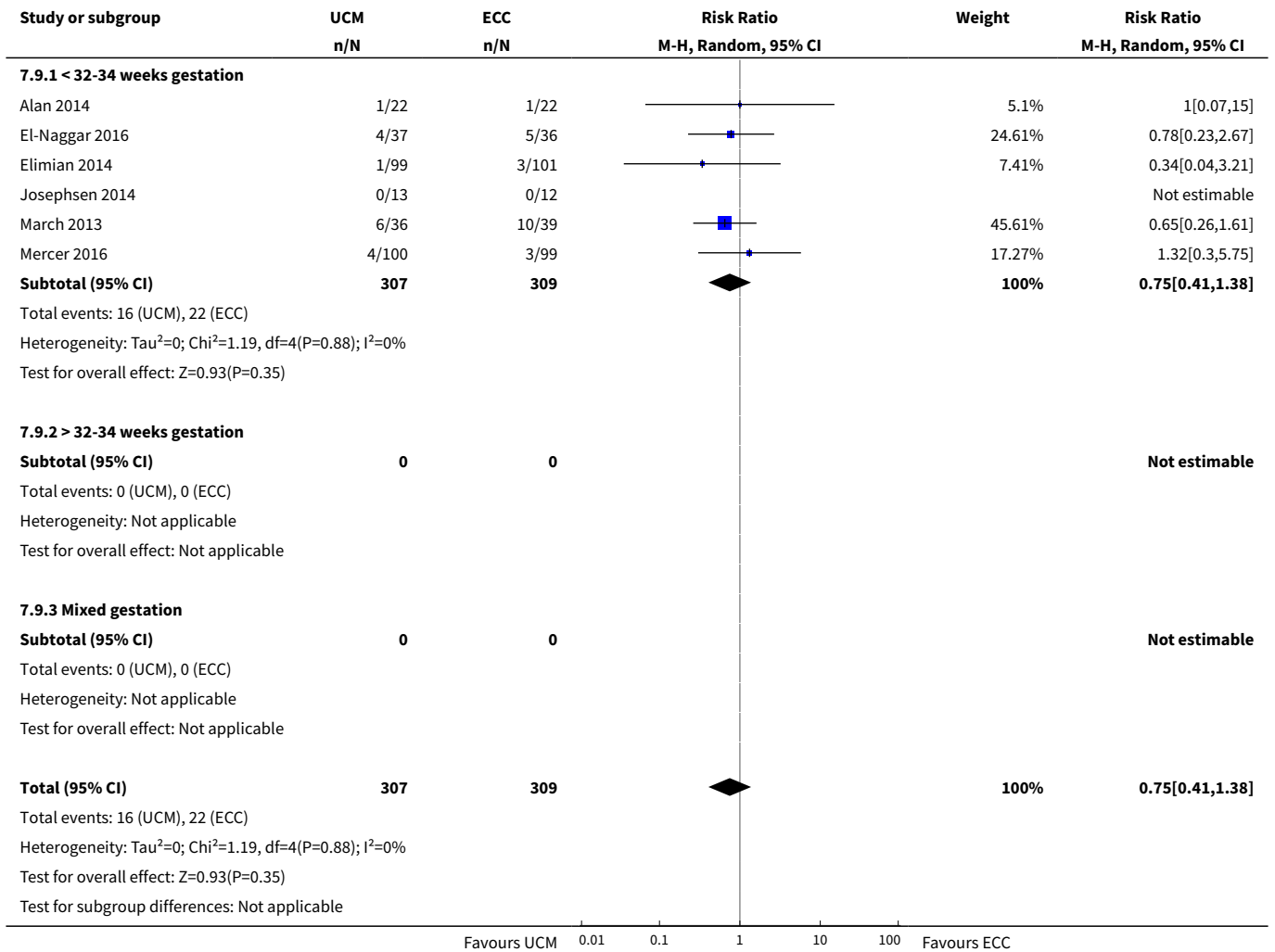




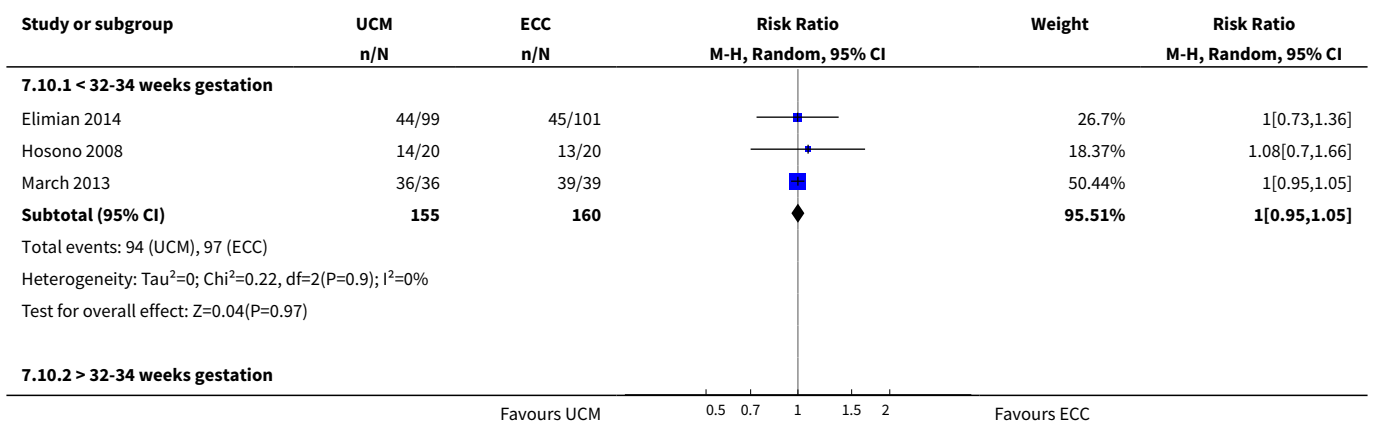
Analysis 7.8. Comparison 7 UCM vs ECC (subgroup analysis by gestation), Outcome 8 Intraventricular haemorrhage (IVH, grades 1 & 2).

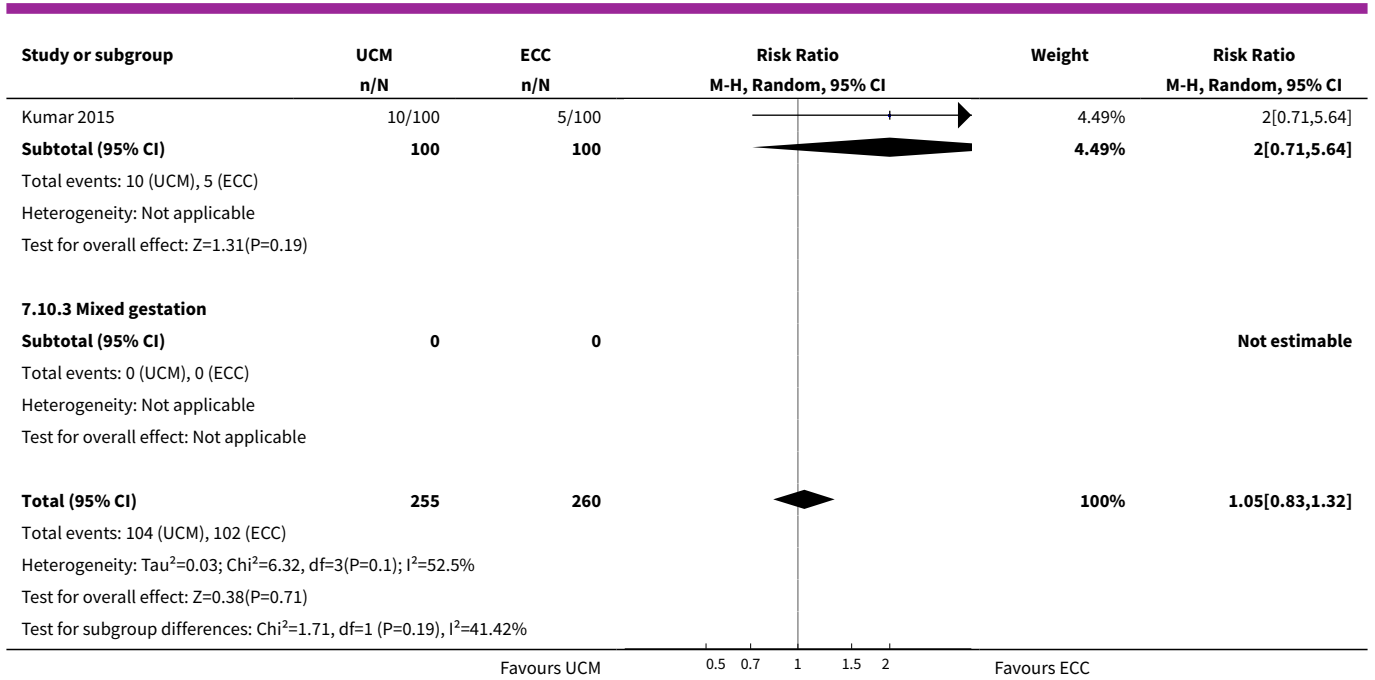


Analysis 7.9. Comparison 7 UCM vs ECC (subgroup analysis by gestation), Outcome 9 Necrotising enterocolitis (NEC) confirmed by X-ray or laparotomy).

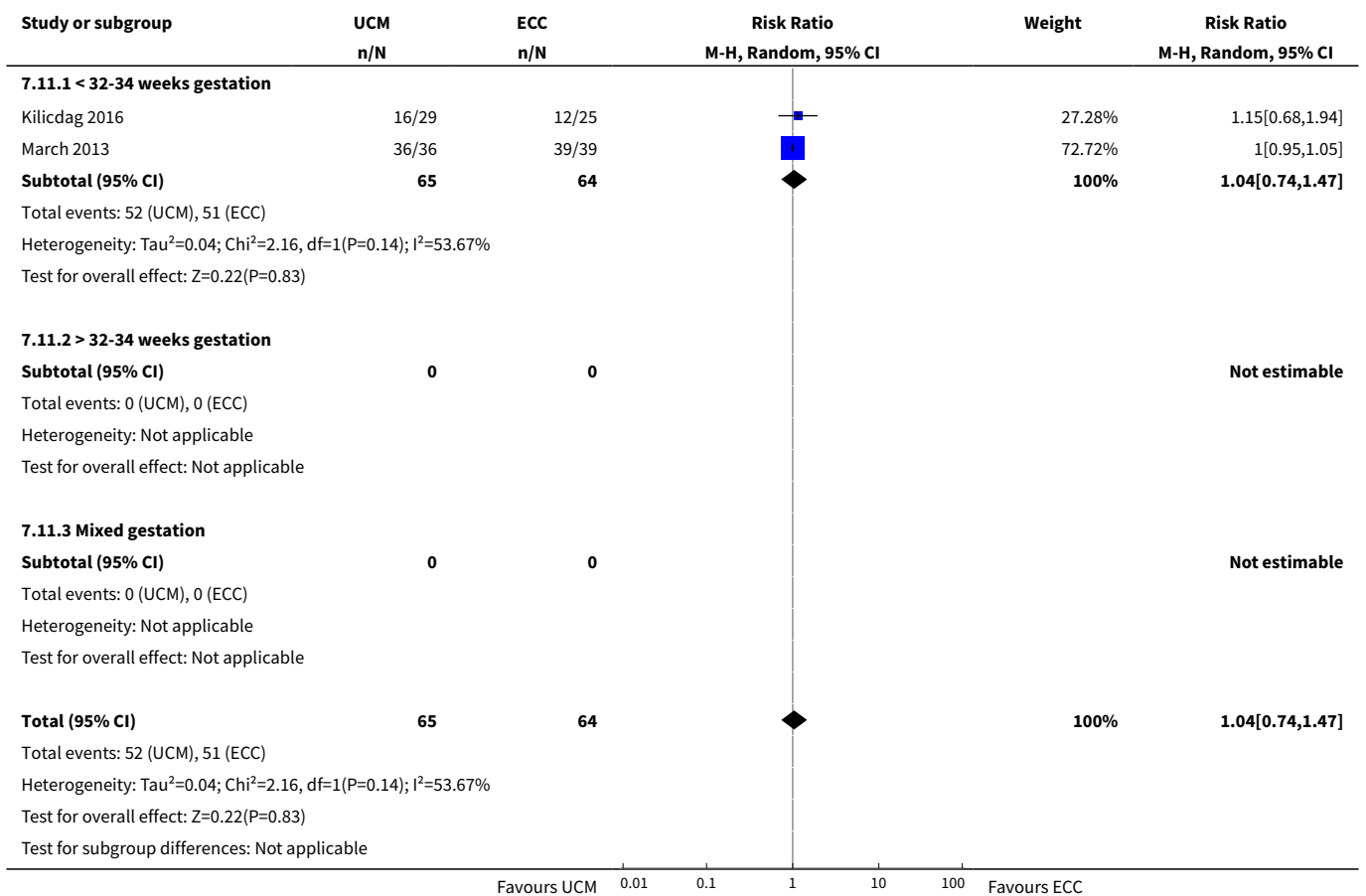


Analysis 7.10. Comparison 7 UCM vs ECC (subgroup analysis by gestation), Outcome 10 Respiratory Distress Syndrome (RDS).

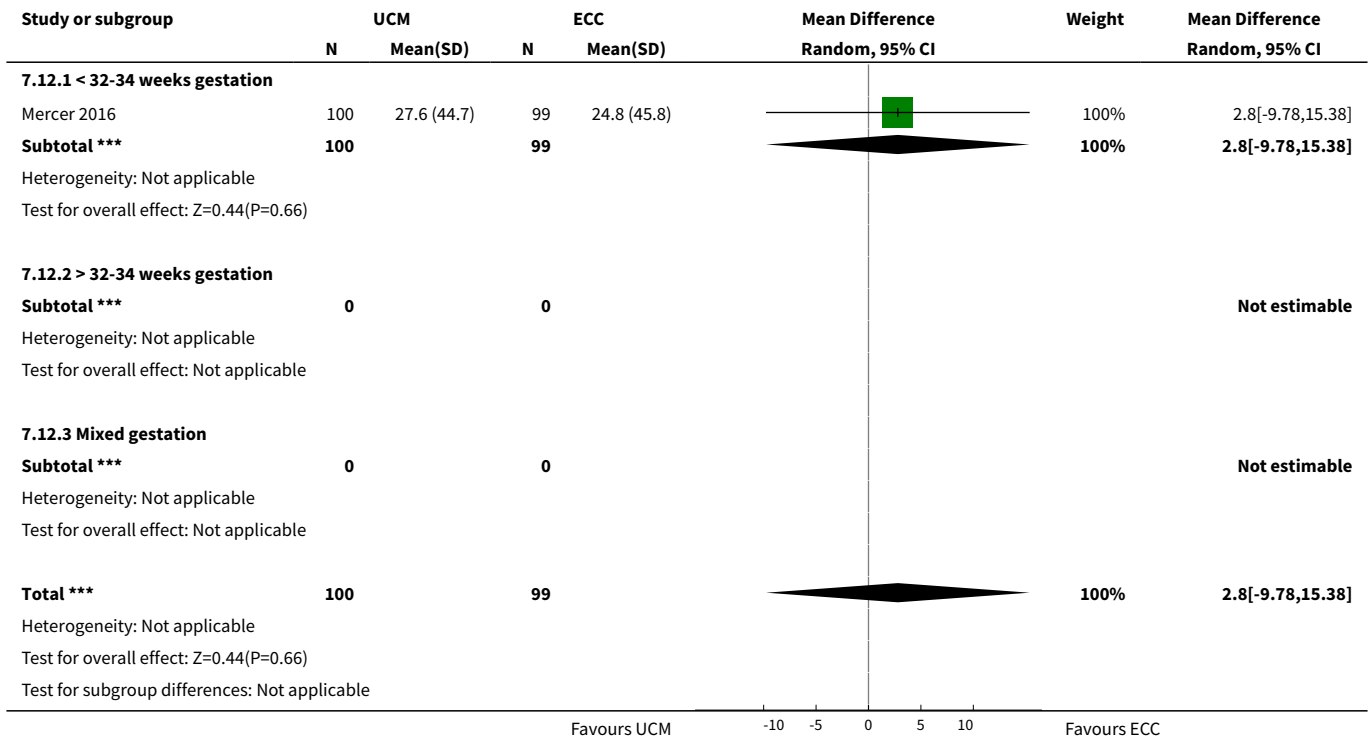




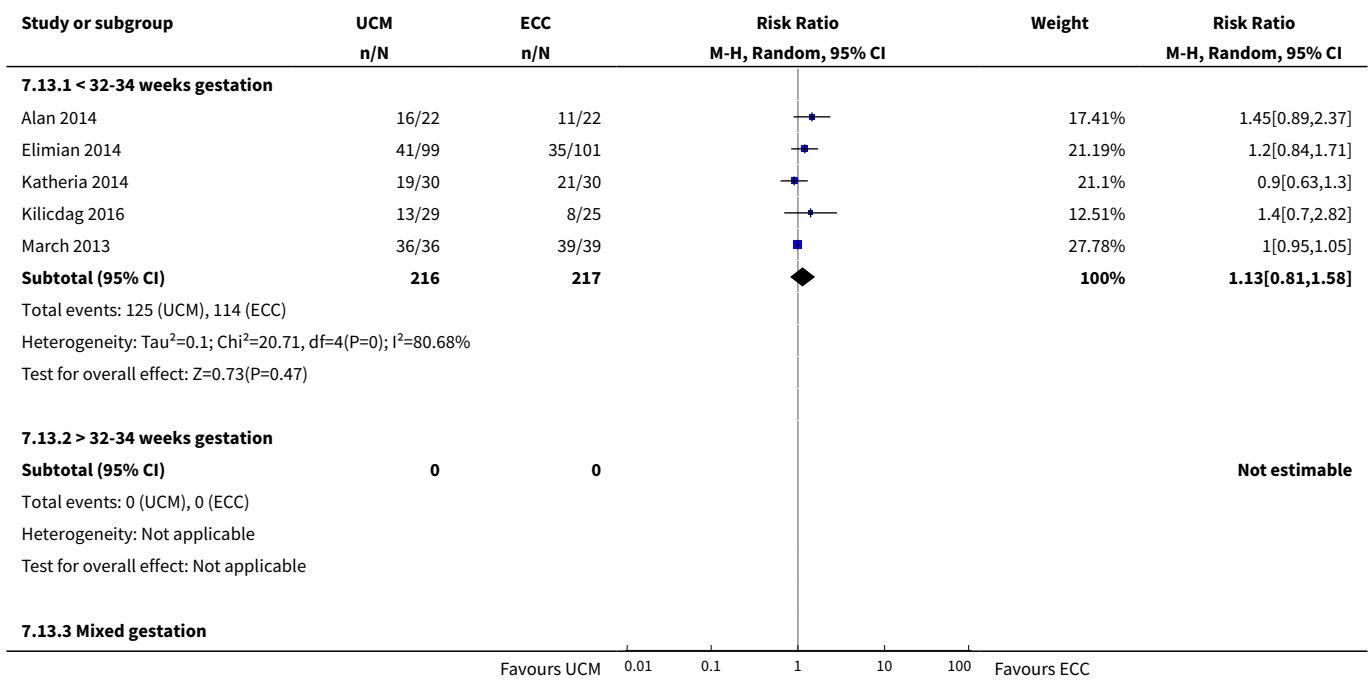
Analysis 7.11. Comparison 7 UCM vs ECC (subgroup analysis by gestation), Outcome 11 Respiratory support (ventilator or CPAP).

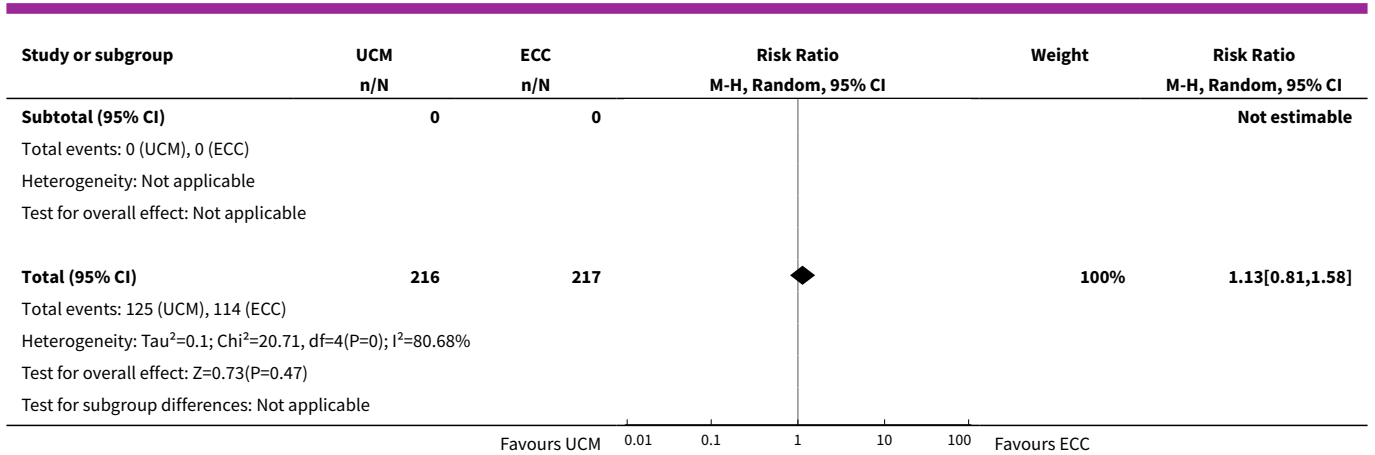


Analysis 7.12. Comparison 7 UCM vs ECC (subgroup analysis by gestation), Outcome 12 Duration of respiratory support (days).

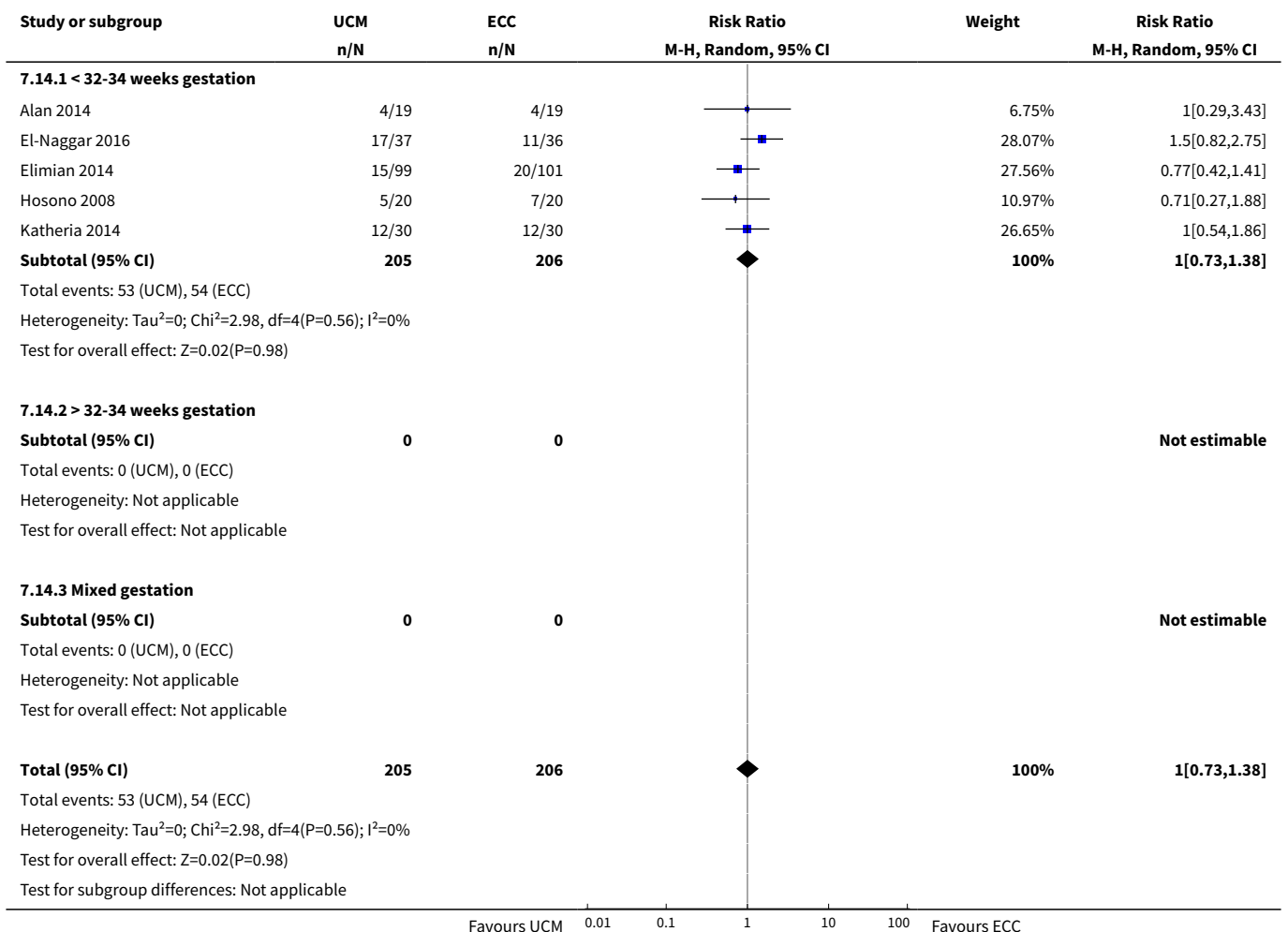


Analysis 7.13. Comparison 7 UCM vs ECC (subgroup analysis by gestation), Outcome 13 Surfactant treatment (for severe RDS).

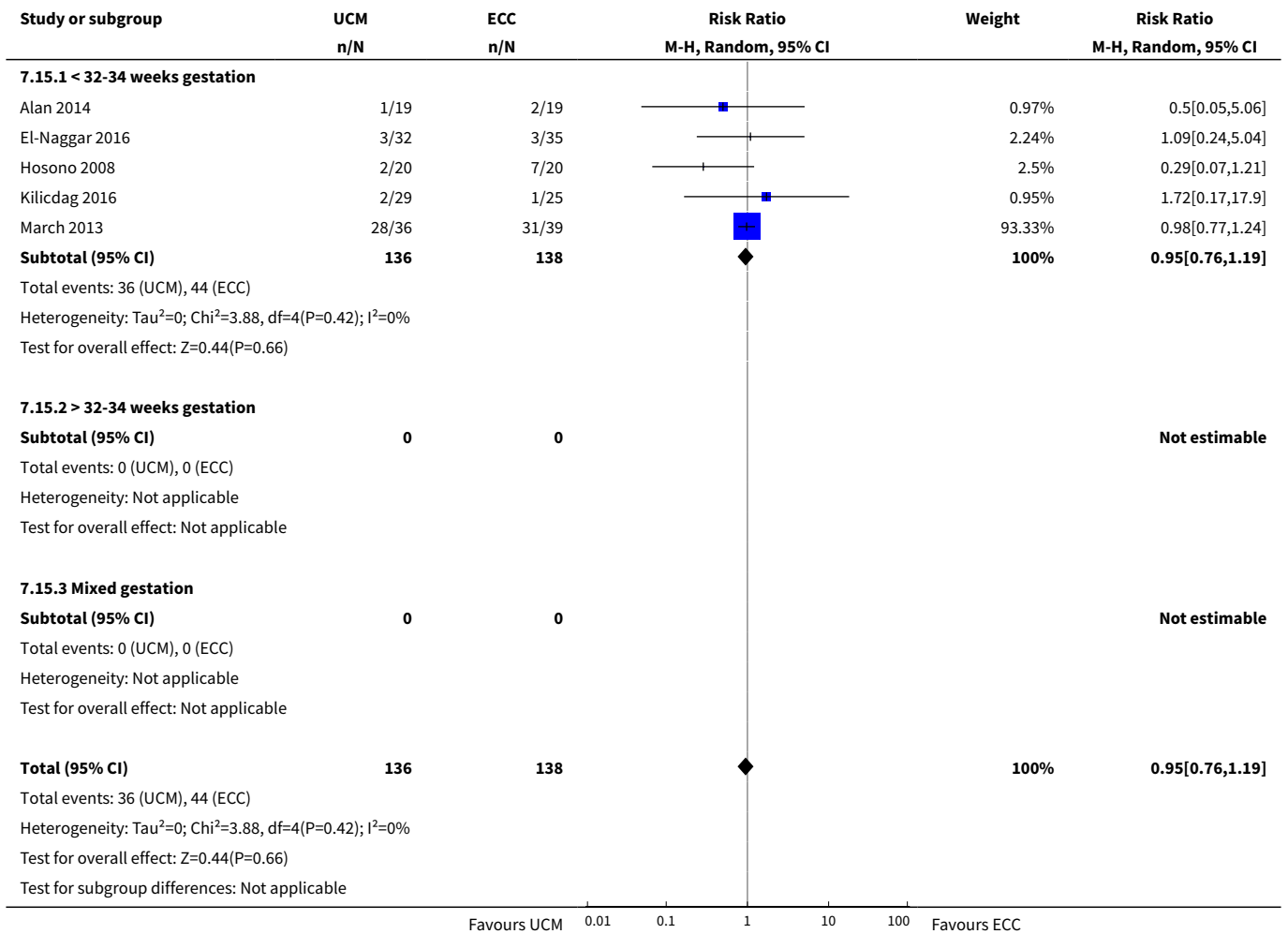




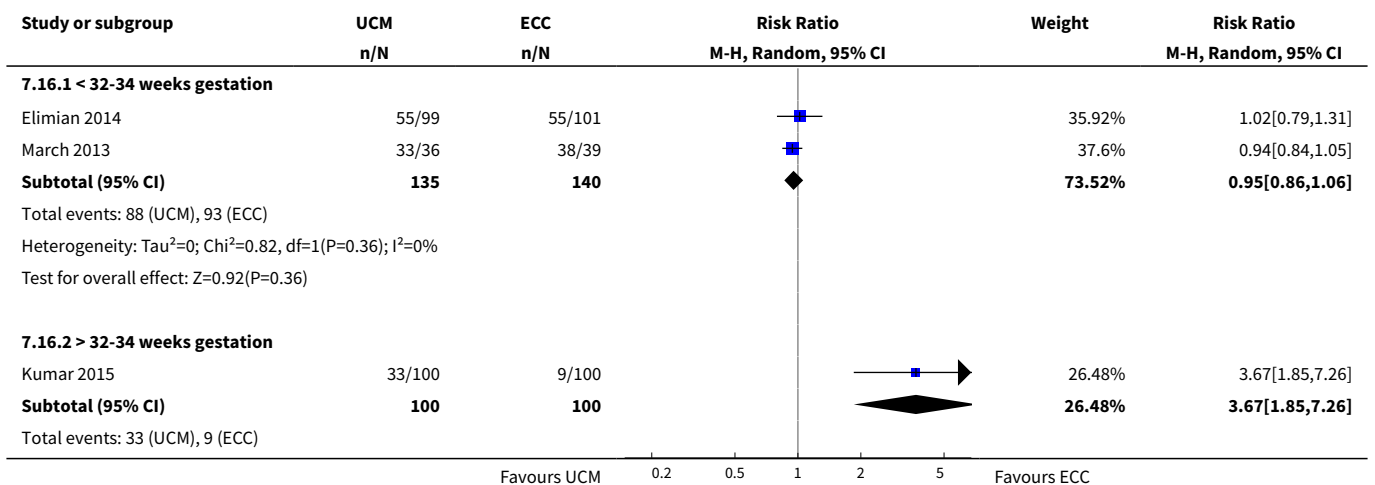
Analysis 7.14. Comparison 7 UCM vs ECC (subgroup analysis by gestation), Outcome 14 Treatment for Patent Ductus Arteriosus (PDA) (medical and/or surgical).

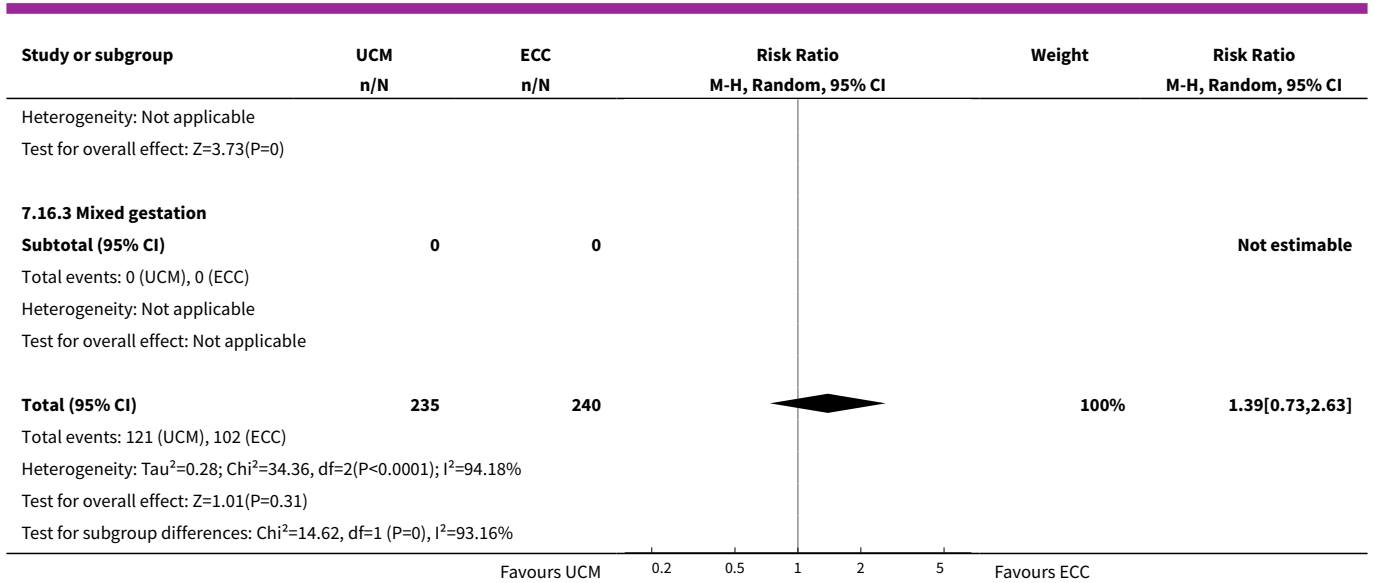


Analysis 7.15. Comparison 7 UCM vs ECC (subgroup analysis by gestation), Outcome 15 Treatment for Retinopathy of Prematurity (RoP).

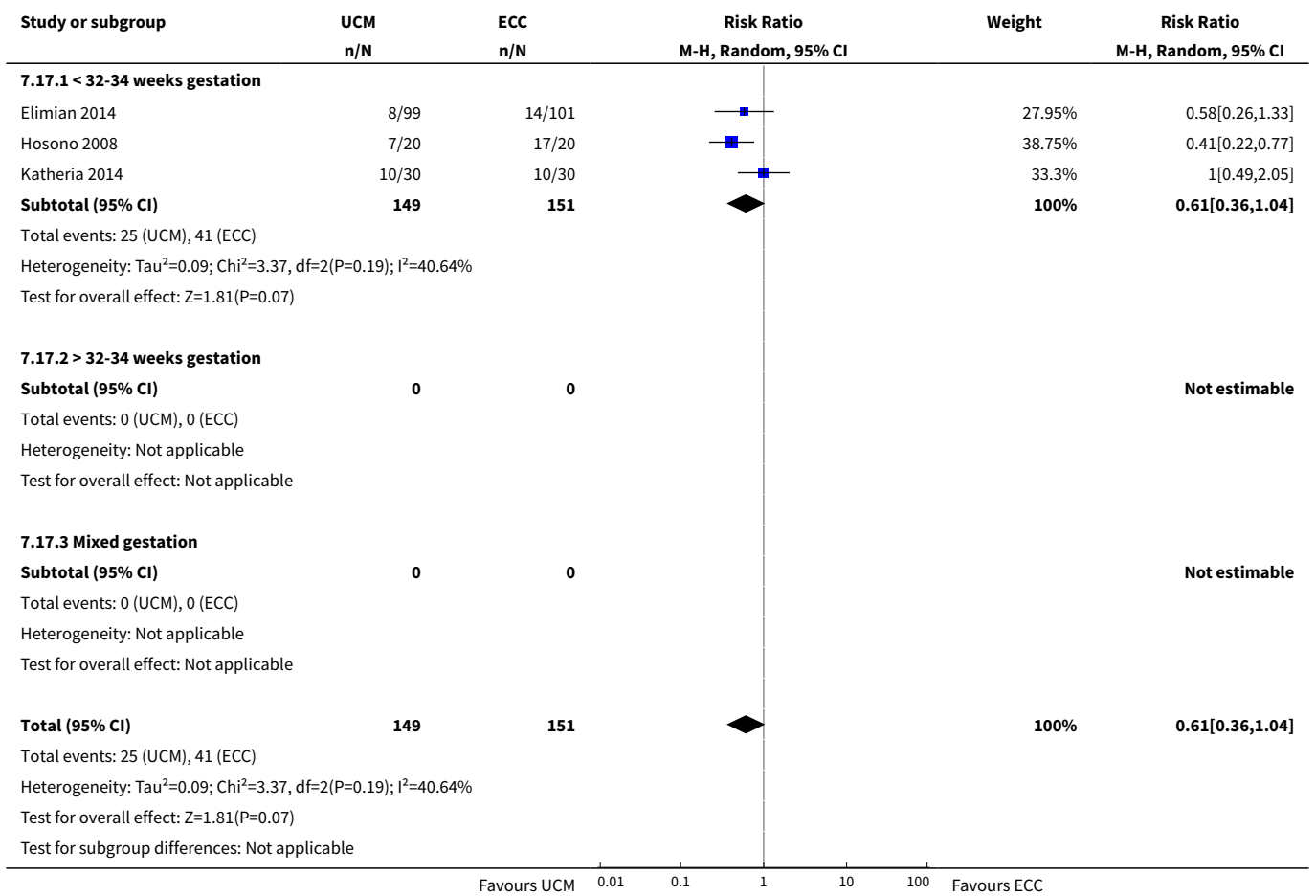


Analysis 7.16. Comparison 7 UCM vs ECC (subgroup analysis by gestation), Outcome 16 Hyperbilirubinemia (treated by phototherapy).

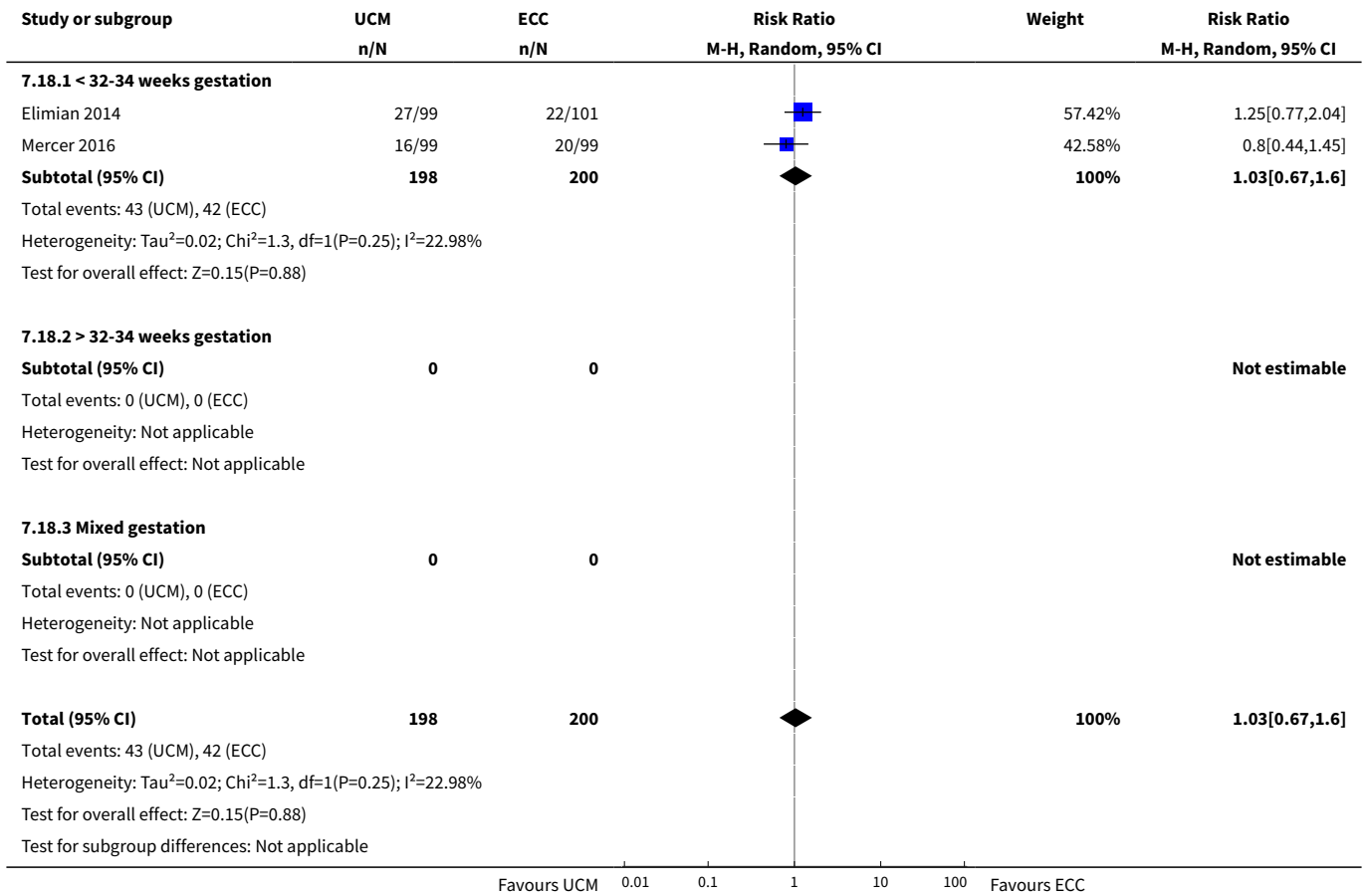




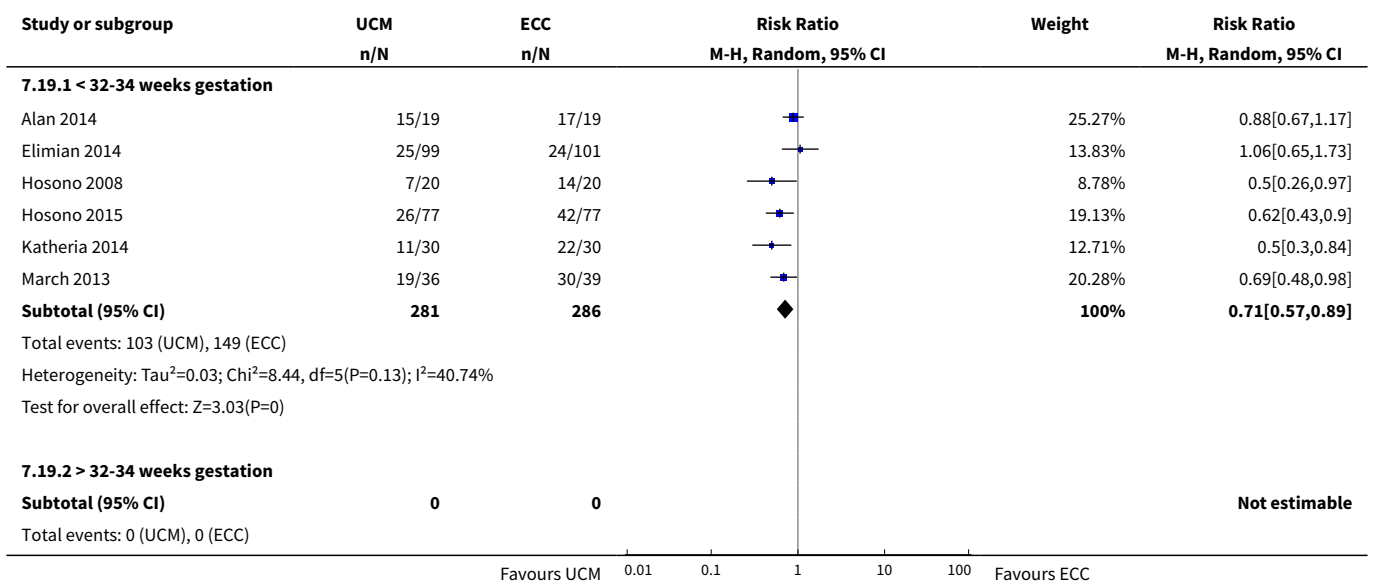
Analysis 7.17. Comparison 7 UCM vs ECC (subgroup analysis by gestation), Outcome 17 Inotropics for low blood pressure.

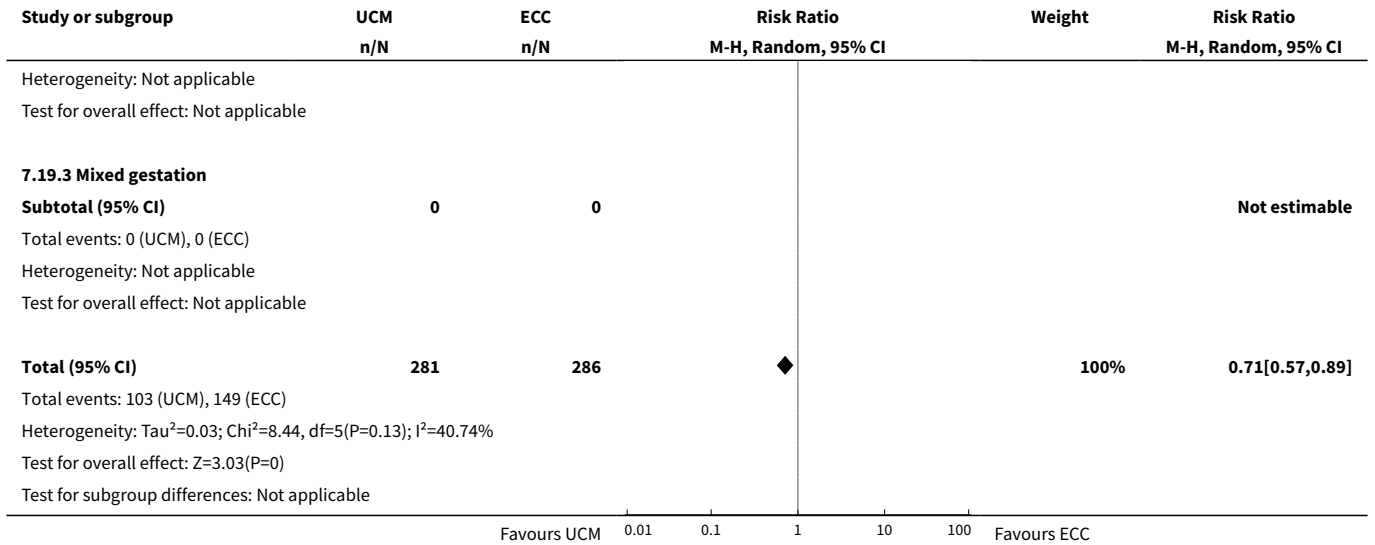


Analysis 7.18. Comparison 7 UCM vs ECC (subgroup analysis by gestation), Outcome 18 Low Apgar as defined by trialists (generally < 8 at 5 mins).

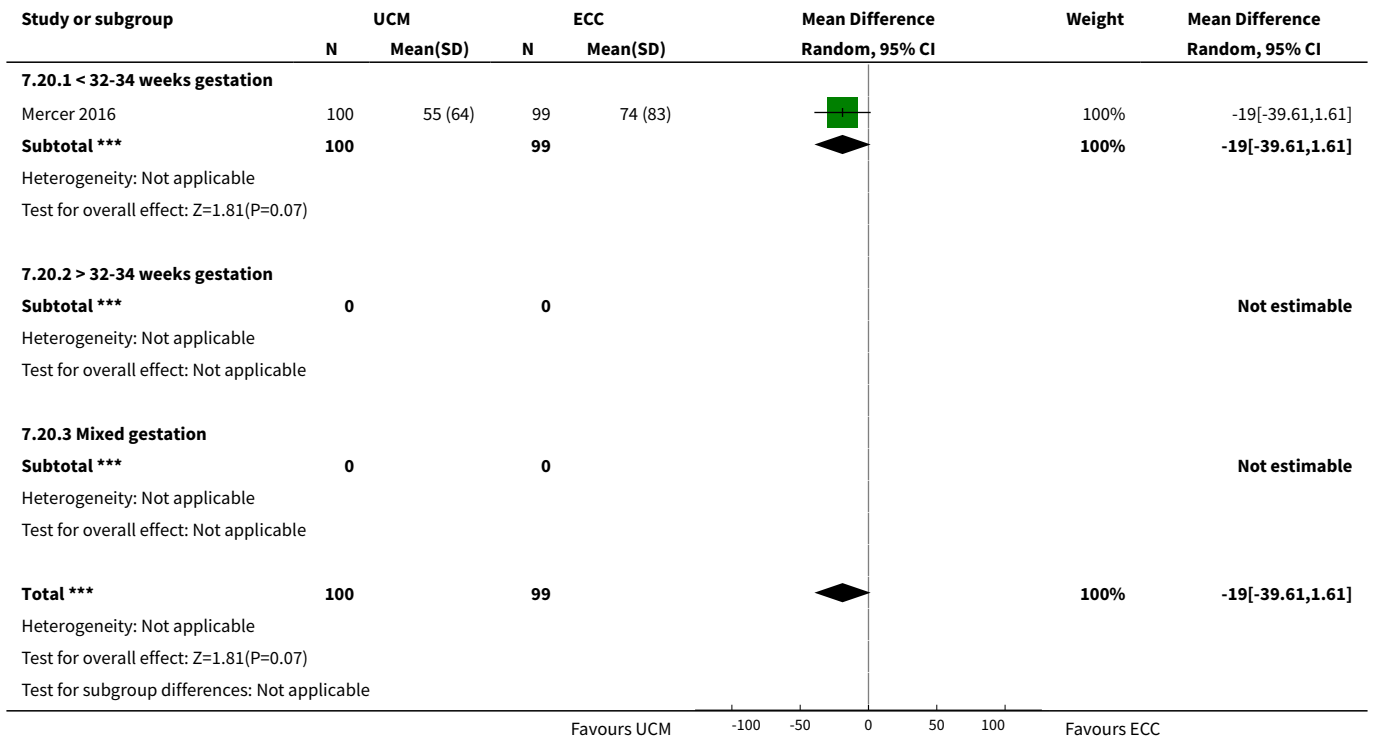


Analysis 7.19. Comparison 7 UCM vs ECC (subgroup analysis by gestation), Outcome 19 Blood transfusion in infant.

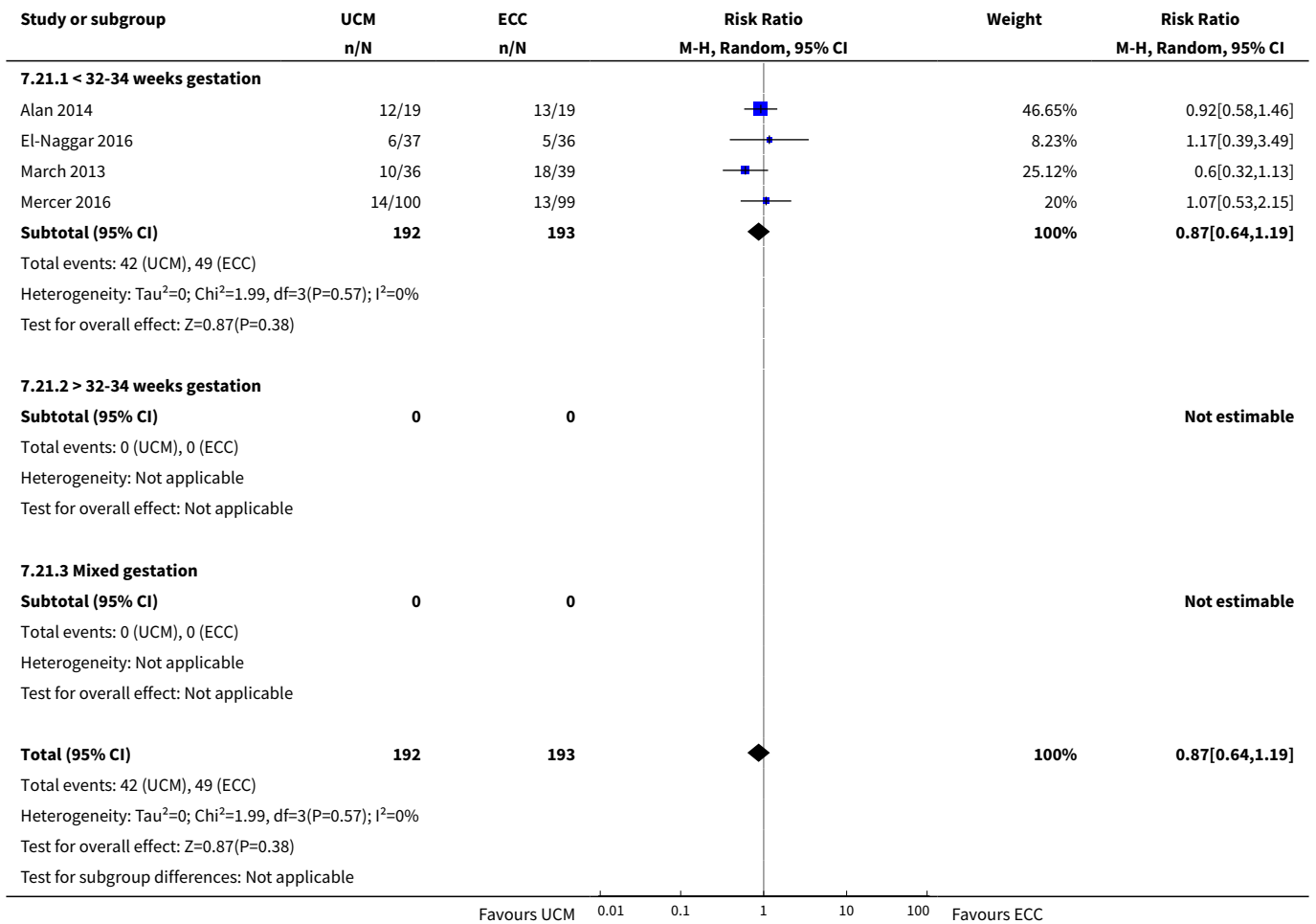




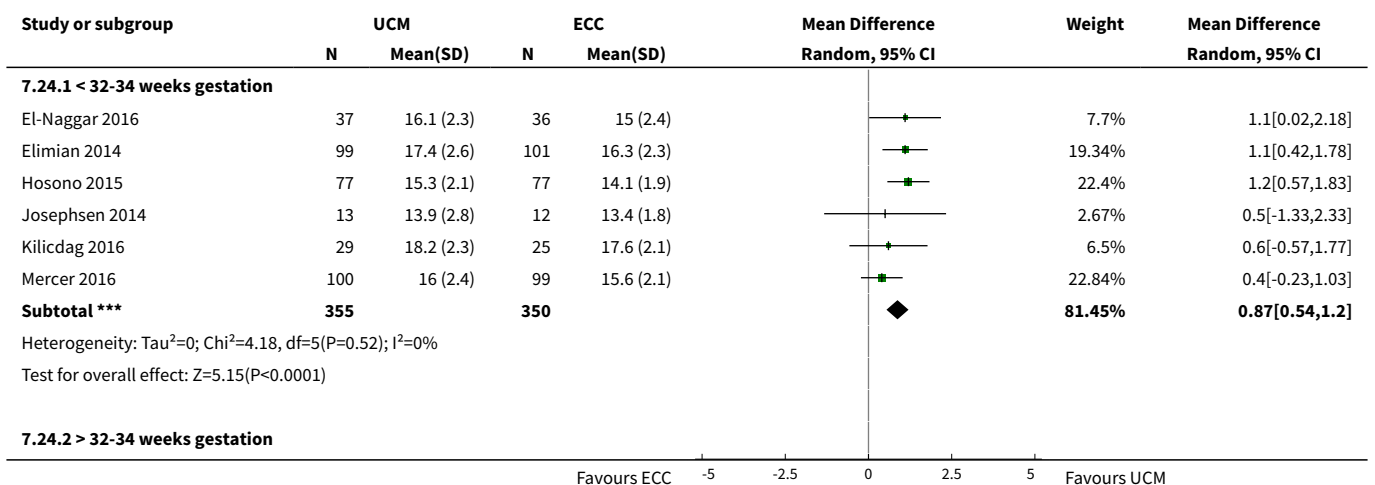
Analysis 7.20. Comparison 7 UCM vs ECC (subgroup analysis by gestation), Outcome 20 Volume of blood transfused (mL).

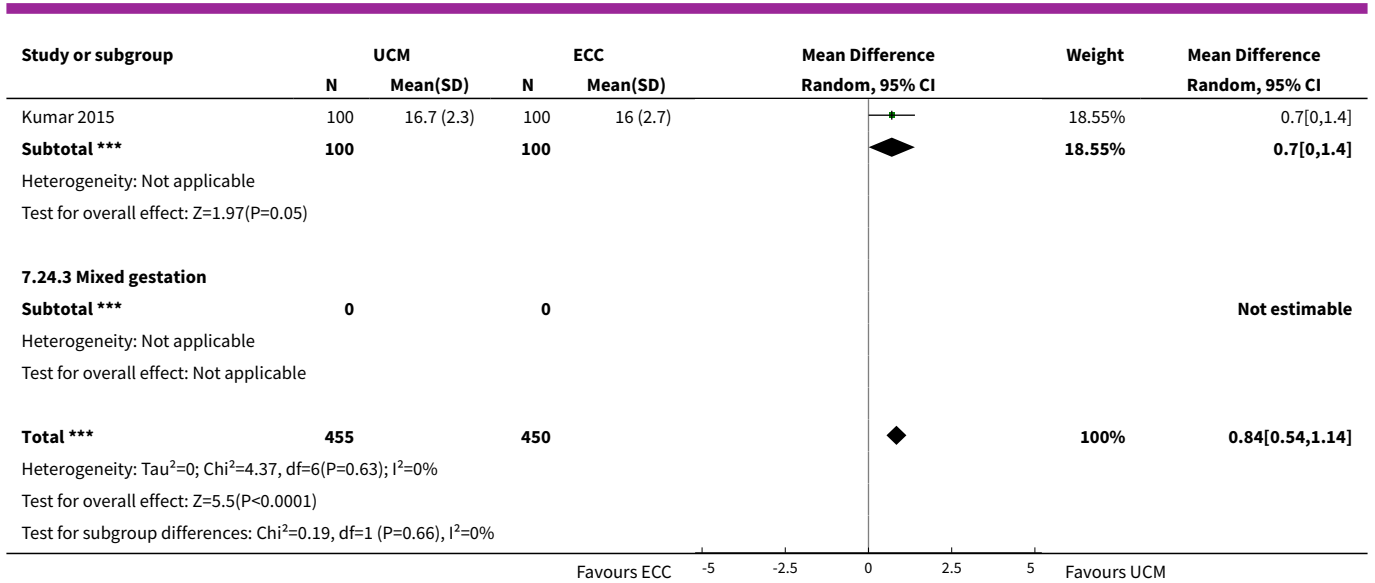


Analysis 7.21. Comparison 7 UCM vs ECC (subgroup analysis by gestation), Outcome 21 Late sepsis (after 3 days or as defined by trialists).

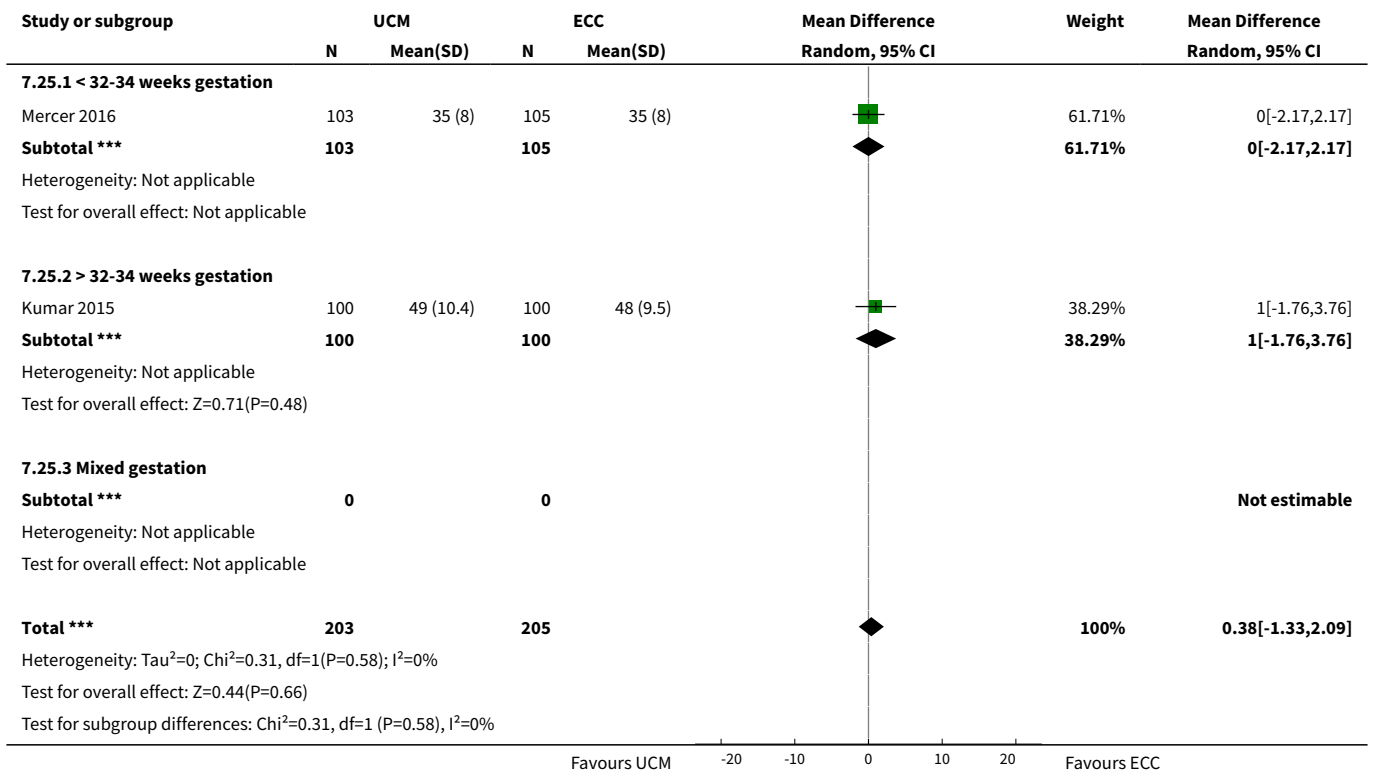


Analysis 7.24. Comparison 7 UCM vs ECC (subgroup analysis by gestation), Outcome 24 Hb within 1st 24 hour of birth (g/dL).

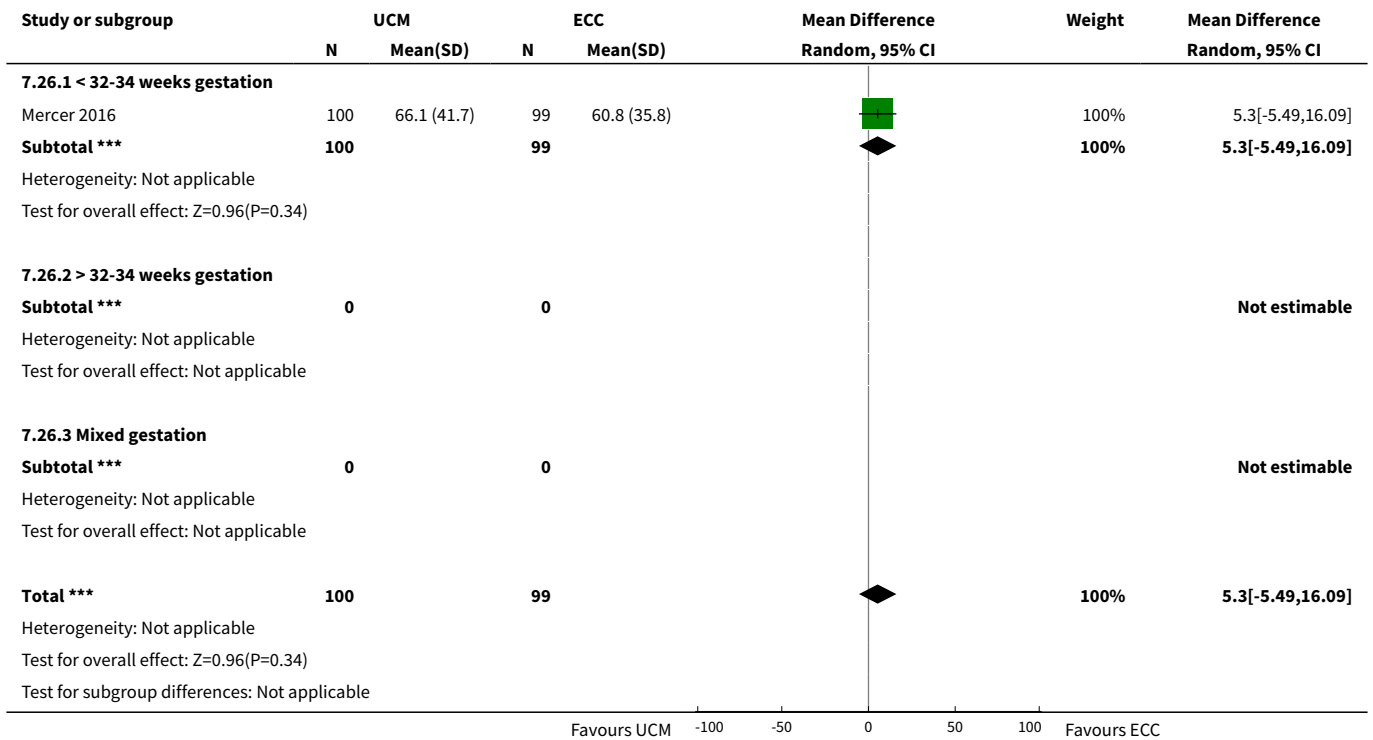




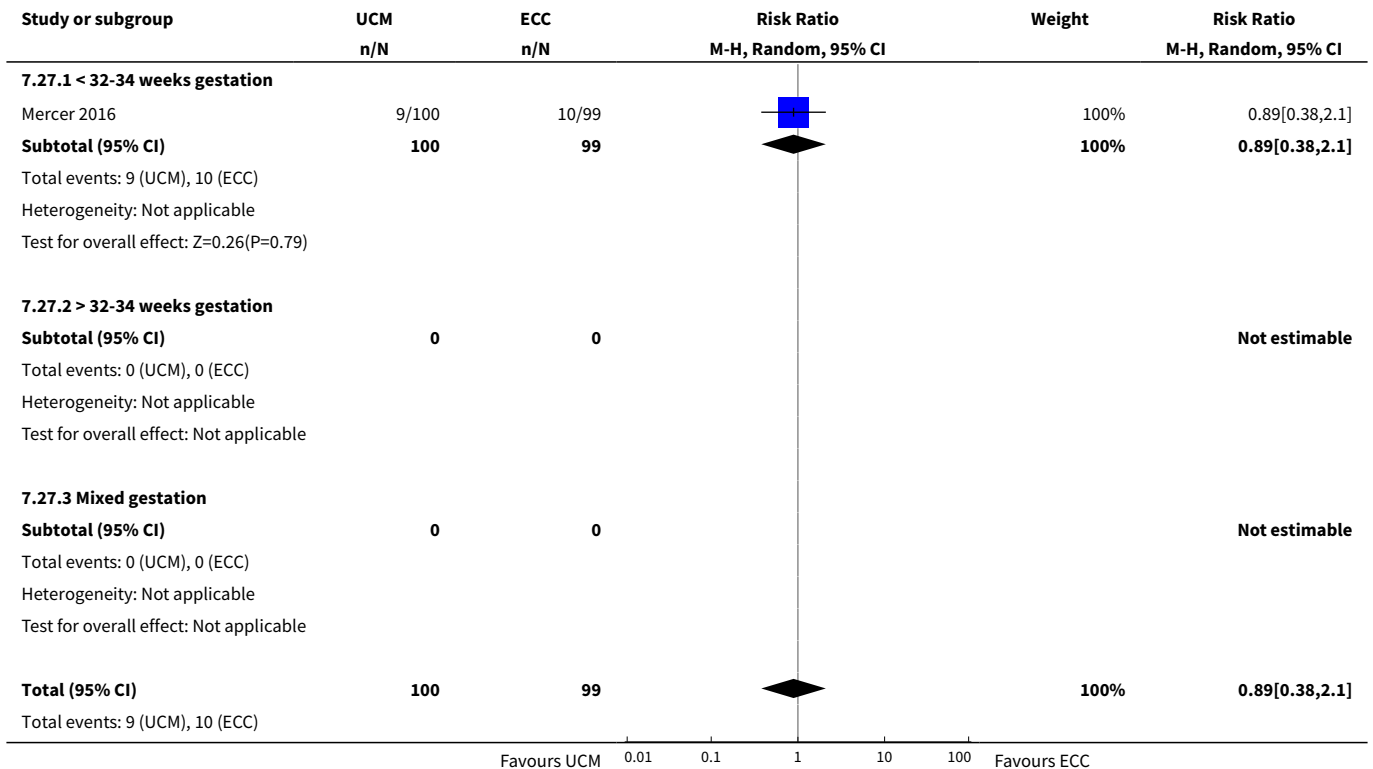
Analysis 7.25. Comparison 7 UCM vs ECC (subgroup analysis by gestation), Outcome 25 Mean arterial blood pressure.

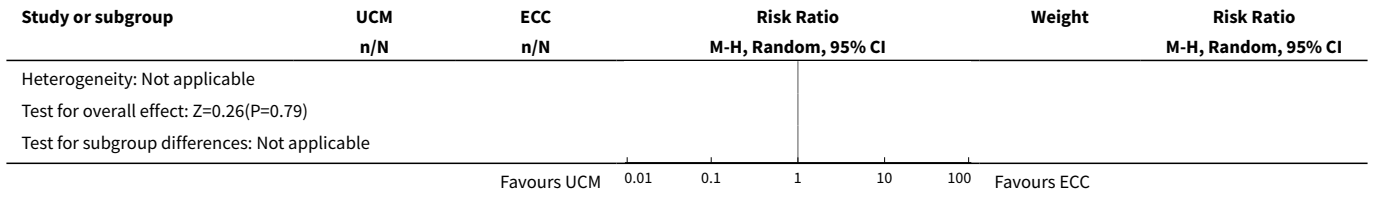


Analysis 7.26. Comparison 7 UCM vs ECC (subgroup analysis by gestation), Outcome 26 Length of infant stay in NICU (in weeks).

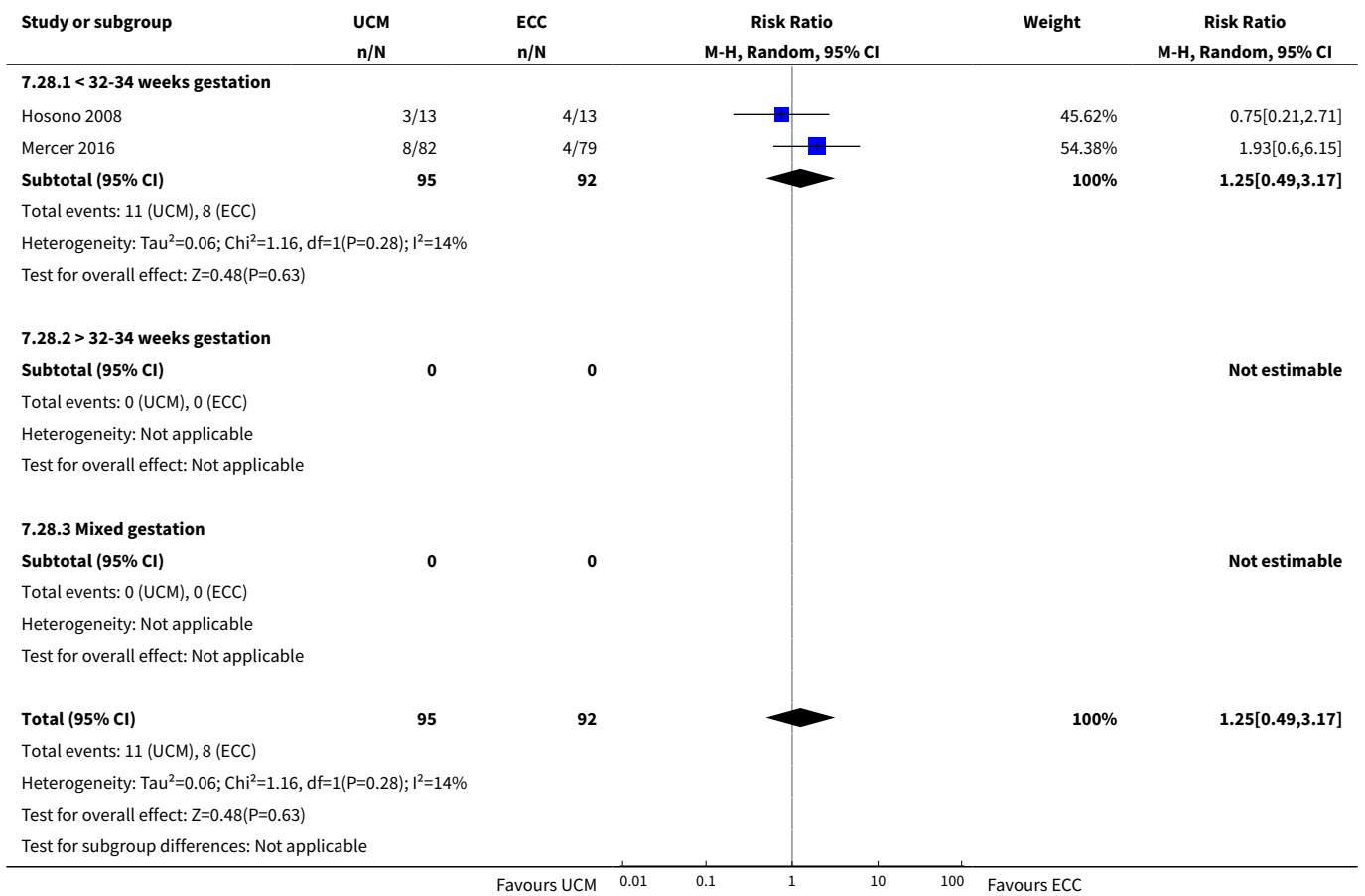


Analysis 7.27. Comparison 7 UCM vs ECC (subgroup analysis by gestation), Outcome 27 Home oxygen.

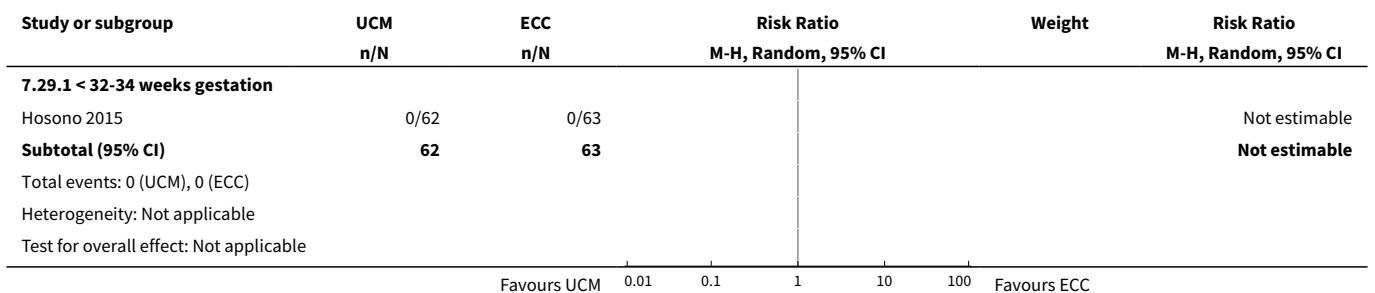


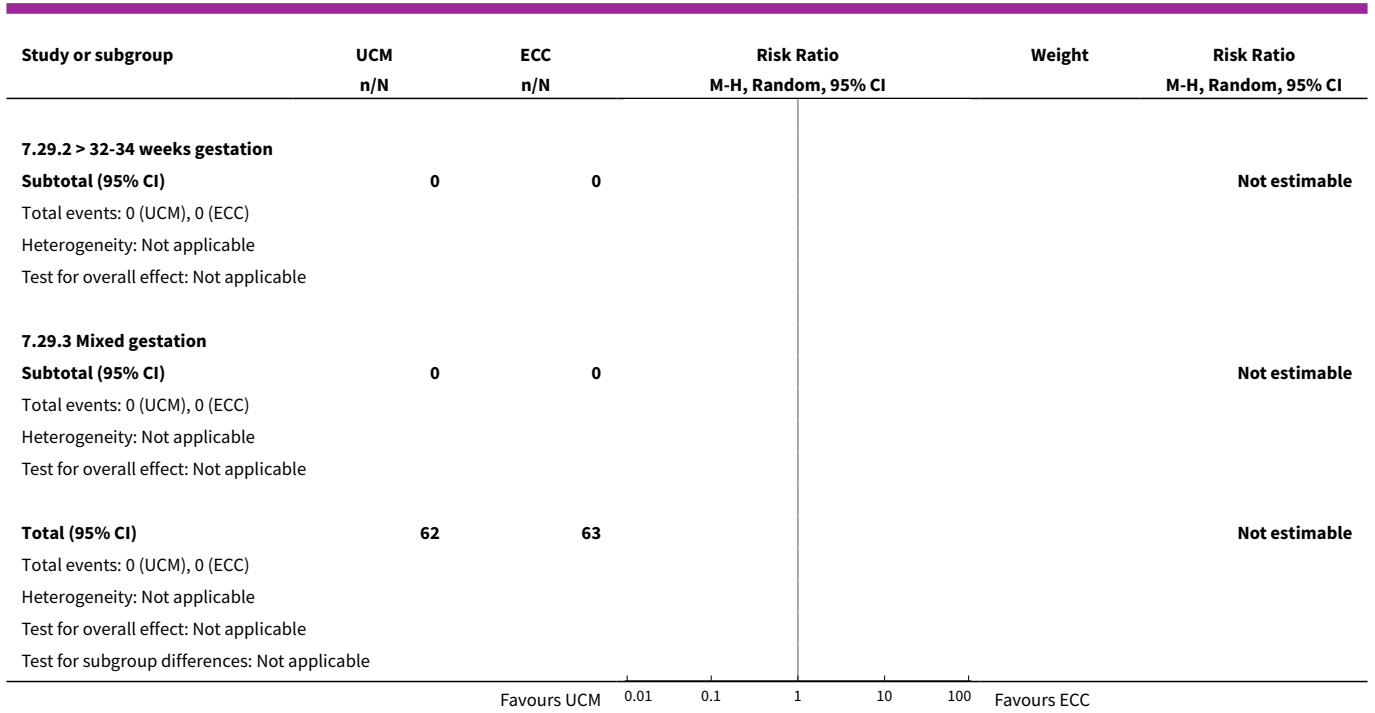


Analysis 7.28. Comparison 7 UCM vs ECC (subgroup analysis by gestation), Outcome 28 Neurodevelopmental impairment at age two to three years.

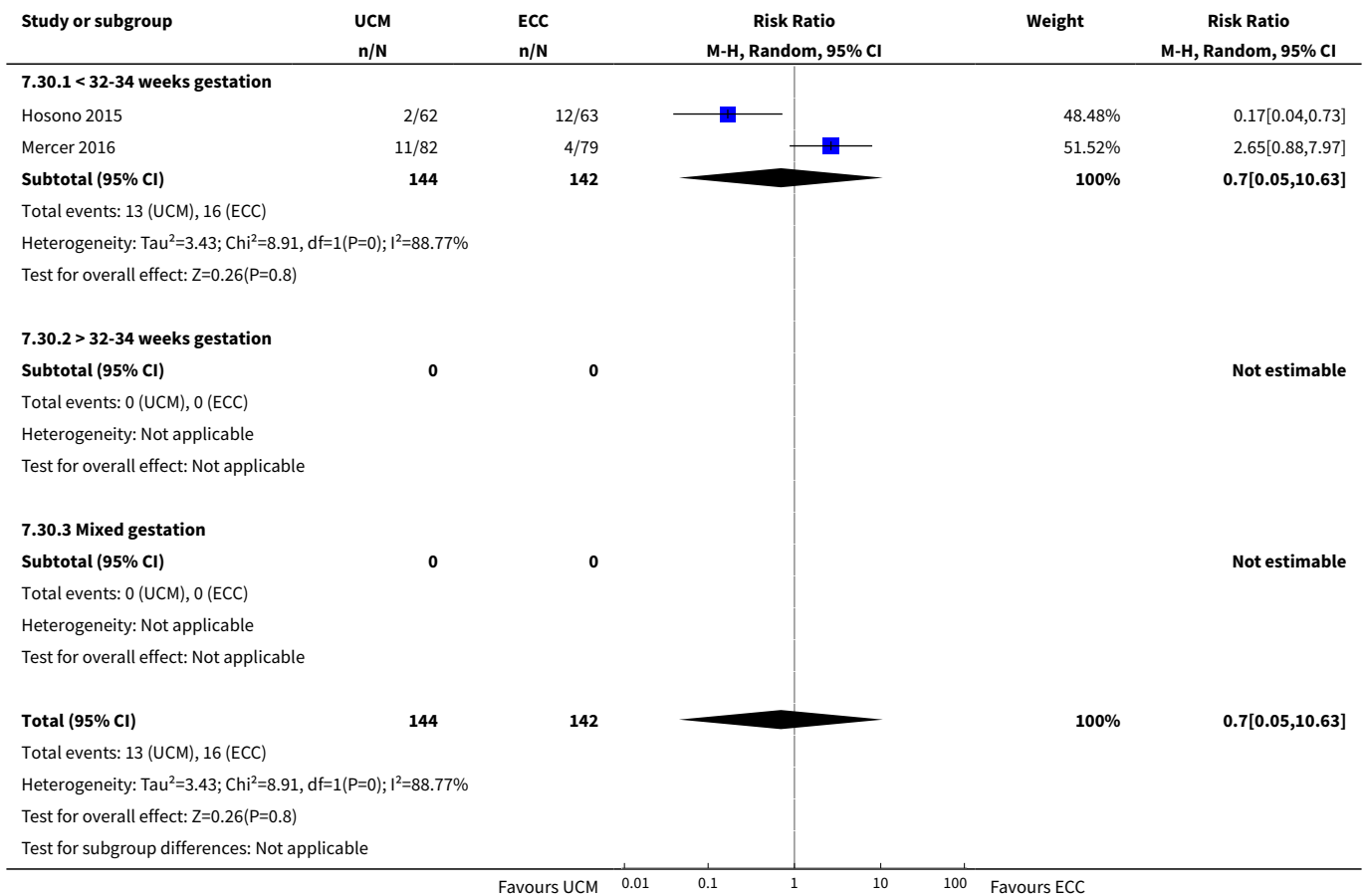


Analysis 7.29. Comparison 7 UCM vs ECC (subgroup analysis by gestation), Outcome 29 Severe visual impairment.





Analysis 7.30. Comparison 7 UCM vs ECC (subgroup analysis by gestation), Outcome 30 Cerebral palsy (CP).



Comparison 8. UCM vs ECC (subgroup analysis by type of intervention)

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Death of baby (up to discharge)	9	931	Risk Ratio (M-H, Random, 95% CI)	0.81 [0.47, 1.41]
1.1 UCM with cord intact	7	705	Risk Ratio (M-H, Random, 95% CI)	0.72 [0.38, 1.34]
1.2 UCM with cord cut	1	200	Risk Ratio (M-H, Random, 95% CI)	1.5 [0.44, 5.15]
1.3 Unclear	1	26	Risk Ratio (M-H, Random, 95% CI)	0.33 [0.01, 7.50]
2 Death or neurodevelopmental impairment at age two to three years	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
2.1 UCM with cord intact	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
2.2 UCM with cord cut	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
2.3 Unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
3 Severe intraventricular haemorrhage (IVH grades 3, 4)	6	618	Risk Ratio (M-H, Random, 95% CI)	0.75 [0.39, 1.45]
3.1 UCM with cord intact	6	618	Risk Ratio (M-H, Random, 95% CI)	0.75 [0.39, 1.45]
3.2 UCM with cord cut	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
3.3 Unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
4 Intraventricular haemorrhage (IVH, all grades)	8	716	Risk Ratio (M-H, Random, 95% CI)	0.85 [0.62, 1.18]
4.1 UCM with cord intact	7	691	Risk Ratio (M-H, Random, 95% CI)	0.84 [0.58, 1.21]
4.2 UCM with cord cut	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
4.3 Unclear	1	25	Risk Ratio (M-H, Random, 95% CI)	0.92 [0.35, 2.41]
5 Periventricular leukomalacia (PVL)	3	315	Risk Ratio (M-H, Random, 95% CI)	0.63 [0.15, 2.63]
5.1 UCM with cord intact	3	315	Risk Ratio (M-H, Random, 95% CI)	0.63 [0.15, 2.63]
5.2 UCM with cord cut	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
5.3 Unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
6 Chronic lung disease (CLD) - oxygen supplement at 36 weeks (corrected for gestation)	7	682	Risk Ratio (M-H, Random, 95% CI)	1.03 [0.64, 1.66]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
6.1 UCM with cord intact	7	682	Risk Ratio (M-H, Random, 95% CI)	1.03 [0.64, 1.66]
6.2 UCM with cord cut	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
6.3 Unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
7 Maternal blood loss of 500 mL or greater	1	200	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
7.1 UCM with cord intact	1	200	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
7.2 UCM with cord cut	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
7.3 Unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
8 Intraventricular haemorrhage (IVH, grades 1 & 2)	6	618	Risk Ratio (M-H, Random, 95% CI)	0.74 [0.44, 1.25]
8.1 UCM with cord intact	6	618	Risk Ratio (M-H, Random, 95% CI)	0.74 [0.44, 1.25]
8.2 UCM with cord cut	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
8.3 Unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
9 Necrotising enterocolitis (NEC) confirmed by X-ray or laparotomy	6	616	Risk Ratio (M-H, Random, 95% CI)	0.75 [0.41, 1.38]
9.1 UCM with cord intact	5	591	Risk Ratio (M-H, Random, 95% CI)	0.75 [0.41, 1.38]
9.2 UCM with cord cut	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
9.3 Unclear	1	25	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
10 Respiratory Distress Syndrome (RDS)	4	515	Risk Ratio (M-H, Random, 95% CI)	1.05 [0.83, 1.32]
10.1 UCM with cord intact	3	315	Risk Ratio (M-H, Random, 95% CI)	1.00 [0.95, 1.05]
10.2 UCM with cord cut	1	200	Risk Ratio (M-H, Random, 95% CI)	2.0 [0.71, 5.64]
10.3 Unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
11 Respiratory support (ventilator or CPAP)	2	129	Risk Ratio (M-H, Random, 95% CI)	1.04 [0.74, 1.47]
11.1 UCM with cord intact	2	129	Risk Ratio (M-H, Random, 95% CI)	1.04 [0.74, 1.47]
11.2 UCM with cord cut	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
11.3 Unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
12 Duration of respiratory support (days)	1	199	Mean Difference (IV, Random, 95% CI)	2.80 [-9.78, 15.38]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
12.1 UCM with cord intact	1	199	Mean Difference (IV, Random, 95% CI)	2.80 [-9.78, 15.38]
12.2 UCM with cord cut	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
12.3 Unclear	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
13 Surfactant treatment (for severe RDS)	5	433	Risk Ratio (M-H, Random, 95% CI)	1.13 [0.81, 1.58]
13.1 UCM with cord intact	5	433	Risk Ratio (M-H, Random, 95% CI)	1.13 [0.81, 1.58]
13.2 UCM with cord cut	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
13.3 Unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
14 Treatment for Patent Ductus Arteriosus (PDA) (medical and/or surgical)	5	411	Risk Ratio (M-H, Random, 95% CI)	1.00 [0.73, 1.38]
14.1 UCM with cord intact	5	411	Risk Ratio (M-H, Random, 95% CI)	1.00 [0.73, 1.38]
14.2 UCM with cord cut	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
14.3 Unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
15 Treatment for Retinopathy of Prematurity (RoP)	5	274	Risk Ratio (M-H, Random, 95% CI)	0.95 [0.76, 1.19]
15.1 UCM with cord intact	5	274	Risk Ratio (M-H, Random, 95% CI)	0.95 [0.76, 1.19]
15.2 UCM with cord cut	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
15.3 Unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
16 Hyperbilirubinemia (treated by phototherapy)	3	475	Risk Ratio (M-H, Random, 95% CI)	1.39 [0.73, 2.63]
16.1 UCM with cord intact	2	275	Risk Ratio (M-H, Random, 95% CI)	0.95 [0.86, 1.06]
16.2 UCM with cord cut	1	200	Risk Ratio (M-H, Random, 95% CI)	3.67 [1.85, 7.26]
16.3 Unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
17 Inotropics for low blood pressure	3	280	Risk Ratio (M-H, Random, 95% CI)	0.63 [0.36, 1.09]
17.1 UCM with cord intact	3	280	Risk Ratio (M-H, Random, 95% CI)	0.63 [0.36, 1.09]
17.2 UCM with cord cut	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
17.3 Unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
18 Low Apgar as defined by trialists (generally < 8 at 5 mins)	2	398	Risk Ratio (M-H, Random, 95% CI)	1.03 [0.67, 1.60]
18.1 UCM with cord intact	2	398	Risk Ratio (M-H, Random, 95% CI)	1.03 [0.67, 1.60]
18.2 UCM with cord cut	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
18.3 Unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
19 Blood transfusion in infant (mL)	6	567	Risk Ratio (M-H, Random, 95% CI)	0.67 [0.54, 0.84]
19.1 UCM with cord intact	5	413	Risk Ratio (M-H, Random, 95% CI)	0.69 [0.51, 0.93]
19.2 UCM with cord cut	1	154	Risk Ratio (M-H, Random, 95% CI)	0.62 [0.43, 0.90]
19.3 Unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
20 Volume of blood transfused	1	199	Mean Difference (IV, Random, 95% CI)	-19.0 [-39.61, 1.61]
20.1 UCM with cord intact	1	199	Mean Difference (IV, Random, 95% CI)	-19.0 [-39.61, 1.61]
20.2 UCM with cord cut	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
20.3 Unclear	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
21 Late sepsis (after 3 days or as defined by trialists)	4	385	Risk Ratio (M-H, Random, 95% CI)	0.87 [0.64, 1.19]
21.1 UCM with cord intact	4	385	Risk Ratio (M-H, Random, 95% CI)	0.87 [0.64, 1.19]
21.2 UCM with cord cut	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
21.3 Unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
22 Hydrocephalus	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
22.1 UCM with cord intact	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
22.2 UCM with cord cut	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
22.3 Unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
23 Temperature < 36.0°C within 1 hour of birth	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
23.1 UCM with cord intact	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
23.2 UCM with cord cut	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
23.3 Unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

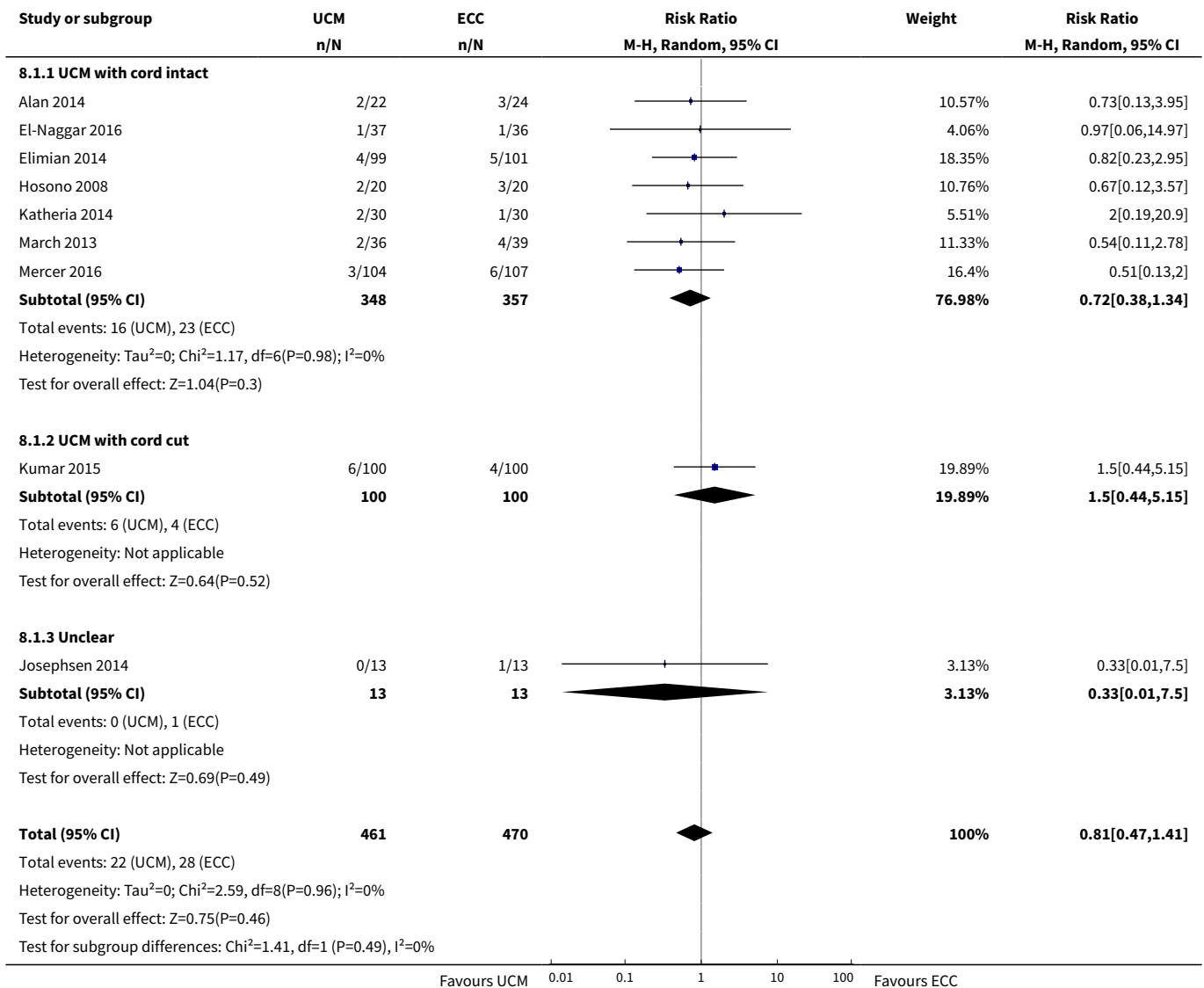
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
24 Hb within 1 st 24 hour of birth (g/dL)	7	905	Mean Difference (IV, Random, 95% CI)	0.84 [0.54, 1.14]
24.1 UCM with cord intact	4	526	Mean Difference (IV, Random, 95% CI)	0.76 [0.36, 1.16]
24.2 UCM with cord cut	2	354	Mean Difference (IV, Random, 95% CI)	0.97 [0.48, 1.46]
24.3 Unclear	1	25	Mean Difference (IV, Random, 95% CI)	0.5 [-1.33, 2.33]
25 Mean arterial blood pressure (subgrouped by time after birth)	2	408	Mean Difference (IV, Random, 95% CI)	0.38 [-1.33, 2.09]
25.1 UCM with cord intact	1	208	Mean Difference (IV, Random, 95% CI)	0.0 [-2.17, 2.17]
25.2 UCM with cord cut	1	200	Mean Difference (IV, Random, 95% CI)	1.0 [-1.76, 3.76]
25.3 Unclear	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
26 Length of infant stay in NICU	1	199	Mean Difference (IV, Random, 95% CI)	5.30 [-5.49, 16.09]
26.1 UCM with cord intact	1	199	Mean Difference (IV, Random, 95% CI)	5.30 [-5.49, 16.09]
26.2 UCM with cord cut	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
26.3 Unclear	0	0	Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
27 Home oxygen	1	199	Risk Ratio (M-H, Random, 95% CI)	0.89 [0.38, 2.10]
27.1 UCM with cord intact	1	199	Risk Ratio (M-H, Random, 95% CI)	0.89 [0.38, 2.10]
27.2 UCM with cord cut	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
27.3 Unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
28 Neurodevelopmental impairment at age two to three years	2	187	Risk Ratio (M-H, Random, 95% CI)	1.25 [0.49, 3.17]
28.1 UCM with cord intact	2	187	Risk Ratio (M-H, Random, 95% CI)	1.25 [0.49, 3.17]
28.2 UCM with cord cut	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
28.3 Unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
29 Severe visual impairment	1	125	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
29.1 UCM with cord intact	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
29.2 UCM with cord cut	1	125	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
29.3 Unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
30 Cerebral palsy (CP)	2	286	Risk Ratio (M-H, Random, 95% CI)	0.70 [0.05, 10.63]
30.1 UCM with cord intact	1	161	Risk Ratio (M-H, Random, 95% CI)	2.65 [0.88, 7.97]
30.2 UCM with cord cut	1	125	Risk Ratio (M-H, Random, 95% CI)	0.17 [0.04, 0.73]
30.3 Unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
31 Manual removal of placenta (denominator = vaginal births)	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
31.1 UCM with cord intact	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
31.2 UCM with cord cut	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
31.3 Unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
32 Prolonged third stage (>30 minutes) (denominator = vaginal births)	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
32.1 UCM with cord intact	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
32.2 UCM with cord cut	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
32.3 Unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
33 Blood transfusion for mother	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
33.1 UCM with cord intact	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
33.2 UCM with cord cut	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
33.3 Unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
34 Postpartum infection in mother	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
34.1 UCM with cord intact	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
34.2 UCM with cord cut	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
34.3 Unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
35 Rhesus isoimmunisation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
35.1 UCM with cord intact	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
35.2 UCM with cord cut	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
35.3 Unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

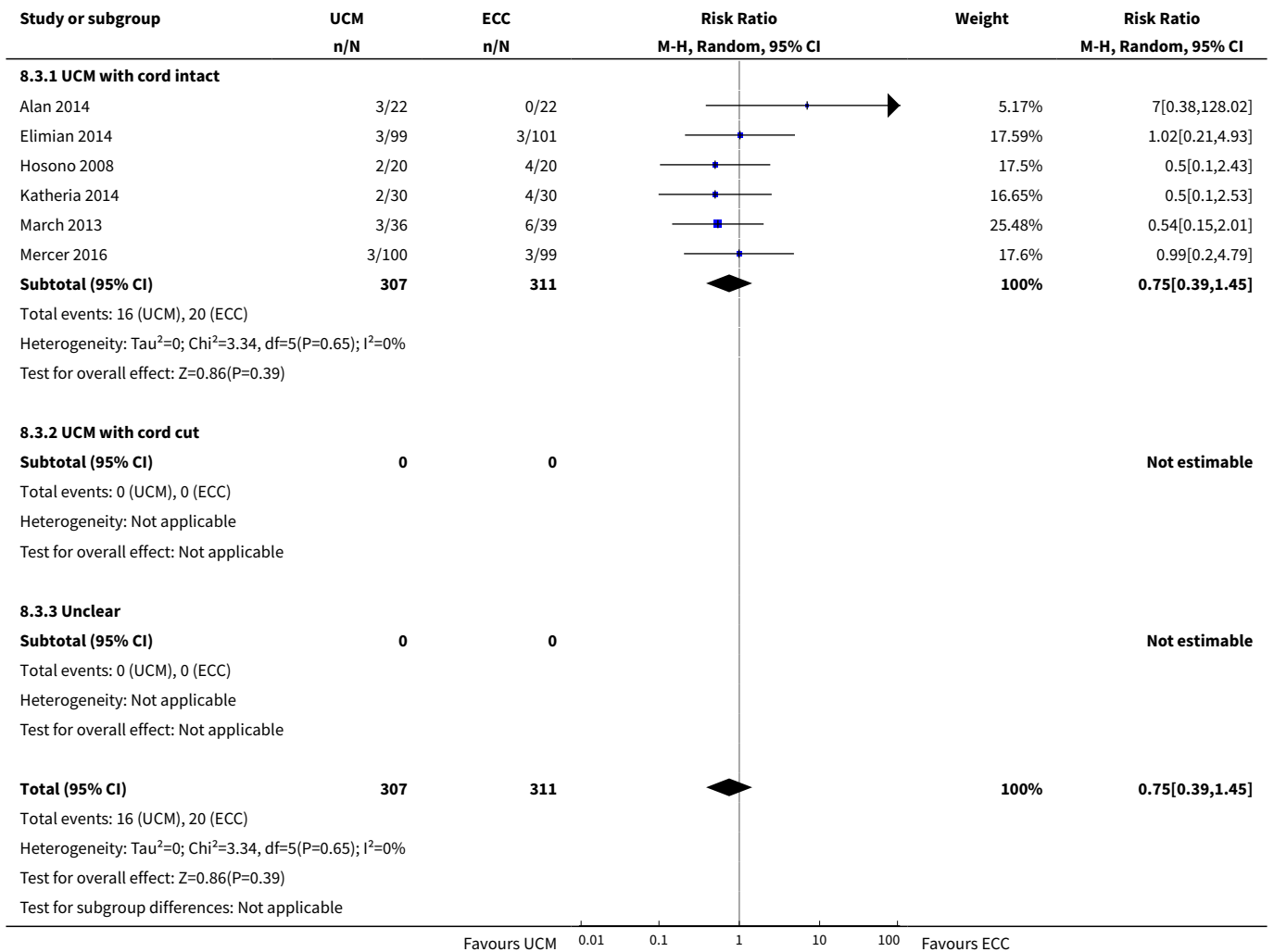
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
36 Psychological well being in mother	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
36.1 UCM with cord intact	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
36.2 UCM with cord cut	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
36.3 Unclear	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37 Bonding	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37.1 UCM with cord intact	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37.2 UCM with cord cut	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
37.3 Unclear	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
38 Breastfeeding initiation	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
38.1 UCM with cord intact	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
38.2 UCM with cord cut	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
38.3 Unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
39 Fully or mixed feeding at infant discharge	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
39.1 UCM with cord intact	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
39.2 UCM with cord cut	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
39.3 Unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40 Maternal anxiety	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40.1 UCM with cord intact	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40.2 UCM with cord cut	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
40.3 Unclear	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
41 Mothers' views	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
41.1 UCM with cord intact	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
41.2 UCM with cord cut	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]
41.3 Unclear	0	0	Std. Mean Difference (IV, Random, 95% CI)	0.0 [0.0, 0.0]

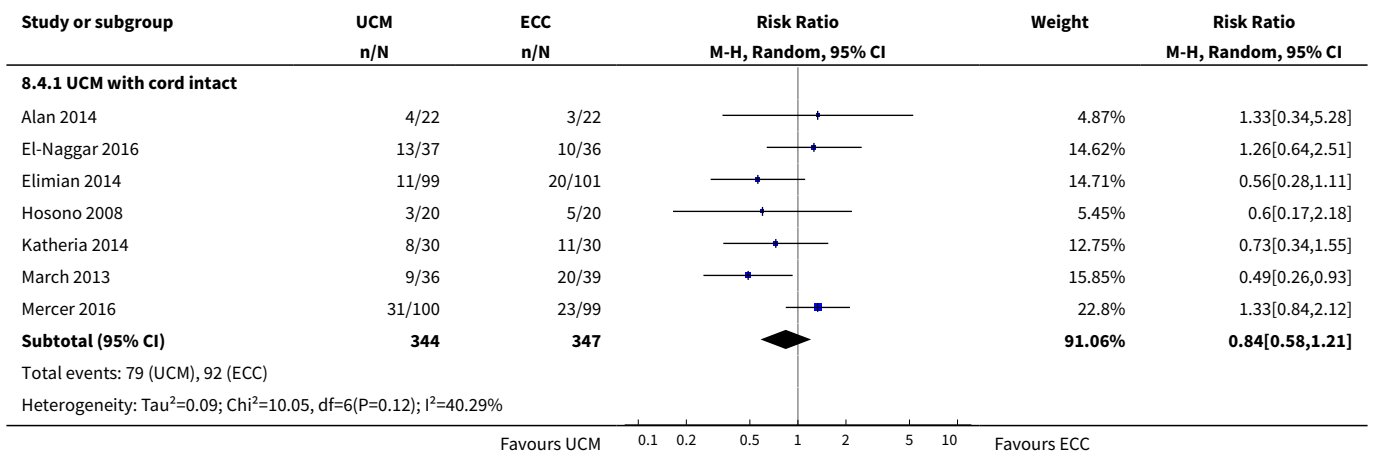
Analysis 8.1. Comparison 8 UCM vs ECC (subgroup analysis by type of intervention), Outcome 1 Death of baby (up to discharge).

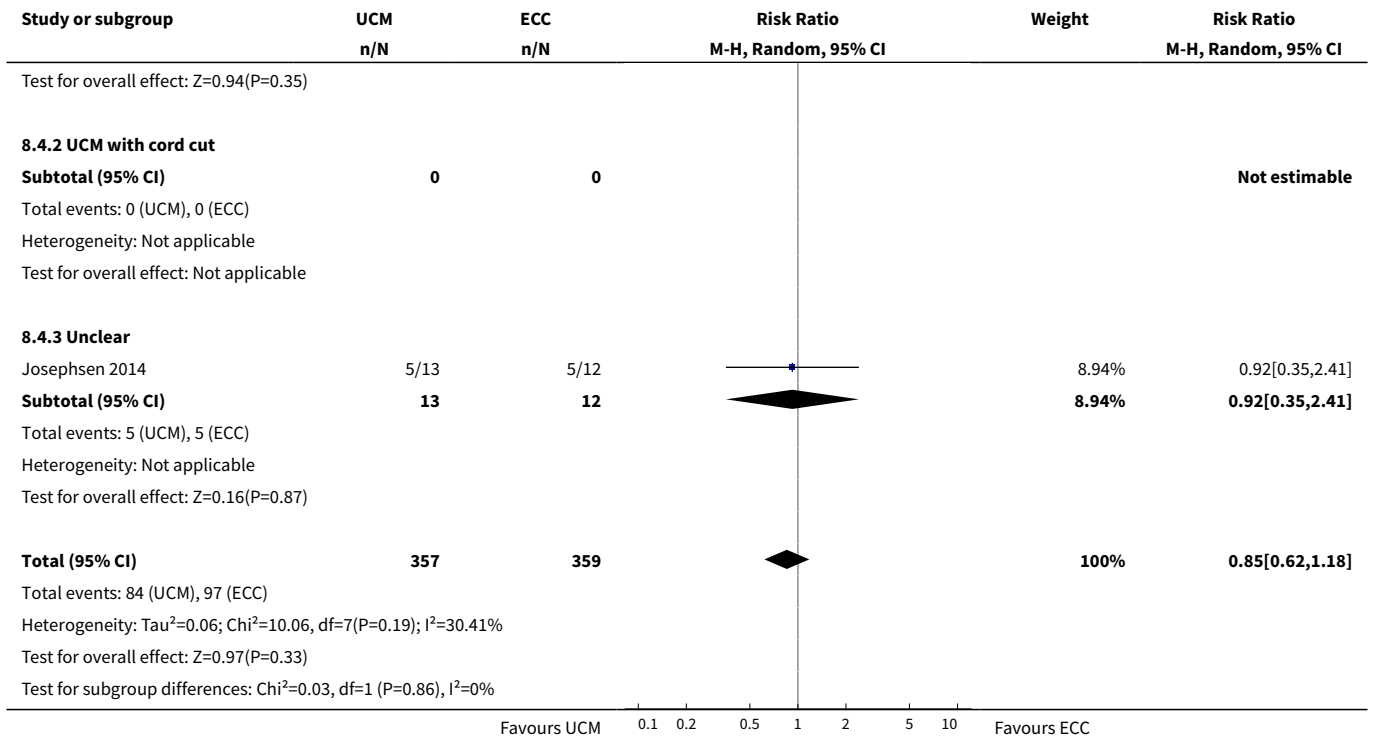


Analysis 8.3. Comparison 8 UCM vs ECC (subgroup analysis by type of intervention), Outcome 3 Severe intraventricular haemorrhage (IVH grades 3, 4).

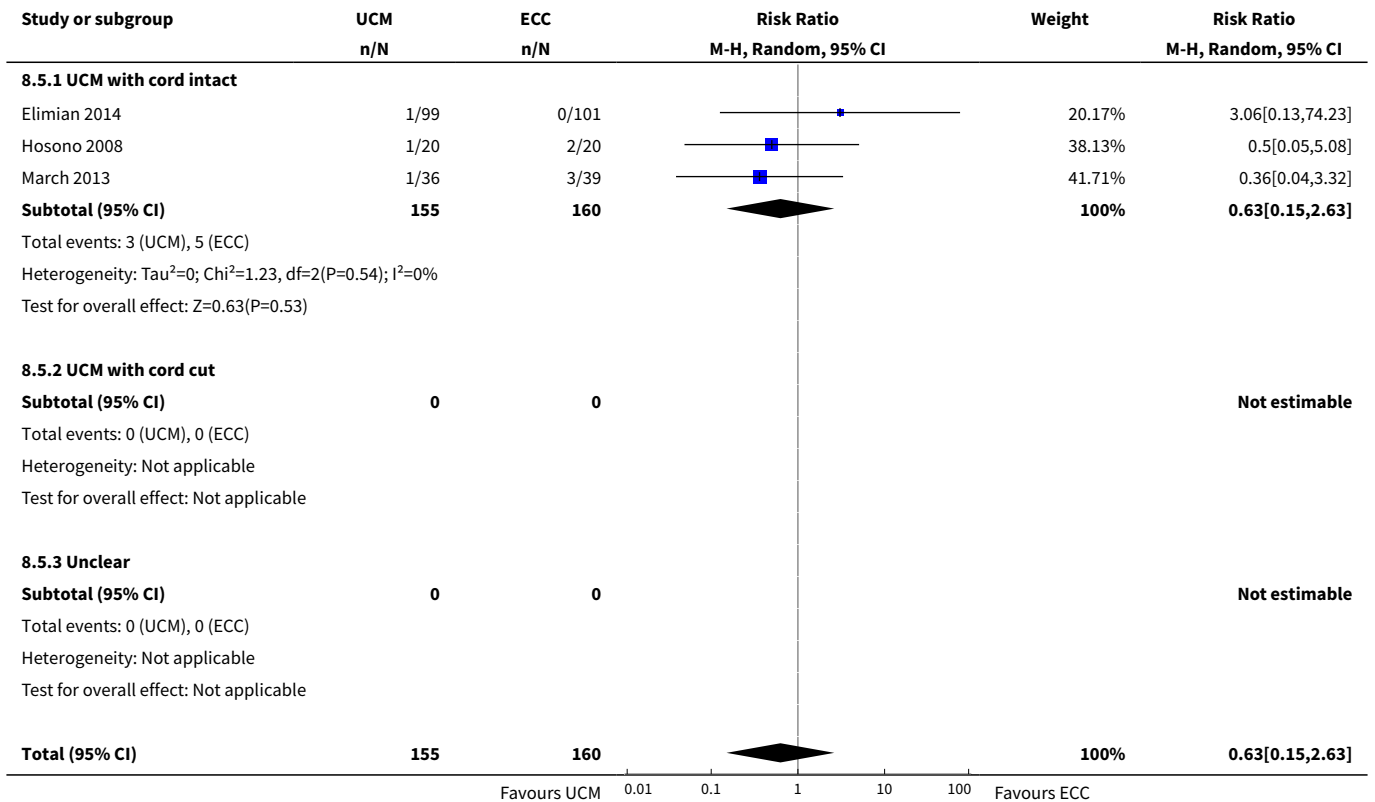


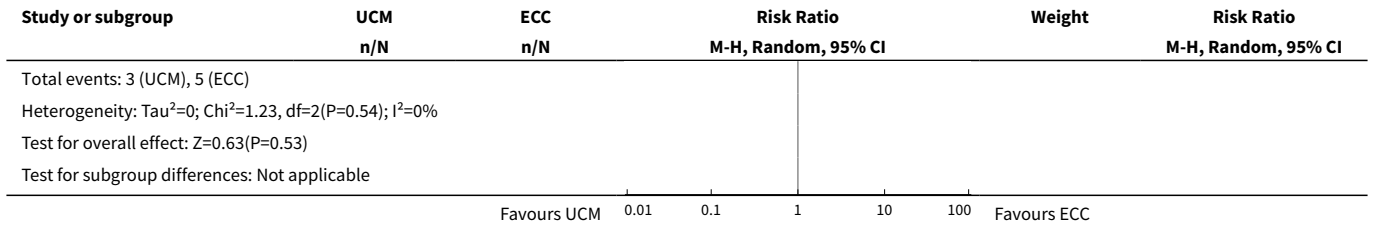
Analysis 8.4. Comparison 8 UCM vs ECC (subgroup analysis by type of intervention), Outcome 4 Intraventricular haemorrhage (IVH, all grades).



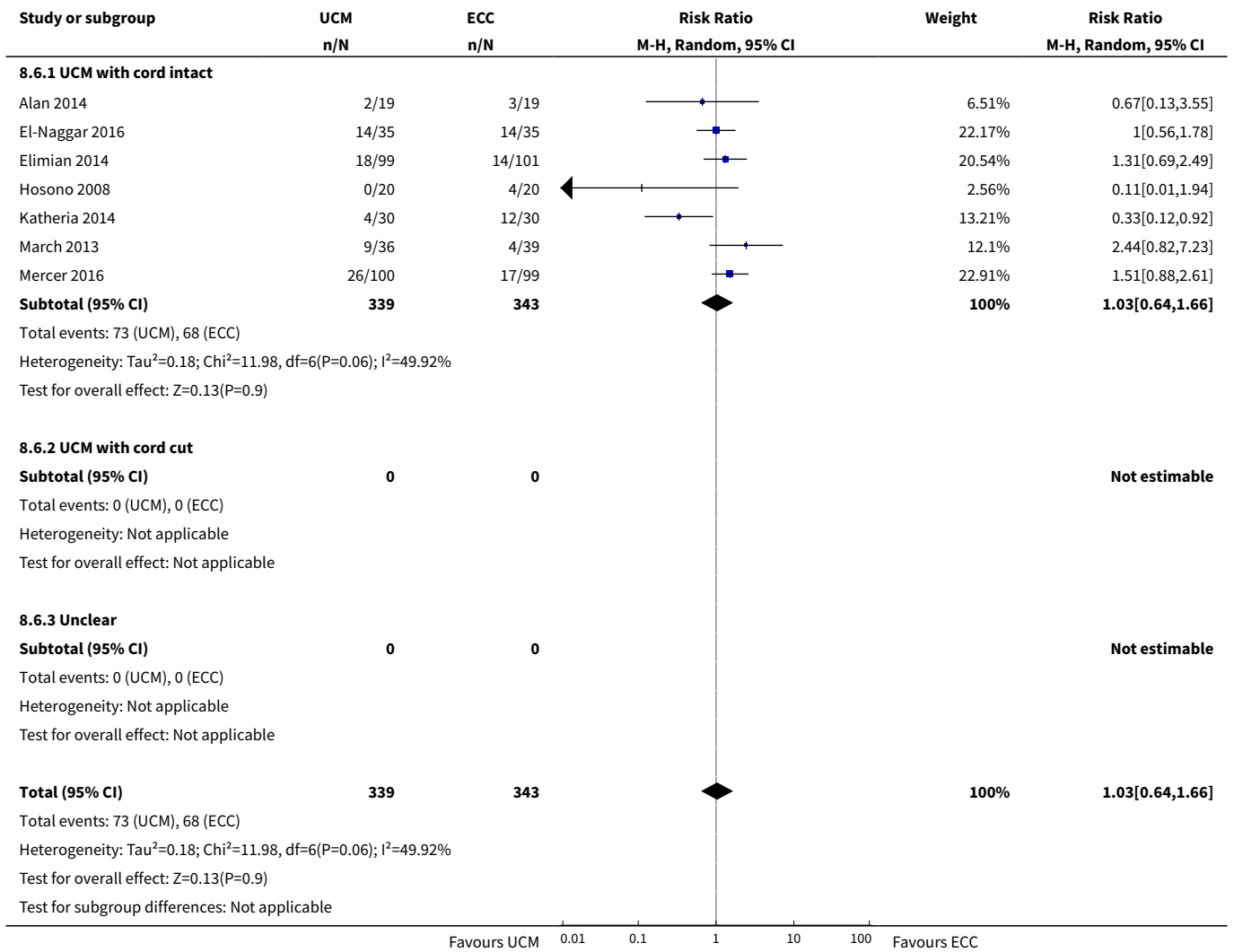


Analysis 8.5. Comparison 8 UCM vs ECC (subgroup analysis by type of intervention), Outcome 5 Periventricular leukomalacia (PVL).

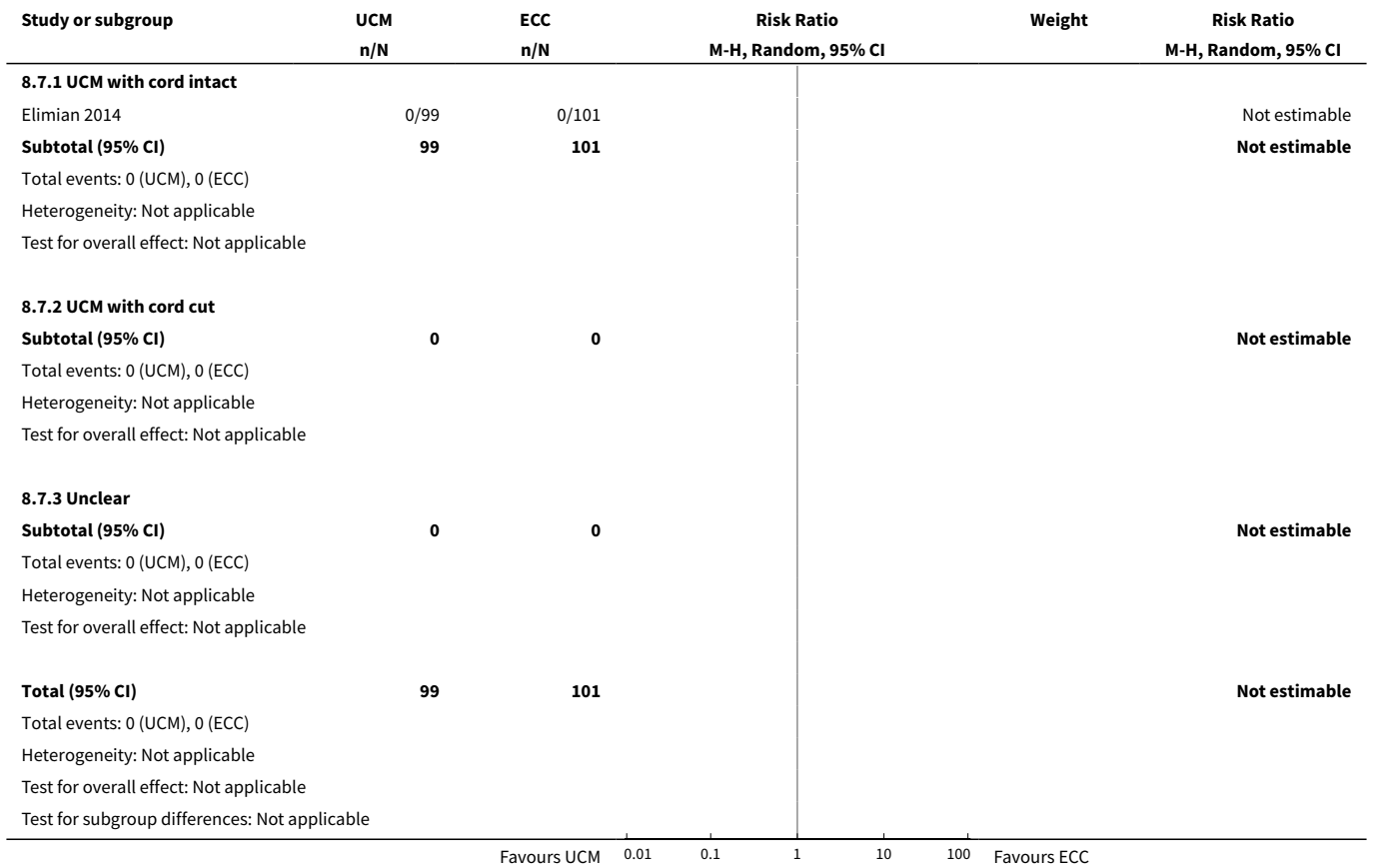




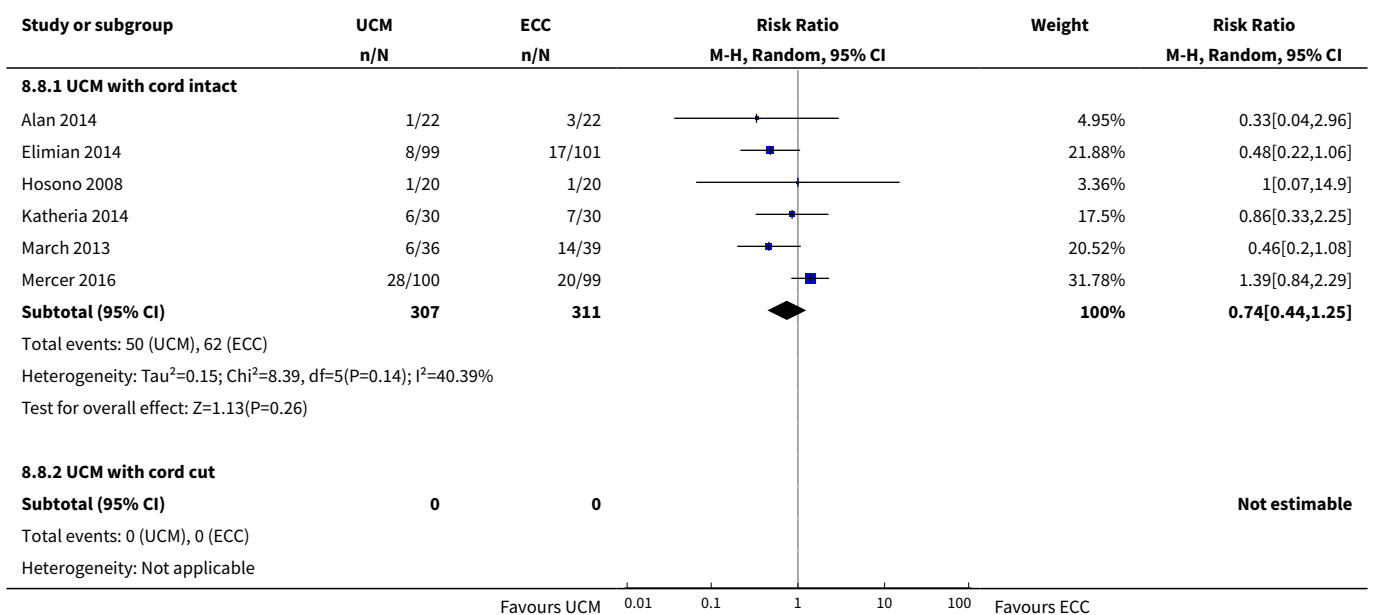
Analysis 8.6. Comparison 8 UCM vs ECC (subgroup analysis by type of intervention), Outcome 6 Chronic lung disease (CLD) - oxygen supplement at 36 weeks (corrected for gestation).

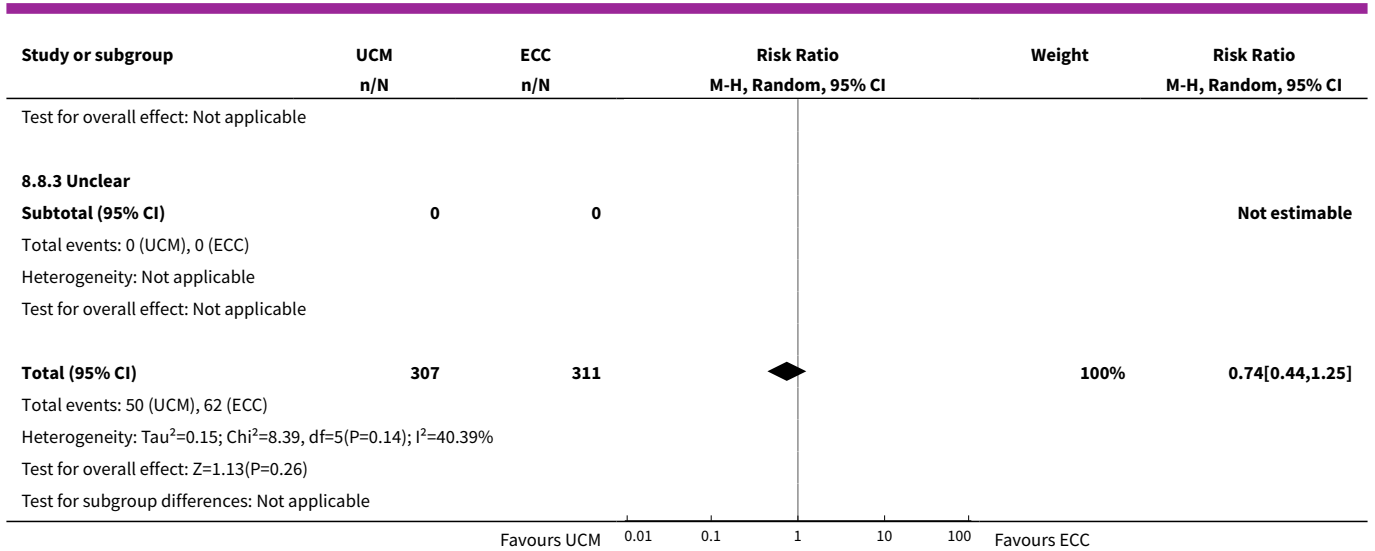


Analysis 8.7. Comparison 8 UCM vs ECC (subgroup analysis by type of intervention), Outcome 7 Maternal blood loss of 500 mL or greater.

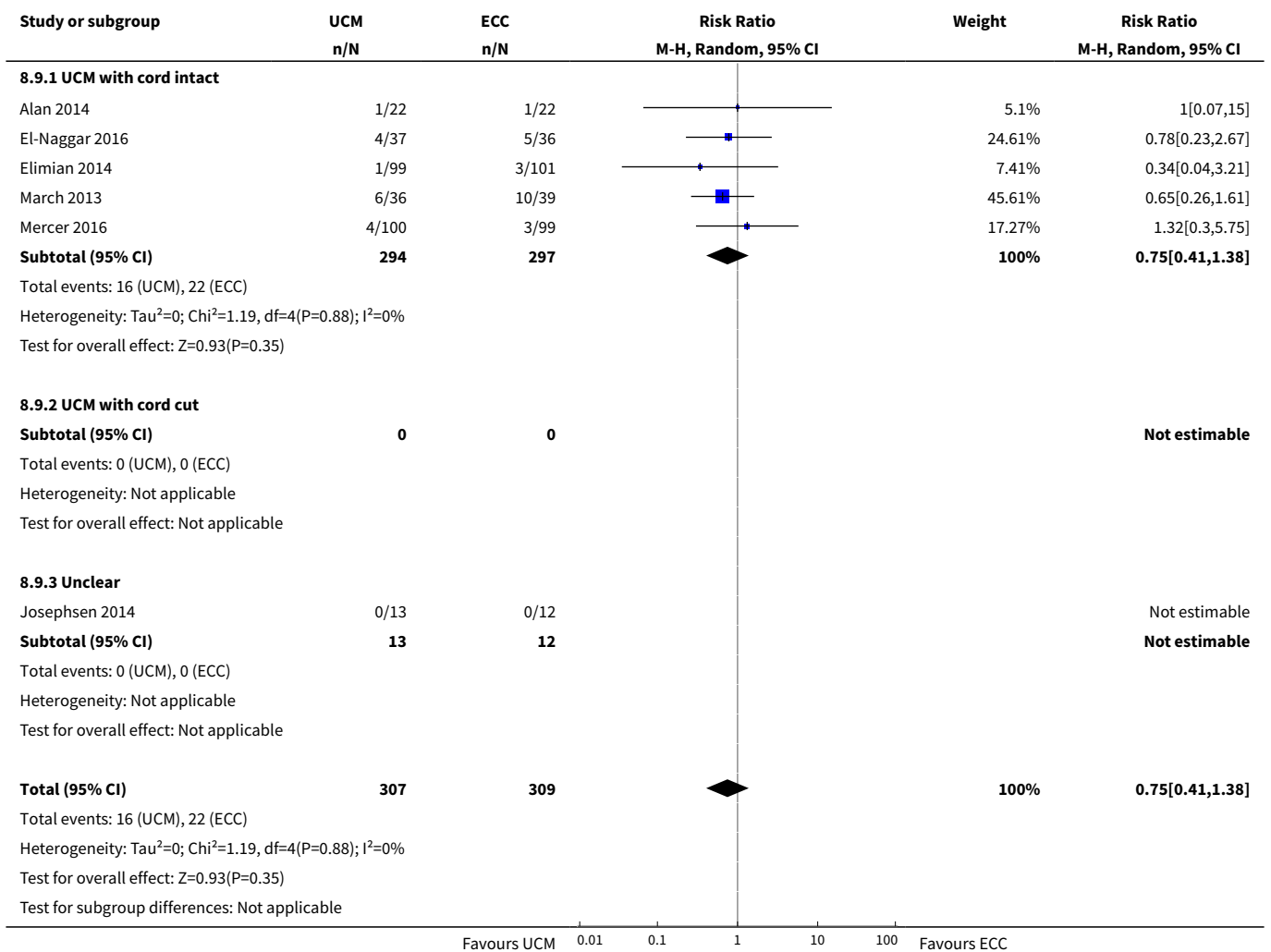


Analysis 8.8. Comparison 8 UCM vs ECC (subgroup analysis by type of intervention), Outcome 8 Intraventricular haemorrhage (IVH, grades 1 & 2).

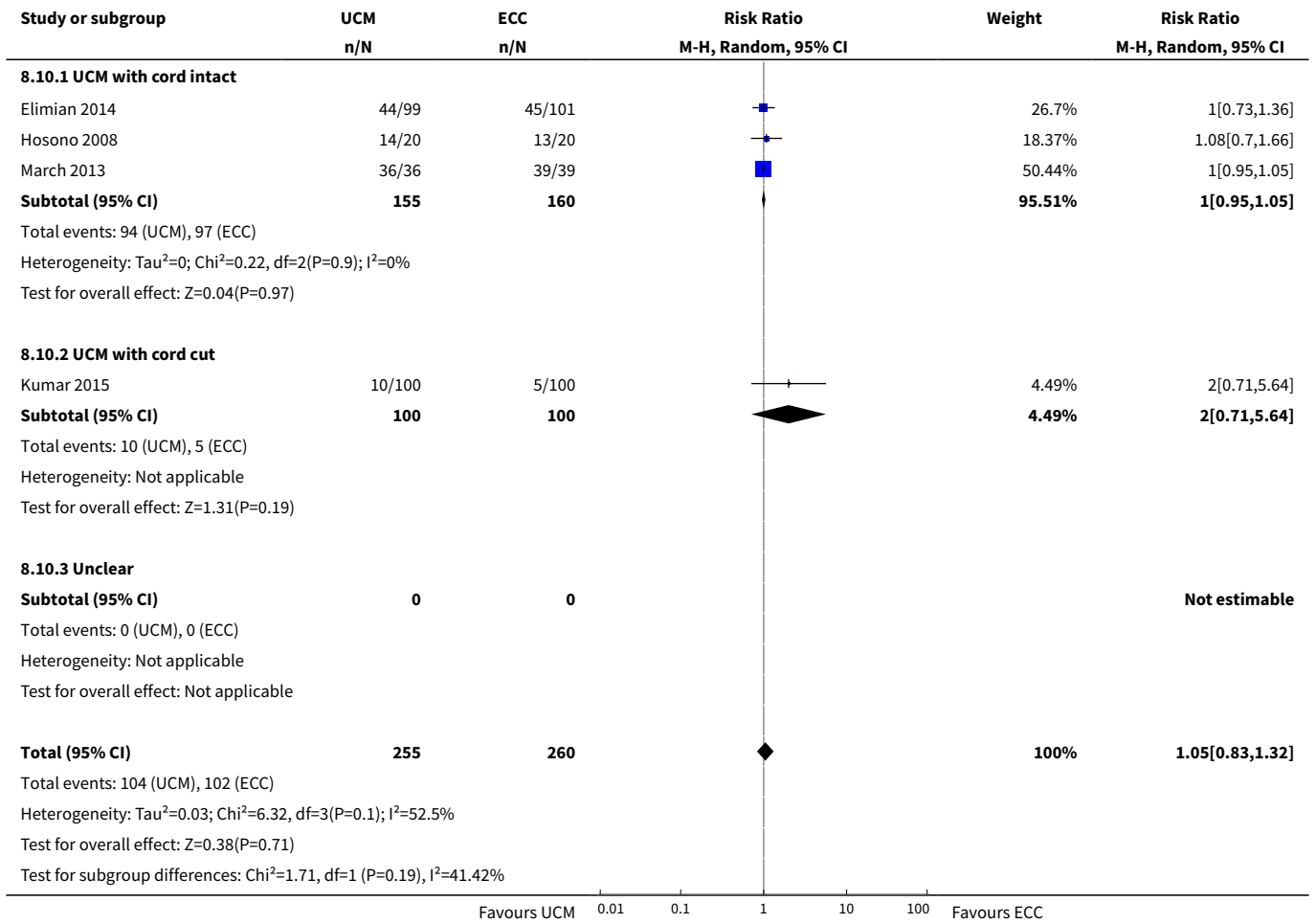




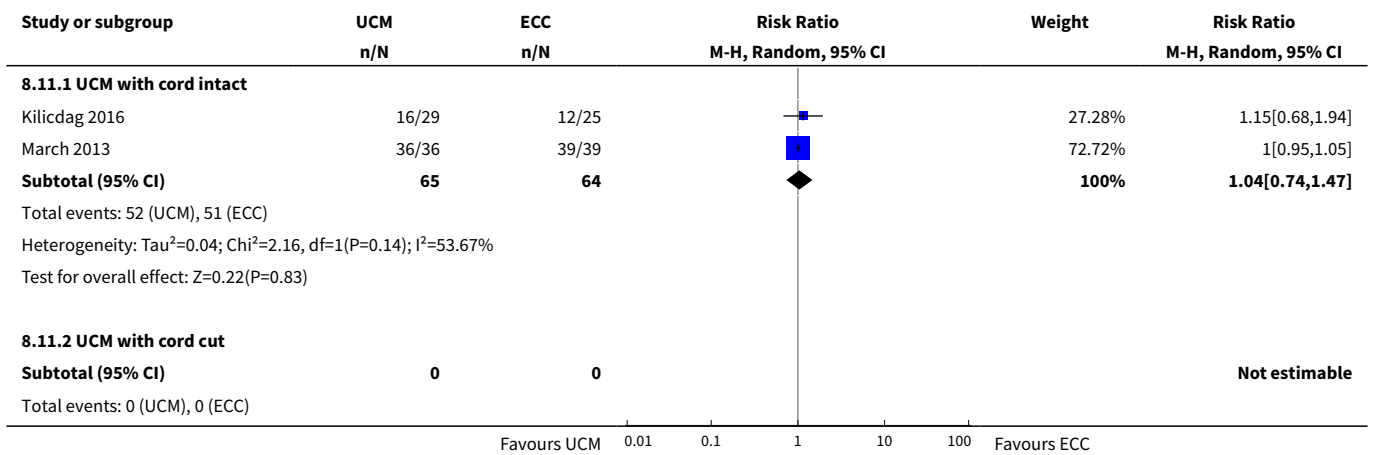
Analysis 8.9. Comparison 8 UCM vs ECC (subgroup analysis by type of intervention), Outcome 9 Necrotising enterocolitis (NEC) confirmed by X-ray or laparotomy).

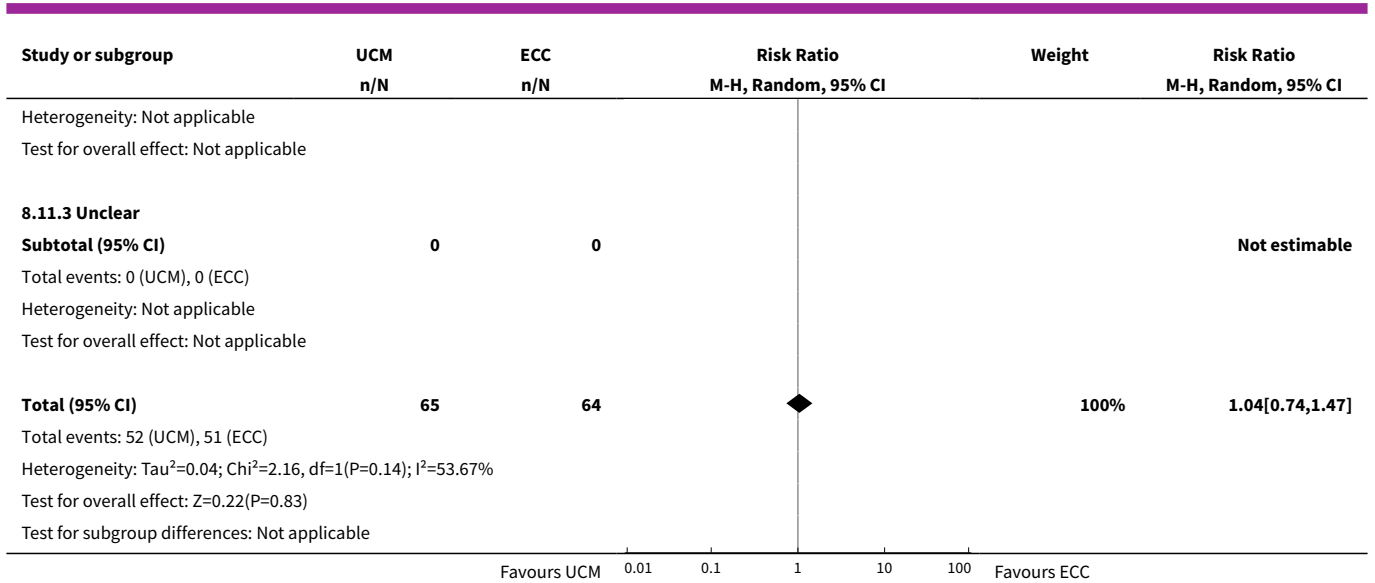


Analysis 8.10. Comparison 8 UCM vs ECC (subgroup analysis by type of intervention), Outcome 10 Respiratory Distress Syndrome (RDS).

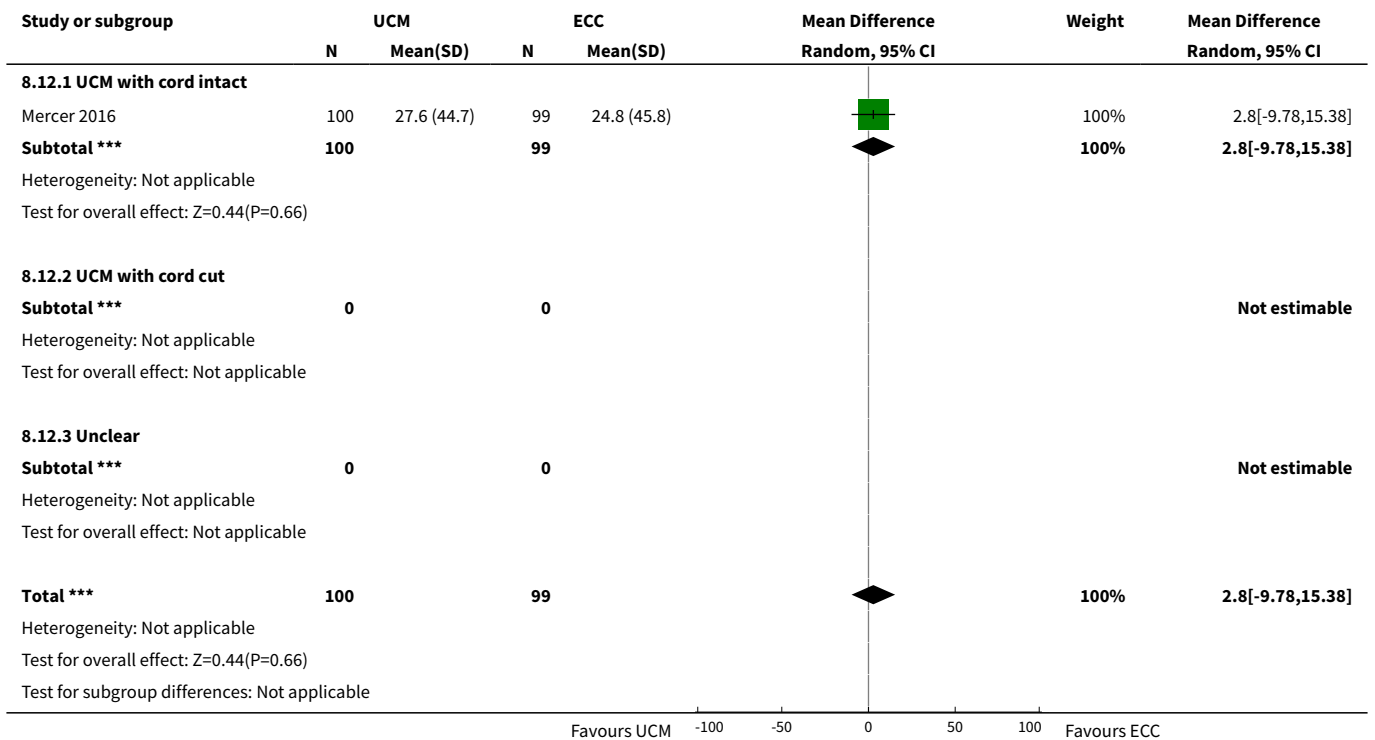


Analysis 8.11. Comparison 8 UCM vs ECC (subgroup analysis by type of intervention), Outcome 11 Respiratory support (ventilator or CPAP).

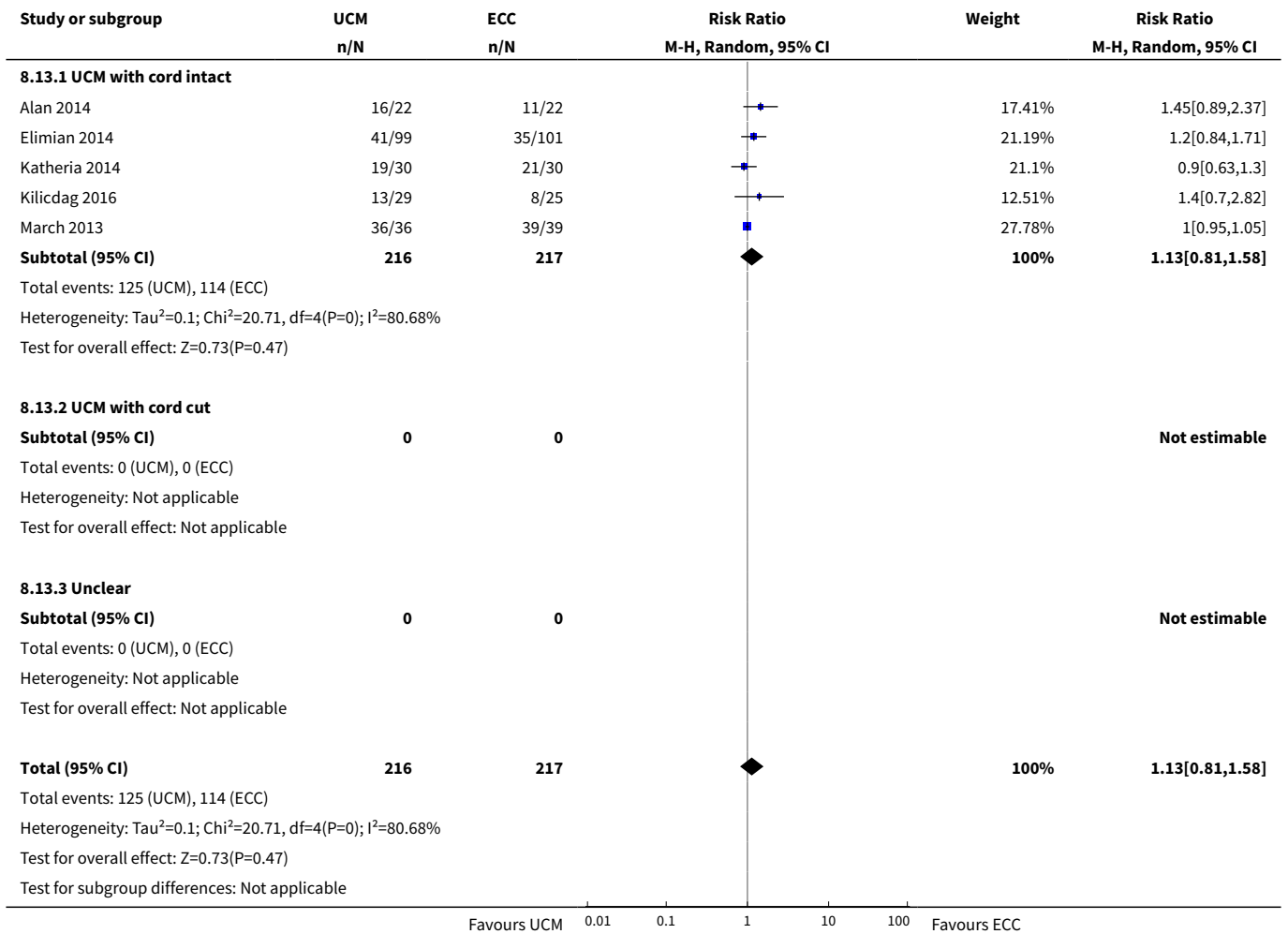




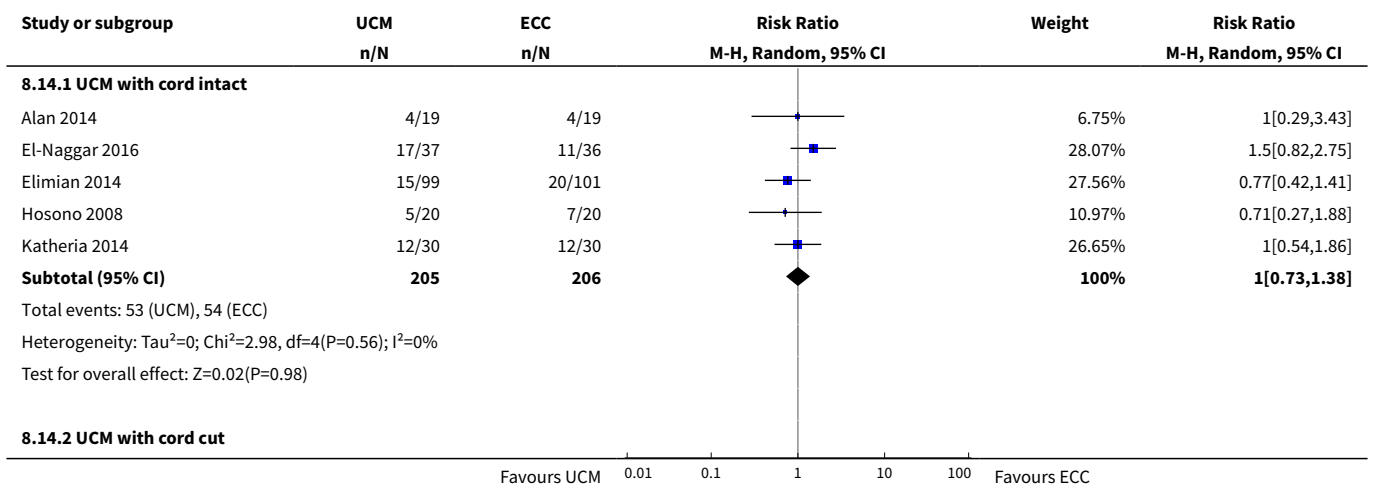
Analysis 8.12. Comparison 8 UCM vs ECC (subgroup analysis by type of intervention), Outcome 12 Duration of respiratory support (days).

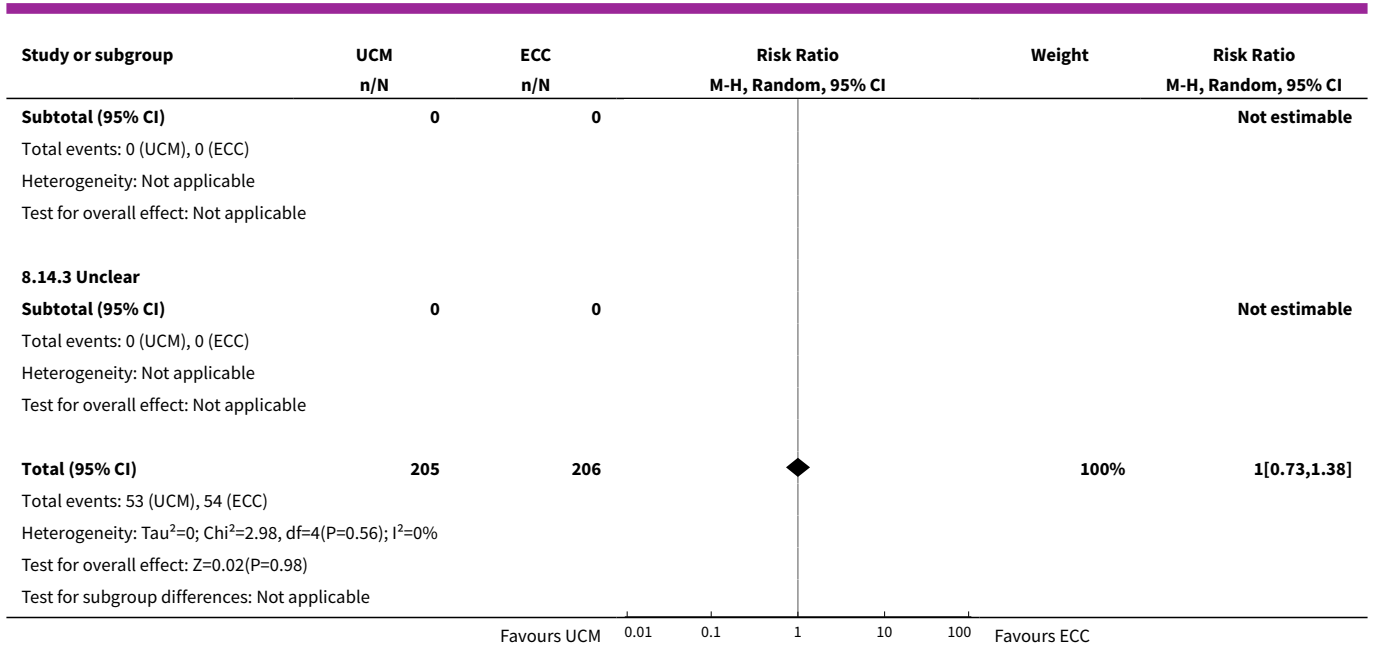


Analysis 8.13. Comparison 8 UCM vs ECC (subgroup analysis by type of intervention), Outcome 13 Surfactant treatment (for severe RDS).

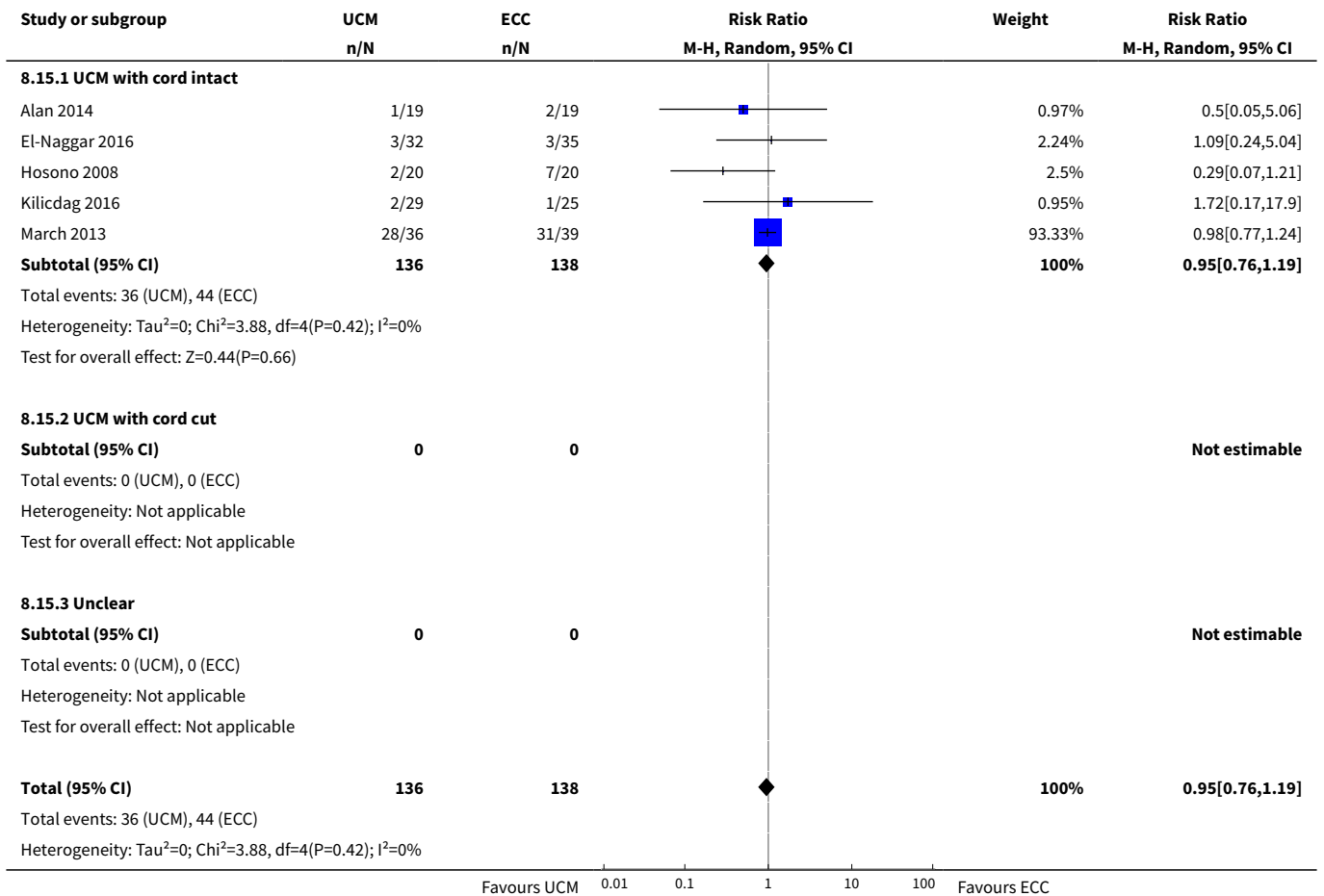


Analysis 8.14. Comparison 8 UCM vs ECC (subgroup analysis by type of intervention), Outcome 14 Treatment for Patent Ductus Arteriosus (PDA) (medical and/or surgical).





Analysis 8.15. Comparison 8 UCM vs ECC (subgroup analysis by type of intervention), Outcome 15 Treatment for Retinopathy of Prematurity (RoP).



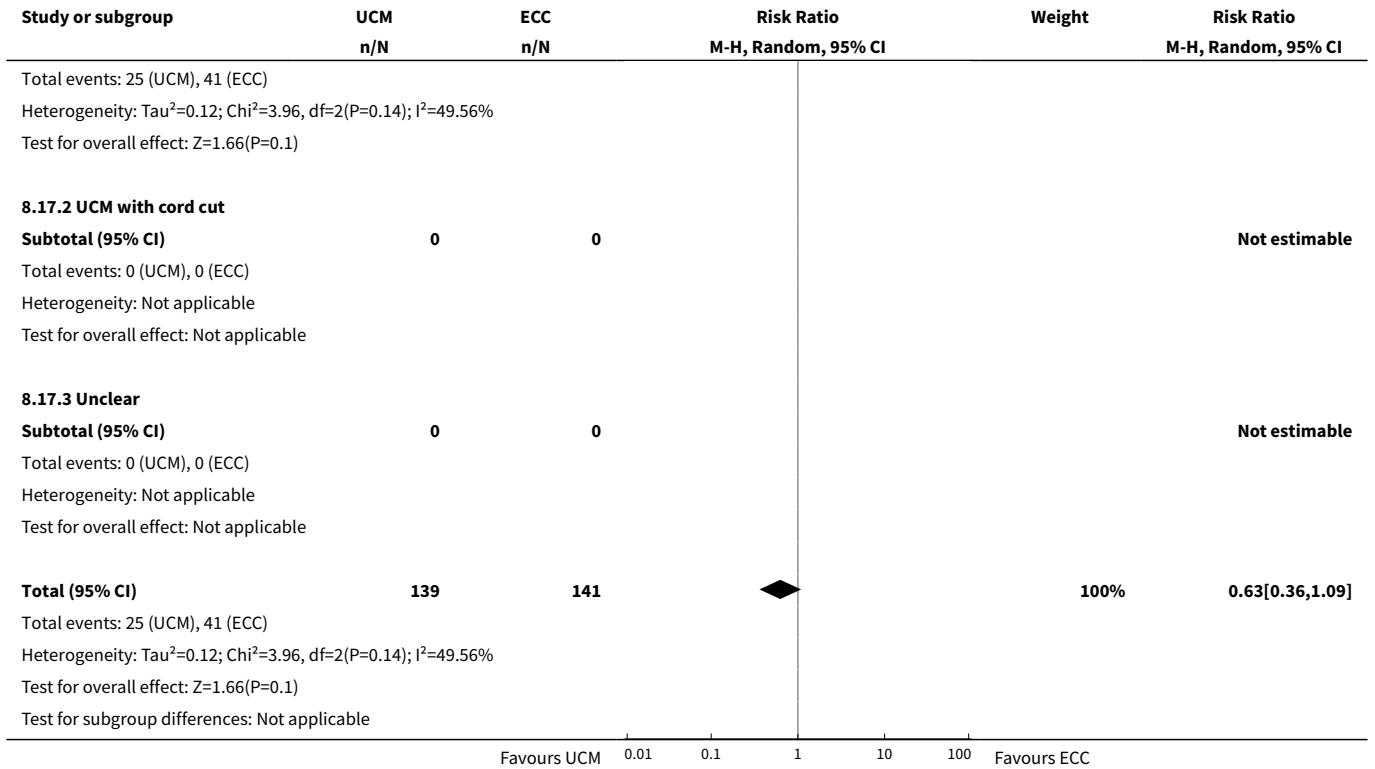
Study or subgroup	UCM n/N	ECC n/N	Risk Ratio M-H, Random, 95% CI	Weight	Risk Ratio M-H, Random, 95% CI
Test for overall effect: Z=0.44(P=0.66)					
Test for subgroup differences: Not applicable					
			Favours UCM 0.01 0.1 1 10 100 Favours ECC		

Analysis 8.16. Comparison 8 UCM vs ECC (subgroup analysis by type of intervention), Outcome 16 Hyperbilirubinemia (treated by phototherapy).

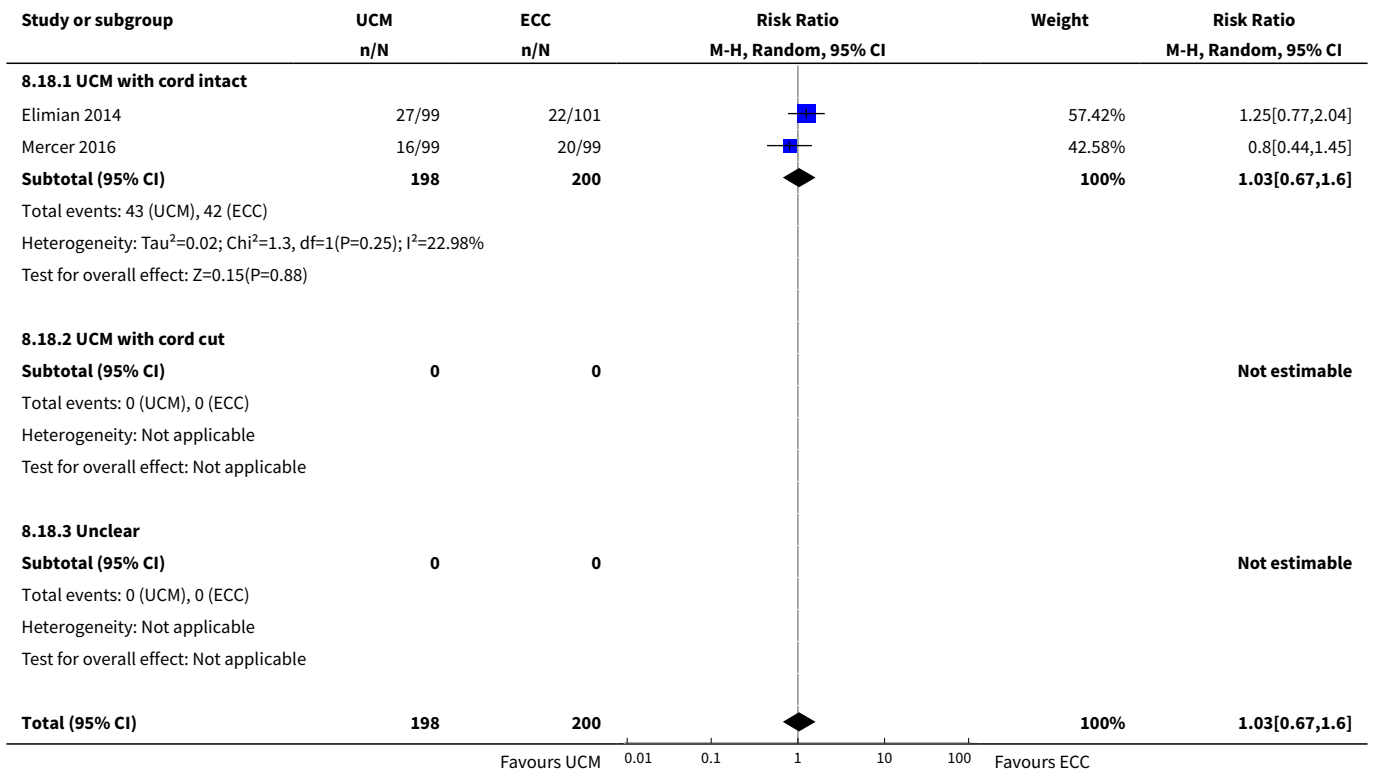
Study or subgroup	UCM n/N	ECC n/N	Risk Ratio M-H, Random, 95% CI	Weight	Risk Ratio M-H, Random, 95% CI
8.16.1 UCM with cord intact					
Elimian 2014	55/99	55/101		35.92%	1.02[0.79,1.31]
March 2013	33/36	38/39		37.6%	0.94[0.84,1.05]
Subtotal (95% CI)	135	140		73.52%	0.95[0.86,1.06]
Total events: 88 (UCM), 93 (ECC)					
Heterogeneity: Tau ² =0; Chi ² =0.82, df=1(P=0.36); I ² =0%					
Test for overall effect: Z=0.92(P=0.36)					
8.16.2 UCM with cord cut					
Kumar 2015	33/100	9/100		26.48%	3.67[1.85,7.26]
Subtotal (95% CI)	100	100		26.48%	3.67[1.85,7.26]
Total events: 33 (UCM), 9 (ECC)					
Heterogeneity: Not applicable					
Test for overall effect: Z=3.73(P=0)					
8.16.3 Unclear					
Subtotal (95% CI)	0	0			Not estimable
Total events: 0 (UCM), 0 (ECC)					
Heterogeneity: Not applicable					
Test for overall effect: Not applicable					
Total (95% CI)	235	240		100%	1.39[0.73,2.63]
Total events: 121 (UCM), 102 (ECC)					
Heterogeneity: Tau ² =0.28; Chi ² =34.36, df=2(P<0.0001); I ² =94.18%					
Test for overall effect: Z=1.01(P=0.31)					
Test for subgroup differences: Chi ² =14.62, df=1 (P=0), I ² =93.16%					
			Favours UCM 0.01 0.1 1 10 100 Favours ECC		

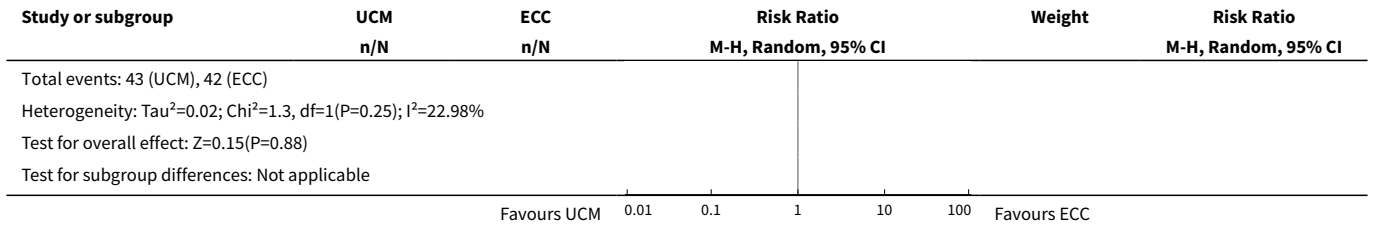
Analysis 8.17. Comparison 8 UCM vs ECC (subgroup analysis by type of intervention), Outcome 17 Inotropics for low blood pressure.

Study or subgroup	UCM n/N	ECC n/N	Risk Ratio M-H, Random, 95% CI	Weight	Risk Ratio M-H, Random, 95% CI
8.17.1 UCM with cord intact					
Elimian 2014	8/99	14/101		27.11%	0.58[0.26,1.33]
Hosono 2008	7/20	17/20		36.3%	0.41[0.22,0.77]
Katheria 2014	10/20	10/20		36.58%	1[0.54,1.86]
Subtotal (95% CI)	139	141		100%	0.63[0.36,1.09]
			Favours UCM 0.01 0.1 1 10 100 Favours ECC		

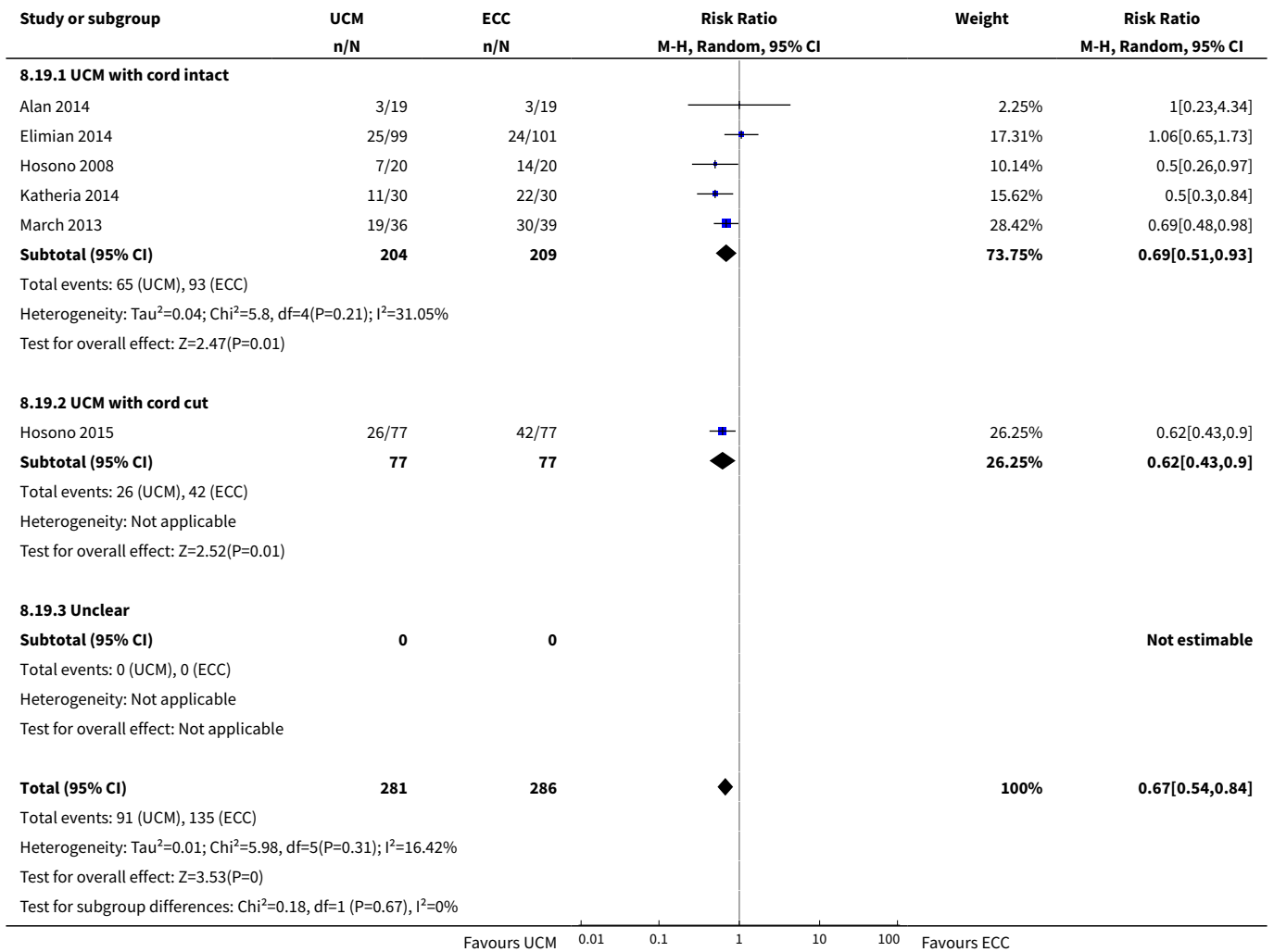


Analysis 8.18. Comparison 8 UCM vs ECC (subgroup analysis by type of intervention), Outcome 18 Low Apgar as defined by trialists (generally < 8 at 5 mins).

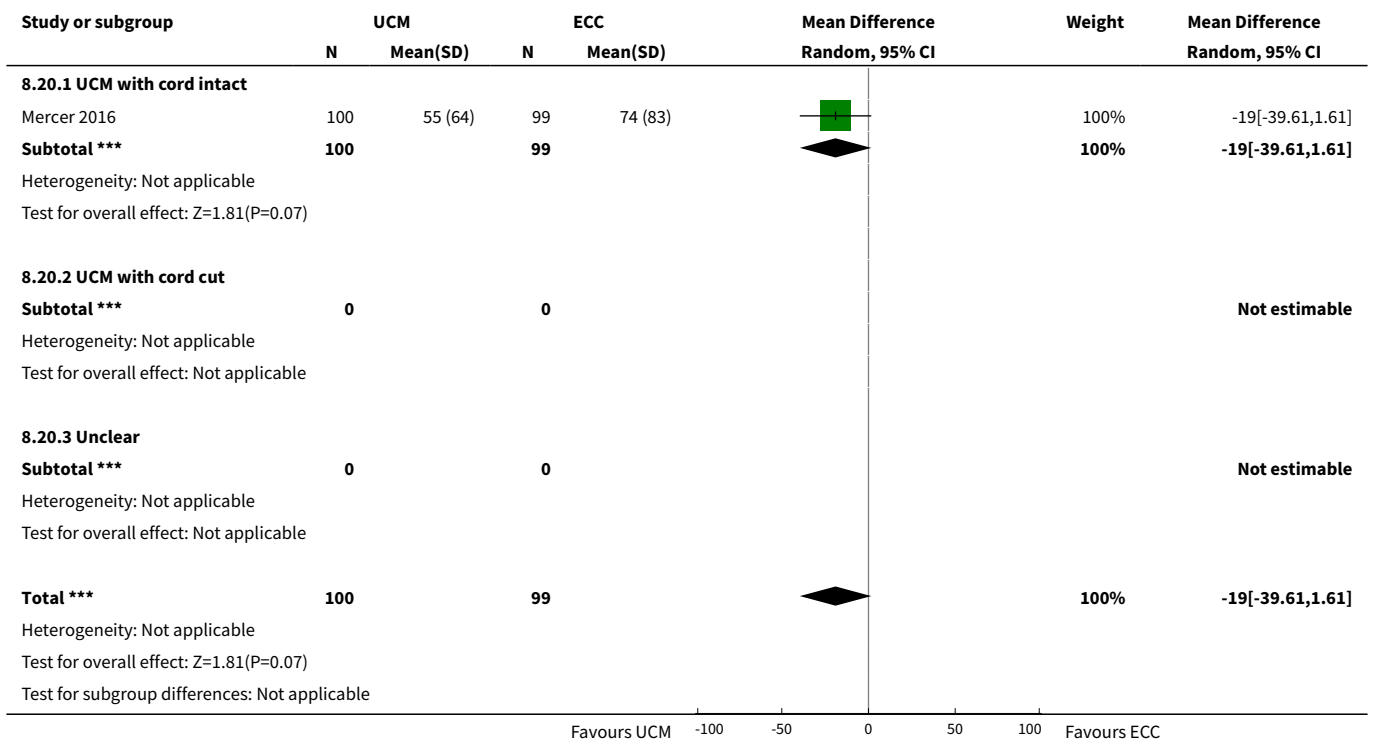




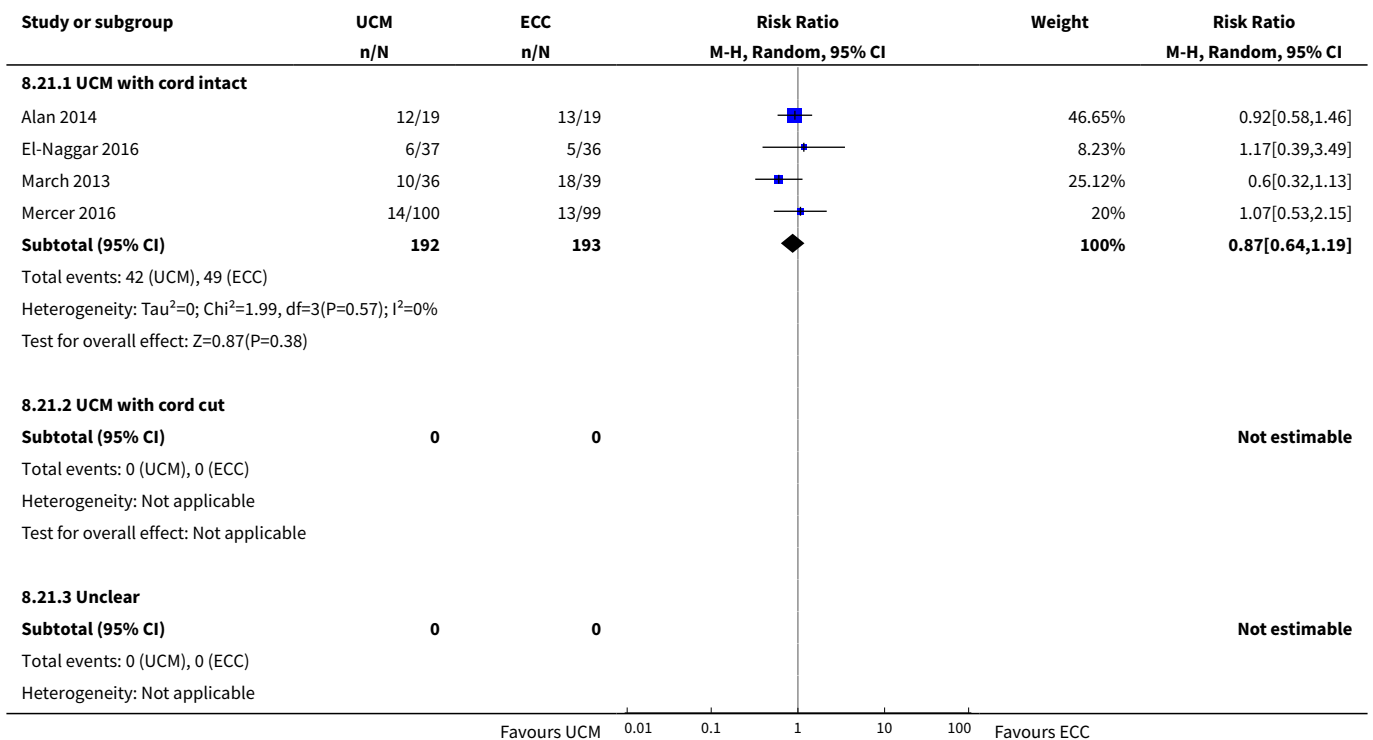
Analysis 8.19. Comparison 8 UCM vs ECC (subgroup analysis by type of intervention), Outcome 19 Blood transfusion in infant (mL).

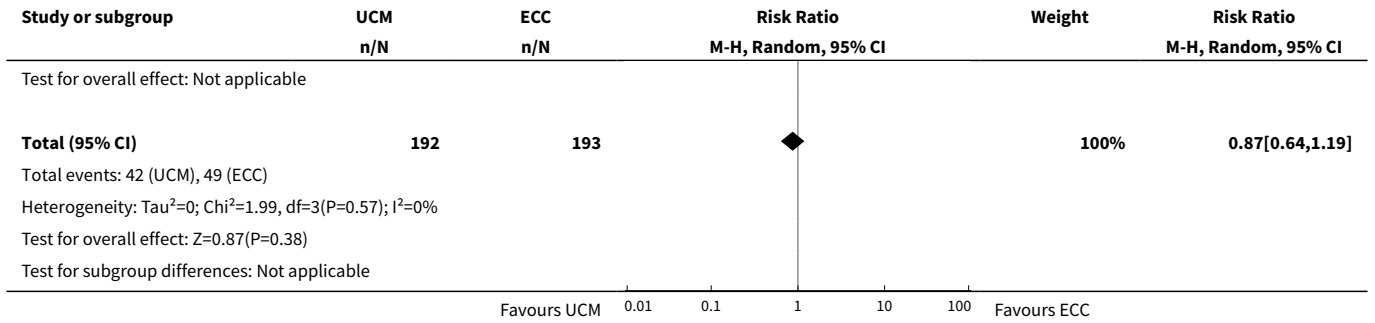


Analysis 8.20. Comparison 8 UCM vs ECC (subgroup analysis by type of intervention), Outcome 20 Volume of blood transfused.

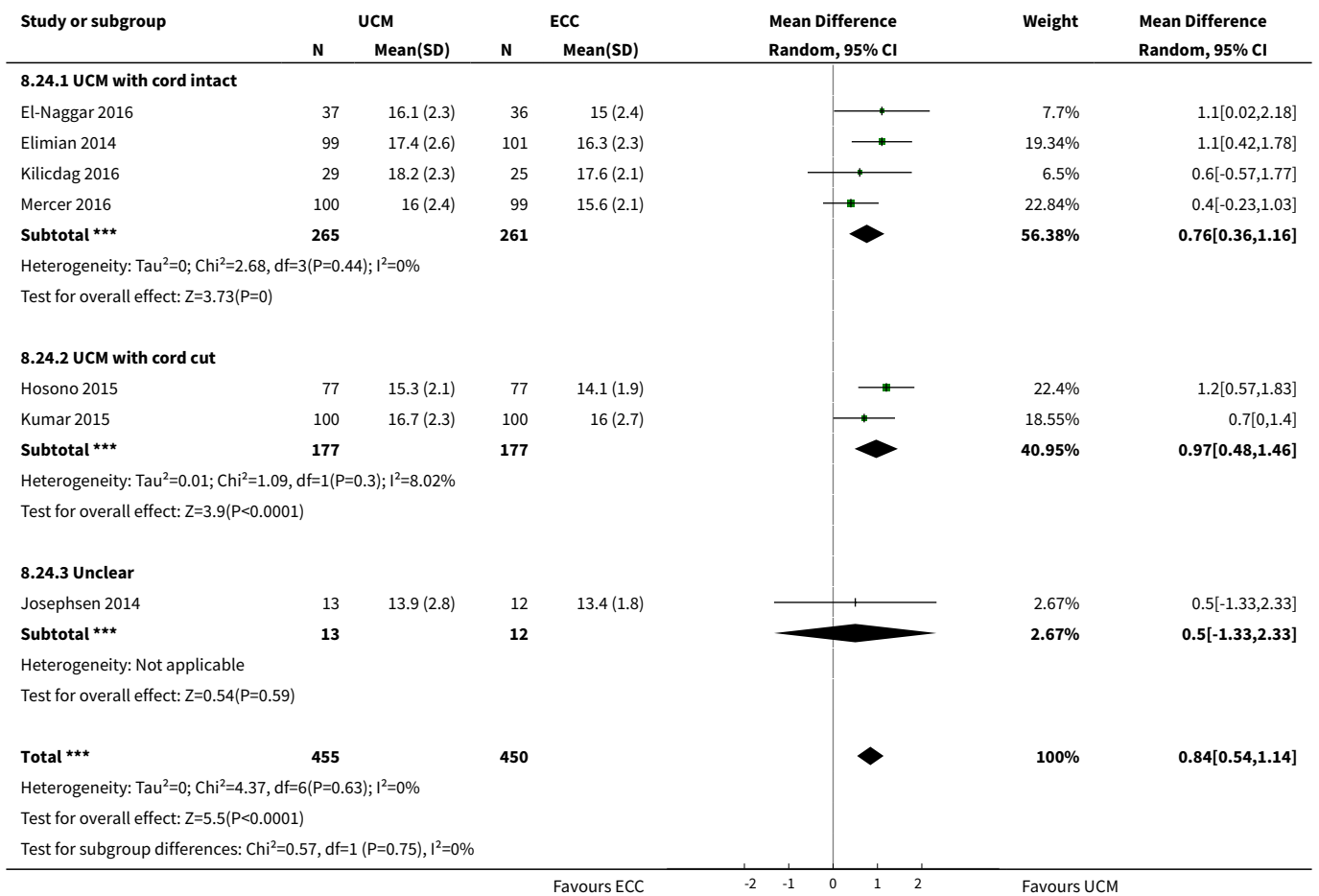


Analysis 8.21. Comparison 8 UCM vs ECC (subgroup analysis by type of intervention), Outcome 21 Late sepsis (after 3 days or as defined by trialists).

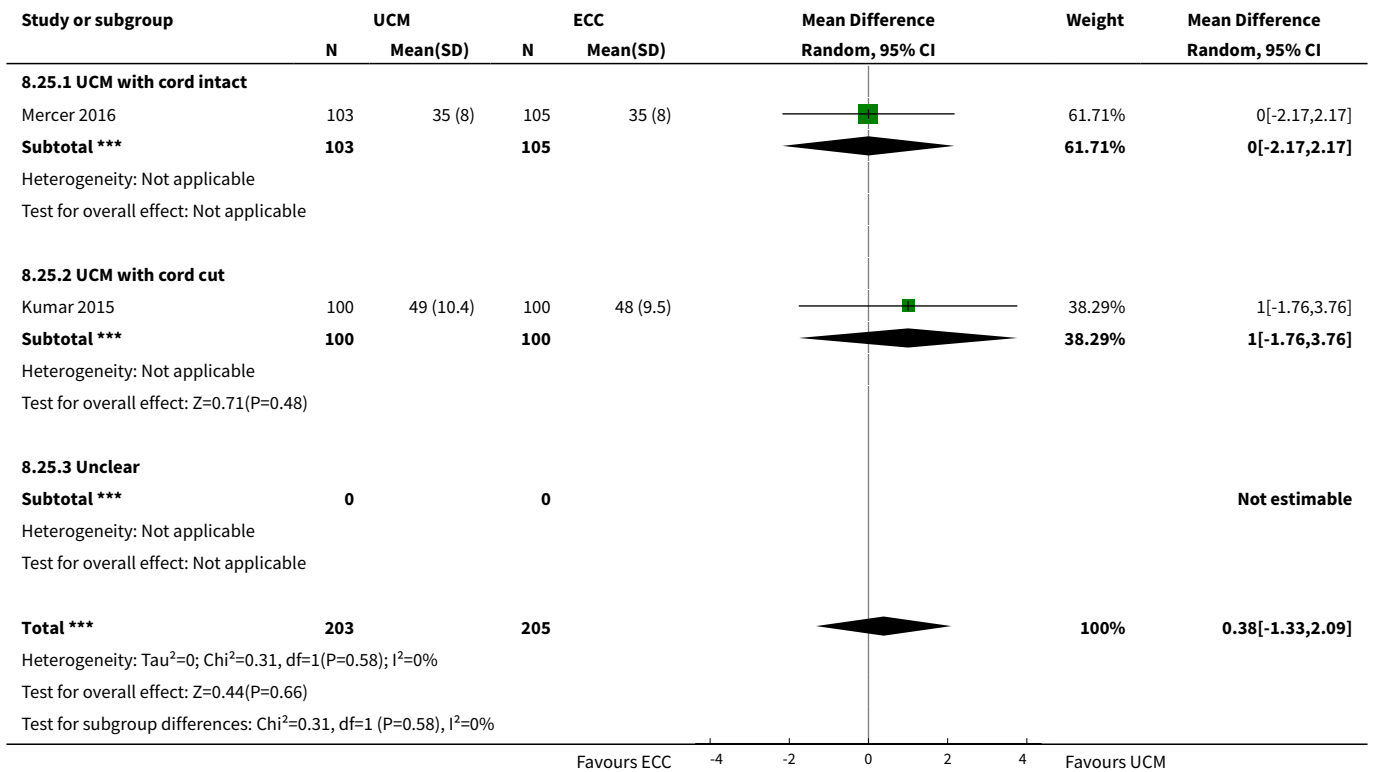




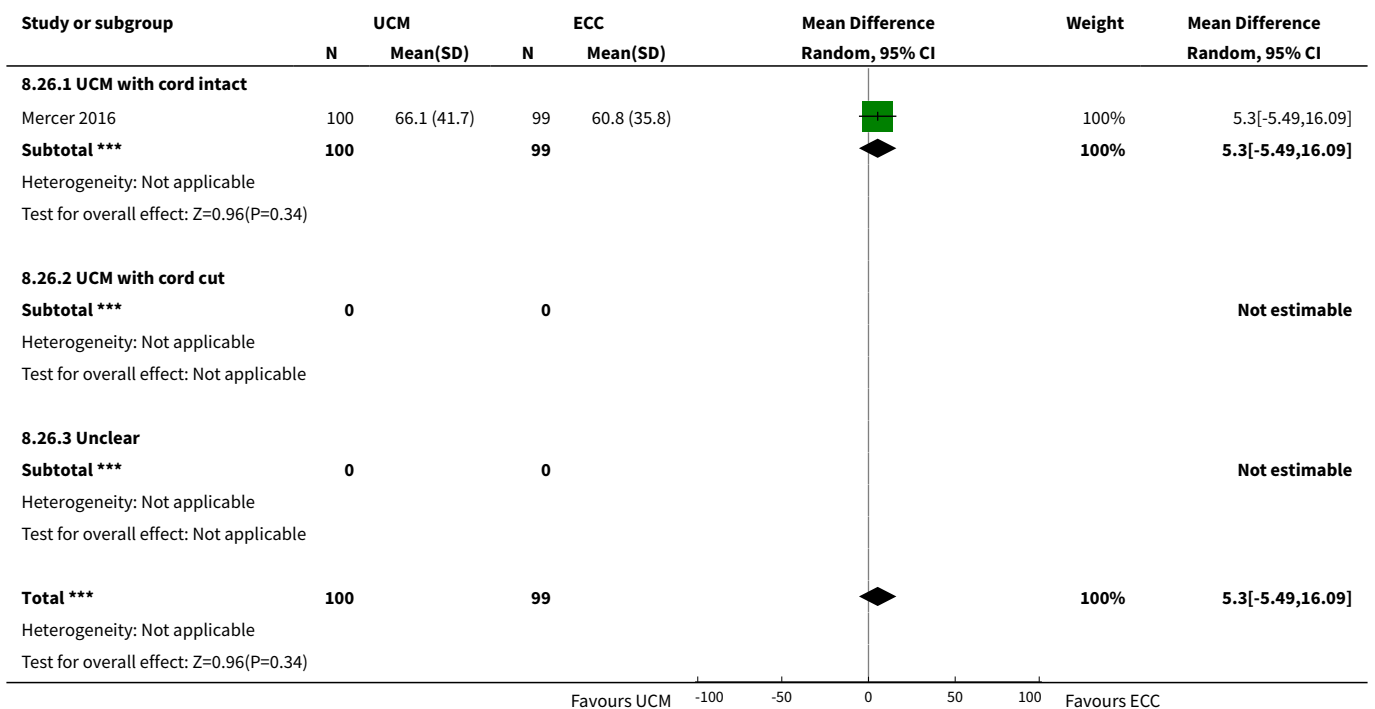
Analysis 8.24. Comparison 8 UCM vs ECC (subgroup analysis by type of intervention), Outcome 24 Hb within 1st 24 hour of birth (g/dL).

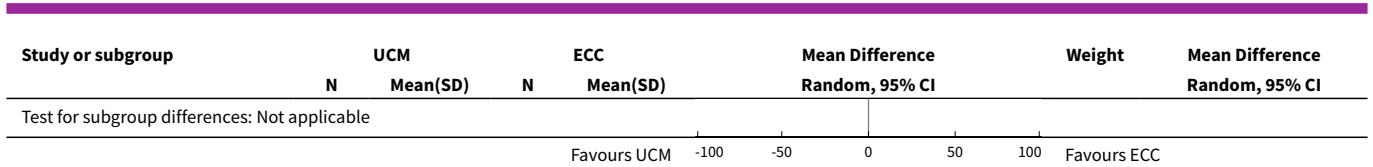


Analysis 8.25. Comparison 8 UCM vs ECC (subgroup analysis by type of intervention), Outcome 25 Mean arterial blood pressure (subgrouped by time after birth).

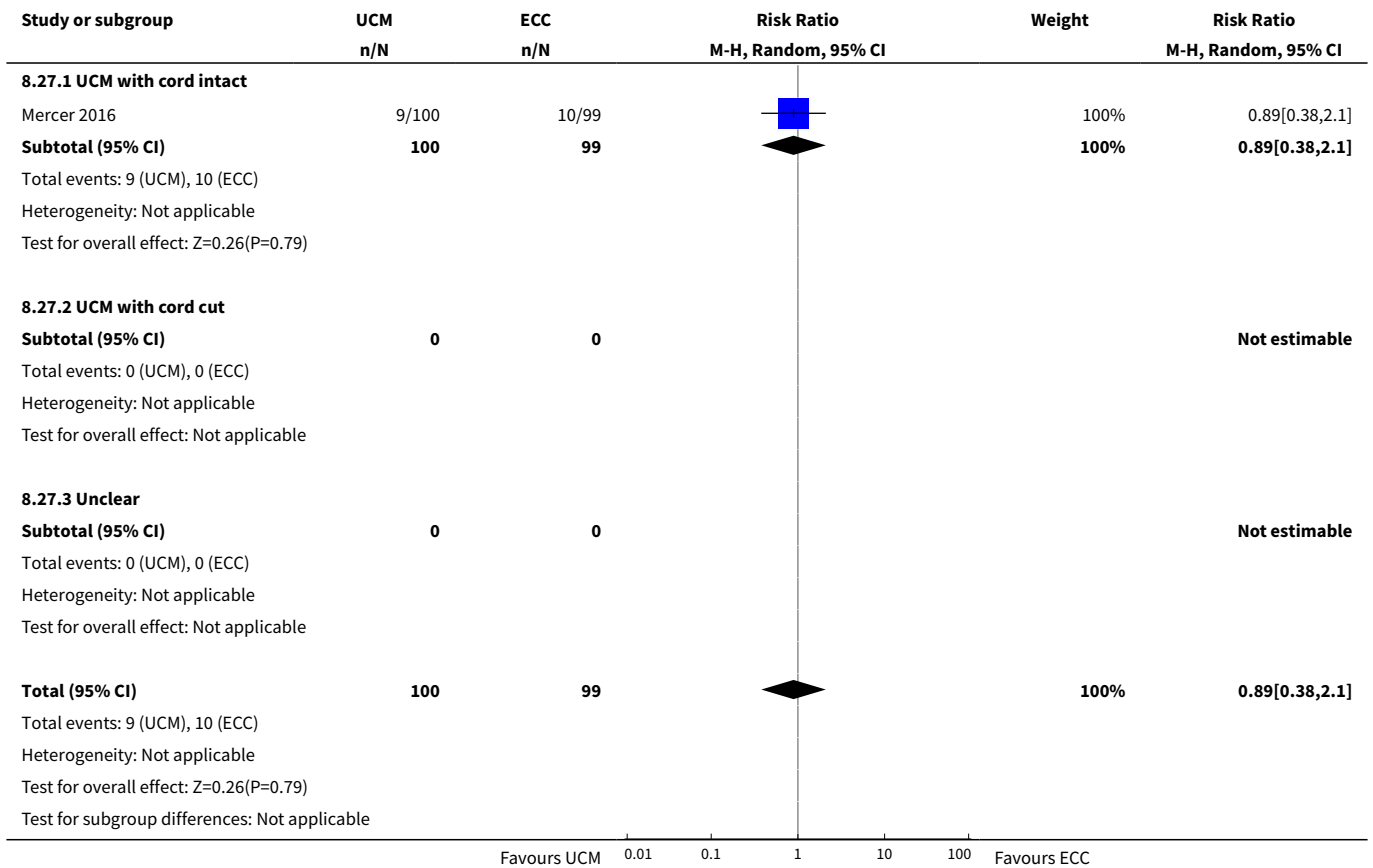


Analysis 8.26. Comparison 8 UCM vs ECC (subgroup analysis by type of intervention), Outcome 26 Length of infant stay in NICU.

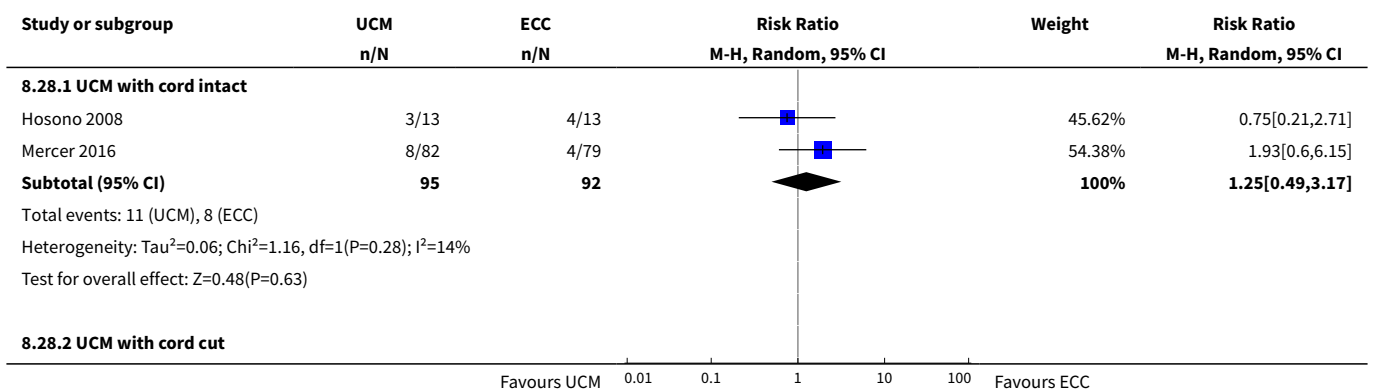


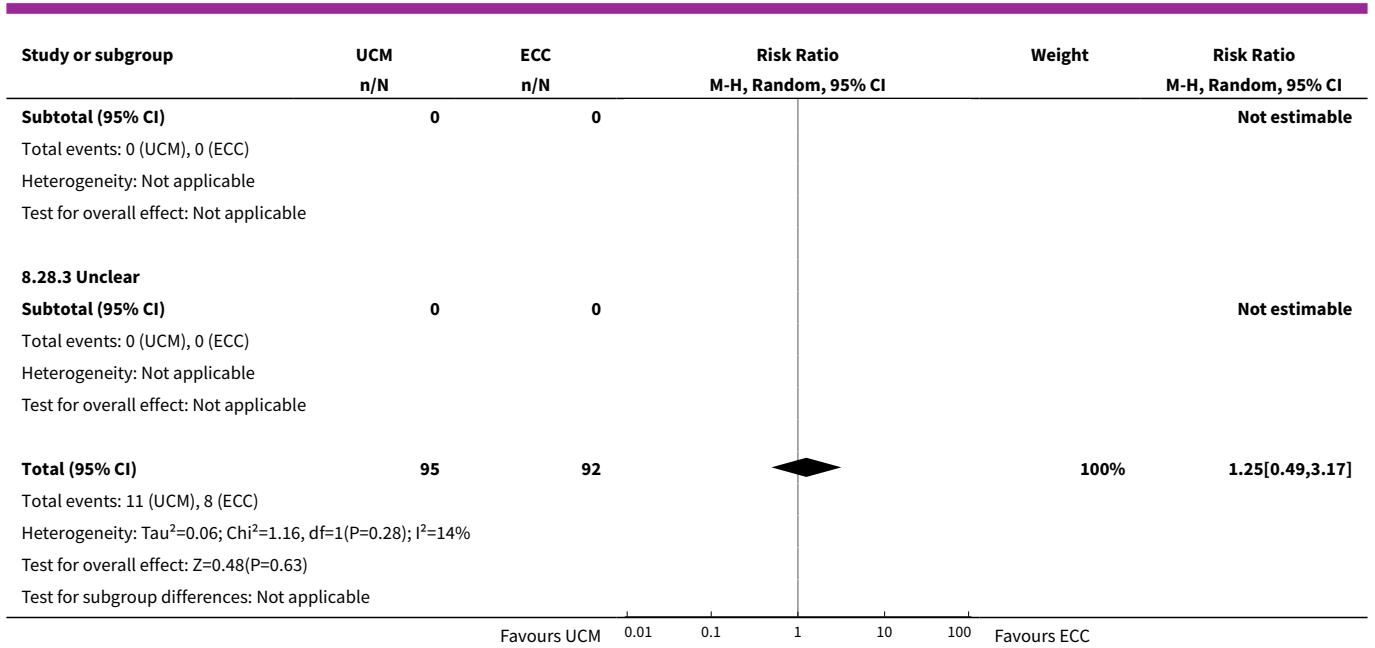


Analysis 8.27. Comparison 8 UCM vs ECC (subgroup analysis by type of intervention), Outcome 27 Home oxygen.

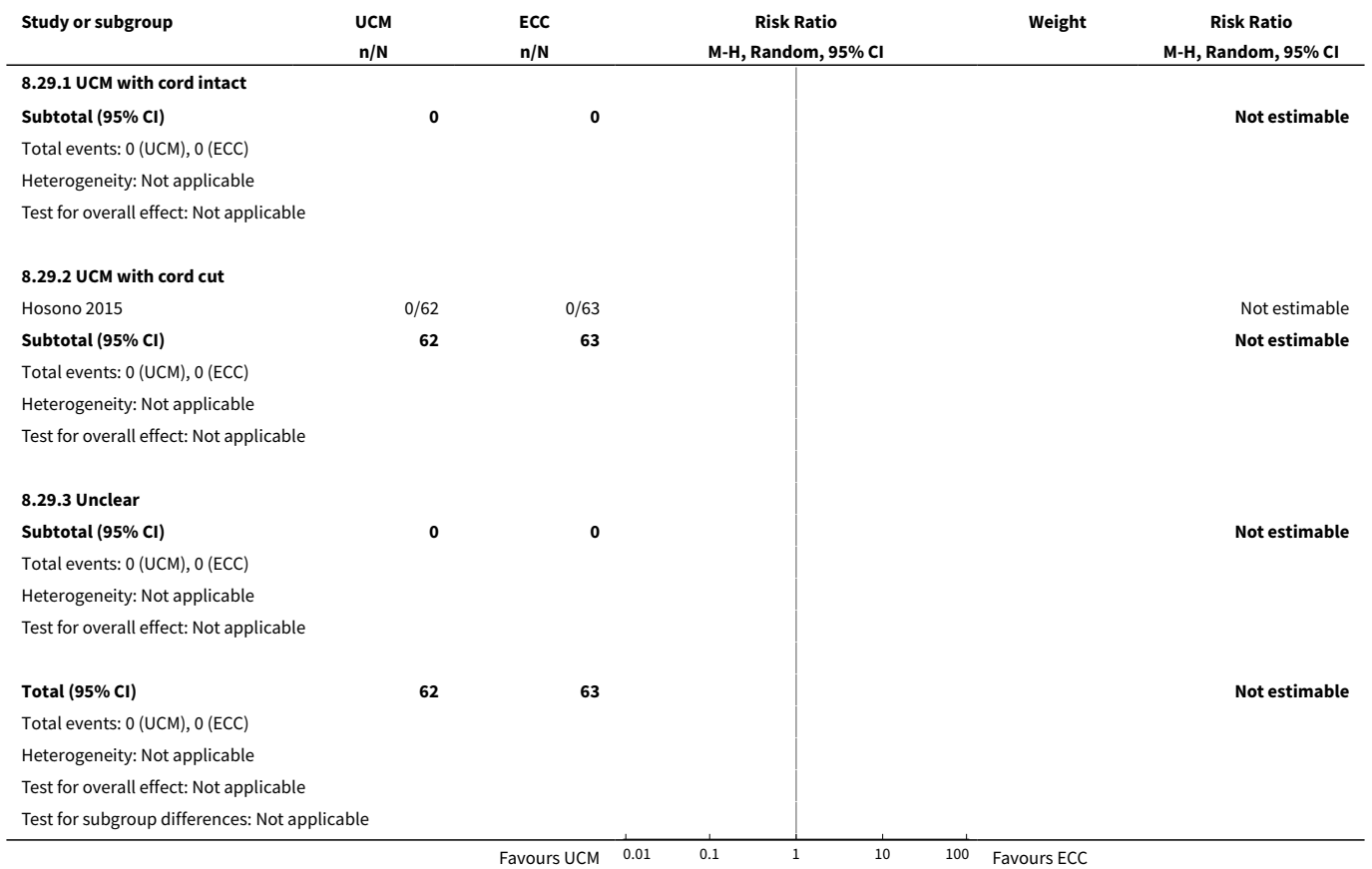


Analysis 8.28. Comparison 8 UCM vs ECC (subgroup analysis by type of intervention), Outcome 28 Neurodevelopmental impairment at age two to three years.

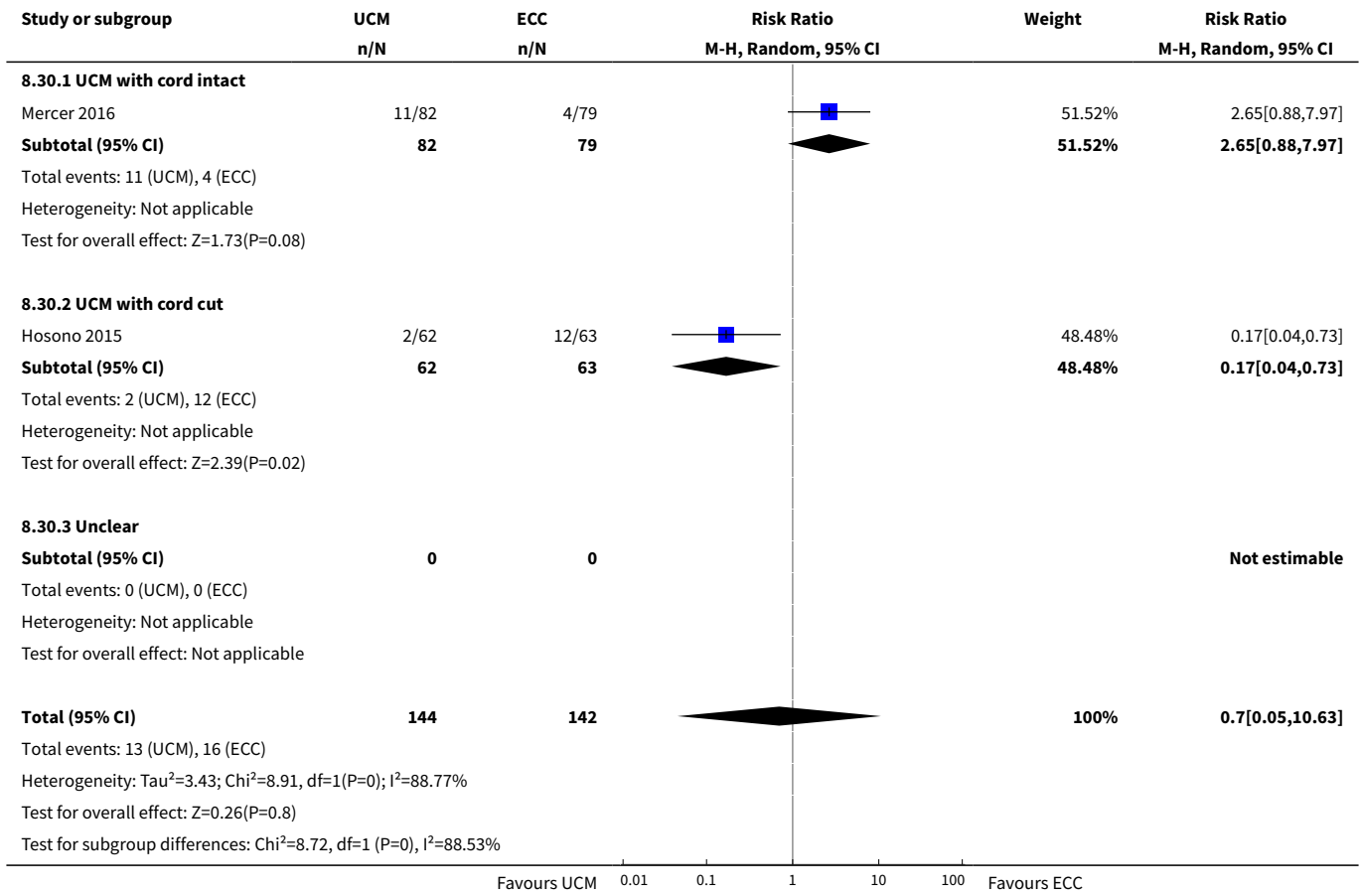




Analysis 8.29. Comparison 8 UCM vs ECC (subgroup analysis by type of intervention), Outcome 29 Severe visual impairment.



Analysis 8.30. Comparison 8 UCM vs ECC (subgroup analysis by type of intervention), Outcome 30 Cerebral palsy (CP).

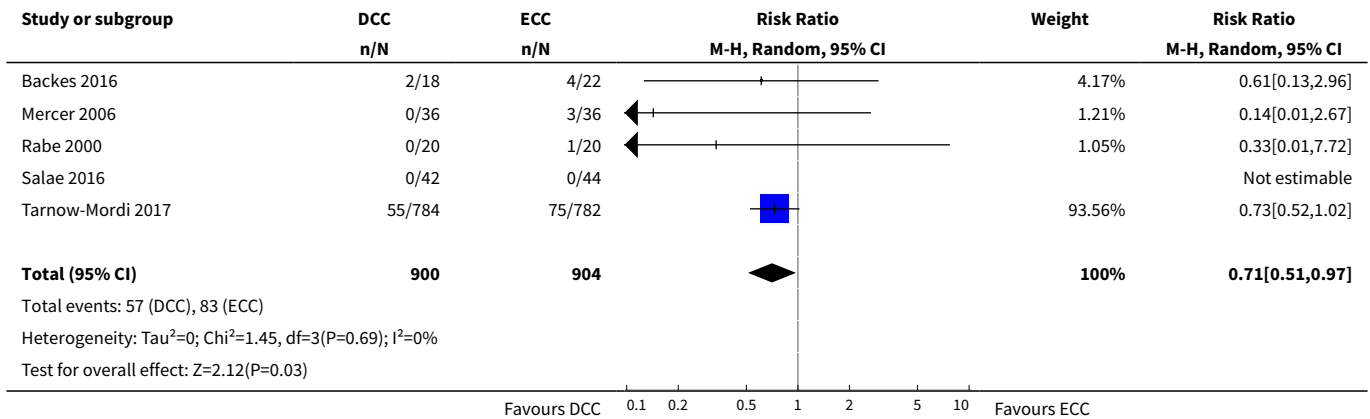


Comparison 9. DCC with immediate neonatal care after cord clamping vs ECC (low risk of bias)

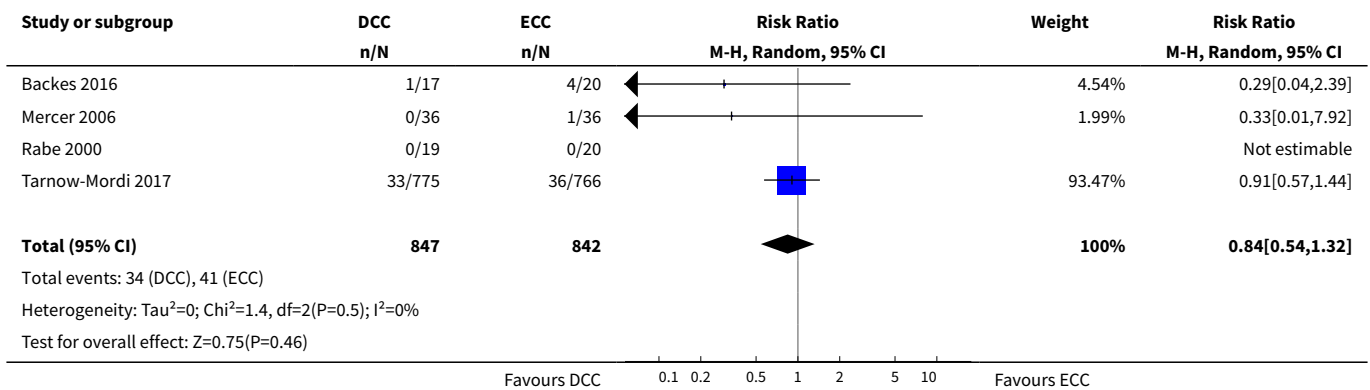
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Death of baby (up to discharge)	5	1804	Risk Ratio (M-H, Random, 95% CI)	0.71 [0.51, 0.97]
2 Death or neurodevelopmental impairment in early years	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
3 Severe intraventricular haemorrhage (IVH grades 3, 4)	4	1689	Risk Ratio (M-H, Random, 95% CI)	0.84 [0.54, 1.32]
4 Intraventricular haemorrhage (IVH, all grades)	4	1689	Risk Ratio (M-H, Random, 95% CI)	0.78 [0.52, 1.18]
5 Periventricular leukomalacia (PVL)	2	1448	Risk Ratio (M-H, Random, 95% CI)	0.52 [0.23, 1.19]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
6 Chronic lung disease (CLD) - oxygen supplement at 36 weeks (corrected for gestation)	4	1587	Risk Ratio (M-H, Random, 95% CI)	1.05 [0.95, 1.15]
7 Maternal blood loss of 500 mL or greater	1	86	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

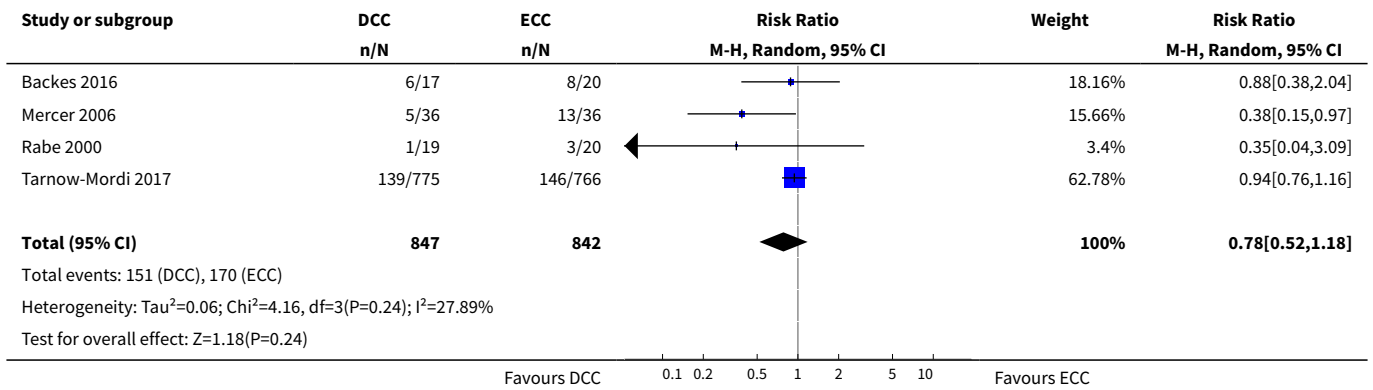
Analysis 9.1. Comparison 9 DCC with immediate neonatal care after cord clamping vs ECC (low risk of bias), Outcome 1 Death of baby (up to discharge).



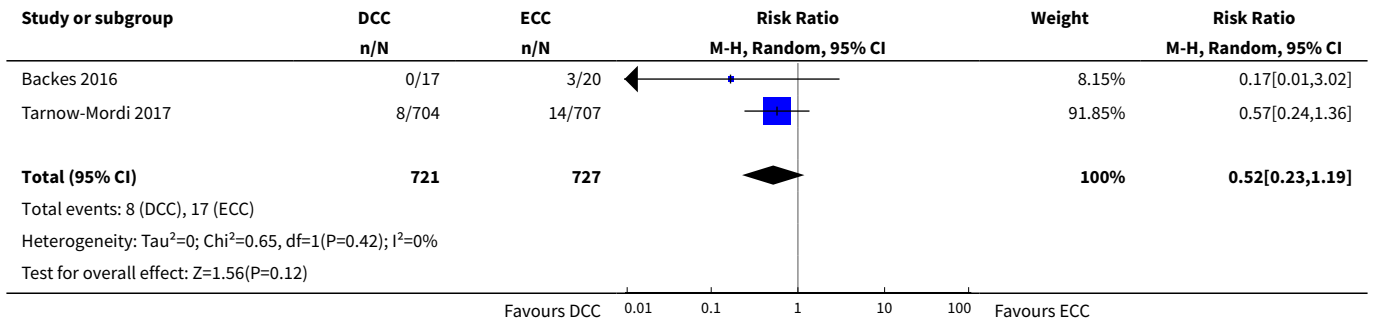
Analysis 9.3. Comparison 9 DCC with immediate neonatal care after cord clamping vs ECC (low risk of bias), Outcome 3 Severe intraventricular haemorrhage (IVH grades 3, 4).



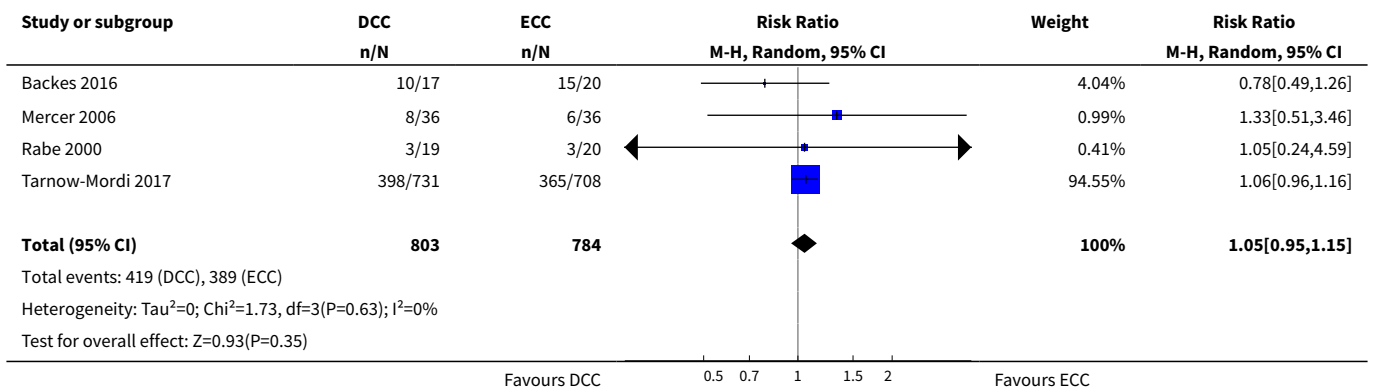
Analysis 9.4. Comparison 9 DCC with immediate neonatal care after cord clamping vs ECC (low risk of bias), Outcome 4 Intraventricular haemorrhage (IVH, all grades).



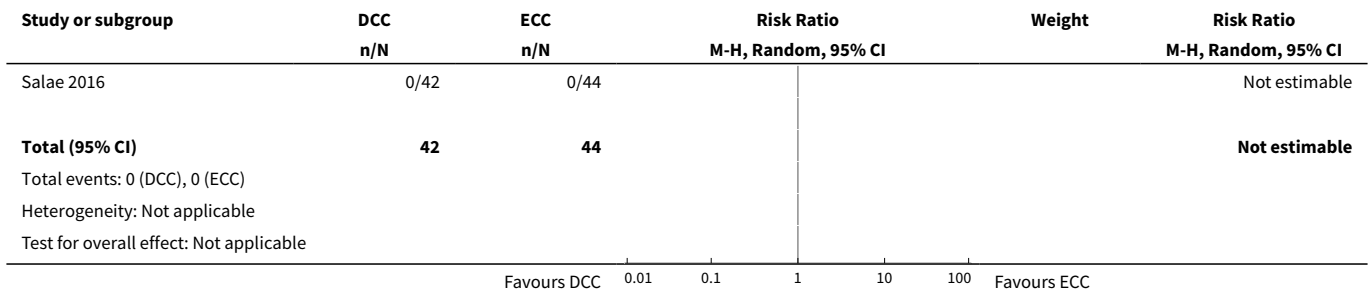
Analysis 9.5. Comparison 9 DCC with immediate neonatal care after cord clamping vs ECC (low risk of bias), Outcome 5 Periventricular leukomalacia (PVL).



Analysis 9.6. Comparison 9 DCC with immediate neonatal care after cord clamping vs ECC (low risk of bias), Outcome 6 Chronic lung disease (CLD) - oxygen supplement at 36 weeks (corrected for gestation).



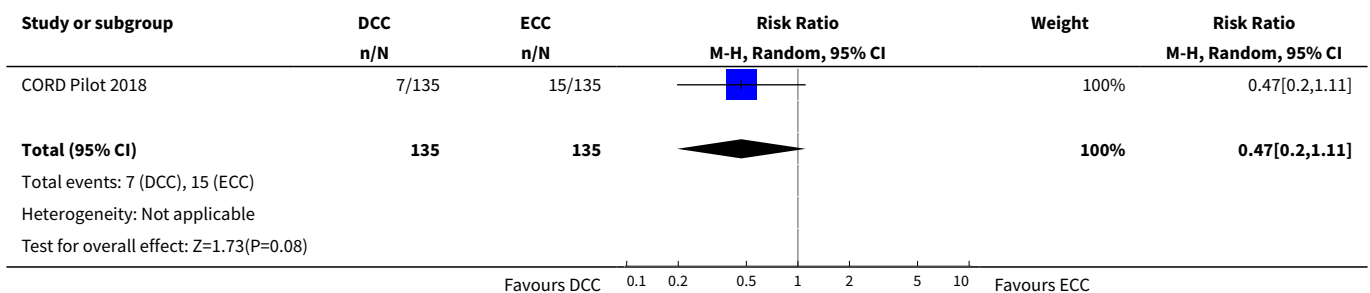
Analysis 9.7. Comparison 9 DCC with immediate neonatal care after cord clamping vs ECC (low risk of bias), Outcome 7 Maternal blood loss of 500 mL or greater.



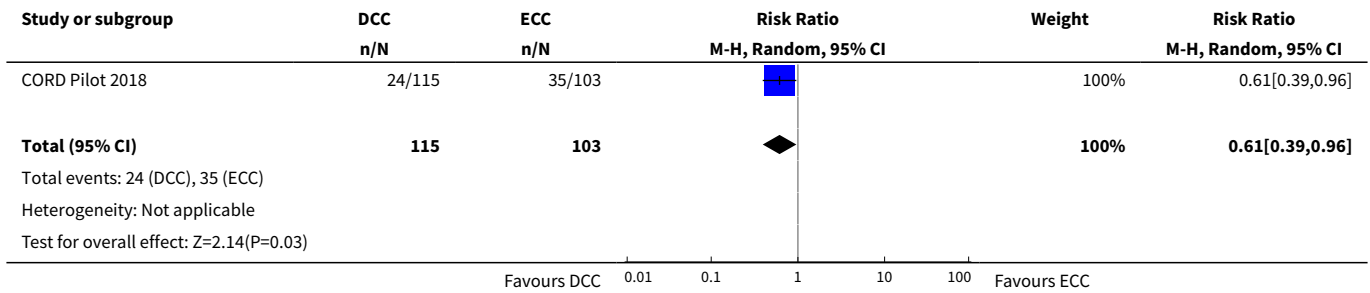
Comparison 10. DCC with immediate neonatal care with cord intact vs ECC (low risk of bias)

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Death of baby (up to discharge)	1	270	Risk Ratio (M-H, Random, 95% CI)	0.47 [0.20, 1.11]
2 Death or neurodevelopmental impairment in early years	1	218	Risk Ratio (M-H, Random, 95% CI)	0.61 [0.39, 0.96]
3 Severe intraventricular haemorrhage (IVH grades 3, 4)	1	266	Risk Ratio (M-H, Random, 95% CI)	0.84 [0.29, 2.45]
4 Intraventricular haemorrhage (IVH, all grades)	1	266	Risk Ratio (M-H, Random, 95% CI)	0.90 [0.64, 1.26]
5 Periventricular leukomalacia (PVL)	1	266	Risk Ratio (M-H, Random, 95% CI)	0.86 [0.32, 2.31]
6 Chronic lung disease (CLD) - oxygen supplement at 36 weeks (corrected for gestation)	1	249	Risk Ratio (M-H, Random, 95% CI)	0.95 [0.66, 1.37]
7 Maternal blood loss of 500 mL or greater	1	254	Risk Ratio (M-H, Random, 95% CI)	0.94 [0.72, 1.22]

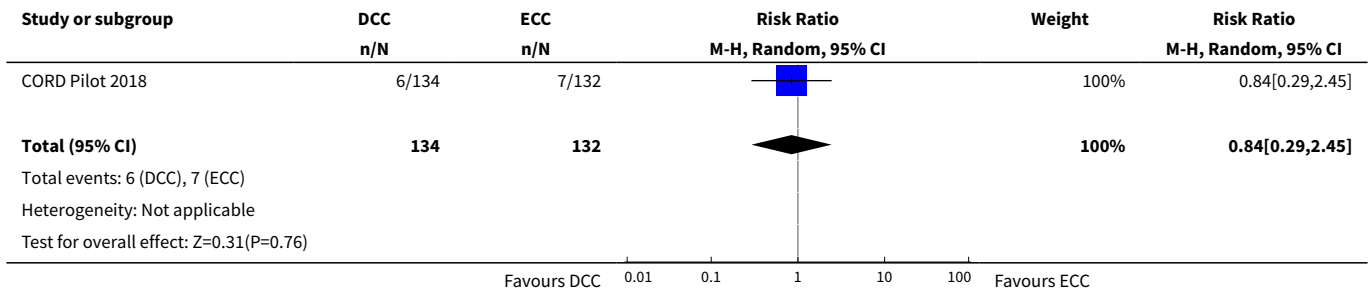
Analysis 10.1. Comparison 10 DCC with immediate neonatal care with cord intact vs ECC (low risk of bias), Outcome 1 Death of baby (up to discharge).



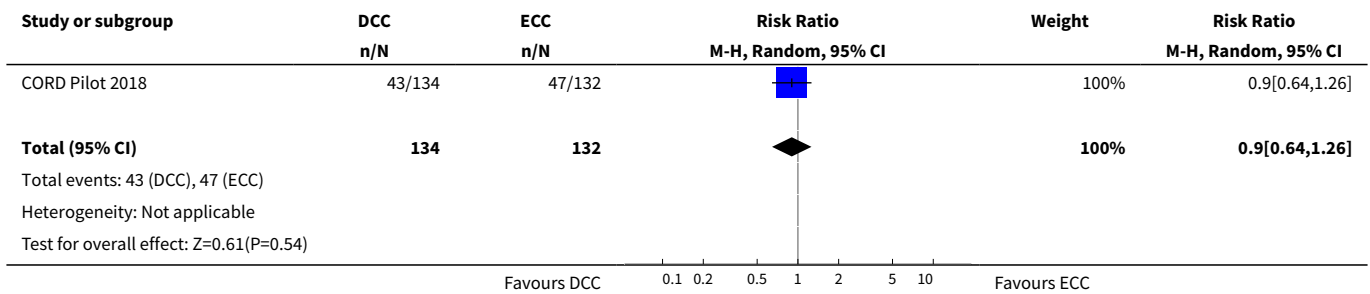
Analysis 10.2. Comparison 10 DCC with immediate neonatal care with cord intact vs ECC (low risk of bias), Outcome 2 Death or neurodevelopmental impairment in early years.



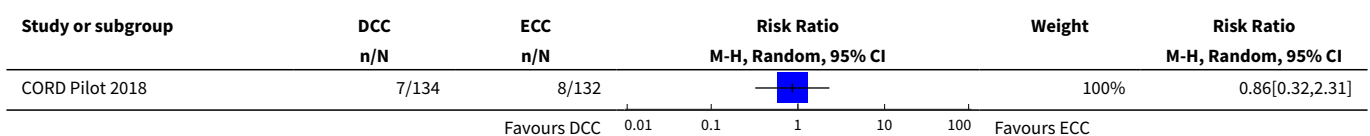
Analysis 10.3. Comparison 10 DCC with immediate neonatal care with cord intact vs ECC (low risk of bias), Outcome 3 Severe intraventricular haemorrhage (IVH grades 3, 4).

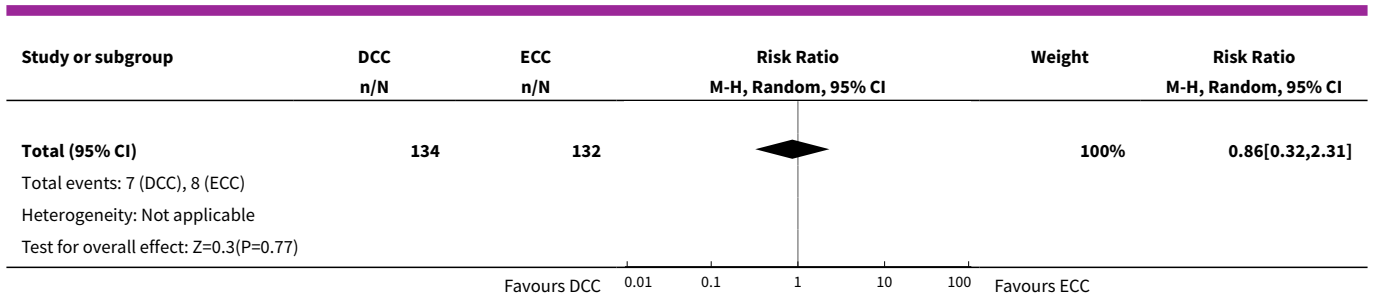


Analysis 10.4. Comparison 10 DCC with immediate neonatal care with cord intact vs ECC (low risk of bias), Outcome 4 Intraventricular haemorrhage (IVH, all grades).

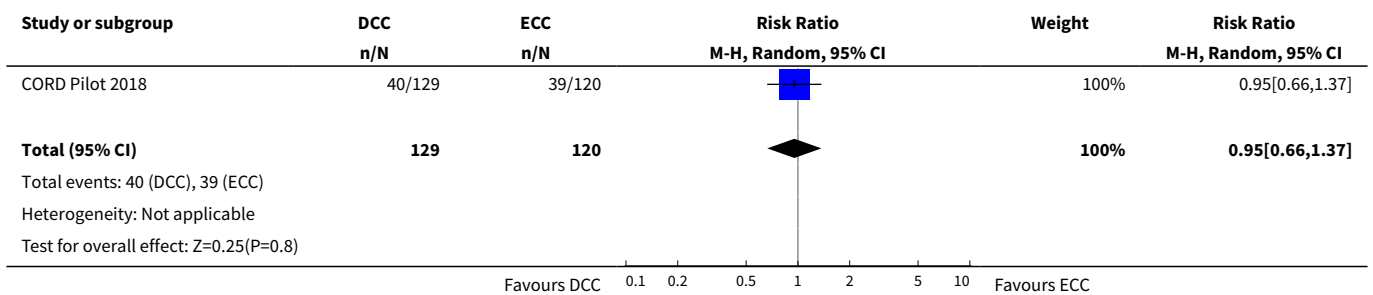


Analysis 10.5. Comparison 10 DCC with immediate neonatal care with cord intact vs ECC (low risk of bias), Outcome 5 Periventricular leukomalacia (PVL).

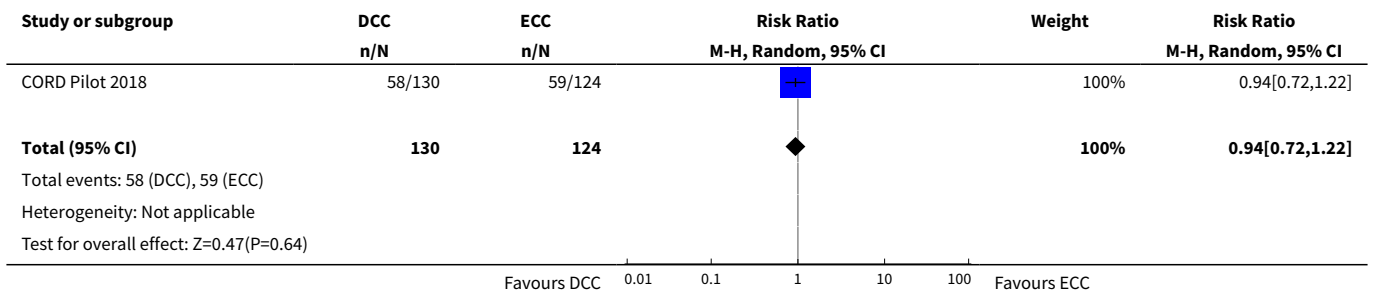




Analysis 10.6. Comparison 10 DCC with immediate neonatal care with cord intact vs ECC (low risk of bias), Outcome 6 Chronic lung disease (CLD) - oxygen supplement at 36 weeks (corrected for gestation).



Analysis 10.7. Comparison 10 DCC with immediate neonatal care with cord intact vs ECC (low risk of bias), Outcome 7 Maternal blood loss of 500 mL or greater.

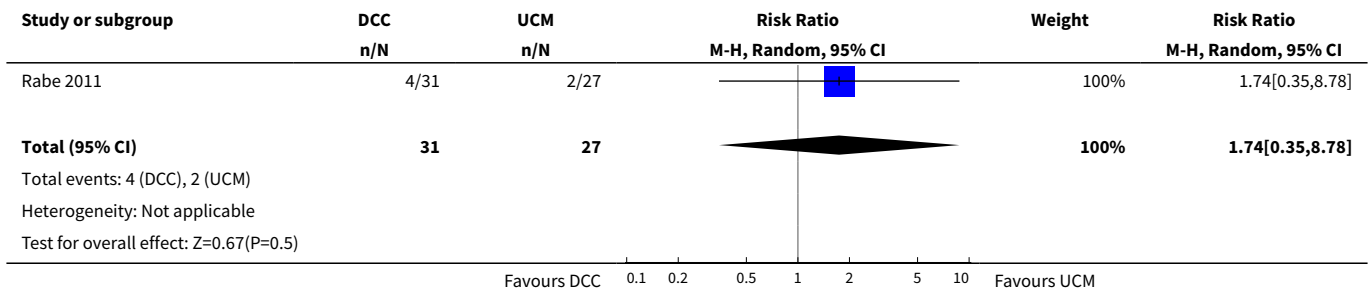


Comparison 11. DCC with immediate neonatal care after cord clamping vs UCM (low risk of bias)

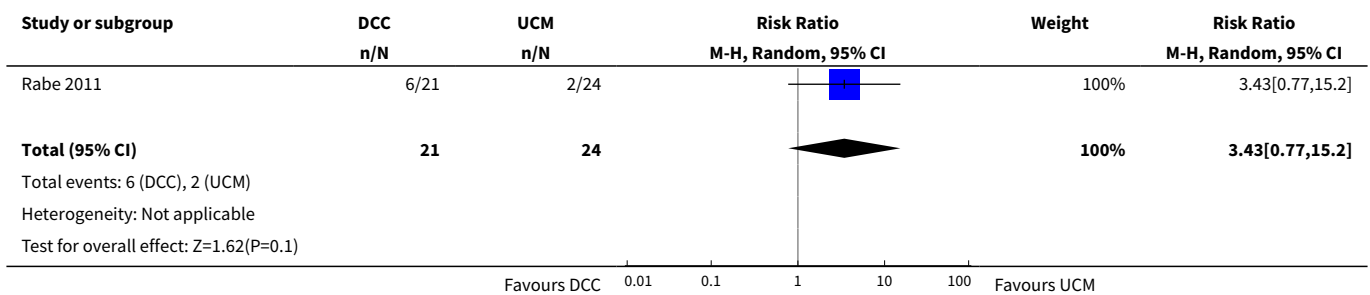
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Death of baby (up to discharge)	1	58	Risk Ratio (M-H, Random, 95% CI)	1.74 [0.35, 8.78]
2 Death or neurodevelopmental impairment in early years	1	45	Risk Ratio (M-H, Random, 95% CI)	3.43 [0.77, 15.20]
3 Severe intraventricular haemorrhage (IVH grades 3, 4)	1	58	Risk Ratio (M-H, Random, 95% CI)	2.63 [0.11, 61.88]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
4 Intraventricular haemorrhage (IVH, all grades)	1	58	Risk Ratio (M-H, Random, 95% CI)	2.03 [0.58, 7.09]
5 Periventricular leukomalacia (PVL)	1	58	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
6 Chronic lung disease (CLD) - oxygen supplement at 36 weeks (corrected for gestation)	1	58	Risk Ratio (M-H, Random, 95% CI)	1.16 [0.28, 4.73]
7 Maternal blood loss of 500 mL or greater	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

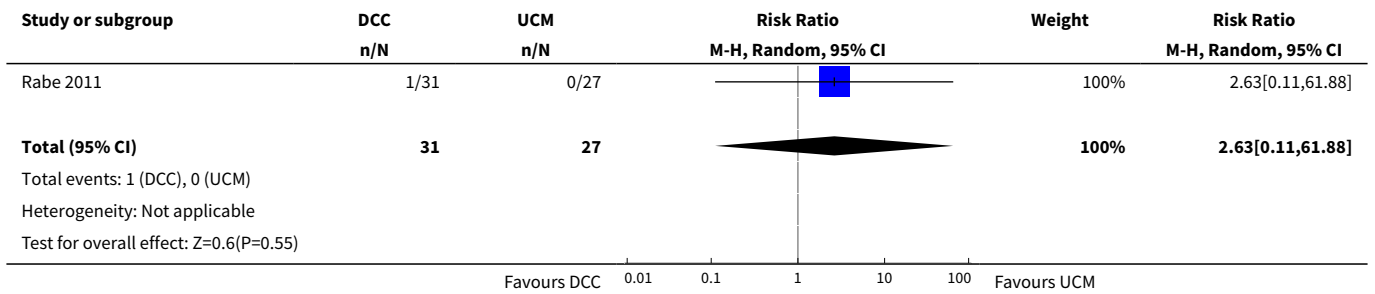
Analysis 11.1. Comparison 11 DCC with immediate neonatal care after cord clamping vs UCM (low risk of bias), Outcome 1 Death of baby (up to discharge).



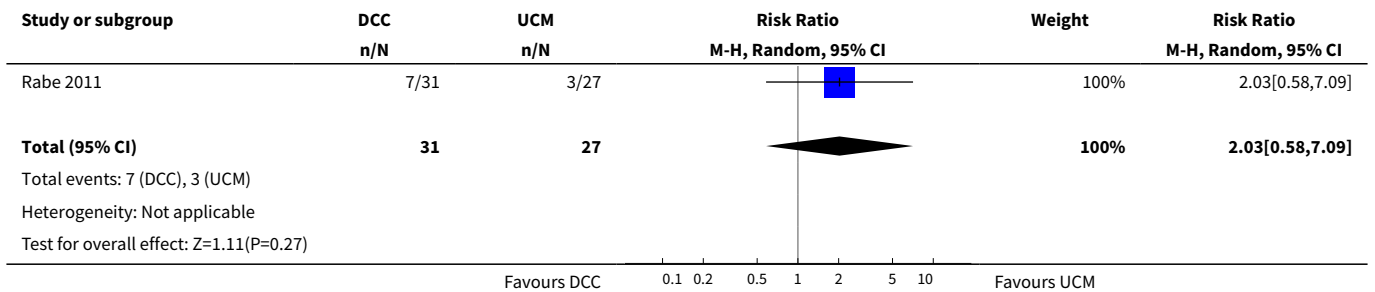
Analysis 11.2. Comparison 11 DCC with immediate neonatal care after cord clamping vs UCM (low risk of bias), Outcome 2 Death or neurodevelopmental impairment in early years.



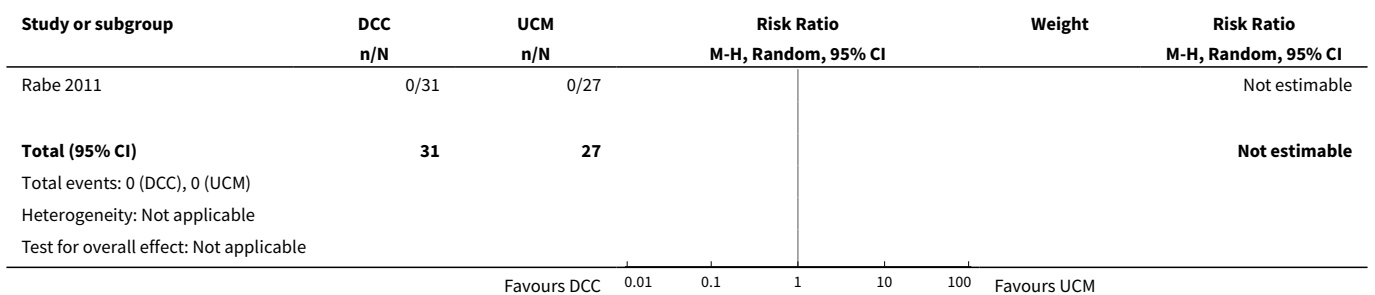
Analysis 11.3. Comparison 11 DCC with immediate neonatal care after cord clamping vs UCM (low risk of bias), Outcome 3 Severe intraventricular haemorrhage (IVH grades 3, 4).



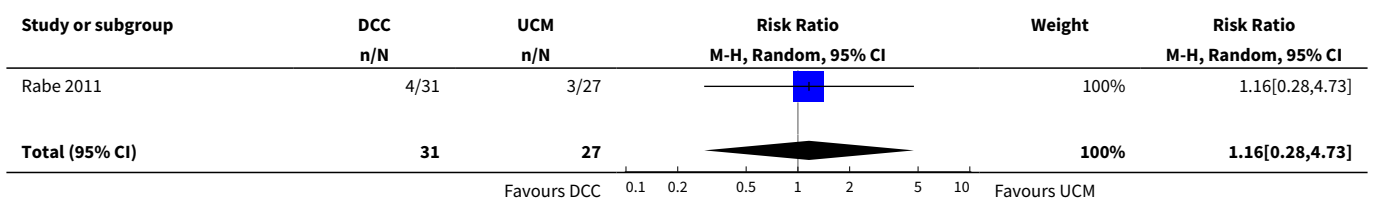
Analysis 11.4. Comparison 11 DCC with immediate neonatal care after cord clamping vs UCM (low risk of bias), Outcome 4 Intraventricular haemorrhage (IVH, all grades).

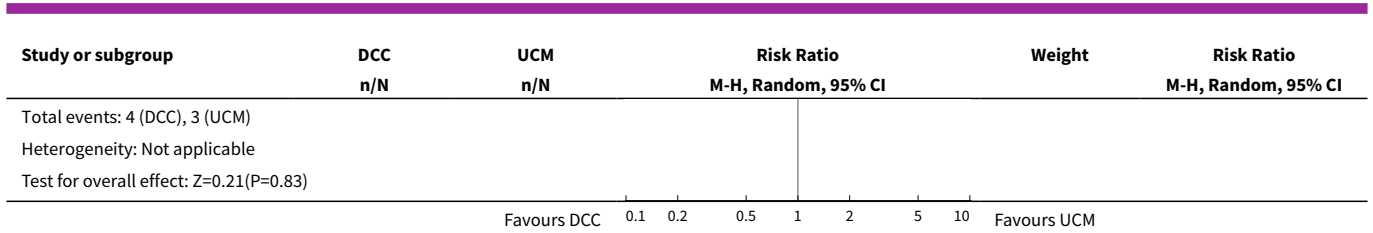


Analysis 11.5. Comparison 11 DCC with immediate neonatal care after cord clamping vs UCM (low risk of bias), Outcome 5 Periventricular leukomalacia (PVL).



Analysis 11.6. Comparison 11 DCC with immediate neonatal care after cord clamping vs UCM (low risk of bias), Outcome 6 Chronic lung disease (CLD) - oxygen supplement at 36 weeks (corrected for gestation).

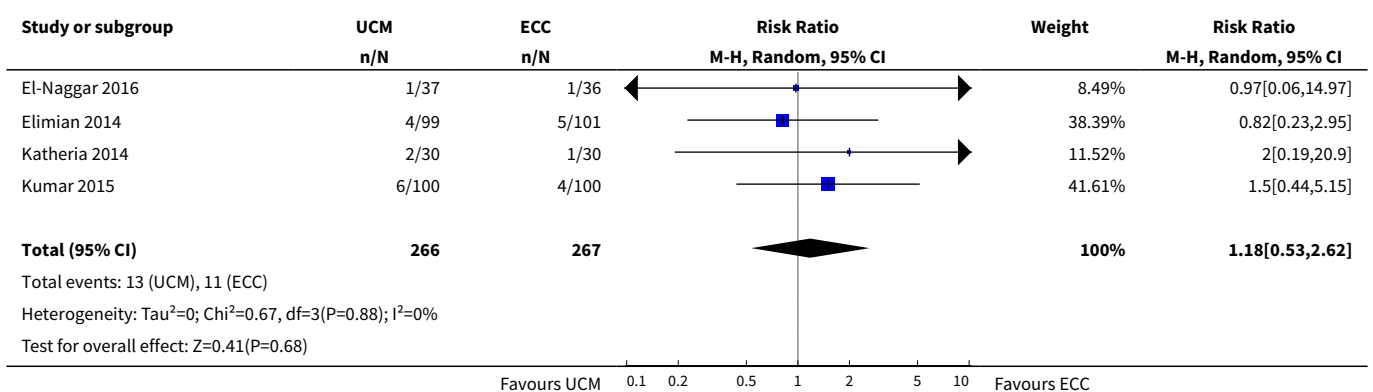




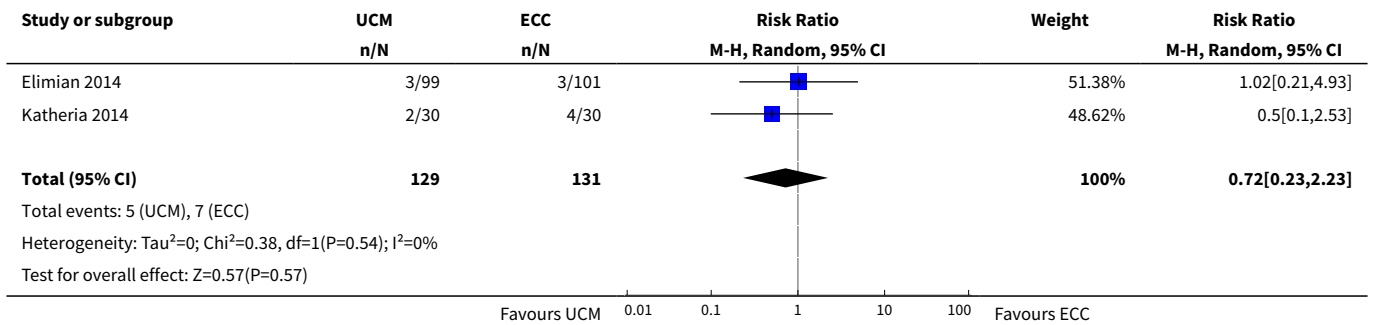
Comparison 12. UCM vs ECC (low risk of bias)

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Death of baby (up to discharge)	4	533	Risk Ratio (M-H, Random, 95% CI)	1.18 [0.53, 2.62]
2 Death or neurodevelopmental impairment in early years	0	0	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]
3 Severe intraventricular haemorrhage (IVH grades 3, 4)	2	260	Risk Ratio (M-H, Random, 95% CI)	0.72 [0.23, 2.23]
4 Intraventricular haemorrhage (IVH, all grades)	3	333	Risk Ratio (M-H, Random, 95% CI)	0.81 [0.50, 1.31]
5 Periventricular leukomalacia (PVL)	1	200	Risk Ratio (M-H, Random, 95% CI)	3.06 [0.13, 74.23]
6 Chronic lung disease (CLD) - oxygen supplement at 36 weeks (corrected for gestation)	3	330	Risk Ratio (M-H, Random, 95% CI)	0.85 [0.44, 1.64]
7 Maternal blood loss of 500 mL or greater	1	200	Risk Ratio (M-H, Random, 95% CI)	0.0 [0.0, 0.0]

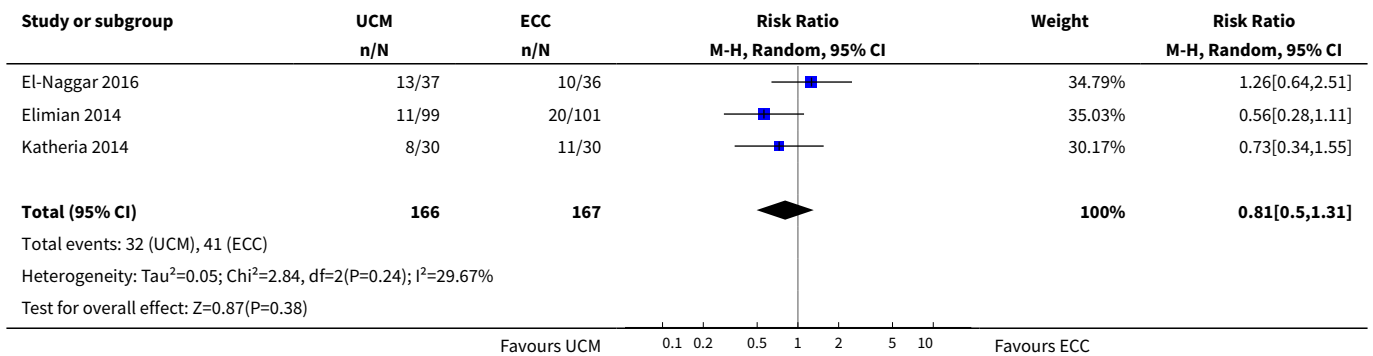
Analysis 12.1. Comparison 12 UCM vs ECC (low risk of bias), Outcome 1 Death of baby (up to discharge).



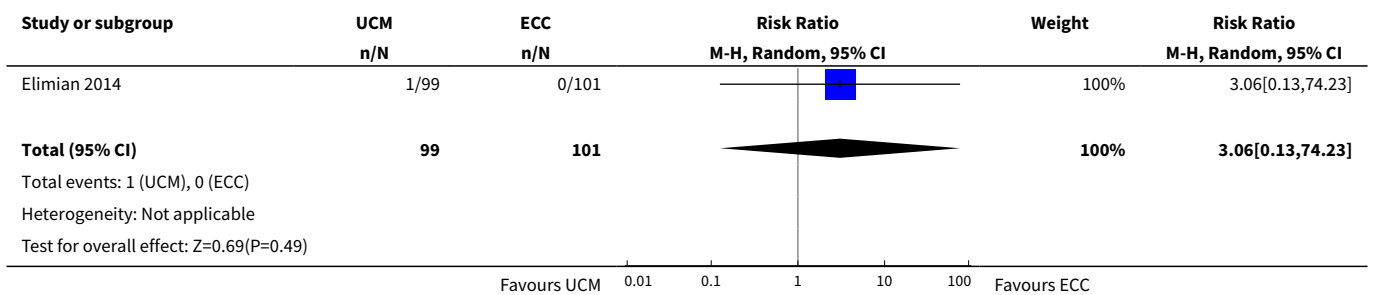
Analysis 12.3. Comparison 12 UCM vs ECC (low risk of bias), Outcome 3 Severe intraventricular haemorrhage (IVH grades 3, 4).



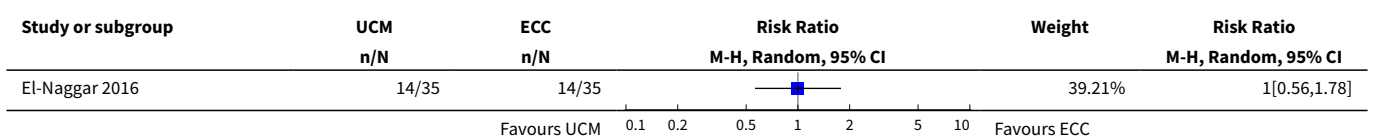
Analysis 12.4. Comparison 12 UCM vs ECC (low risk of bias), Outcome 4 Intraventricular haemorrhage (IVH, all grades).

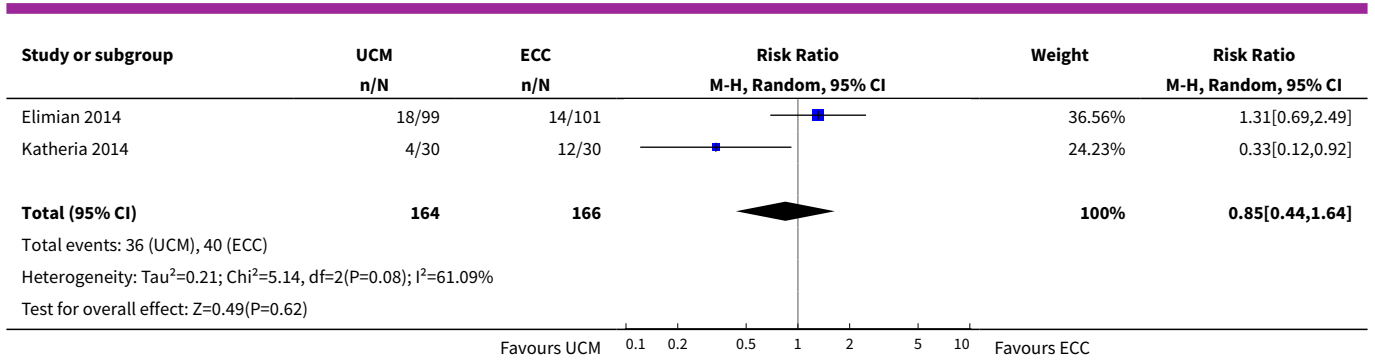


Analysis 12.5. Comparison 12 UCM vs ECC (low risk of bias), Outcome 5 Periventricular leukomalacia (PVL).

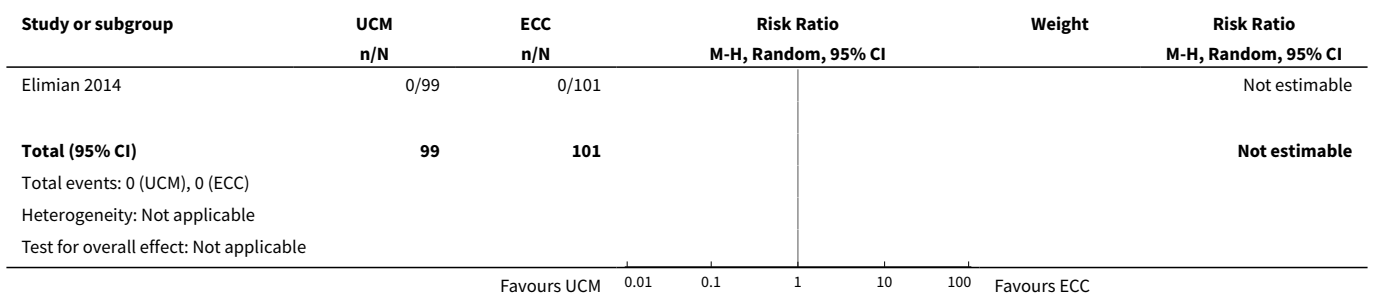


Analysis 12.6. Comparison 12 UCM vs ECC (low risk of bias), Outcome 6 Chronic lung disease (CLD) - oxygen supplement at 36 weeks (corrected for gestation).





Analysis 12.7. Comparison 12 UCM vs ECC (low risk of bias), Outcome 7 Maternal blood loss of 500 mL or greater.



APPENDICES

Appendix 1. Search methods - ICTRP and ClinicalTrials.gov

ICTRP

- cord AND clamp
- cord and clamping
- cord AND milking
- cord AND stripping

ClinicalTrials.gov

- Advanced search
- Interventional studies | cord clamping
- Interventional studies | cord milking
- Interventional studies | cord stripping

WHAT'S NEW

Date	Event	Description
10 November 2017	New citation required and conclusions have changed	We updated the search (November 2017) and included 33 new studies. The data now show that compared with early cord

Date	Event	Description
		clamping, delayed cord clamping probably reduces the risk of infant death before hospital discharge.
10 November 2017	New search has been performed	<p>Gillian Gyte has joined the team.</p> <p>We have separated delayed cord clamping from umbilical cord milking and included a new delayed intervention where immediate neonatal care is given with the cord intact.</p> <p>We have re-visited the outcomes and modified them to focus more on clinical outcomes (See Differences between protocol and review).</p> <p>New subgroups are gestation and type of intervention (see Differences between protocol and review).</p> <p>We have extended the definition of 'low risk' for sensitivity analyses to include sequence generation, allocation concealment and incomplete outcome data.</p> <p>We have restructured the 'Plain language summary' to incorporate standardised headings.</p> <p>Four new 'Summary of findings' tables have been incorporated.</p> <p>We updated the search in November 2018 and identified 26 new reports. The references have been assessed but not fully incorporated into the review. Two of these were additional reports of included studies with no new data so the references have been added under the main study (Katheria 2015; Tarnow-Mordi 2017). Six are new studies to be fully assessed at the next update (Kazemi 2017; Leal 2018; Li 2018; Ram Mothan 2018; Song 2017; Weeks 2018). Three are additional reports of included studies and the new data will be added at the next update (Das 2018a; El-Naggar 2018; Wang 2018). The remaining 15 reports refer to 11 ongoing studies and have been added to Ongoing studies (Aghai 2018; Al-lam 2018; Gupta 2018; Hao 2018; Jomjak 2018; Katheria 2018; Liu 2018; Mirzaeian 2018; Nour 2018a; Nour 2018b; Shahgheibi 2018).</p>

HISTORY

Protocol first published: Issue 3, 2001

Review first published: Issue 4, 2004

Date	Event	Description
16 January 2012	New citation required and conclusions have changed	This updated review is based on a search carried out in May 2011. We have now included 15 studies and the weight of the evidence is greater. New authors have helped to update the review. We updated the search in June 2012 and added results to Studies awaiting classification for consideration in the next update.
31 December 2011	New search has been performed	Search updated in May 2011, eight new studies added with 437 mother and infant pairs. Subgroup analyses added for cord milking. Methods updated in line with the new Cochrane Handbook.

Date	Event	Description
30 November 2009	Amended	Search updated. Thirteen reports added to Studies awaiting classification .
28 February 2009	Amended	Converted to new review format.
1 May 2008	New citation required and conclusions have changed	Substantive amendment.

CONTRIBUTIONS OF AUTHORS

For this update

Gill Gyte (GG) undertook the data extraction and data entry with assistance from Heike Rabe (HR), Jose Diaz-Rosello (JDR) and Lelia Duley (LD). HR, JDR and LD contributed clinical knowledge and input. GG conducted the GRADE assessments and drafted the results section. Review authors assessed the studies independently. HR and LD did not assess their own studies and GG did not assess the study on which she was a co-applicant.

For previous versions of the review

Graham Reynolds (GR) prepared the first draft of the protocol and commented on the second draft. HR commented on the first draft of the protocol and wrote the second draft.

All review authors assessed studies independently. HR did not assess her own study. HR and GR entered study data. GR wrote the 'Methodological quality of included studies' section. HR completed all other sections of the review. JDR completed the corrections to the statistics. All three review authors commented on the review and agreed on the conclusion.

For the update of this review, the process of assessing the eligible studies and extracting the data were followed in the same way as described as above. HR updated the data tables and updated the text of the review. JDR and Therese Dowswell (TD) corrected the statistics. TD and LD introduced the risk of bias tables, and revised the text of the review. All review authors agreed on the updated version of the review.

DECLARATIONS OF INTEREST

Heike Rabe is main author for two included studies in this review ([Rabe 2000](#); [Rabe 2011](#)). Studies by the contact author, which may be relevant for inclusion in this review, were not assessed by herself but by the co-authors who, in agreement with the Cochrane Pregnancy and Childbirth group, have named other experts in the field for this purpose.

Jose Diaz-Rosello - none known.

Lelia Duley has been awarded an NIHR research grant for a programme of work which includes a pilot trial of timing of cord clamping for preterm births ([CORD Pilot 2018](#)), and a prospective meta-analysis.

Gillian Gyte was a co-applicant on one of the included studies in this review ([CORD Pilot 2018](#)). She also has received royalties from John Wiley & Son in respect of 'A Cochrane Pocket Handbook – Pregnancy and Childbirth' Hofmeyr GJ et al. 2008.

SOURCES OF SUPPORT

Internal sources

- University of Liverpool, UK.

External sources

- No sources of support, UK.

DIFFERENCES BETWEEN PROTOCOL AND REVIEW

We set up separate comparisons for delayed cord clamping and umbilical cord milking.

HR, LD and GG modified the list of outcomes choosing seven primary outcomes to assist the assessment using GRADE software.

We removed the following outcomes: Requirement for resuscitation; Apgar scores at 1,5 and 10 minutes; Use of exogenous surfactant; Days of oxygen dependency; Oxygen dependency at 28 days; Treatment for hyperbilirubinaemia with blood exchange transfusion; Blood counts at six and 12 months of age (haemoglobin and ferritin); Maternal death.

We added the following new outcomes: Apgar < eight at five minutes; Duration of respiratory support; Home oxygen; Mean arterial blood pressure in early hours after birth; Hydrocephalus; Neurosensory disability at two to three years; Cerebral Palsy; Late sepsis; Treatment for retinopathy of prematurity; Severe visual impairment; Length of infant stay in NICU; Maternal blood transfusion; Maternal postpartum infection; Breastfeeding initiation; Fully breastfeeding or mixed breast & formula feeding at discharge.

We changed the following outcomes: 'Maternal blood loss greater than 500 mL' to 'Maternal blood loss of 500 mL or greater'; 'Hypothermia' to 'Temperature < 36° within 1 hour of birth'; 'Oxygen dependency at 36 weeks to CLD with this definition; Chronic lung disease (Northway Stage two, three or four) to CLD (oxygen dependency at 36 weeks corrected for gestational age)'; 'Volume (colloid, sodium chloride 0.9%, blood transfusion) administration for hypotension during the first 24 hours of life' to 'Blood transfusion in infant'; 'Maternal bonding to infant' to 'Bonding'

Due to lack of data for previously intended subgroups (Position of the baby relative to the placenta; Whether the mother had oxytocin before cord clamping; With or without milking of the cord; Mode of birth), we chose to look at gestation and type of intervention only.

We updated the methods including the use of GRADE as recommended by Cochrane's MECIR standards and incorporated four new 'Summary of findings' tables.

We updated the Plain language summary to reflect the Cochrane Pregnancy and Childbirth Group's guidance on this.

We searched ClinicalTrials.gov and the WHO International Clinical Trials Registry Platform (ICTRP) for unpublished, planned and ongoing trial reports.

NOTES

The title of the previously published protocol was 'Early versus delayed cord clamping in preterm infants'.

INDEX TERMS

Medical Subject Headings (MeSH)

*Infant, Premature [growth & development]; *Umbilical Cord; Blood Transfusion [statistics & numerical data]; Cerebral Hemorrhage [prevention & control]; Delivery, Obstetric; Placental Circulation [*physiology]; Pregnancy Outcome; Premature Birth; Randomized Controlled Trials as Topic; Time Factors

MeSH check words

Female; Humans; Infant, Newborn; Pregnancy