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Urgent-start peritoneal dialysis versus conventional-start peritoneal dialysis for people with chronic kidney disease (Review)

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TABLE OF CONTENTS

[Intervention Review]

Urgent-start peritoneal dialysis versus conventional-start peritoneal dialysis for people with chronic kidney disease

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ABSTRACT

Background

Urgent-start peritoneal dialysis (PD), defined as initiation of PD within two weeks of catheter insertion, has been emerging as an alternative mode of dialysis initiation for patients with chronic kidney disease (CKD) requiring urgent dialysis without established permanent dialysis access. Recently, several small studies have reported comparable patient outcomes between urgent-start and conventional-start PD.

Objectives

To examine the benefits and harms of urgent-start PD compared with conventional-start PD in adults and children with CKD requiring long-term kidney replacement therapy.

Search methods

We searched the Cochrane Kidney and Transplant Register of Studies up to 25 May 2020 through contact with the Information Specialist using search terms relevant to this review. Studies in the Register are identified through searches of CENTRAL, MEDLINE, EMBASE, conference proceedings, the International Clinical Trials Register (ICTRP) Search Portal, and ClinicalTrials.gov.

For non-randomised controlled trials, MEDLINE (OVID) (1946 to 27 June 2019), EMBASE (OVID) (1980 to 27 June 2019), Clinical Trials Register (ICTRP) Search Portal and ClinicalTrials.gov (up to 27 June 2019) were searched.

Selection criteria

All randomised controlled trials (RCTs) and non-RCTs comparing the outcomes of urgent-start PD (within 2 weeks of catheter insertion) and conventional-start PD (≥ 2 weeks of catheter insertion) treatment in children and adults CKD patients requiring long-term dialysis were included. Studies without a control group were excluded.

Data collection and analysis

Data were extracted and quality of studies were examined by two independent authors. The authors contacted investigators for additional information. Summary estimates of effect were examined using random-effects model and results were presented as risk ratios (RR) with

95% confidence intervals (CI) as appropriate for the data. The certainty of evidence for individual outcome was assessed using the GRADE approach.

Main results

A total of 16 studies (2953 participants) were included in this review, which included one multicentre RCT (122 participants) and 15 non-RCTs (2831 participants): 13 cohort studies (2671 participants) and 2 case-control studies (160 participants). The review included unadjusted data for analyses due to paucity of studies reporting adjusted data.

In low certainty evidence, urgent-start PD may increase dialysate leak (1 RCT, 122 participants: RR 3.90, 95% CI 1.56 to 9.78) compared with conventional-start PD which translated into an absolute number of 210 more leaks per 1000 (95% CI 40 to 635).

In very low certainty evidence, it is uncertain whether urgent-start PD increases catheter blockage (4 cohort studies, 1214 participants: RR 1.33, 95% CI 0.40 to 4.43; 2 case-control studies, 160 participants: RR 1.89, 95% CI 0.58 to 6.13), catheter malposition (6 cohort studies, 1353 participants: RR 1.63, 95% CI 0.80 to 3.32; 1 case-control study, 104 participants: RR 3.00, 95% CI 0.64 to 13.96), and PD dialysate flow problems (3 cohort studies, 937 participants: RR 1.44, 95% CI 0.34 to 6.14) compared to conventional-start PD.

In very low certainty evidence, it is uncertain whether urgent-start PD increases exit-site infection (2 cohort studies, 337 participants: RR 1.43, 95% CI 0.24 to 8.61; 1 case-control study, 104 participants RR 1.20, 95% CI 0.41 to 3.50), exit-site bleeding (1 RCT, 122 participants: RR 0.70, 95% CI 0.03 to 16.81; 1 cohort study, 27 participants: RR 1.58, 95% CI 0.07 to 35.32), peritonitis (7 cohort studies, 1497 participants: RR 1.00, 95% CI 0.68 to 1.46; 2 case-control studies, 160 participants: RR 1.09, 95% CI 0.12 to 9.51), catheter readjustment (2 cohort studies, 739 participants: RR 1.27, 95% CI 0.40 to 4.02), or reduces technique survival (1 RCT, 122 participants: RR 1.09, 95% CI 1.00 to 1.20; 8 cohort studies, 1668 participants: RR 0.90, 95% CI 0.76 to 1.07; 2 case-control studies, 160 participants: RR 0.92, 95% CI 0.79 to 1.06).

In very low certainty evidence, it is uncertain whether urgent-start PD compared with conventional-start PD increased death (any cause) (1 RCT, 122 participants: RR 1.49, 95% CI 0.87 to 2.53; 7 cohort studies, 1509 participants: RR 1.89, 95% CI 1.07 to 3.3; 1 case-control study, 104 participants: RR 0.90, 95% CI 0.27 to 3.02; very low certainty evidence). None of the included studies reported on tunnel tract infection.

Authors' conclusions

In patients with CKD who require dialysis urgently without ready-to-use dialysis access in place, urgent-start PD may increase the risk of dialysate leak and has uncertain effects on catheter blockage, malposition or readjustment, PD dialysate flow problems, infectious complications, exit-site bleeding, technique survival, and patient survival compared with conventional-start PD.

PLAIN LANGUAGE SUMMARY

Is urgent-start peritoneal dialysis safe for patients with chronic kidney disease?

What is the issue?

Peritoneal dialysis is a form of kidney replacement therapy in which the lining of the abdomen is used as a filter for dialysis. The dialysis fluid is introduced via a tube which is placed into the abdomen, called a peritoneal dialysis catheter. Traditionally, dialysis is delayed for two weeks after catheter placement, in order to allow proper wound healing. However, some studies reported that patients with chronic kidney disease who urgently need to start dialysis within two weeks of catheter insertion (urgent- start peritoneal dialysis) experienced comparable outcomes to others who commenced dialysis more than two weeks after catheter insertion (conventional-start peritoneal dialysis).

What did we do?

We conducted a systematic review to examine the complications and outcomes of patients with chronic kidney disease who started peritoneal dialysis urgently within two weeks of insertion of peritoneal dialysis catheter.

What did we find?

We identified 16 studies (2953 participants) examining the outcomes of urgent versus conventional start peritoneal dialysis. When we compared results from patients who initiated dialysis two weeks after catheter insertion, patients who initiated dialysis urgently were more likely to have leakage of dialysis fluid outside the abdominal cavity into the skin near the exit site of peritoneal dialysis catheter. The differences in infection of the lining of the abdomen (peritonitis), infection at the exit point of the peritoneal dialysis catheter (exit-site infection), mechanical complications of peritoneal dialysis (including catheter blockage, catheter malposition and catheter readjustment), patients remaining on peritoneal dialysis (technique survival), and death between patients who started dialysis urgently and those who waited for two weeks after catheter insertion remain unclear.

Conclusions

In patients with chronic kidney disease who require dialysis urgently without ready-to-use dialysis access in place, peritoneal dialysis may increase dialysate leak. However, the overall risks of infectious and other non-infectious complications between urgent-start peritoneal dialysis and conventional-start peritoneal dialysis remains unclear.

Summary of findings 1. Summary of findings of randomised controlled trials

Urgent-start peritoneal dialysis versus conventional-start peritoneal dialysis for people with chronic kidney disease

Patient or population: people with CKD

Settings: community

Intervention: USPD

Comparison: CSPD

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	No. of participants (studies)	Quality of the evidence (GRADE)
	Risk with CSPD	Risk with USPD			
Dialysate leak	72 per 1,000	**282 per 1,000** (113 to 707)	**RR 3.90** (1.56 to 9.78)	122 (1)	⊕⊕⊖⊖ LOW[1]
Catheter blockage	-	-	-	No studies	Absent
Catheter malposition	-	-	-	No studies	Absent
PD dialysate flow problem	-	-	-	No studies	Absent
Exit-site infection	-	-	-	No studies	Absent
Exit-site bleeding	12 per 1,000	8 per 1,000 (0 to 203)	RR 0.70 (0.03 to 16.81)	122 (1)	⊕⊖⊖⊖ VERY LOW [2]
Tunnel tract infection	-	-	-	No studies	Absent
Peritonitis	-	-	-	No studies	Absent
Catheter readjustment	-	-	-	No studies	Absent
Technique survival	892 per 1,000	**972 per 1,000** (892 to 1,000)	**RR 1.09** (1.00 to 1.20)	122 (1)	⊕⊖⊖⊖ VERY LOW [2]

*__The risk in the USPD group__ (and its 95% CI) 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; **PD**: peritoneal dialysis;**USPD**: urgent-start PD; **CSPD**: conventional-start PD

GRADE Working Group grades of evidence
High quality: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: We are very uncertain about the estimate.

[1] downgrade two levels for imprecision (small number of study and participants) and indirectness (all patients in USPD initiated PD only at day-7 of catheter insertion and the majority of patients (69%) required bridging hemodialysis prior to USPD)
[2] downgrade three levels for imprecision: small number of study and participants and suboptimal follow-up duration to assess technique survival

Summary of findings 2. Summary of findings of non-randomised study interventions: cohort studies

Urgent-start peritoneal dialysis versus conventional-start peritoneal dialysis for people with chronic kidney disease

Patient or population: people with CKD

Settings: community

Intervention: USPD

Comparison: CSPD

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	No. of participants (cohort studies)	Quality of the evidence (GRADE)
	Risk with CSPD	Risk with USPD			
Dialysate leak	9 per 1,000	**18 per 1,000** (7 to 47)	**RR 2.06** (0.80 to 5.28)	1322 (7)	⊕⊖⊖⊖ VERY LOW[1]
Catheter blockage	8 per 1,000	**11 per 1,000** (3 to 37)	**RR 1.33** (0.40 to 4.43)	1214 (4)	⊕⊖⊖⊖ VERY LOW[1]
Catheter malposition	28 per 1,000	**45 per 1,000** (22 to 93)	**RR 1.63** (0.80 to 3.32)	1353 (6)	⊕⊖⊖⊖ VERY LOW[1]
PD dialysate flow problem	23 per 1,000	**33 per 1,000** (8 to 140)	**RR 1.44** (0.34 to 6.14)	937 (3)	⊕⊖⊖⊖ VERY LOW[1]
Exit-site infection	11 per 1,000	**15 per 1,000**	**RR 1.43**	337 (2)	⊕⊖⊖⊖

		(3 to 93)	(0.24 to 8.61)		VERY LOW[1]
Exit-site bleeding	0 per 1,000	0 per 1,000 (0 to 0)	**RR 1.58** (0.07 to 35.32)	27 (1)	⊕⊖⊖⊖ VERY LOW[1]
Tunnel tract infection	-	-	-	No studies	Absent
Peritonitis	107 per 1,000	**107 per 1,000** (73 to 157)	**RR 1.00** (0.68 to 1.46)	1497 (7)	⊕⊖⊖⊖ VERY LOW[1]
Catheter readjustment	20 per 1,000	**25 per 1,000** (8 to 78)	**RR 1.27** (0.40 to 4.02)	739 (2)	⊕⊖⊖⊖ VERY LOW [1]
Technique survival	757 per 1,000	**681 per 1,000** (575 to 810)	**RR 0.90** (0.76 to 1.07)	1668 (8 studies)	⊕⊖⊖⊖ VERY LOW [1,2]

*__The risk in the USPD group__ (and its 95% CI) 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; **PD**: peritoneal dialysis;**USPD**: urgent-start PD; **CSPD**: conventional-start PD

GRADE Working Group grades of evidence
High quality: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: We are very uncertain about the estimate.

[1] All studies were observational studies, downgrade one level for imprecision (small number of study and participants)
[2] Downgrade one level for inconsistency

Summary of findings 3. Summary of findings of non-randomised study interventions: case-control studies

Urgent-start peritoneal dialysis versus conventional-start peritoneal dialysis for people with chronic kidney disease

Patient or population: people with CKD

Settings: community

Intervention: USPD

Comparison: CSPD

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	No. of participants (case-control studies)	Quality of the evidence (GRADE)
	Risk with CSPD	Risk with USPD			
Dialysate leak	10 per 1,000	**73 per 1,000** (12 to 425)	**RR 7.41** (1.27 to 43.36)	160 (2)	⊕⊖⊖⊖ VERY LOW[1]
Catheter blockage	39 per 1,000	**74 per 1,000** (23 to 240)	**RR 1.89** (0.58 to 6.13)	160 (2)	⊕⊖⊖⊖ VERY LOW[1]
Catheter malposition	38 per 1,000	**115 per 1,000** (25 to 537)	**RR 3.00** (0.64 to 13.96)	104 (1)	⊕⊖⊖⊖ VERY LOW[1]
PD dialysate flow problem	-	-	-	No studies	Absent
Exit-site infection	128 per 1,000	**154 per 1,000** (53 to 449)	**RR 1.20** (0.41 to 3.50)	104 (1)	⊕⊖⊖⊖ VERY LOW[1]
Exit-site bleeding	-	-	-	No studies	Absent
Tunnel tract infection	-	-	-	No studies	Absent
Peritonitis	284 per 1,000	**310 per 1,000** (34 to 1,000)	**RR 1.09** (0.12 to 9.51)	160 (2)	⊕⊖⊖⊖ VERY LOW[1]
Catheter readjustment	-	-	-	No studies	Absent
Technique survival	627 per 1,000	**577 per 1,000** (496 to 665)	**RR 0.92** (0.79 to 1.06)	160 (2)	⊕⊖⊖⊖ VERY LOW [1]

*__The risk in the USPD group__ (and its 95% CI) 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; **PD**: peritoneal dialysis;**USPD**: urgent-start PD; **CSPD**: conventional-start PD

GRADE Working Group grades of evidence
High quality: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: We are very uncertain about the estimate.

1 All studies were observational studies, downgrade one level for imprecision (small number of study and participants)
2 Downgrade one level for inconsistency

BACKGROUND

Description of the condition

People with chronic kidney disease (CKD) requiring long-term kidney replacement therapy (KRT) is a common and growing problem affecting over two million people worldwide (AIHW 2016; Couser 2011; Gilg 2016). In the USA, CKD consumes 6.7% of total Medicare budget to care for less than 1% of the covered population (ISN 2015). Increasing utilization of home-based dialysis, such as peritoneal dialysis (PD), can lead to an annual cost saving of up to 40% compared to facility haemodialysis (HD) (KHA 2012; KHA 2016).

PD is a type of dialysis that uses the peritoneum in a person's abdomen as the membrane through which fluid and dissolved substances are exchanged with the blood. Even though PD is a relatively simple technique to master and has been shown to improve many patient-level clinical outcomes (e.g. an initial survival advantage compared to HD, better preservation of residual kidney function, superior patient-level satisfaction, and preservation of vascular access for future use (Mehrotra 2016; Tokgoz 2009), only approximately 11% of the global dialysis population are currently receiving PD as their dialysis modality (Jain 2012; Li 2017). One of the main impediments to growth in PD uptake has been a clinician reluctance to utilize PD as the preferred dialysis modality of choice when there is no established functional dialysis access in place (e.g. PD catheter or mature arteriovenous fistula/graft). This has been driven by traditional practice to delay commencement of PD by at least two weeks from the time of PD catheter insertion to prevent complications, as recommended by the International Society for Peritoneal Dialysis (ISPD) and European Renal Best Practice (ERBP) guidelines (Dombros 2005; Figueiredo 2010). These recommendations are based on a weak level of evidence (Dombros 2005; Figueiredo 2010), which has variably shown that early use of a PD catheter shortly after its insertion is associated with increased risks of early complications, such as dialysate leaks, infection and catheter dysfunction (See 2017; Yang 2011). However, there are several advantages of urgent-start PD, for example, avoiding temporary vascular catheters and their attendant risks (including bloodstream infections), avoiding initiation of a dialysis modality that is contrary to patient choice, and possibly avoiding the risk of patients remaining on in-centre HD rather than home dialysis. These would have to be balanced against the apparent increased risk of dialysate leaks versus elective PD start. The effect of urgent-start PD, defined as initiation of PD to treat patients who require dialysis imminently without established dialysis access, on long-term patient outcomes remains uncertain.

Unfortunately, the need to commence dialysis without mature permanent dialysis access in situ is a relatively common phenomena, affecting approximately 20% of patients who present 'late' to nephrology service whereby patients need to commence dialysis within three months of being first reviewed by nephrologist (Foote 2014). The practice of urgent-start PD has been increasingly adopted across both developed (Arramreddy 2014; See 2017) and developing countries (Bitencourt Dias 2017). However, at present, there is no universally agreed definition regarding the duration between PD catheter insertion and commencement that qualifies as urgent-start PD. Moreover, whether there exists a 'necessary' wait period to minimise the risk of complications within this clinical context is unknown. The ISPD recommends to use PD catheters at least two weeks after their insertion (Figueiredo 2010). Moreover, recently published randomised controlled trial (RCT) demonstrated an increased risk of leaks in patients who started PD at one week compared to those starting at two weeks or later (Timely PD 2010). The variation in duration between PD catheter insertion and commencement, fill volume, methods of catheter insertion across the studies involving urgent-start PD might potentially influence the observed outcomes. Therefore, it is important to conduct a detailed examination of the effect of urgent-start PD on both short- and long-term patient-level outcomes compared to conventional-start PD treatment regimens including subgroup analyses (e.g. duration between PD catheter placement and commencement, fill volume and insertion technique) to examine their relationship.

Description of the intervention

Unlike conventional-start PD where initiation of PD occurs > two weeks after PD catheter placement, urgent-start PD takes an approach to initiate PD within two weeks of PD catheter insertion.

How the intervention might work

Recommendation to delay the initiation of PD till two weeks after PD catheter insertion in conventional-start PD is to minimize the early complication of PD including leak (Yang 2011). Urgent-start PD is initiated with low fill volumes in the supine position using a cycler to reduce the intra-abdominal pressure in order to minimize the risk of pericatheter leak. Treatment can be delivered in both inpatient and outpatient settings.

Why it is important to do this review

Although urgent-start PD has been received as a conceptually positive initiative with reassuring early outcomes, the vast majority of evidence has been generated from single-centre observational studies with relatively small patient numbers (Casaretto 2012; Ghaffari 2012; Jo 2007; Koch 2012; Lobbedez 2008), which has resulted in ad hoc implementation rather than a 'standard' care across the world. The objective of this review is to conduct a comprehensive examination of the literature to examine all possible outcomes from urgent-start PD compared to those of conventional-start PD treatments.

OBJECTIVES

This review aims to look at the benefits and harms of urgent-start PD compared with conventional-start PD in adults and children with CKD requiring long-term KRT.

METHODS

Criteria for considering studies for this review

Types of studies

All RCTs and non-RCTs comparing urgent-start PD to conventional-start PD treatments.

Types of participants

Inclusion criteria

Participants included in this review were both adults and children with CKD who required dialysis treatment. Participants had a PD catheter inserted, which could be their first PD catheter or any subsequent catheter.

Exclusion criteria

The review did not include data obtained from patients with acute kidney injury as recovery of kidney function may potentially introduce the risk of detection bias (i.e. those with rapid recovery may not remain on PD for 30 or 90 days to capture clinical events of interest).

Types of interventions

Studies comparing two different PD therapy commencement types were included in this review. They could be broadly divided into urgent-start PD and conventional-start PD groups.

- Intervention: patients commenced on urgent-start PD, defined as initiation of PD therapy within two weeks of catheter placement.
- Comparator: patients commenced on conventional-start PD, defined as initiation of PD therapy at or after two weeks of catheter placement.

Types of outcome measures

Primary outcomes

- Mechanical complications occurring within 30 days (early complication) and 90 days (late complication) of commencement of PD (proportion of patients for each relevant outcome listed below).
  * Dialysate leak
  * Catheter blockage
  * Catheter malposition
  * PD dialysate flow problem.
- Exit-site complications occurring within 30 days (early complication) and 90 days (late complication) of commencement of PD.
  * Exit-site infection (proportion of patients with exit-site infection and episodes of exit-site infections per patient-year)
  * Tunnel tract infection (proportion of patients with tunnel tract infection and episodes of tunnel tract infections per patient-year)
  * Exit-site bleeding (proportion of patients developing exit-site bleeding).
- Technique survival (number of patients remaining on PD at study completion).

Secondary outcomes

- Peritonitis occurring within 30 days (early complication) and 90 days (late complication) of commencement of PD (proportion of patients developing peritonitis and episodes of peritonitis per patient-year)
- Catheter re-adjustment within 30 days (early complication) and 90 days (late complication) of commencement of PD (proportion of patients requiring intervention for catheter malfunction
- Catheter survival
- Interim HD (number of patients requiring temporary HD after PD commencement)
- Hospitalisation (average days spent in hospital or number of hospitalisation episodes)
- PD training duration (number of days from PD commencement to PD at home)
- Death (all causes)
- Adverse effects (including pain/discomfort)
- Quality of life (QoL)
- Cost of dialysis

Search methods for identification of studies

Electronic searches

We searched the Cochrane Kidney and Transplant Register of Studies up to 25 May 2020 through contact with the Information Specialist using search terms relevant to this review. The Register contains studies identified from the following sources.

1. Monthly searches of the Cochrane Central Register of Controlled Trials (CENTRAL)
2. Weekly searches of MEDLINE OVID SP
3. Handsearching of kidney-related journals and the proceedings of major kidney conferences
4. Searching of the current year of EMBASE OVID SP
5. Weekly current awareness alerts for selected kidney and transplant journals
6. Searches of the International Clinical Trials Register (ICTRP) Search Portal and ClinicalTrials.gov.

Studies contained in the Register are identified through search strategies for CENTRAL, MEDLINE, and EMBASE based on the scope of Cochrane Kidney and Transplant. Details of these strategies, as well as a list of hand searched journals, conference proceedings and current awareness alerts, are available in the Specialised Register section of information about Cochrane Kidney and Transplant.

See Appendix 1 for search terms used in strategies for this review.

For non-randomised controlled trials, MEDLINE (OVID) (1946 - 27 June 2019), EMBASE (OVID) (1980 - 27 June 2019), International Clinical Trials Register (ICTRP) Search Portal and ClinicalTrials.gov were searched.

Searching other resources

1. Reference lists of review articles, relevant studies, and clinical practice guidelines.
2. Letters seeking information about unpublished or incomplete trials to investigators known to be involved in previous studies.

Data collection and analysis

Selection of studies

The search strategy described was used to obtain titles and abstracts of studies that may be relevant to the review. The titles and abstracts will be screened independently by two authors, who will discard studies that are not applicable; however, studies and reviews that might include relevant data or information on studies will be retained initially. Two authors will independently assess retrieved abstracts and, if necessary, the full text of these studies to determine which studies satisfy the inclusion criteria.

Data extraction and management

Data extraction was carried out independently by two authors using standard data extraction forms. Studies reported in non-English language journals were translated before assessment. Where more

than one publication of one study exists, reports were grouped together and the publication with the most complete data were used in the analyses. Where relevant outcomes are only published in earlier versions, these data were used.

Assessment of risk of bias in included studies

Randomised controlled trials

The following items were independently assessed by two authors using the risk of bias assessment tool for RCTs (Higgins 2011) (see Appendix 2).

- Was there adequate sequence generation (selection bias)?
- Was allocation adequately concealed (selection bias)?
- Was knowledge of the allocated interventions adequately prevented during the study?
  - Participants and personnel (performance bias)
  - Outcome assessors (detection bias)
- Were incomplete outcome data adequately addressed (attrition bias)?
- Are reports of the study free of suggestion of selective outcome reporting (reporting bias)?
- Was the study apparently free of other problems that could put it at a risk of bias?

Non-randomised controlled trials

The Newcastle-Ottawa Scale (www.ohri.ca/programs/clinical_epidemiology/nosgen.pdf) for assessing the quality of non-randomised studies was used.

- For case control studies the following items were evaluated.
  - Selection (adequacy of definition, representativeness of the cases, selection of controls, definition of controls)
  - Comparability (comparability of cases and controls on the basis of the design or analysis)
  - Exposure (ascertainment of exposure, same method of ascertainment for cases and controls, non-response rate).
- For cohort studies the following items were evaluated.
  - Selection (representativeness of the exposed cohort, selection of the non-exposed cohort, ascertainment of exposure, demonstration that outcome of interest was not present at start of study)
  - Comparability (comparability of cohorts on the basis of the design or analysis)
  - Outcome (assessment of outcome, adequacy of follow-up and duration of follow-up).

Measures of treatment effect

For dichotomous outcomes (e.g. death, mechanical complications within one month of commencement of PD) results were expressed as risk ratio (RR) with 95% confidence intervals (CI). Where continuous scales of measurement were used to assess the effects of treatment (e.g. duration of hospitalisation, duration of PD training), the mean difference (MD) was used, or the standardised mean difference (SMD) if different scales had been used. SMD was re-expressed using a familiar instrument, by applying the calculated SMD back into one of the original studies and depicted on the scale used in that study. Studies may report different risk measures such as hazards ratios, odds ratio (OR) or relative risk. We analysed the studies by the type of measure reported whenever possible. However, in the present review, the event rate was very small for case-control studies which led to similar values obtained for odds ratio and risk ratio were similar. Hence, we used risk ratio instead of the OR for case-control studies. The results of studies with the same risk measure were combined using the generic inverse-variance method and a random effect model.

Unit of analysis issues

The present review included only one RCT, which adopted parallel design. There was no issue with unit of analysis.

Dealing with missing data

Any further information required from the original author was requested by written correspondence (e.g. emailing corresponding author/s) and any relevant information obtained in this manner were included in the review. Evaluation of important numerical data, such as screened, randomised patients as well as intention-to-treat, as-treated and per-protocol population, was carefully performed. Attrition rates, for example drop-outs, losses to follow-up and withdrawals, were investigated. Issues of missing data and imputation methods (for example, last-observation-carried-forward) were critically appraised (Higgins 2011).

Assessment of heterogeneity

The heterogeneity was first assessed by visual inspection of the forest plot. We quantified statistical heterogeneity using the I^2 statistic, which describes the percentage of total variation across studies that is due to heterogeneity rather than sampling error (Higgins 2003). A guide to the interpretation of I^2 values was based on the following:

- 0% to 40%: might not be important
- 30% to 60%: may represent moderate heterogeneity
- 50% to 90%: may represent substantial heterogeneity
- 75% to 100%: considerable heterogeneity.

The importance of the observed value of I^2 depends on the magnitude and direction of treatment effects and the strength of evidence for heterogeneity (e.g. P-value from the Chi^2 test, or a confidence interval for I^2) (Higgins 2011).

Assessment of reporting biases

Funnel plots were used to assess for the potential existence of small study bias (Higgins 2011).

Data synthesis

Studies with different designs, RCT and non-RCT or non-RCT with dissimilar study design were analysed separately. For dichotomous outcomes, a random effects model was performed to measure treatment effects. In sensitivity analyses, adjusted effect estimates (whenever possible) and their standard errors were used for combining studies in meta-analyses and the generic inverse-variance method was used .

Subgroup analysis and investigation of heterogeneity

Subgroup analysis were planned to explore possible sources of heterogeneity (e.g. participants, interventions and study quality including method of PD catheter insertion). Heterogeneity among participants could be related to age and renal pathology (e.g.

children versus adults). Heterogeneity in treatments could be related to prior agent(s) used and the agent, dose, and duration of therapy (e.g. initial fill volume). Therefore, subgroup analyses were conducted to evaluate the source of heterogeneity.

- Participants
  - Adults versus children
  - Incident versus prevalent patients
- Setting
  - Single-centre versus multi-centre
- Type of treatment utilised
  - According to initial fill volume
  - Days to PD commencement (e.g. within 24 hours versus 7 days).

Adverse effects were tabulated and assessed with descriptive techniques, as they were likely to be different for the various agents used. Where possible, the risk difference with 95% CI was calculated for each adverse effect, either compared to no treatment or to another agent.

Sensitivity analysis

We performed sensitivity analyses in order to explore the influence of the following factors on effect size.

- Repeating the analysis excluding unpublished studies
- Repeating the analysis taking account of risk of bias, as specified
- Repeating the analysis excluding any very long or large studies to establish how much they dominate the results
- Repeating the analysis excluding studies using the following filters: diagnostic criteria, language of publication, source of funding (industry versus other), and country.

'Summary of findings' tables

The main results of the review were presented in 'Summary of findings' tables. These tables present key information concerning the quality of the evidence, the magnitude of the effects of the interventions examined, and the sum of the available data for the main outcomes (Schunemann 2011a). The 'Summary of findings' tables also include an overall grading of the evidence related to each of the main outcomes using the GRADE (Grades of Recommendation, Assessment, Development and Evaluation) approach (GRADE 2008; GRADE 2011). The GRADE approach defines the quality of a body of evidence as the extent to which one can be confident that an estimate of effect or association is close to the true quantity of specific interest. The quality of a body of evidence involves consideration of within-trial risk of bias (methodological quality), directness of evidence, heterogeneity, precision of effect estimates and risk of publication bias (Schunemann 2011b). We plan to present the following outcomes in the 'Summary of findings' tables.

- Mechanical complications: dialysate leak, catheter blockage, catheter malposition, PD dialysate flow problems
- Exit-site complications: exit-site infection, exit-site bleeding, tunnel tract infection
- Peritonitis
- Catheter re-adjustment within a month of commencement of PD
- Technique survival
- Interim HD
- Duration of hospitalisation.

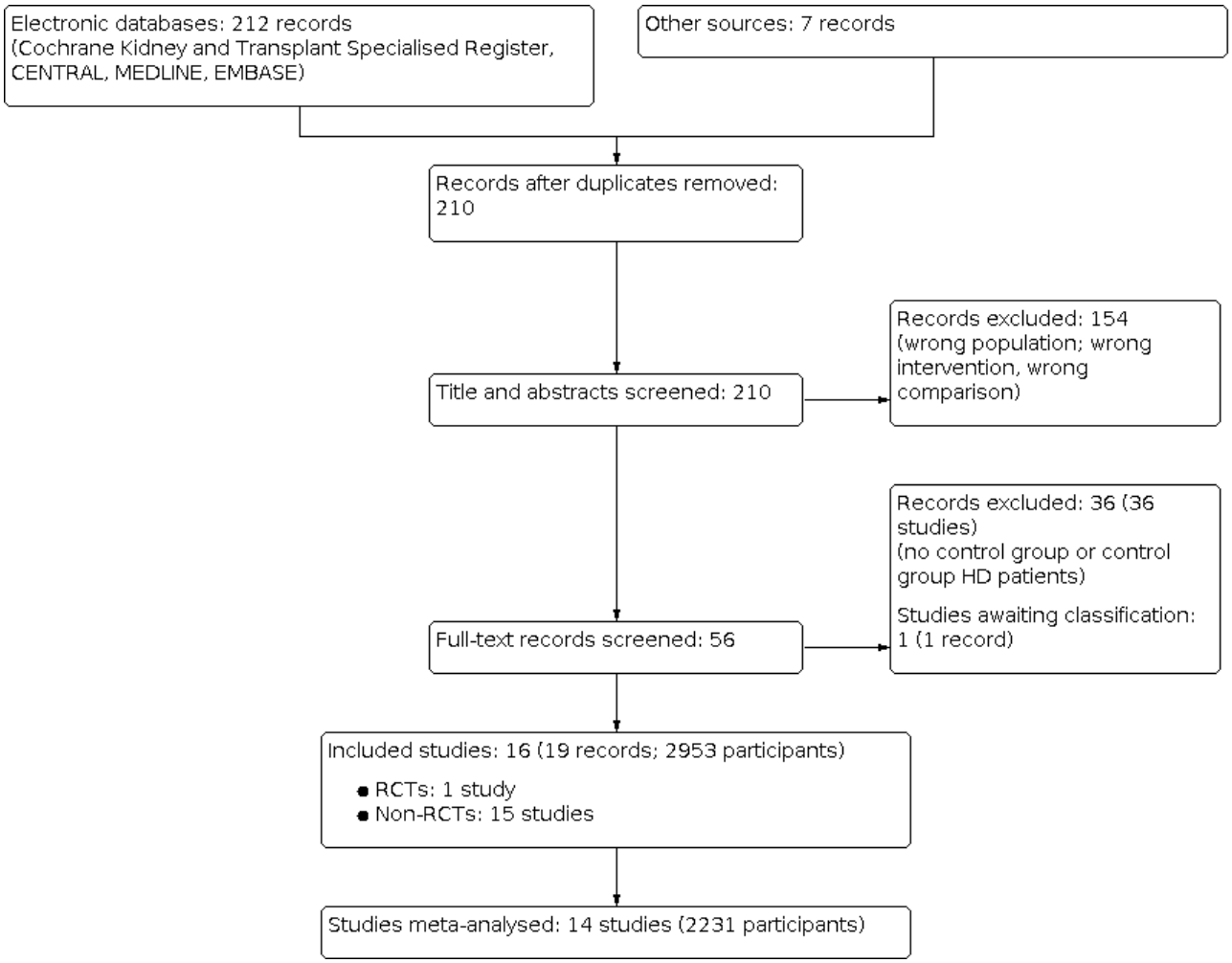
RESULTS

Description of studies

Results of the search

An electronic search (last search date for RCTs: 25 May 2020; non-RCTs: 26 June 2019) identified total 219 potentially relevant reports. After removing duplicates and screening through 210 titles and abstracts, 160 reports were excluded. Full text review was conducted of the remaining 56 records (53 studies); 16 studies (19 records) were included, 36 studies (36 records) were excluded, and one study is awaiting classification and will be assessed in a future update of this review (Figure 1).

Figure 1. Study flow diagram.



Included studies

Sixteen studies (2953 participants) (Ghaffari 2012; Jaivid 2017; Kim 2018; Liu 2014; Nayak 2018; Pai 2016; Povlsen 2016; Salari 2018; See 2017; Serrano 2019; Silva 2018; Timely PD 2010; Vlasak 2017; Wojtaszek 2018; Yang 2011; Zhang 2017) were included in this review (see Table 1).

One multicentre RCT (Timely PD 2010) (122 participants) and fifteen non-RCTs (13 cohort studies: Ghaffari 2012; Jaivid 2017; Kim 2018; Liu 2014; Pai 2016; Povlsen 2016; Salari 2018; Serrano 2019; Silva 2018; Vlasak 2017; Wojtaszek 2018; Yang 2011; Zhang 2017 (2671 participants); 2 case-control studies: Nayak 2018; See 2017 (160 participants)) were included. Of these, four studies were conducted in China (Liu 2014; Pai 2016; Yang 2011; Zhang 2017), two in Australia (Timely PD 2010; See 2017), one in Brazil (Silva 2018), three in the USA (Ghaffari 2012; Salari 2018; Serrano 2019), one in the Czech Republic (Vlasak 2017), one in Denmark (Povlsen 2016), one in India (Nayak 2018), one in Korea (Kim 2018), one in Poland (Wojtaszek 2018), and one in Singapore (Jaivid 2017). Study were conducted between 2001 to 2018. Catheter insertion techniques also varied across studies: three studies used the percutaneous approach (Ghaffari 2012; Jaivid 2017; Silva 2018), five studies used laparotomy (Liu 2014; Kim 2018; Pai 2016; Timely PD 2010; Yang 2011), two studies used laparoscopic insertion methods (See 2017; Vlasak 2017), and two studies (Serrano 2019; Wojtaszek 2018) did not report the insertion technique (see Table 1).

- Ten studies (1604 participants) examined dialysate leak (Ghaffari 2012; Jaivid 2017; Kim 2018; Liu 2014; Nayak 2018; See 2017; Serrano 2019; Timely PD 2010; Vlasak 2017; Yang 2011)
- Seven studies (1457 participants) examined catheter malposition (Jaivid 2017; Kim 2018; Liu 2014; See 2017; Vlasak 2017; Yang 2011; Zhang 2017)
- Six studies (1374 participants) examined catheter blockage (Kim 2018; Liu 2014; Nayak 2018; See 2017; Yang 2011; Zhang 2017)
- Three studies (937 participants) examined PD dialysate flow problem (Liu 2014; Serrano 2019; Yang 2011)
- Two studies (739 participants) examined catheter readjustment (Kim 2018; Liu 2014)
- Two studies (149 participants) examined exit-site bleeding (Ghaffari 2012; Timely PD 2010)
- Three studies (441 participants) examined the incidence of exit-site infection (Ghaffari 2012; See 2017; Yang 2011)
- Eight studies (1492 participants) examined the incidence of peritonitis (Ghaffari 2012; Kim 2018; Liu 2014; Nayak 2018; Pai 2016; See 2017; Serrano 2019; Yang 2011)

- Eleven studies (1950 participants) examined technique survival and death-censored technique survival (Jaivid 2017; Kim 2018; Liu 2014; Nayak 2018; Pai 2016; Salari 2018; See 2017; Serrano 2019; Silva 2018; Timely PD 2010; Yang 2011)
- Nine studies (1735 participants) examined death (any cause) (Jaivid 2017; Kim 2018; Liu 2014; Pai 2016; See 2017; Serrano 2019; Silva 2018; Timely PD 2010; Yang 2011).

See Characteristics of included studies.

Excluded studies

A total of 36 studies were excluded from this review. The reasons for exclusion included; lack of a control group (conventional-start PD group), wrong comparison (comparison with another intervention e.g. HD), different definition of conventional-start PD, and being a review paper.

See Characteristics of excluded studies.

Risk of bias in included studies

Risk of bias for randomised controlled trials

The risk of bias for the RCT is presented in Table 2.

Allocation

One RCT (Timely PD 2010) was included in the review, which demonstrated a low risk of selection bias risk based on utilisation of randomly varying block (permuted block) method where sequence of randomisation was generated using STATA software by an independent research nurse.

Allocation concealment was achieved using sealed envelopes.

Blinding

Blinding of participants and investigators was not possible due to the nature of the study.

Incomplete outcome data

There was a low risk of attrition bias because all patients were followed till the end of the study. Data were analysed using intention-to-treat method.

Selective reporting

Risk of reporting bias was low based on the published protocol, and the study reported most of the pre-specified outcomes.

Risk of bias for observational studies

Risk of bias for all cohort studies is presented in Table 3 and the risk of bias of case-control studies is presented in Table 4.

Selection

There were four criteria in the selection domain including: a) representativeness of the exposed cohort, b) selection of the non-exposed cohort, c) ascertainment of exposure, and d) demonstration that the outcome of interest was not present at start of study. Six included cohort studies (Ghaffari 2012; Jaivid 2017; Kim 2018; Liu 2014; Pai 2016; Yang 2011) met three Newcastle-Ottawa Scale criteria for the domains of selection which included representativeness of the exposed cohort (truly representative), selection of the non-exposed cohort (dawn from the same community as the exposed cohort) and ascertainment of exposure (secure record). There was insufficient information to assess the selection domain for one study (Povlsen 2016). Six studies (Salari 2018; Serrano 2019; Silva 2018; Vlasak 2017; Wojtaszek 2018; Zhang 2017) met two (representativeness of exposed cohort and selection of non-exposed cohort) out of three criteria for selection domain. There was insufficient information to assess the ascertainment of exposure for these studies. Outcome of interest was unlikely to be present at the start of study in 13 cohort studies (Ghaffari 2012; Jaivid 2017; Kim 2018; Liu 2014; Pai 2016; Povlsen 2016; Salari 2018; Serrano 2019; Silva 2018; Vlasak 2017; Wojtaszek 2018; Yang 2011; Zhang 2017).

There were two case control studies (Nayak 2018; See 2017). See 2017 met four Newcastle-Ottawa Scale criteria for selection which included case definition, representativeness of the cases, control selection and control definition. There was insufficient information to assess the two selection criteria (case definition and representativeness) for Nayak 2018.

Comparability of groups of study

This domain assessed the comparability of cohorts/case and controls on the basis of the design or analysis. Two cohort studies (Liu 2014) (adjusted for potential confounders) and (Pai 2016) (cohorts were comparable and adjusted for confounders) met the criteria, however, five cohort studies (Ghaffari 2012; Jaivid 2017; Kim 2018; Silva 2018; Yang 2011) did not met these criteria and six studies did not report the comparability between the two groups (Povlsen 2016; Salari 2018; Serrano 2019; Vlasak 2017; Wojtaszek 2018; Zhang 2017).

One case control study (See 2017) met the criteria given the study matched between case and control by age and co-morbidities (diabetes mellitus), however, one case control study (Nayak 2018) did not match between case and control groups.

Outcome

There were three criteria included in this domain, method of assessment of outcome, duration, and adequacy of follow-up of cohorts. Four cohort studies (Kim 2018; Liu 2014; Pai 2016; Yang 2011) met the criterion for assessment of outcome. Outcome assessment method was not reported in nine cohort studies (Ghaffari 2012; Jaivid 2017; Povlsen 2016; Salari 2018; Serrano 2019; Silva 2018; Vlasak 2017; Wojtaszek 2018; Zhang 2017).

Eleven of 13 cohort studies (85%) studies (Jaivid 2017; Kim 2018; Liu 2014; Pai 2016; Povlsen 2016; Salari 2018; Serrano 2019; Silva 2018; Wojtaszek 2018; Yang 2011) had follow-up duration of at least six months. Nine cohort studies (Ghaffari 2012; Kim 2018; Liu 2014; Povlsen 2016; Salari 2018; Silva 2018; Vlasak 2017; Wojtaszek 2018; Zhang 2017) did not report number lost to follow-up and remaining four cohort studies (Jaivid 2017; Pai 2016; Serrano 2019; Yang 2011) reported low percentage of lost to follow-up.

Exposure

One case control study (See 2017) met the two Newcastle-Ottawa Scale criteria for exposure; the ascertainment of exposure was based on secure record and same method of ascertainment was applied for case and controls. One case control study (Nayak 2018) did not report ascertainment of exposure, method of ascertainment, or non-response rate.

Other potential sources of bias

There was potential other bias as authors of one of the included studies (See 2017) were involved in the present review. The majority of included studies did not adjust the potential confounders including age, presence of diabetes mellitus, cardiovascular disease, malignancy, aetiology of kidney failure, nutritional status of patients, and residual kidney function. In general, patients who required urgent dialysis were sicker and more likely to have worse outcomes compared to patients who had planned dialysis initiation, regardless of modality of dialysis (confounding by indication).

Effects of interventions

See: **Summary of findings 1** Summary of findings of randomised controlled trials; **Summary of findings 2** Summary of findings of non-randomised study interventions: cohort studies; **Summary of findings 3** Summary of findings of non-randomised study interventions: case-control studies

Mechanical complications

Dialysate leak

In low certainty evidence, urgent-start PD may increase dialysate leak (Analysis 1.1) (1 RCT, 122 participants: RR 3.90, 95% CI 1.56 to 9.78) compared with conventional-start PD (Summary of findings 1) which translated into an absolute number of 210 more leaks per 1000 (95% CI 40 to 635). It is uncertain whether urgent-start PD increased dialysate leak compared to conventional-start PD in analysis of non-RCTs (Analysis 1.2) (7 cohort studies, 1322 participants): RR 2.06, 95% CI 0.80 to 5.28; I^2 = 0%, very low certainty evidence; 2 case-control studies, 160 participants: RR 7.41, 95% CI 1.27 to 43.36; I^2 = 0%, very low certainty evidence).

We graded the evidence as low certainty based on one RCT, although the evidence for non-RCTs was uncertain.

Catheter blockage

It is uncertain whether urgent-start PD increases catheter blockage compared to conventional-start PD (Analysis 1.3) (4 cohort studies, 1214 participants: RR 1.33, 95% CI 0.40 to 4.43, I^2 = 0%; 2 case-control studies, 160 participants; RR 1.89, 95% CI 0.58 to 6.13,I^2 = 7%; very low certainty evidence) (Summary of findings 2). All included studies were observational studies with a small number of events which resulted in imprecision.

Catheter malposition

It is uncertain whether urgent-start PD increase catheter malposition compared with conventional-start PD (Analysis 1.4) (6 cohort studies, 1353 participants: RR 1.63, 95% CI 0.80 to 3.32, I^2 = 0%; 1 case-control study, 104 participants: RR 3.00, 95% CI 0.64 to 13.96; very low certainty evidence). We graded the evidence as very low certainty because all included studies were observational studies and a small number of events resulted in imprecision.

Peritoneal dialysis dialysate flow problem

It is uncertain whether urgent-start PD increases dialysate flow problem compared to conventional-start PD (Analysis 1.5) (3 cohort studies, 937 participants: RR 1.44, 95% CI 0.34 to 6.14; I^2 = 55%). We graded very low certainty evidence because all included studies were observational studies and moderate heterogeneity was observed. Further sub-group and sensitivity analyses were not able to be meaningfully performed due to insufficient data.

Exit-site complications

Exit-site infection

It is uncertain whether urgent-start PD increased exit-site infection (Analysis 2.1) (2 cohort studies, 337 participants: RR 1.43, 95% CI 0.24 to 8.6, I^2 = 0%; 1 case-control study, 104 participants: RR 1.20, 95% CI 0.41 to 3.50; very low certainty evidence) or exit-site infection rate (Analysis 2.2) (2 cohort studies, 8048 patient-months: RR 1.06, 95% CI 0.17 to 6.75, I^2 = 0%; very low certainty evidence) compared to conventional-start PD. See 2017 reported comparable risk of early exit-site infection (day 30) between urgent-start and conventional-start groups (15% versus 13% respectively). Similarly, Ghaffari 2012 reported comparable risk of late exit-site infection (day 90) between the urgent-start and conventional-start PD groups (1 over 55 versus 1 over 42 patient-months, respectively). Tunnel tract infection was not reported separately in any of the included studies.

Exit-site bleeding

It is uncertain whether urgent-start PD increased exit-site bleeding compared with conventional-start PD (Analysis 2.3) (1 RCT, 122 participants: RR 0.70, 95% CI 0.03 to 16.81; 1 cohort study, 27 participants: RR 1.58, 95% CI 0.07 to 35.32; very low certainty evidence). We graded the evidence as very low certainty because of imprecision due to small number of participants and studies.

Peritonitis

It is uncertain whether urgent-start PD increased the risk of peritonitis compared with conventional-start PD (Analysis 3.1) (7 cohort studies, 1497 participants; RR 1.00, 95% CI 0.68 to 1.46, I^2 = 18%; 2 case-control studies, 160 participants: RR 1.09, 95% CI 0.12 to 9.51, I^2 = 57%; very low certainty evidence). We graded very low certainty evidence because all included studies were non-RCTs. In addition, imprecision and/or inconsistency were observed. A similar result was observed in secondary analyses of day-30 peritonitis (Analysis 3.3) (2 cohort studies, 627 participants: RR 1.02, 95% CI 0.59 to 1.74; I^2 = 0%; 1 case-control study, 104 participants: RR 0.52, 95% CI 0.22 to 1.20; I^2 = 0%) and day-90 peritonitis (Analysis 3.4) (2 cohort studies, 192 participants: RR 0.67, 95% CI 0.17 to 2.57; I^2 = 0%; 1 case-control study, 56 participants: RR 5.30, 95% CI 0.29 to 98.06; I^2 = 0%). Similarly, it is uncertain whether urgent-start PD increases peritonitis rate compared to conventional-start PD (Analysis 3.2) (2 cohort studies, 8048 patient-months: RR 0.88, 95% CI 0.23 to 3.34, I^2 = 0%; very low certainty evidence). Two studies (Timely PD 2010; Vlasak 2017) reported similar in the PD-related infection between urgent-start and conventional-start PD groups.

Tunnel tract infection

No studies reported tunnel tract infection.

Catheter readjustment

It is uncertain whether urgent-start PD compared with conventional-start PD increases catheter readjustment (Analysis 4.1) (2 cohort studies, 739 participants: RR 1.27, 95% CI 0.40 to 4.02, I^2 = 0%; very low certainty evidence). There was no study specifically reported catheter readjustment within one month of commencement of PD.

Technique and patient survival

Technique survival

It is uncertain whether urgent-start PD compared with conventional-start PD reduces technique survival. This analysis included one RCT (Analysis 5.1) (1 RCT, 122 participants: RR 1.09, 95% CI 1.00 to 1.20, very low certainty evidence), and 10 non-RCTs (Analysis 5.2) (8 cohort studies, 1668 participants: RR 0.90, 95% CI 0.76 to 1.07, I^2 = 88%; 2 case-control studies, 160 participants: RR 0.92, 95% CI 0.79 to 1.06, I^2 = 0%; very low certainty evidence). We graded the evidence as very low certainty because this analysis only included one RCT with inadequate follow-up duration for the outcome and substantial heterogeneity was observed in analysis of cohort studies. The heterogeneity was unable to be resolved when analyses were repeated according to the method of catheter insertion (laparotomy) (Analysis 5.3) (4 cohort studies, 1198 participants: RR 0.74, 95% CI 0.58 to 0.94, I^2 = 84%) or follow-up duration of up to 6 months (Analysis 5.4) (4 cohort studies, 896 participants: RR 0.94, 95% CI 0.78 to 1.12; I^2 = 85%) or more than 6 months (Analysis 5.5) (4 cohort studies, 772 participants: RR 0.87, 95% CI 0.58 to 1.30, I^2 = 92%). Sensitivity analysis was performed after excluding studies with a high risk of bias and a large study: urgent-start PD had little or no effect on technique survival compared to conventional-start PD (Analysis 5.6) (3 cohort studies, 418 participants: RR 0.87, 95% CI 0.76 to 1.00; I^2 = 0%; 1 case-control study, 104 participants: RR 0.95, 95% CI 0.61 to 1.47).

Death-censored technique survival

It is uncertain whether urgent-start PD compared with conventional-start PD reduces death-censored technique survival (Analysis 5.7) (1 RCT, 122 participants: RR 1.08, 95% CI 0.99 to 1.18, very low certainty evidence) and (Analysis 5.8) (7 cohort studies,1509 participants: RR 0.99, 95% CI 0.88 to 1.10; I^2 = 82%; very low certainty evidence; 1 case-control study, 104 participants: RR 0.94, 95% CI 0.67 to 1.33; I^2 = 0%, very low certainty evidence). We graded the evidence as very low certainty because substantial heterogeneity (inconsistency) was observed during analysis of cohort studies. Heterogeneity was not resolved when analyses were repeated according to the method of catheter insertion (laparotomy) (Analysis 5.9) (4 cohort studies, 1198 participants: RR 0.90, 95% CI 0.81 to 1.00; I^2 = 61%) or according to follow-up duration of up to 6 months (Analysis 5.10) (4 cohort studies, 896 participants: RR 0.98, 95% CI 0.91 to 1.07; I^2 = 59%), or more than 6 months (Analysis 5.11) (3 cohort studies, 613 participants: RR 1.00, 95% CI 0.69 to 1.46; I^2 = 92%).

Death (any cause)

It is uncertain whether urgent-start PD compared with conventional-start PD increased death (any cause) (Analysis 6.1) (1 RCT, 122 participants: RR 1.49, 95% CI 0.87 to 2.53; very low certainty evidence); (Analysis 6.2) (7 cohort studies, 1509 participants: RR 1.89, 95% CI 1.07 to 3.32; I^2 = 42%; very low certainty evidence; 1 case-control study, 104 participants: RR 0.90, 95% CI 0.27 to 3.02; I^2 = 0%;very low certainty evidence). We graded the evidence as very low certainty because inconsistency was observed.

Interim haemodialysis

Only Timely PD 2010 reported that eight patients from the urgent-start PD group and four patients from the conventional-start PD group required interim HD after commencement of PD (Analysis 8.1).

Hospitalisation

Hospitalisation was reported in 2 studies (Jaivid 2017; Yang 2011). Due to inconsistently reported outcome measures, results from these studies could not be directly compared. Jaivid 2017 reported no difference in hospitalisation between the urgent-start PD and conventional-start PD group (7.3 versus 7.29 patient-months), whereas Yang 2011 reported longer mean length of hospitalisation in the urgent-start PD group compared to the conventional-start PD group (11.8 ± 10.2 versus 7.5 ± 6.2 days, P < 0.001). Continuous scale of measurement of effect was unable to be used given the insufficient studies on duration of hospitalisation.

Adverse events

Yang 2011 reported pericatheter hernia (Analysis 7.1) and hemoperitoneum (Analysis 7.2) and Timely PD 2010 reported delayed wound healing (Analysis 7.3)

See Table 5.

Cost of dialysis

No studies compared the cost of urgent-start PD with conventional PD.

Peritoneal dialysis training duration

No studies compared PD training durations between urgent-start PD and conventional-start PD.

Quality of life

No studies compared patient QoL between urgent-start PD and conventional-start PD.

Overall, there were insufficient data to allow other subgroup or sensitivity analyses for most of the outcomes.

DISCUSSION

Summary of main results

Urgent-start PD may increase the risk of dialysate leak compared with conventional-start PD (RR 3.90, 95% CI 1.56 to 9.78; low certainty evidence). It is uncertain whether urgent-start PD compared with conventional-start PD increased other mechanical complications including catheter blockage, catheter malposition, poor flow of catheter, and catheter readjustment because of the suboptimal quality of included studies and a small number of events resulting in imprecision. It is uncertain whether urgent-start PD compared with conventional-start PD increased exit-site complications including exit-site infection, exit-site bleeding, and peritonitis, or reduced technique survival compared with conventional-start PD. Substantial heterogeneity was observed when analysed for technique survival and heterogeneity was unable to resolve despite after secondary analyses accordingly to methods of insertion (laparotomy), duration of follow-up (≤ or > 6 months). Similarly, it is uncertain whether urgent-start PD compared with conventional-start PD increases death (any cause) because the certainty of this evidence was very low.

Overall completeness and applicability of evidence

The present review included a total of 16 studies (2953 participants) comparing the outcomes between urgent-start and conventional-start PD. Only one RCT was identified (Timely PD 2010), the remaining studies were observational studies. Most studies did not adjust for potential confounders including age, gender, body mass index, comorbidities of patients (such as diabetes mellitus and cardiovascular disease), methods of catheter insertion, skills of interventionists, initial dialysate fill volume and initial PD regimen, and PD modality. The review performed analyses using unadjusted estimates instead of adjusted estimates because most studies did not adjust for potential confounders. Therefore, the pooled analysis of adjusted estimates was not available for the present review.

In this review, initiation of PD within 2 weeks of catheter insertion may increase the risk of pericatheter or subcutaneous dialysate leak compared with initiation of PD at least 2 weeks after catheter insertion. This is based on one RCT with a low risk of bias, whereas the results of observational studies on this outcome are uncertain. These results are supported by previous literature where an increase in the risk of dialysate leak was observed in conditions associated with poor wound healing and impaired tensile strength of tissues (Tzallaloukas 1990). Therefore, initiation of urgent PD, as early as within 24 hours of catheter implantation, would not have allowed for sufficient time for the operative wound to heal, resulting in an increase in risk of dialysate leak (Povlsen 2006). Other recognised risk factors for dialysate leak include catheter insertion technique (median versus lateral catheter insertion) (Stegmayr 1990), larger initial fill volume, history of previous abdominal surgery, chronic steroid use, and multiple pregnancies (Tzallaloukas 1990). Early leak, which is defined as leak within 30 days of catheter insertion, is usually manifested as dialysate loss externally. Two included studies (See 2017; Vlasak 2017) reported early leak. See 2017 reported that early leak was more likely to occur in urgent-start PD than conventional-start PD (12% versus 1%). See 2017 reported that patients with early leak were successfully managed with conservative approaches including using lower dwell volume or temporary interruption of PD. See 2017 also reported that long-term (up to 3 years) technique survival rates were comparable between urgent-start PD and conventional-start PD. Other studies included in the review did not distinguish between early and late leaks.

The effects of urgent-start PD compared with conventional-start PD on catheter blockage, catheter malposition, and PD dialysate flow problems remain uncertain. Previous small individual studies (See 2017; Bitencourt Dias 2017) reported a trend of higher odds of catheter migration in the urgent-start PD group. All included studies reporting catheter migration/malposition were retrospective, single centre, observational studies. We graded low certainty evidence in view of suboptimal quality of included studies and a small number of events resulting in imprecision.

There were only two studies (Ghaffari 2012; Timely PD 2010) that reported bleeding/haematoma at the catheter exit site. In Ghaffari 2012, the method of catheter placement was different between the urgent-start and conventional-start PD groups (percutaneous versus laparoscopic insertion), with one case of exit-site bleeding/haematoma observed in a patient who received urgent-start PD. Based on the available evidence, it is uncertain whether urgent-start PD increases exit-site bleeding/haematoma compared with conventional-start PD.

It is uncertain whether urgent-start PD increases risks of exit-site infection compared with conventional-start PD groups. The risk of early exit-site infection (day-30 of PD initiation) was reported in one study (See 2017), which found no difference between the two groups. Similarly, the risk of late exit-site infection (day-90 of PD initiation) was reported to be comparable between the two groups in one study (Ghaffari 2012). It is uncertain whether urgent-start PD increased risk of peritonitis or peritonitis rate. Similarly, it is uncertain whether urgent-start PD increases early peritonitis (day 30) and late peritonitis (day 90) compared with conventional-start PD.

Urgent-start PD has uncertain effect on technique survival compared with conventional-start PD groups. There was a considerable heterogeneity in the analysis of technique survival between urgent-start and conventional-start PD groups. Heterogeneity was not resolved despite subgroup analyses according to method of catheter insertion (laparotomy) and follow-up duration (up to 6 months versus more than 6 months). Based on the available evidence, it is uncertain whether urgent-start PD increases technique survival compared with conventional-start PD.

This review observed that it is uncertain whether urgent-start PD increases death (any cause) compared with conventional-start PD, because all but one of the included studies were observational studies and there was inadequate follow-up duration, and most studies did not adjust for potential confounders. Generally, patients with CKD who required urgent dialysis were more unwell and had a higher risk of experiencing adverse outcomes than patients who required planned dialysis, regardless of type of dialysis initiation (confounding by indication).

In general, the majority of included studies were retrospective, observational studies, with only one RCT included in the review. In addition, most studies had small numbers of participants and the follow-up durations varied among the included studies. Moreover, there was considerable variation in the duration of time between catheter placement and initiation of dialysis (break-in period) among patients in the urgent-start PD group, ranging from within 24 hours to 14 days of catheter insertion. Furthermore, there were various catheter placement methods, PD modalities, and initial PD fill volumes, which would have likely contributed to the observed heterogeneity in outcomes. Lastly, some of the included studies did not clearly distinguish whether urgent-start PD was initiated in patients who were initially planned for conventional-start PD, but used their catheters early or in those who had an unplanned, urgent- PD start. At present, it is unknown whether the outcomes of these patients are different. In summary, due to the suboptimal methodological quality of the included reviews, and the imprecision and inconsistency of results, the majority of outcomes were graded as low to very low level of evidence. There is no strong recommendation that can be made for or against urgent-start PD based on the available evidence.

Quality of the evidence

There was only one RCT identified, which is perhaps not surprising as the need to initiate dialysis urgently is driven by clinical indication. However, prior to any broader implementation of urgent-start PD, it is important to ensure that this approach confers at least comparable outcomes to those of the more traditional, conventional-start approach. In this review the majority of studies were retrospective cohort studies. All included observational

studies met the criteria for the selection domain of risk of bias assessment. There were only 2 out of 12 cohort studies (17%) and one case-control (50%) that met the criteria for the comparability domain. The majority of cohort studies did not report the method of outcome assessment and only one case-control study met most of the criteria for the exposure domain. The one RCT had a low risk of bias. In general, studies were limited by non-RCTs, small sample sizes, retrospective study designs, and lack of comparability of cohorts.

There were potential systemic differences between participants in urgent-start and conventional-start PD groups (selection bias). An attempt to counter bias introduced from confounding by analysing with adjusted estimates of intervention effects was not possible because only a few studies adjusted for potential confounders and different studies adjusted different confounders means that pooling analysis is inappropriate.

Potential biases in the review process

The review included comprehensive systematic review of publications through MEDLINE, EMBASE, and CENTRAL search. The review processes, including data extraction, data analysis and assessment of study quality, were performed by two independent investigators and any differences were resolved by checking with additional two authors. The authors of previous publications were approached for additional data for the review. However, there was a potential risk of bias as authors from one of the included studies were also authors for this review.

Agreements and disagreements with other studies or reviews

A previous narrative literature review of urgent-start PD by Alkatheeri 2016 reported that there was no significant difference in the risk of leak between urgent-start and conventional-start PD groups. However, a previous meta-analysis by Zang 2019, which included only six observational studies, reported that urgent-start PD was associated with a higher risk of dialysate leak. Similarly, the present meta-analysis, which included one RCT and 15 observational studies, concluded that urgent-start PD may slightly increase the risk of dialysate leak compared with conventional-start PD.

The risk of catheter readjustment was reported to be higher in urgent-start PD patients, who initiated PD within 24 hours of catheter insertion, compared with conventional-start PD patients, who initiated PD > 12 days after catheter insertion, in a small single centre study (Povlsen 2006). Zang 2019, including only 2 observational studies (Liu 2014; Povlsen 2006), reported the comparable risk of catheter readjustment between the two groups. The present review including two studies (Kim 2018; Liu 2014) for the outcomes of catheter readjustment, it was observed that urgent-start PD had an uncertain effect on the risk of catheter readjustment compared with conventional-start PD because the certainty of this evidence is very low given that a few included studies with small events resulting in imprecision. This review did not include Povlsen 2006 because the control arm initiated PD > 12 days instead of ≥ 14 days.

Zang 2019 reported no difference in death between urgent-start PD and conventional-start PD. This review included a larger number of studies and observed that urgent-start PD had an uncertain effect on death (any cause) compared with conventional-start PD. Most of the included observational studies had different, and relatively short follow-up durations, and the studies were unadjusted for potential confounders. In summary, the certainty of evidence is very low for the mortality outcome.

AUTHORS' CONCLUSIONS

Implications for practice

In patients with CKD requiring urgent commencement of dialysis, either due to late referral to nephrologists or unexpected rapid progression of kidney disease, and who are suitable for PD, clinicians and patients should be aware that based on one small RCT, urgent-start PD may slightly increase dialysate leak (results from the observational studies are uncertain – imprecise and based on unadjusted data) and has uncertain effects on catheter blockage, catheter malposition, catheter readjustment, infectious complications, technique survival, and patient survival compared with conventional-start PD.

Implications for research

Future studies need to specify and report the early versus late mechanical or infection-related complications to allow for a better understanding of the timing and types of complications. In addition, future studies should clearly indicate the technique of catheter insertion, urgency of PD initiation (early versus urgent use of PD catheter) to allow for adjustment of potential confounders and better understanding of the outcomes of urgent-start PD

Future studies should examine cost effectiveness, QoL and other patient-reported outcomes in addition to clinical outcomes in patients with kidney failure on urgent-start PD.

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CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

Ghaffari 2012

Study characteristics

Methods	• Country: USA • Type of study: observational • Design: cohort study (prospective), single centre • Time frame: March 2010 and March 2011 • Duration of follow-up: short-term (90 days)

Participants	• Inclusion criteria
	  * USPD group: CKD stage 5 patients who required urgent-start PD
	  * CSPD group: not reported
	• Number: treatment group (18); control group (9)
	• Mean age ± SD (years): treatment group (45.1 ± 13.7); control group (53.6 ± 19.1)
	• Sex (males): treatment group (13, 72%); control group (4, 44%)
	• DM: treatment group (9, 50%): control group (5, 56%)
	• Exclusion criteria: not reported

Interventions	Treatment group • Started PD within 2 weeks but 48 hours after PD catheter insertion Control group • Started PD 2 weeks after catheter insertion
Outcomes	• Peritonitis incidence • Exit-site tract infection • Mechanical complications (leak/catheter blockage, malposition) • Exit-site bleeding
Notes	• Catheter placement was different with mainly percutaneous method for USPD and laparoscopic placement for planned group

Risk of bias

Bias	Authors' judgement	Support for judgement
Selection: representativeness of exposed cohort	Low risk	Cohorts are true representative of CKD 5 patients in the community

Ghaffari 2012 *(Continued)*

Selection: non exposed cohort	Low risk	Non-exposed drawn from the same community as exposed cohorts
Selection: ascertainment of exposure	Low risk	Ascertainment of exposure by secure record
Selection: demonstration that outcome of interest was not present at the start of the study	Low risk	Outcome of interest was unlikely to be present before the study
Comparability of cohorts on basis of design or analysis	High risk	Data were not adjusted for potential confounders, used percutaneous method for urgent-start group and laparoscopic method for non-urgent start group. In addition, study did not adjust for potential confounders.
Outcome: assessment	Unclear risk	Insufficient information to permit judgement
Outcome: follow-up length	Unclear risk	Follow-up: 90 days
Outcome: adequacy of follow-up	Unclear risk	Insufficient information to permit judgement

Jaivid 2017

Study characteristics	
Methods	• Country: Singapore • Type of study: observational • Design: cohort study (retrospective), single centre • Time frame: July 2015 • Duration of follow-up: 180 days
Participants	• Number: treatment group (17); control group (33) • Mean age, range (years): treatment group (56, 25 to 87); control group (62, 27 to 84) • Sex (males): not reported • DM: treatment group (41%); control group (67%)
Interventions	Treatment group • USPD, in which PD was initiated within 2 weeks of catheter insertion
Outcomes	• Mechanical complications (leak/catheter blockage, malposition) (adjusted for method of catheter insertion for outcome - dialysate leak) • Technique survival • Death (any cause) • Hospitalisation
Notes	• Laparoscopic PD catheter insertions for patients not suitable for percutaneous insertions • A significantly higher number of patients in the urgent-start group had percutaneous PD catheter insertions, 82% versus 39% (P = 0.0064).
Risk of bias	

Jaivid 2017 *(Continued)*

Bias	Authors' judgement	Support for judgement
Selection: representativeness of exposed cohort	Low risk	Representative of the average CKD stage 5 patients without having planned dialysis in the community
Selection: non exposed cohort	Low risk	Same cohort
Selection: ascertainment of exposure	Low risk	Secure record
Selection: demonstration that outcome of interest was not present at the start of the study	Low risk	Outcome of interest was unlikely to be present before the study
Comparability of cohorts on basis of design or analysis	High risk	Significantly higher number of laparoscopic assisted catheter insertion in control group than urgent-start group, and data were not adjusted for all potential confounders
Outcome: assessment	Unclear risk	Insufficient information to permit judgement
Outcome: follow-up length	Low risk	180 days, long enough to examine the main outcomes of interest
Outcome: adequacy of follow-up	Low risk	8% dropout

Kim 2018

Study characteristics	
Methods	• Country: Korea • Type of study: observational • Design: cohort study (retrospective), single centre • Time frame: January 2007 to December 2014 • Duration of follow-up: 6 months

Participants	• Number
	  * Treatment group: P1 (initiated within 48 hours; 103), P2 (initiated 2 to 13 days; 87)
	  * Control group: 29
	• Mean age ± SD (years)
	  * Treatment group: P1 (58 ± 12.5); P2 (58.2 ± 14.8)
	• Sex (males): treatment group (119, 63%); control group (15, 51.7%)
	• DM: treatment group (41%); control group (34.5%)

Interventions	Treatment group • Started PD within 2 weeks after PD catheter insertion Control group • Started PD 2 weeks after catheter insertion
Outcomes	• Mechanical complications (leak/catheter blockage, malposition)

Kim 2018 *(Continued)*

	• Peritonitis • Technique survival • Death (any cause)
Notes	• BUN and Cr level were significantly higher and serum albumin was lower in the urgent-start PD group compared with conventional-start PD group • Outcomes were unadjusted for potential confounders

Risk of bias

Bias	Authors' judgement	Support for judgement
Selection: representativeness of exposed cohort	Low risk	Representative of CKD stage 5 patients who initiated PD urgently in a hospital
Selection: non exposed cohort	Low risk	These patients were selected from the same hospital as exposed cohort
Selection: ascertainment of exposure	Low risk	Secure record
Selection: demonstration that outcome of interest was not present at the start of the study	Low risk	Outcome of interest was unlikely to be present before the study
Comparability of cohorts on basis of design or analysis	High risk	Baseline characteristics were significantly different between the two groups, the outcomes were not adjusted for potential confounders
Outcome: assessment	Low risk	Medical record
Outcome: follow-up length	Low risk	Adequate for study of short term outcomes
Outcome: adequacy of follow-up	Unclear risk	Insufficient information to permit judgement

Liu 2014

Study characteristics

Methods	• Country: China • Type of study: observational • Design: cohort study • Time frame: between 1 January 2001 and 31 December 2010 • Duration of follow up: 6 months
Participants	• Inclusion criteria: all patients who underwent Tenckhoff catheter implantation and initiated PD in Renji Hospital, Shanghai Jiao Tong University School of Medicine • Number: treatment group (344); control group (176) • Mean age ± SD (years): treatment group (52.6 ± 17.7); control group (56.2 ± 15.5) • Sex (male): treatment group (159, 46.2%); control group (79, 45.1%) • DM (%): treatment group (78, 22.7%); control group (36, 20.6%)

Liu 2014 *(Continued)*

	• Exclusion criteria: not reported
Interventions	Treatment group • To start PD within 14 days of catheter insertion (≤ 7 days) Control group • To start PD > 14 days after catheter insertion The choice of when to start dialysis after catheter implantation was made by the nephrologists based on the clinical condition of individual patients
Outcomes	• Peritonitis incidence (early/late) • Mechanical complications (leak/catheter blockage, malposition) (adjusted for age, sex, BMI, comorbidities, history of abdominal surgery, use of steroids) • Technique survival (adjusted for age, gender, comorbidities, break-in period) • Death (any cause)
Notes	• This study was funded by a grant from the Science and Technology Commission of Shanghai Municipality

Risk of bias

Bias	Authors' judgement	Support for judgement
Selection: representativeness of exposed cohort	Low risk	Representative of the average CKD stage 5 patients in the community
Selection: non exposed cohort	Low risk	Same cohort
Selection: ascertainment of exposure	Low risk	Secure record
Selection: demonstration that outcome of interest was not present at the start of the study	Low risk	All patients were not on dialysis before the study
Comparability of cohorts on basis of design or analysis	Low risk	Age and baseline albumin were different between groups, however, data were adjusted for potential confounders including age, gender, comorbidities
Outcome: assessment	Low risk	Medical record
Outcome: follow-up length	Low risk	6 months, long enough to examine the primary outcomes of interest
Outcome: adequacy of follow-up	Unclear risk	No description of lost to follow-up

Nayak 2018

Study characteristics

Methods	• Country: India

Nayak 2018 *(Continued)*

	• Type of study: observational • Design: single centre, case control study • Time frame: March 2016 to August 2017 • Duration of follow-up: 90 days
Participants	• Number: treatment group (32); control group (24) • Mean age ± SD (years): not reported • Sex (males): not reported • DM: not reported
Interventions	Treatment group • Started PD within 48 hours of presentation Control group • Started PD 14 days or more after PD catheter insertion
Outcomes	• Peritonitis at day 90 • Exit-site infection at day 90 • Catheter blockage • Technique survival at day 90
Notes	• Did not match between case and control group, emergent-start group had significantly higher PVD than control group

Risk of bias

Bias	Authors' judgement	Support for judgement
Case definition	Unclear risk	Insufficient information to permit judgement
Representativeness of the case	Unclear risk	Insufficient information to permit judgement
Selection: control	Low risk	Control from same community
Definition of control	Low risk	Initiation of PD 14 days after catheter insertion
Comparability of cases and controls on basis of design or analysis	High risk	Data were not matched, PVD was significantly higher in emergent start group, data were not adjusted for potential confounders
Exposure: ascertainment of exposure	Unclear risk	Insufficient information to permit judgement
Exposure: same methods for case and control	Unclear risk	Insufficient information to permit judgement
Exposure: non-response rate	Unclear risk	insufficient information to permit judgement

Pai 2016

Study characteristics

Pai 2016 *(Continued)*

Methods	• Country: China • Type of study: observational • Design: cohort study (retrospective), single centre • Time frame: 1 January 2006 to 31 December 2012 • Duration of follow-up: The average period of follow-up was 30.5 ± 24.9 months, follow up until the time of death, transplantation, transfer, PD failure or 31 December 2013, whichever came first
Participants	• Inclusion criteria: all patients who underwent insertion of a Tenckhoff catheter at Far Eastern Memorial Hospital • Number: treatment group (80); control group (69) • Mean age ± SD (years): treatment group (56.2 ± 14.5); control group (55.0 ± 13.2) • Sex (male): treatment group (40, 50%); control group (26, 38%) • DM: treatment group (33, 41.3%); control group (31, 44.9%) • Exclusion criteria: Tenckhoff catheter inserted at another hospital, or if they had previously undergone PD before 1 January 2006
Interventions	Treatment group • Started PD earlier than 14 days after PD catheter insertion Control group • Started PD 14 days or more after PD catheter insertion
Outcomes	• Peritonitis rate (adjusted for early starters, DM, age, and serum albumin) • Technique survival (adjusted for early starters, DM, age, and serum albumin) • Death (any cause) (adjusted for early starters, DM, age, and serum albumin)
Notes	• If the patient had previously undergone abdominal surgery, the above procedure was performed with the assistance of laparoscopy

Risk of bias

Bias	Authors' judgement	Support for judgement
Selection: representativeness of exposed cohort	Low risk	Representative of average CKD stage 5 patients who choose to do PD in the community
Selection: non exposed cohort	Low risk	Same cohort
Selection: ascertainment of exposure	Low risk	Secure record
Selection: demonstration that outcome of interest was not present at the start of the study	Low risk	All are CKD stage 5 patients not on dialysis before the study
Comparability of cohorts on basis of design or analysis	Low risk	Study adjusted for diabetes, age, albumin
Outcome: assessment	Low risk	Medical record review
Outcome: follow-up length	Low risk	The average period of follow-up was 30.5 ± 24.9 months

Pai 2016 *(Continued)*

Outcome: adequacy of follow-up	Low risk	Description provided for lost to follow up, similar dropout in both groups

Povlsen 2016

Study characteristics

Methods	• Country: Denmark • Type of study: observational • Design: cohort study (prospective), multicentre • Time frame: 2005 to 2009 • Duration of follow-up: at least 2 years
Participants	• Number: treatment group (338); control group (255) • Mean age ± SD (years): not reported • Sex (male): not reported • DM: not reported
Interventions	Treatment group • Unplanned start PD, PD initiation within 2 weeks of PD catheter insertion Control group • Planned start with PD initiation > 2 weeks after catheter insertion
Outcomes	• Technique survival
Notes	• Contacted authors but unable to get additional information

Risk of bias

Bias	Authors' judgement	Support for judgement
Selection: representativeness of exposed cohort	Unclear risk	Insufficient information to permit judgement
Selection: non exposed cohort	Unclear risk	Insufficient information to permit judgement
Selection: ascertainment of exposure	Unclear risk	Insufficient information to permit judgement
Selection: demonstration that outcome of interest was not present at the start of the study	Low risk	Outcome of interest was unlikely to be present before the study
Comparability of cohorts on basis of design or analysis	Unclear risk	Insufficient information to permit judgement
Outcome: assessment	Unclear risk	Insufficient information to permit judgement

Povlsen 2016 *(Continued)*

Outcome: follow-up length	Low risk	Adequate for outcomes of interest
Outcome: adequacy of follow-up	Unclear risk	Insufficient information to permit judgement

Salari 2018

Study characteristics	
Methods	• Country: USA • Type of study: observational • Design: cohort study (retrospective), single centre • Time frame: January 2010 to July 2017 • Duration of follow-up: average period of follow-up was 986 ± 634 days in USPD and 1010 ± 732 days in CSPD
Participants	• Number: treatment group (107); control group (52) • Mean age ± SD (years): treatment group (43.0 ± 13.5); control group (49.0 ± 16.5) • Sex (male): not reported • DM: treatment group (60, 56%); control group (31, 59.6%)
Interventions	Treatment group • Started PD within 14 days of PD catheter insertion Control group • Started PD 14 days or more after PD catheter insertion
Outcomes	• Technique survival • Peritonitis • Exit-site infection
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Selection: representativeness of exposed cohort	Low risk	Included all patients underwent PD in a single centre, during the study period
Selection: non exposed cohort	Low risk	Same cohort, underwent PD in the same hospital
Selection: ascertainment of exposure	Unclear risk	Insufficient information to permit judgement
Selection: demonstration that outcome of interest was not present at the start of the study	Low risk	Outcome of interest was unlikely to be present before the study

Salari 2018 *(Continued)*

Comparability of cohorts on basis of design or analysis	Unclear risk	Insufficient information to permit judgement
Outcome: assessment	Unclear risk	Insufficient information to permit judgement
Outcome: follow-up length	Low risk	Duration of follow-up was adequate
Outcome: adequacy of follow-up	Unclear risk	Insufficient information to permit judgement

See 2017

Study characteristics	
Methods	• Country: Australia • Type of study: observational • Design: matched case-control study (1:3), single centre study • Time frame: 1 January 2010 to 30 June 2015 • Duration of follow up: 4 weeks
Participants	• Inclusion criteria: patients with advanced CKD who required urgent KRT, had no established access, and were suitable for PD were enrolled in a structured USPD program • Number: treatment group (26); control group (78) • Mean age ± SD (years): treatment group (51.0 ± 14.5); control group (50.6 ± 13.0) • Sex (male): treatment group (17, 65%); control group (49, 63%) • DM: treatment group (9, 35%); control group (27, 35%) • Exclusion criteria: not reported
Interventions	Treatment group • USPD within 2 weeks of catheter insertion Control group • CSPD > 2 weeks after catheter insertion
Outcomes	• Peritonitis incidence (early/late) • Exit-site infection (early/late) • Mechanical complications (leak/catheter blockage, malposition) • Technique survival (adjusted for obesity, late referral status) • Death (any cause)
Notes	• Compared with CSPD patients, USPD patients were more likely to be referred late (73% versus 1%, P < 0.001) and were less likely to be obese (23% versus 50%, P = 0.02)

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Case definition	Low risk	Independent validation – from unit database, further confirmed using hospital medical records

See 2017 *(Continued)*

Representativeness of the case	Low risk	All eligible cases with outcome of interest over a defined period of time were included
Selection: control	Low risk	Control from same community
Definition of control	Low risk	Initiation of PD > 2 weeks after catheter placement
Comparability of cases and controls on basis of design or analysis	Low risk	Matched for confounders: age, diabetic status
Exposure: ascertainment of exposure	Low risk	Hospital records
Exposure: same methods for case and control	Low risk	Yes
Exposure: non-response rate	Unclear risk	Unclear

Serrano 2019

Study characteristics	
Methods	• Country: USA • Type of study: observational • Design: retrospective cohorts, single centre study • Time frame: not specified exact time frame (total 10 years duration) • Duration of follow-up: 6 months
Participants	• Inclusion criteria: all patients who initiated PD during the study period • Number: treatment group (59); control group (48) • Mean age (years): treatment group (48.8); control group (not reported) • Sex (male): not reported • DM: treatment group (24, 41%); control group (not reported) • Exclusion criteria: not reported
Interventions	Treatment group • USPD within 2 weeks of catheter insertion Control group • CSPD > 2 weeks after catheter insertion
Outcomes	• Peritonitis incidence (day 30 and day 180) • Mechanical complications (leak/poor catheter flow) • Technique failure • Death (any cause)
Notes	• Reported unadjusted data only • It was unclear whether the baseline characteristics were similar between the two groups
Risk of bias	

Serrano 2019 *(Continued)*

Bias	Authors' judgement	Support for judgement
Selection: representativeness of exposed cohort	Low risk	All patients from single centre who required urgent initiation of PD within 2 weeks of catheter insertion were included
Selection: non exposed cohort	Low risk	Same cohort, underwent traditional PD in the same hospital
Selection: ascertainment of exposure	Unclear risk	Insufficient information to permit judgement
Selection: demonstration that outcome of interest was not present at the start of the study	Low risk	Outcomes are unlikely to be present at the start of the study
Comparability of cohorts on basis of design or analysis	Unclear risk	Insufficient information to permit judgement
Outcome: assessment	Unclear risk	Insufficient information to permit judgement
Outcome: follow-up length	Low risk	long enough to determine the early complications
Outcome: adequacy of follow-up	Low risk	low dropout < 5% (5 out of 107 patients dropout from the programme)

Silva 2018

Study characteristics	
Methods	• Country: Brazil • Type of study: observational • Design: Prospective cohorts, single centre study • Time frame: December 2010 to January 2018 • Duration of follow-up: median time of 381 days
Participants	• Inclusion criteria: not reported • Number: treatment group (40); control group (114) • Mean age, range (years): treatment group (56, 40 to 70); control group (48, 32 to 63) • Gender (male): treatment group (24, 60%); control group (55, 48%) • DM: treatment group (24, 41%); control group (31, 27%) • Exclusion criteria: not reported
Interventions	Treatment group • USPD within 3 to 14 days of catheter insertion Control group • CSPD > 2 weeks after catheter insertion
Outcomes	• Technique failure (adjusted for DM, BMI, and mode of PD initiation (USPD urgent versus CSPD)

Silva 2018 *(Continued)*

Notes	• Higher number of heart failure in USPD, unequal follow-up duration, reported slightly lower in the USPD

Risk of bias

Bias	Authors' judgement	Support for judgement
Selection: representativeness of exposed cohort	Low risk	CKD stage 5 patients admitted to hospital requiring urgent-dialysis
Selection: non exposed cohort	Low risk	Recruited from the same hospital as exposed cohort
Selection: ascertainment of exposure	Unclear risk	Insufficient information to permit judgement
Selection: demonstration that outcome of interest was not present at the start of the study	Low risk	Outcome unlikely to be present before the study
Comparability of cohorts on basis of design or analysis	High risk	Unequal baseline characteristics between groups with higher number of heart failure among urgent-start group. The analysis only adjusted for DM, BMI and mode of PD imitation (USPD versus CSPD)
Outcome: assessment	Unclear risk	Insufficient information to permit judgement
Outcome: follow-up length	Low risk	Median follow-up duration 381 days
Outcome: adequacy of follow-up	Unclear risk	Insufficient information to permit judgement
Other bias	High risk	Reporting bias

Timely PD 2010

Study characteristics

Methods	• Country: Australia • Type of study: RCT • Setting/Design: multicentre • Time frame (year of study): 1 March 2008 to 31 May 2013 • Duration of follow-up: 180 days
Participants	• Inclusion criteria: 18 years of age, who will receive PD within four weeks of insertion of PD catheter • Treatment group (week 1) (urgent-start PD) • Number: treatment group (39); control group 1 (42); control group 2 (41) • Mean age ± SD (years): treatment group (60.92 ± 15.2); control group 1 (57.55 ± 17.9); control group 2 (54.41 ± 15.5) • Sex (male): treatment group (22, 56.4%); control group 1 (20, 47.6%); control group 2 (26, 63.4%) • DM: treatment group (15, 38.5%); control group 1 (14, 33.3%); control group 2 (14, 34.2%)

Timely PD 2010 *(Continued)*

	• Exclusion criteria: history of psychological illness or condition which interferes with their ability to understand or comply with the requirements of the study or if they had an acute infectious episode in the last month before enrolment
Interventions	Treatment group • Time to start of PD: at week 1 Control group 1 • Time to start of PD: at week 2 Control group 2 • Time to start of PD: at week 4
Outcomes	• Incidence of peritoneal fluid leaks (adjusted for DM) • PD-related infection, tunnel infection, and/or peritonitis • Occurrence of mechanical complications (hematoma, outflow failure, total blockage) • PD catheter revision • Conversion to HD • Technique failure at 180 days after catheter insertion
Notes	• The study was stopped early when the interim analysis found a significantly higher percentage of complications in treatment group. There was protocol violation in both groups • This study is partly funded by unrestricted research grants from the Baxter Renal Division Clinical Evidence Council

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Block randomised (permuted block)
Allocation concealment (selection bias)	Low risk	Used sealed envelopes
Blinding (performance bias and detection bias) All outcomes	Low risk	Not blinded, unlikely to influence the outcomes
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Not blinded, unlikely to influence the outcomes
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Not blinded, unlikely to influence the outcomes
Incomplete outcome data (attrition bias) All outcomes	Low risk	All patients were followed till at the end of study period
Selective reporting (reporting bias)	Low risk	Published protocol before the study

Timely PD 2010 *(Continued)*

Other bias	Unclear risk	Insufficient information to permit judgement

Vlasak 2017

Study characteristics

Methods	• Country: Czech Republic • Study design: retrospective observational study, single centre • Time frame: commenced 2011 • Duration of follow-up: 4 weeks
Participants	• Inclusion criteria: not reported • Number: treatment group (15), control group (74) • Mean age ± SD (years): not reported • Sex (male): not reported • Exclusion criteria: not reported
Interventions	Treatment group • PD was initiated < 2 weeks after catheter insertion Control group • PD was initiated ≥ 2 weeks after catheter insertion
Outcomes	• Dialysate leak • Early catheter migration • Infection-related complications
Notes	• Funding source: not reported

Risk of bias

Bias	Authors' judgement	Support for judgement
Selection: representativeness of exposed cohort	Low risk	Represent kidney failure patients who chose PD from the single centre
Selection: non exposed cohort	Low risk	Same cohort
Selection: ascertainment of exposure	Unclear risk	Insufficient information to permit judgement
Selection: demonstration that outcome of interest was not present at the start of the study	Low risk	Outcomes of interest were unlikely to be present before the study
Comparability of cohorts on basis of design or analysis	Unclear risk	Insufficient information to permit judgement
Outcome: assessment	Unclear risk	Insufficient information to permit judgement

Vlasak 2017 *(Continued)*

Outcome: follow-up length	High risk	Follow-up 4 weeks only
Outcome: adequacy of follow-up	Unclear risk	Insufficient information to permit judgement

Wojtaszek 2018

Study characteristics	
Methods	• Country: Poland • Type of study: observational • Design: retrospective cohort single centre study • Time frame: January 2005 to December 2015 • Duration of follow-up: mean follow-up of 17.6 ± 11.09 months (median: 19.0) was in the USPD group and 28.6 ± 26.6 months (median: 19.5) in the CSPD group
Participants	• Inclusion criteria: not reported • Treatment group • Number: treatment group (35); control group (94) • Mean age ± SD (years): not reported • Sex (male): not reported • DM: not reported • Exclusion criteria: not reported
Interventions	Treatment group • USPD within 2 weeks of catheter insertion (mean break-in period 3.5 ± 2.3 days) Control group • CSPD > 2 weeks after catheter insertion (mean break-in period 16.2 ± 1.7 days)
Outcomes	• Mechanical complications • Technique survival • Patient survival (adjusted for Charlson comorbidity index)
Notes	• The durations of follow-up were different between the two groups

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Selection: representativeness of exposed cohort	Low risk	The study included all incident PD patients from the same hospital during the study period
Selection: non exposed cohort	Low risk	Non-exposed cohorts were from the same hospital as exposed cohorts
Selection: ascertainment of exposure	Unclear risk	Insufficient information to permit judgement
Selection: demonstration that outcome of interest	Low risk	Outcomes unlikely to be present before the study

Wojtaszek 2018 *(Continued)*

was not present at the start of the study		
Comparability of cohorts on basis of design or analysis	Unclear risk	Insufficient information to permit judgement
Outcome: assessment	Unclear risk	Insufficient information to permit judgement
Outcome: follow-up length	Low risk	Long enough for short-term outcomes
Outcome: adequacy of follow-up	Unclear risk	Insufficient information to permit judgement

Yang 2011

Study characteristics	
Methods	• Country: Taiwan • Type of study: observational • Design: cohort study (retrospective), single centre • Time frame: January 2003 to October 2007 • Duration of follow-up: 823 ± 591 days in USPD and 522 ± 319 days in CSPD group
Participants	• Number: treatment group (226); control group (84) • Mean age ± SD (years): treatment group (57.1 ± 14.9); control group (54.8 ± 13.1) • Sex (male): treatment group (82, 36.3%); control group (44, 52.4%) • DM (%): not reported
Interventions	Treatment group • USPD Control group • CSPD
Outcomes	• Peritonitis incidence • Exit-site infection • Mechanical complications (leak/catheter blockage, malposition) • Technique survival • Death (any cause)
Notes	• The patients with complications tended to be heavier and taller: body weight was 63.2 ± 15.2 kg in patients with complications and 58.2 ± 10.2 kg in patients without complications (P = 0.04); body height was 160.4 ± 9.2 cm in patients with complications and 157.2 ± 8.4 cm in patients without complications (P = 0.03) • The duration of follow up were largely different (823 ± 591 days in USPD and 522 ± 319 days in CSPD groups) • The study was partly supported by grants from the China Medical University Hospital
Risk of bias	

Yang 2011 *(Continued)*

Bias	Authors' judgement	Support for judgement
Selection: representativeness of exposed cohort	Low risk	Representative of new CKD stage 5 patients in the community
Selection: non exposed cohort	Low risk	Same community
Selection: ascertainment of exposure	Low risk	Secure record
Selection: demonstration that outcome of interest was not present at the start of the study	Low risk	Outcome of interest was unlikely to be present before the study
Comparability of cohorts on basis of design or analysis	High risk	No adjustment was done for potential confounders. There were significant different in baseline data, serum albumin, gender, HD before PD etc. Different follow up period between the two groups
Outcome: assessment	Low risk	Medical record review
Outcome: follow-up length	Low risk	6 months, enough to examine the outcome of interest
Outcome: adequacy of follow-up	Low risk	5% lost to follow-up

Zhang 2017

Study characteristics	
Methods	• Country: China • Type of study: observational • Design: cohort study (retrospective), single centre • Time frame: January 2014 to December 2016 • Duration of follow-up: not reported
Participants	• Number: treatment group (95); control group (70) • Age range (years): treatment group (18 to 72); control group (22 to 73) • Sex (male): treatment group (45, 47%); control group (38, 54%) • DM: not reported
Interventions	Treatment group • USPD (1 to 3 days break in period) Control group • CSPD (> 14 days break-in period)
Outcomes	• Mechanical complications (leak/catheter blockage, malposition)
Notes	

Zhang 2017 *(Continued)*

Risk of bias

Bias	Authors' judgement	Support for judgement
Selection: representativeness of exposed cohort	Low risk	Kidney failure patients treated with emergency dialysis
Selection: non exposed cohort	Low risk	Selected from the same hospital
Selection: demonstration that outcome of interest was not present at the start of the study	Low risk	Outcomes unlikely to be present at the start of the study
Comparability of cohorts on basis of design or analysis	High risk	Results were not adjusted for potential confounders
Outcome: assessment	Unclear risk	Insufficient information to permit judgement
Outcome: follow-up length	High risk	Followed up to 90 days only
Outcome: adequacy of follow-up	Unclear risk	Insufficient information to permit judgement

BMI - body mass index; BUN - blood urea nitrogen; CKD - chronic kidney disease; Cr - creatinine; CSPD - conventional-start PD; DM - diabetes mellitus; KRT - kidney replacement therapy; PD - peritoneal dialysis; PVD - peripheral vascular disease; SD - standard deviation; USPD - urgent-start PD

Characteristics of excluded studies *[ordered by study ID]*

Study	Reason for exclusion
Abdel 2018	Wrong comparison: compared different methods of catheter insertion
Abid 2014	Control group was not CSPD
Alkatheeri 2016	Control group was not CSPD
Banli 2005	No control group for the study
Bhalla 2017	Wrong comparison: control group was HD patients
Bitencourt Dias 2017	No control group for the study
Brabo 2018	Wrong comparison: control group was HD patients
Casaretto 2012	No control group for the study
Davis 2018	No control group for the study
Dias 2016	No control group for the study

Study	Reason for exclusion
Ghaffari 2015	Wrong comparison: control group was HD patients
Jin 2016	Wrong comparison: control group was HD patients
Jin 2018	Wrong comparison: control group was HD patients
Jin 2019	Wrong comparison: control group was HD patients
Jo 2007	No control group for the study
Kim 2016	No control group for the study
Koch 2012	Wrong comparison: control group was HD patients
Li 2017a	Wrong comparison: treatment group was emergent start group which required emergency HD using central venous catheter, followed by insertion of PD catheter but authors did not indicate the urgent PD initiation in this group
Liu 2014a	Wrong comparison: control group was HD patients
Liu 2018a	Wrong comparison: compared different modality of PD
Lobbedez 2008	Wrong comparison: control group is urgent-start HD
Machowska 2017	Wrong intervention: study the impact of educational programme on the choice of KRT modality in unplanned kidney failure patients
Masseur 2014	Control group was not CSPD
Naljayan 2018	No control group for the study
NCT02946528	Wrong comparison: compared USPD and HD
NCT03474367	Wrong comparison: compared USPD and HD
Povlsen 2006	Wrong comparison: conventional-start group initiated PD > 12 days
Povlsen 2009	Review article
Serrano 2014	Wrong definition of USPD: average break-in period was 15 days for USPD
Song 2000	Wrong intervention: compared the effect of different fill volume on outcomes in USPD patients
Soto-Vargas 2017	No control group for the study
Tannus 2017	Control arm was HD patients
TCTR20140814001	Comparison of early versus late initiation of dialysis, which are not the subject of the review
Vlasak 2017b	No control arm which is CSPD group
Wang 2017	Wrong comparison: control group was HD patients
Wong 2016	No control group for the study

Study	Reason for exclusion
Xu 2017	No control group for the study

CSPD - conventional-start peritoneal dialysis; HD - haemodialysis; KRT - kidney replacement therapy; PD - peritoneal dialysis; USPD - urgent-start peritoneal dialysis

Characteristics of studies awaiting classification *[ordered by study ID]*

Abdel 2018a

Methods	• Country: USA • Type of study: observational • Design: cohort study (prospective), single centre • Time frame: January 2005 and December 2015 • Duration of follow-up: 365 days
Participants	• Number: treatment group (29); control group (211) • Mean age, range (years): not reported • Sex (males): not reported • DM: not reported
Interventions	Treatment group • USPD (duration of break-in period was not reported)
Outcomes	• Mechanical complications (leak/catheter blockage, malposition) • complication-free and overall catheter survival at day-90 and day-365
Notes	• Definition of urgent-start PD was not reported in the abstract

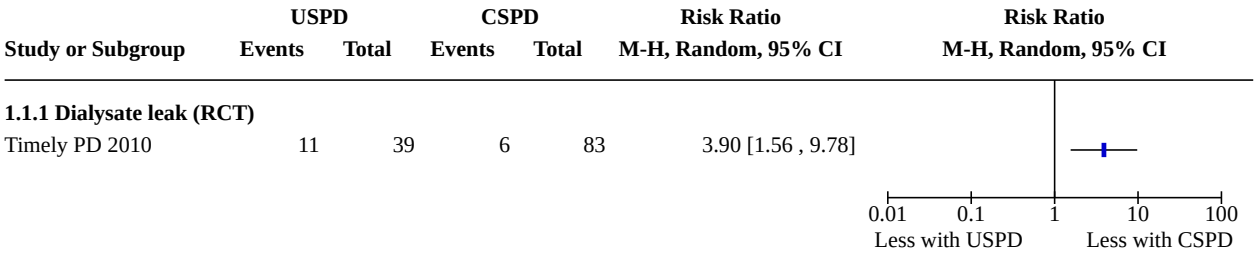
DATA AND ANALYSES

Comparison 1. Mechanical complications

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1.1 Dialysate leak (RCT)	1		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
1.1.1 Dialysate leak (RCT)	1		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
1.2 Dialysate leak (non-RCT)	9		Risk Ratio (M-H, Random, 95% CI)	Subtotals only
1.2.1 Dialysate leak (cohort studies)	7	1322	Risk Ratio (M-H, Random, 95% CI)	2.06 [0.80, 5.28]
1.2.2 Dialysate leak (case-control studies)	2	160	Risk Ratio (M-H, Random, 95% CI)	7.41 [1.27, 43.36]

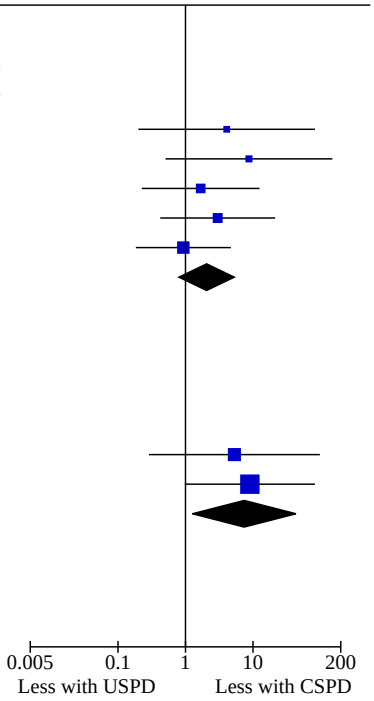
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1.3 Catheter blockage (non-RCT)	6		Risk Ratio (M-H, Random, 95% CI)	Subtotals only
1.3.1 Catheter blockage (cohort studies)	4	1214	Risk Ratio (M-H, Random, 95% CI)	1.33 [0.40, 4.43]
1.3.2 Catheter blockage (case-control studies)	2	160	Risk Ratio (M-H, Random, 95% CI)	1.89 [0.58, 6.13]
1.4 Catheter malposition (non-RCT)	7		Risk Ratio (M-H, Random, 95% CI)	Subtotals only
1.4.1 Catheter malposition (cohort studies)	6	1353	Risk Ratio (M-H, Random, 95% CI)	1.63 [0.80, 3.32]
1.4.2 Catheter malposition (case-control studies)	1	104	Risk Ratio (M-H, Random, 95% CI)	3.00 [0.64, 13.96]
1.5 PD dialysate flow problem (non-RCT)	3	937	Risk Ratio (M-H, Random, 95% CI)	1.44 [0.34, 6.14]

Analysis 1.1. Comparison 1: Mechanical complications, Outcome 1: Dialysate leak (RCT)



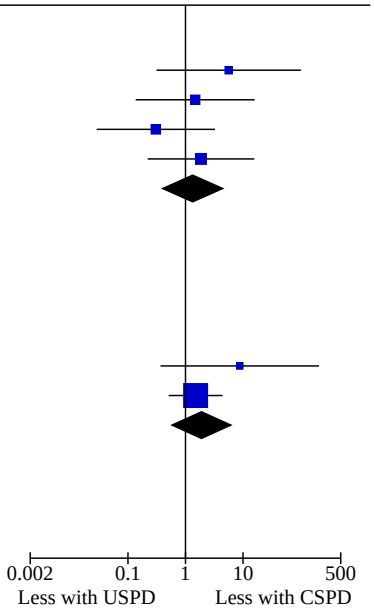
Analysis 1.2. Comparison 1: Mechanical complications, Outcome 2: Dialysate leak (non-RCT)

Study or Subgroup	USPD Events	USPD Total	CSPD Events	CSPD Total	Weight	Risk Ratio M-H, Random, 95% CI
1.2.1 Dialysate leak (cohort studies)						
Jaivid 2017	0	17	0	33		Not estimable
Vlasak 2017	0	15	0	74		Not estimable
Serrano 2019	2	59	0	48	9.8%	4.08 [0.20 , 83.07]
Liu 2014	8	344	0	176	11.0%	8.72 [0.51 , 150.24]
Kim 2018	11	190	1	29	22.1%	1.68 [0.23 , 12.52]
Ghaffari 2012	6	18	1	9	23.2%	3.00 [0.42 , 21.30]
Yang 2011	5	226	2	84	33.9%	0.93 [0.18 , 4.70]
Subtotal (95% CI)		**869**		**453**	**100.0%**	**2.06 [0.80 , 5.28]**
Total events:	32		4			
Heterogeneity: Tau² = 0.00; Chi² = 2.43, df = 4 (P = 0.66); I² = 0%						
Test for overall effect: Z = 1.50 (P = 0.13)						
1.2.2 Dialysate leak (case-control studies)						
Nayak 2018	3	32	0	24	36.7%	5.30 [0.29 , 98.06]
See 2017	3	26	1	78	63.3%	9.00 [0.98 , 82.80]
Subtotal (95% CI)		**58**		**102**	**100.0%**	**7.41 [1.27 , 43.36]**
Total events:	6		1			
Heterogeneity: Tau² = 0.00; Chi² = 0.08, df = 1 (P = 0.77); I² = 0%						
Test for overall effect: Z = 2.22 (P = 0.03)						
Test for subgroup differences: Chi² = 1.58, df = 1 (P = 0.21), I² = 36.6%						



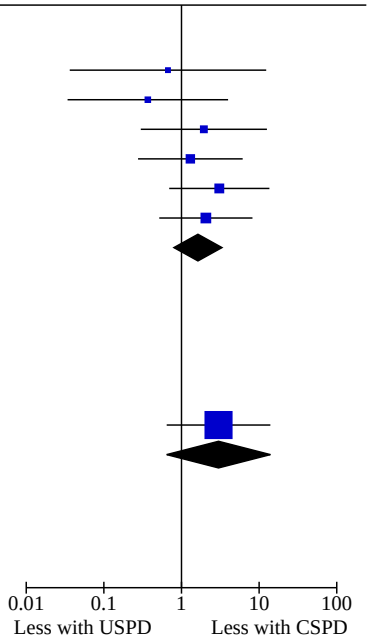
Analysis 1.3. Comparison 1: Mechanical complications, Outcome 3: Catheter blockage (non-RCT)

Study or Subgroup	USPD Events	USPD Total	CSPD Events	CSPD Total	Weight	Risk Ratio M-H, Random, 95% CI
1.3.1 Catheter blockage (cohort studies)						
Liu 2014	5	344	0	176	17.2%	5.64 [0.31 , 101.48]
Zhang 2017	2	95	1	70	25.4%	1.47 [0.14 , 15.93]
Kim 2018	2	190	1	29	25.7%	0.31 [0.03 , 3.26]
Yang 2011	5	226	1	84	31.7%	1.86 [0.22 , 15.68]
Subtotal (95% CI)		**855**		**359**	**100.0%**	**1.33 [0.40 , 4.43]**
Total events:	14		3			
Heterogeneity: Tau² = 0.00; Chi² = 2.73, df = 3 (P = 0.44); I² = 0%						
Test for overall effect: Z = 0.47 (P = 0.64)						
1.3.2 Catheter blockage (case-control studies)						
See 2017	1	26	0	78	13.2%	8.78 [0.37 , 209.11]
Nayak 2018	8	32	4	24	86.8%	1.50 [0.51 , 4.40]
Subtotal (95% CI)		**58**		**102**	**100.0%**	**1.89 [0.58 , 6.13]**
Total events:	9		4			
Heterogeneity: Tau² = 0.11; Chi² = 1.08, df = 1 (P = 0.30); I² = 7%						
Test for overall effect: Z = 1.06 (P = 0.29)						
Test for subgroup differences: Chi² = 0.17, df = 1 (P = 0.68), I² = 0%						



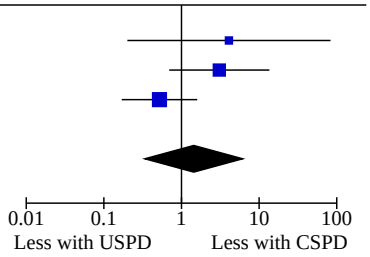
Analysis 1.4. Comparison 1: Mechanical complications, Outcome 4: Catheter malposition (non-RCT)

Study or Subgroup	USPD Events	USPD Total	CSPD Events	CSPD Total	Weight	Risk Ratio M-H, Random, 95% CI
1.4.1 Catheter malposition (cohort studies)						
Vlasak 2017	0	15	3	74	6.0%	0.67 [0.04 , 12.34]
Zhang 2017	1	95	2	70	8.9%	0.37 [0.03 , 3.98]
Jaivid 2017	2	17	2	33	14.5%	1.94 [0.30 , 12.60]
Yang 2011	7	226	2	84	21.1%	1.30 [0.28 , 6.14]
Liu 2014	12	344	2	176	23.0%	3.07 [0.69 , 13.56]
Kim 2018	27	190	2	29	26.5%	2.06 [0.52 , 8.21]
Subtotal (95% CI)		**887**		**466**	**100.0%**	**1.63 [0.80 , 3.32]**
Total events:	49		13			
Heterogeneity: Tau² = 0.00; Chi² = 2.79, df = 5 (P = 0.73); I² = 0%						
Test for overall effect: Z = 1.34 (P = 0.18)						
1.4.2 Catheter malposition (case-control studies)						
See 2017	3	26	3	78	100.0%	3.00 [0.64 , 13.96]
Subtotal (95% CI)		**26**		**78**	**100.0%**	**3.00 [0.64 , 13.96]**
Total events:	3		3			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.40 (P = 0.16)						
Test for subgroup differences: Chi² = 0.50, df = 1 (P = 0.48), I² = 0%						



Analysis 1.5. Comparison 1: Mechanical complications, Outcome 5: PD dialysate flow problem (non-RCT)

Study or Subgroup	USPD Events	USPD Total	CSPD Events	CSPD Total	Weight	Risk Ratio M-H, Random, 95% CI
Serrano 2019	2	59	0	48	16.9%	4.08 [0.20 , 83.07]
Liu 2014	12	344	2	176	37.7%	3.07 [0.69 , 13.56]
Yang 2011	7	226	5	84	45.4%	0.52 [0.17 , 1.59]
Total (95% CI)		**629**		**308**	**100.0%**	**1.44 [0.34 , 6.14]**
Total events:	21		7			
Heterogeneity: Tau² = 0.88; Chi² = 4.48, df = 2 (P = 0.11); I² = 55%						
Test for overall effect: Z = 0.49 (P = 0.62)						
Test for subgroup differences: Not applicable						



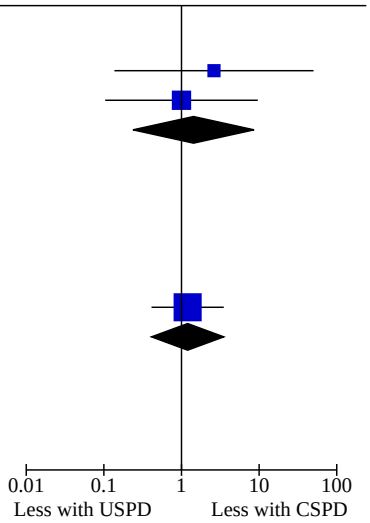
Comparison 2. Exit-site complications

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
2.1 Exit-site infection (non-RCT)	3		Risk Ratio (M-H, Random, 95% CI)	Subtotals only
2.1.1 Exit-site or tunnel infection (cohort studies)	2	337	Risk Ratio (M-H, Random, 95% CI)	1.43 [0.24, 8.61]
2.1.2 Exit-site or tunnel infection (case-control studies)	1	104	Risk Ratio (M-H, Random, 95% CI)	1.20 [0.41, 3.50]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
2.2 Exit-site infection rate (non-RCT)	2	8048	Risk Ratio (M-H, Random, 95% CI)	1.06 [0.17, 6.75]
2.3 Exit-site bleeding (RCT)	1		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
2.3.1 Exit-site bleeding (RCT)	1		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
2.4 Exit-site bleeding (non-RCT)	1		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
2.4.1 Exit-site bleeding (cohort studies)	1		Risk Ratio (M-H, Random, 95% CI)	Totals not selected

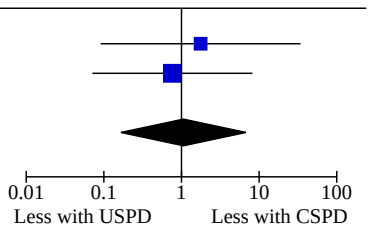
Analysis 2.1. Comparison 2: Exit-site complications, Outcome 1: Exit-site infection (non-RCT)

Study or Subgroup	USPD Events	USPD Total	CSPD Events	CSPD Total	Weight	Risk Ratio M-H, Random, 95% CI
2.1.1 Exit-site or tunnel infection (cohort studies)						
Yang 2011	3	226	0	84	37.0%	2.62 [0.14 , 50.21]
Ghaffari 2012	2	18	1	9	63.0%	1.00 [0.10 , 9.61]
Subtotal (95% CI)		**244**		**93**	**100.0%**	**1.43 [0.24 , 8.61]**
Total events:	5		1			
Heterogeneity: Tau² = 0.00; Chi² = 0.27, df = 1 (P = 0.60); I² = 0%						
Test for overall effect: Z = 0.39 (P = 0.70)						
2.1.2 Exit-site or tunnel infection (case-control studies)						
See 2017	4	26	10	78	100.0%	1.20 [0.41 , 3.50]
Subtotal (95% CI)		**26**		**78**	**100.0%**	**1.20 [0.41 , 3.50]**
Total events:	4		10			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.33 (P = 0.74)						
Test for subgroup differences: Chi² = 0.03, df = 1 (P = 0.87), I² = 0%						



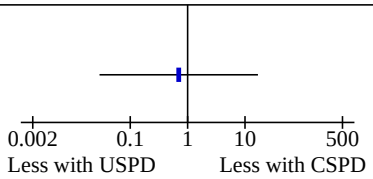
Analysis 2.2. Comparison 2: Exit-site complications, Outcome 2: Exit-site infection rate (non-RCT)

Study or Subgroup	USPD Events	USPD Total	CSPD Events	CSPD Total	Weight	Risk Ratio M-H, Random, 95% CI
Yang 2011	3	6308	0	1588	39.1%	1.76 [0.09 , 34.11]
Ghaffari 2012	2	110	1	42	60.9%	0.76 [0.07 , 8.20]
Total (95% CI)		**6418**		**1630**	**100.0%**	**1.06 [0.17 , 6.75]**
Total events:	5		1			
Heterogeneity: Tau² = 0.00; Chi² = 0.19, df = 1 (P = 0.66); I² = 0%						
Test for overall effect: Z = 0.06 (P = 0.95)						
Test for subgroup differences: Not applicable						



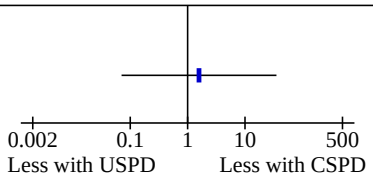
Analysis 2.3. Comparison 2: Exit-site complications, Outcome 3: Exit-site bleeding (RCT)

Study or Subgroup	USPD Events	USPD Total	CSPD Events	CSPD Total	Risk Ratio M-H, Random, 95% CI
2.3.1 Exit-site bleeding (RCT)					
Timely PD 2010	0	39	1	83	0.70 [0.03 , 16.81]



Analysis 2.4. Comparison 2: Exit-site complications, Outcome 4: Exit-site bleeding (non-RCT)

Study or Subgroup	USPD Events	USPD Total	CSPD Events	CSPD Total	Risk Ratio M-H, Random, 95% CI
2.4.1 Exit-site bleeding (cohort studies)					
Ghaffari 2012	1	18	0	9	1.58 [0.07 , 35.32]



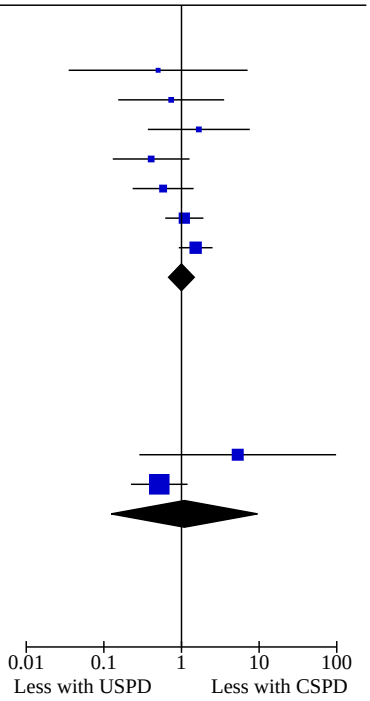
Comparison 3. Peritonitis

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
3.1 Peritonitis (non-RCT)	9		Risk Ratio (M-H, Random, 95% CI)	Subtotals only
3.1.1 Peritonitis (cohort studies)	7	1497	Risk Ratio (M-H, Random, 95% CI)	1.00 [0.68, 1.46]
3.1.2 Peritonitis (case-control studies)	2	160	Risk Ratio (M-H, Random, 95% CI)	1.09 [0.12, 9.51]
3.2 Peritonitis rate (non-RCT)	2	8048	Risk Ratio (M-H, Random, 95% CI)	0.88 [0.23, 3.34]
3.3 Peritonitis (secondary analysis: day 30)	3		Risk Ratio (M-H, Random, 95% CI)	Subtotals only
3.3.1 Peritonitis (cohort studies)	2	627	Risk Ratio (M-H, Random, 95% CI)	1.02 [0.59, 1.74]
3.3.2 Peritonitis (case-control studies)	1	104	Risk Ratio (M-H, Random, 95% CI)	0.52 [0.22, 1.20]
3.4 Peritonitis (secondary analysis: day 90)	3		Risk Ratio (M-H, Random, 95% CI)	Subtotals only

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
3.4.1 Peritonitis (cohort studies)	2	192	Risk Ratio (M-H, Random, 95% CI)	0.67 [0.17, 2.57]
3.4.2 Peritonitis (case-control studies)	1	56	Risk Ratio (M-H, Random, 95% CI)	5.30 [0.29, 98.06]

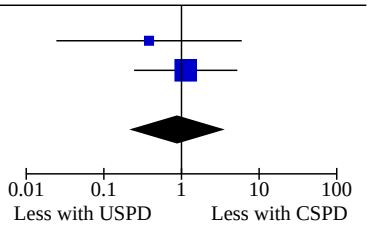
Analysis 3.1. Comparison 3: Peritonitis, Outcome 1: Peritonitis (non-RCT)

Study or Subgroup	USPD Events	USPD Total	CSPD Events	CSPD Total	Weight	Risk Ratio M-H, Random, 95% CI
3.1.1 Peritonitis (cohort studies)						
Ghaffari 2012	1	18	1	9	2.0%	0.50 [0.04 , 7.10]
Zhang 2017	3	95	3	70	5.5%	0.74 [0.15 , 3.54]
Yang 2011	9	226	2	84	5.9%	1.67 [0.37 , 7.58]
Serrano 2019	4	59	8	48	9.8%	0.41 [0.13 , 1.27]
Kim 2018	19	190	5	29	14.5%	0.58 [0.23 , 1.43]
Liu 2014	34	344	16	176	28.9%	1.09 [0.62 , 1.91]
Pai 2016	30	80	17	69	33.6%	1.52 [0.92 , 2.51]
Subtotal (95% CI)		**1012**		**485**	**100.0%**	**1.00 [0.68 , 1.46]**
Total events:	100		52			
Heterogeneity: Tau² = 0.05; Chi² = 7.32, df = 6 (P = 0.29); I² = 18%						
Test for overall effect: Z = 0.01 (P = 0.99)						
3.1.2 Peritonitis (case-control studies)						
Nayak 2018	3	32	0	24	31.9%	5.30 [0.29 , 98.06]
See 2017	5	26	29	78	68.1%	0.52 [0.22 , 1.20]
Subtotal (95% CI)		**58**		**102**	**100.0%**	**1.09 [0.12 , 9.51]**
Total events:	8		29			
Heterogeneity: Tau² = 1.61; Chi² = 2.35, df = 1 (P = 0.13); I² = 57%						
Test for overall effect: Z = 0.08 (P = 0.94)						
Test for subgroup differences: Chi² = 0.01, df = 1 (P = 0.94), I² = 0%						

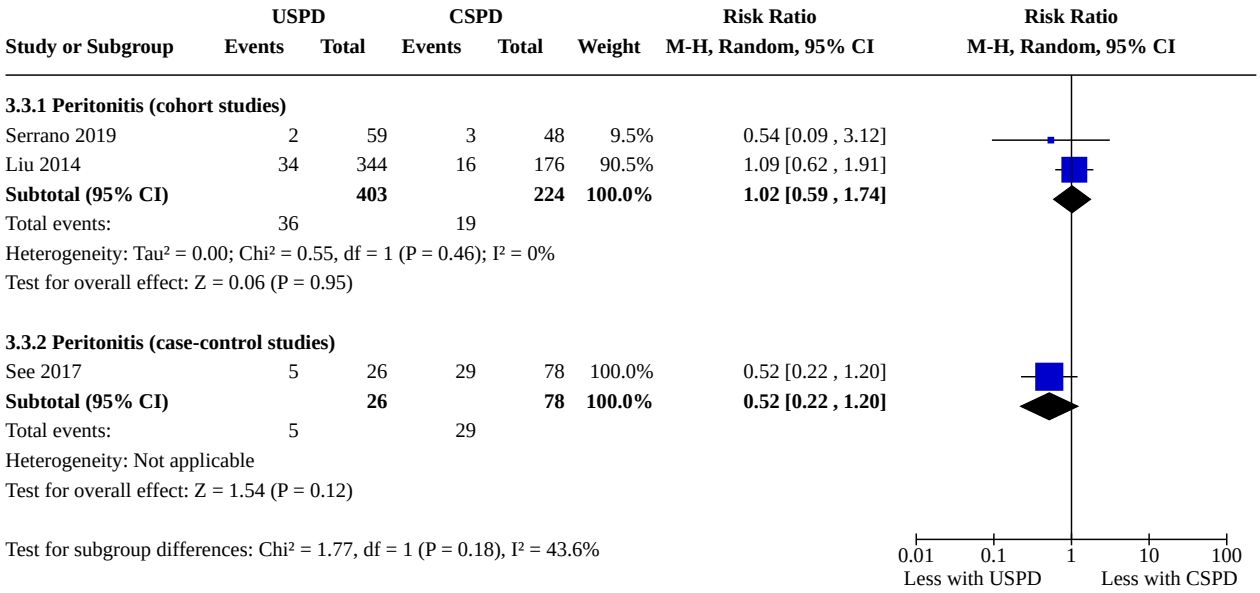


Analysis 3.2. Comparison 3: Peritonitis, Outcome 2: Peritonitis rate (non-RCT)

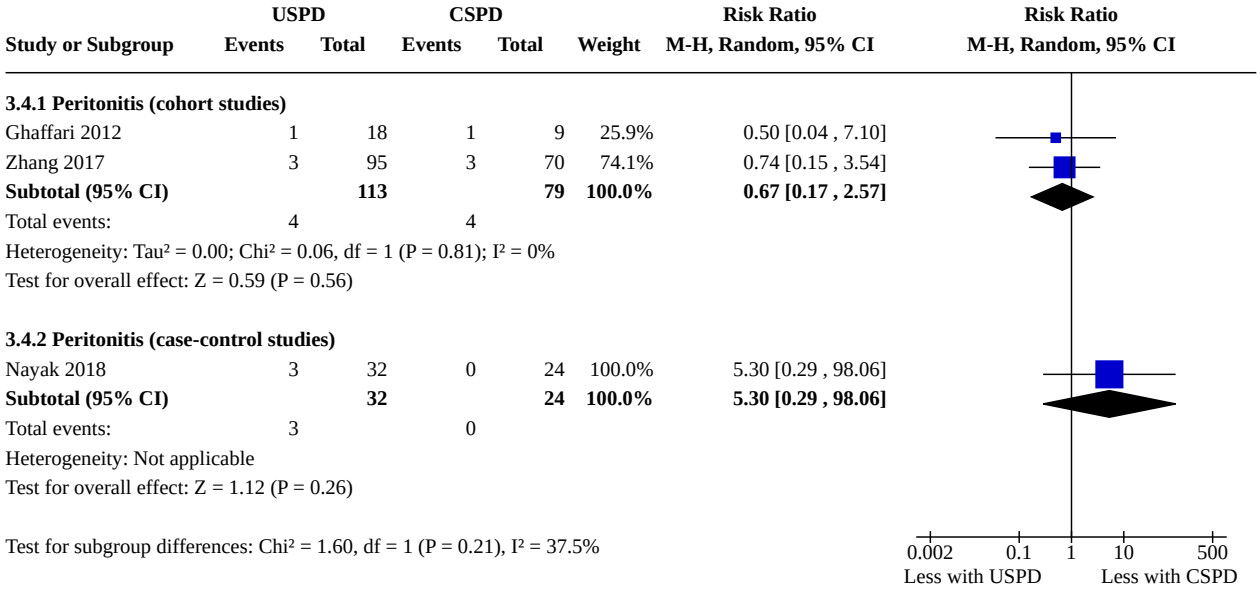
Study or Subgroup	USPD Events	USPD Total	CSPD Events	CSPD Total	Weight	Risk Ratio M-H, Random, 95% CI
Ghaffari 2012	1	110	1	42	23.7%	0.38 [0.02 , 5.97]
Yang 2011	9	6308	2	1588	76.3%	1.13 [0.25 , 5.24]
Total (95% CI)		**6418**		**1630**	**100.0%**	**0.88 [0.23 , 3.34]**
Total events:	10		3			
Heterogeneity: Tau² = 0.00; Chi² = 0.46, df = 1 (P = 0.50); I² = 0%						
Test for overall effect: Z = 0.19 (P = 0.85)						
Test for subgroup differences: Not applicable						



Analysis 3.3. Comparison 3: Peritonitis, Outcome 3: Peritonitis (secondary analysis: day 30)



Analysis 3.4. Comparison 3: Peritonitis, Outcome 4: Peritonitis (secondary analysis: day 90)



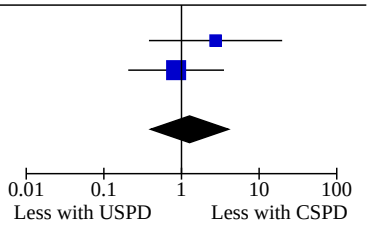
Comparison 4. Catheter re-adjustment (non-RCT)

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
4.1 Catheter readjustment	2	739	Risk Ratio (M-H, Random, 95% CI)	1.27 [0.40, 4.02]

Analysis 4.1. Comparison 4: Catheter re-adjustment (non-RCT), Outcome 1: Catheter readjustment

Study or Subgroup	USPD Events	USPD Total	CSPD Events	CSPD Total	Weight	Risk Ratio M-H, Random, 95% CI
Kim 2018	18	190	1	29	34.1%	2.75 [0.38 , 19.81]
Liu 2014	5	344	3	176	65.9%	0.85 [0.21 , 3.53]
Total (95% CI)		**534**		**205**	**100.0%**	**1.27 [0.40 , 4.02]**
Total events:	23		4			

Heterogeneity: Tau² = 0.00; Chi² = 0.93, df = 1 (P = 0.34); I² = 0%
Test for overall effect: Z = 0.41 (P = 0.68)
Test for subgroup differences: Not applicable

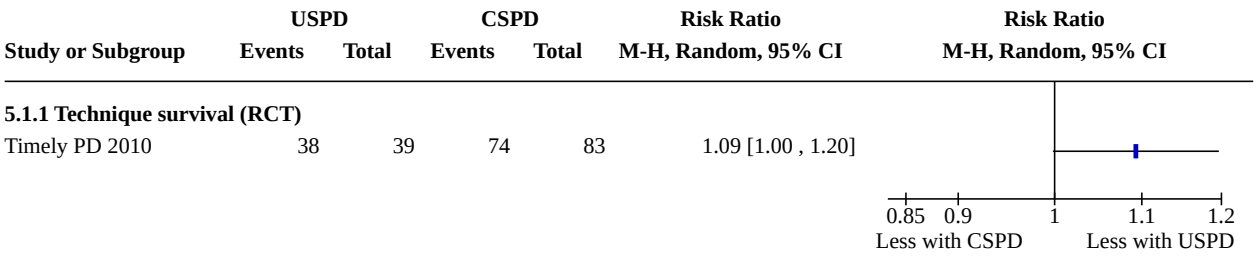


Comparison 5. Technique survival

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
5.1 Technique survival (RCT)	1		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
5.1.1 Technique survival (RCT)	1		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
5.2 Technique survival (non-RCT)	10		Risk Ratio (M-H, Random, 95% CI)	Subtotals only
5.2.1 Technique survival (cohort studies)	8	1668	Risk Ratio (M-H, Random, 95% CI)	0.90 [0.76, 1.07]
5.2.2 Technique survival (case-control studies)	2	160	Risk Ratio (M-H, Random, 95% CI)	0.92 [0.79, 1.06]
5.3 Technique survival: secondary analysis (cohort studies - laparotomy)	4		Risk Ratio (M-H, Random, 95% CI)	Subtotals only
5.3.1 Technique survival (cohort studies)	4	1198	Risk Ratio (M-H, Random, 95% CI)	0.74 [0.58, 0.94]
5.4 Technique survival: sensitivity analysis (cohort studies - up to 6 months follow-up)	4		Risk Ratio (M-H, Random, 95% CI)	Subtotals only
5.4.1 Technique survival (cohort studies)	4	896	Risk Ratio (M-H, Random, 95% CI)	0.94 [0.78, 1.12]
5.5 Technique survival: sensitivity analysis (cohort studies - more than 6 months follow-up)	4		Risk Ratio (M-H, Random, 95% CI)	Subtotals only
5.5.1 Technique survival (cohort studies)	4	772	Risk Ratio (M-H, Random, 95% CI)	0.87 [0.58, 1.30]
5.6 Technique survival: sensitivity analysis (cohort studies - low risk of bias)	4		Risk Ratio (M-H, Random, 95% CI)	Subtotals only

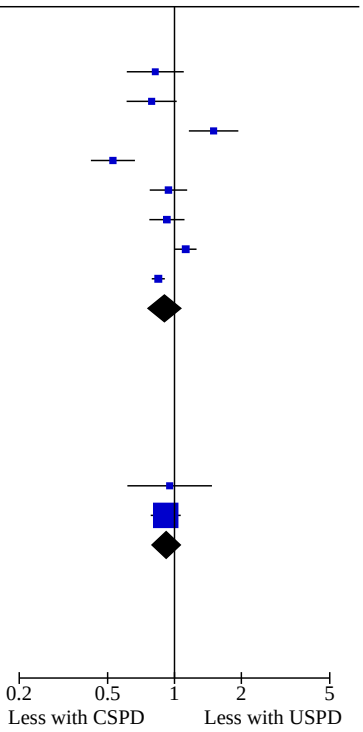
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
5.6.1 Technique survival (cohort studies)	3	418	Risk Ratio (M-H, Random, 95% CI)	0.87 [0.76, 1.00]
5.6.2 Technique survival (case-control studies)	1	104	Risk Ratio (M-H, Random, 95% CI)	0.95 [0.61, 1.47]
5.7 Death-censored technique survival (RCT)	1		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
5.7.1 Death-censored technique survival (RCT)	1		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
5.8 Death-censored technique survival (non-RCT)	8		Risk Ratio (M-H, Random, 95% CI)	Subtotals only
5.8.1 Death-censored technique survival (cohort studies)	7	1509	Risk Ratio (M-H, Random, 95% CI)	0.99 [0.88, 1.10]
5.8.2 Death-censored technique survival (case-control studies)	1	104	Risk Ratio (M-H, Random, 95% CI)	0.94 [0.67, 1.33]
5.9 Death-censored technique survival: secondary analysis (cohort studies - laparotomy)	4		Risk Ratio (M-H, Random, 95% CI)	Subtotals only
5.9.1 Death-censored technique survival (cohort studies)	4	1198	Risk Ratio (M-H, Random, 95% CI)	0.90 [0.81, 1.00]
5.10 Death-censored technique survival: sensitivity analysis (cohort studies - up to 6 months follow-up)	4		Risk Ratio (M-H, Random, 95% CI)	Subtotals only
5.10.1 Death-censored technique survival (cohort studies)	4	896	Risk Ratio (M-H, Random, 95% CI)	0.98 [0.91, 1.07]
5.11 Death-censored technique survival: sensitivity analysis (cohort studies - more than 6 months follow-up)	3		Risk Ratio (M-H, Random, 95% CI)	Subtotals only
5.11.1 Death-censored technique survival (cohort studies)	3	613	Risk Ratio (M-H, Random, 95% CI)	1.00 [0.69, 1.46]

Analysis 5.1. Comparison 5: Technique survival, Outcome 1: Technique survival (RCT)



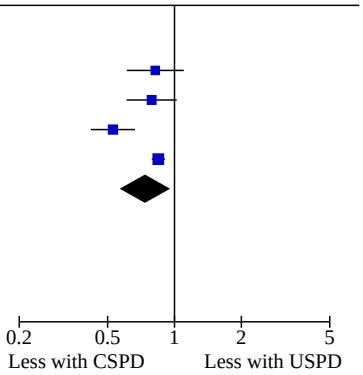
Analysis 5.2. Comparison 5: Technique survival, Outcome 2: Technique survival (non-RCT)

Study or Subgroup	USPD Events	USPD Total	CSPD Events	CSPD Total	Weight	Risk Ratio M-H, Random, 95% CI
5.2.1 Technique survival (cohort studies)						
Kim 2018	102	190	19	29	10.4%	0.82 [0.61 , 1.10]
Pai 2016	43	80	47	69	11.3%	0.79 [0.61 , 1.02]
Silva 2018	30	40	57	114	11.3%	1.50 [1.16 , 1.94]
Yang 2011	81	226	57	84	12.0%	0.53 [0.42 , 0.66]
Jaivid 2017	15	17	31	33	12.7%	0.94 [0.77 , 1.14]
Salari 2018	78	107	41	52	13.0%	0.92 [0.77 , 1.11]
Serrano 2019	58	59	42	48	14.3%	1.12 [1.00 , 1.26]
Liu 2014	271	344	164	176	14.9%	0.85 [0.79 , 0.90]
Subtotal (95% CI)		**1063**		**605**	**100.0%**	**0.90 [0.76 , 1.07]**
Total events:	678		458			
Heterogeneity: Tau² = 0.05; Chi² = 59.41, df = 7 (P < 0.00001); I² = 88%						
Test for overall effect: Z = 1.21 (P = 0.23)						
5.2.2 Technique survival (case-control studies)						
See 2017	13	26	41	78	11.1%	0.95 [0.61 , 1.47]
Nayak 2018	28	32	23	24	88.9%	0.91 [0.78 , 1.07]
Subtotal (95% CI)		**58**		**102**	**100.0%**	**0.92 [0.79 , 1.06]**
Total events:	41		64			
Heterogeneity: Tau² = 0.00; Chi² = 0.06, df = 1 (P = 0.80); I² = 0%						
Test for overall effect: Z = 1.16 (P = 0.25)						
Test for subgroup differences: Chi² = 0.03, df = 1 (P = 0.87), I² = 0%						



Analysis 5.3. Comparison 5: Technique survival, Outcome 3: Technique survival: secondary analysis (cohort studies - laparotomy)

Study or Subgroup	USPD Events	USPD Total	CSPD Events	CSPD Total	Weight	Risk Ratio M-H, Random, 95% CI
5.3.1 Technique survival (cohort studies)						
Kim 2018	102	190	19	29	21.5%	0.82 [0.61 , 1.10]
Pai 2016	43	80	47	69	23.2%	0.79 [0.61 , 1.02]
Yang 2011	81	226	57	84	24.6%	0.53 [0.42 , 0.66]
Liu 2014	271	344	164	176	30.6%	0.85 [0.79 , 0.90]
Subtotal (95% CI)		**840**		**358**	**100.0%**	**0.74 [0.58 , 0.94]**
Total events:	497		287			
Heterogeneity: Tau² = 0.05; Chi² = 18.40, df = 3 (P = 0.0004); I² = 84%						
Test for overall effect: Z = 2.45 (P = 0.01)						
Test for subgroup differences: Not applicable						



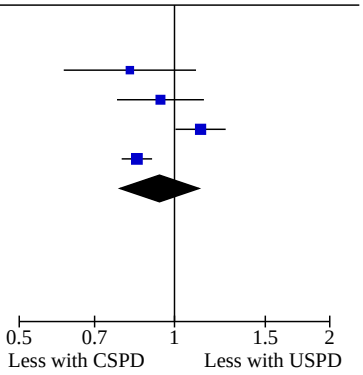
Analysis 5.4. Comparison 5: Technique survival, Outcome 4: Technique survival: sensitivity analysis (cohort studies - up to 6 months follow-up)

Study or Subgroup	USPD Events	USPD Total	CSPD Events	CSPD Total	Weight	Risk Ratio M-H, Random, 95% CI
5.4.1 Technique survival (cohort studies)						
Kim 2018	102	190	19	29	17.0%	0.82 [0.61 , 1.10]
Jaivid 2017	15	17	31	33	23.3%	0.94 [0.77 , 1.14]
Serrano 2019	58	59	42	48	28.7%	1.12 [1.00 , 1.26]
Liu 2014	271	344	164	176	31.0%	0.85 [0.79 , 0.90]
Subtotal (95% CI)		**610**		**286**	**100.0%**	**0.94 [0.78 , 1.12]**
Total events:	446		256			

Heterogeneity: Tau² = 0.02; Chi² = 19.44, df = 3 (P = 0.0002); I² = 85%

Test for overall effect: Z = 0.75 (P = 0.46)

Test for subgroup differences: Not applicable



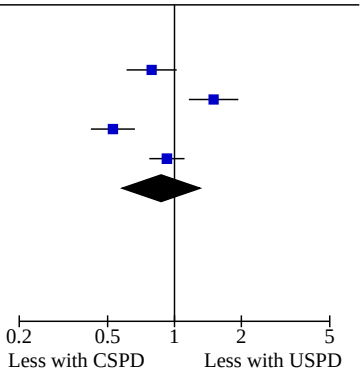
Analysis 5.5. Comparison 5: Technique survival, Outcome 5: Technique survival: sensitivity analysis (cohort studies - more than 6 months follow-up)

Study or Subgroup	USPD Events	USPD Total	CSPD Events	CSPD Total	Weight	Risk Ratio M-H, Random, 95% CI
5.5.1 Technique survival (cohort studies)						
Pai 2016	43	80	47	69	24.5%	0.79 [0.61 , 1.02]
Silva 2018	30	40	57	114	24.6%	1.50 [1.16 , 1.94]
Yang 2011	81	226	57	84	25.1%	0.53 [0.42 , 0.66]
Salari 2018	78	107	41	52	25.8%	0.92 [0.77 , 1.11]
Subtotal (95% CI)		**453**		**319**	**100.0%**	**0.87 [0.58 , 1.30]**
Total events:	232		202			

Heterogeneity: Tau² = 0.16; Chi² = 37.33, df = 3 (P < 0.00001); I² = 92%

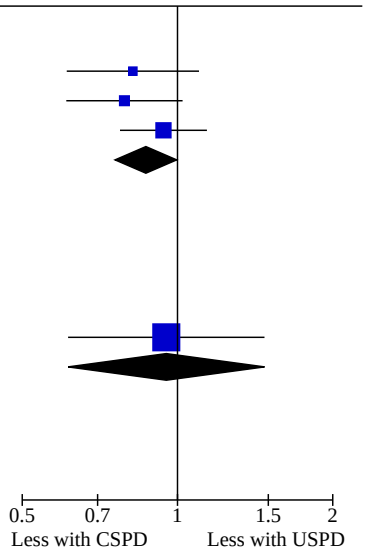
Test for overall effect: Z = 0.67 (P = 0.50)

Test for subgroup differences: Not applicable



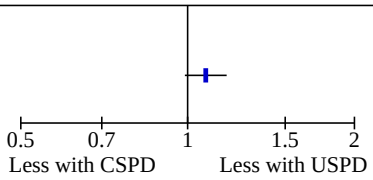
Analysis 5.6. Comparison 5: Technique survival, Outcome 6: Technique survival: sensitivity analysis (cohort studies - low risk of bias)

Study or Subgroup	USPD Events	USPD Total	CSPD Events	CSPD Total	Weight	Risk Ratio M-H, Random, 95% CI
5.6.1 Technique survival (cohort studies)						
Kim 2018	102	190	19	29	21.7%	0.82 [0.61 , 1.10]
Pai 2016	43	80	47	69	28.1%	0.79 [0.61 , 1.02]
Jaivid 2017	15	17	31	33	50.2%	0.94 [0.77 , 1.14]
Subtotal (95% CI)		**287**		**131**	**100.0%**	**0.87 [0.76 , 1.00]**
Total events:	160		97			
Heterogeneity: Tau² = 0.00; Chi² = 1.74, df = 2 (P = 0.42); I² = 0%						
Test for overall effect: Z = 2.01 (P = 0.04)						
5.6.2 Technique survival (case-control studies)						
See 2017	13	26	41	78	100.0%	0.95 [0.61 , 1.47]
Subtotal (95% CI)		**26**		**78**	**100.0%**	**0.95 [0.61 , 1.47]**
Total events:	13		41			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.22 (P = 0.82)						
Test for subgroup differences: Chi² = 0.15, df = 1 (P = 0.70), I² = 0%						



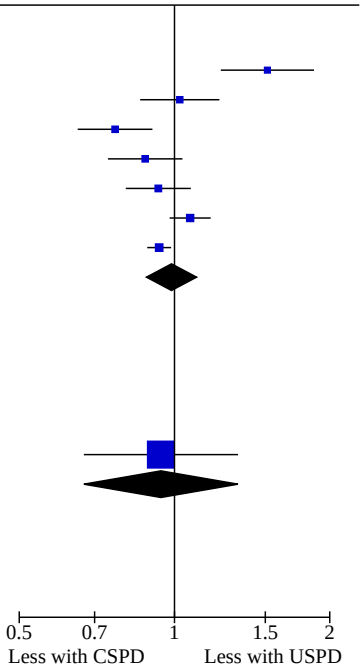
Analysis 5.7. Comparison 5: Technique survival, Outcome 7: Death-censored technique survival (RCT)

Study or Subgroup	USPD Events	USPD Total	CSPD Events	CSPD Total	Risk Ratio M-H, Random, 95% CI
5.7.1 Death-censored technique survival (RCT)					
Timely PD 2010	38	39	75	83	1.08 [0.99 , 1.18]



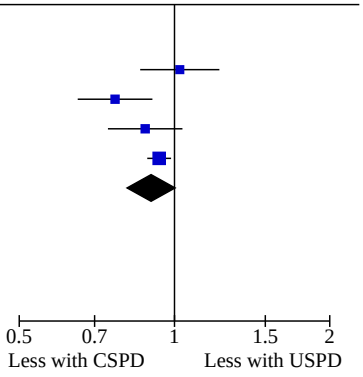
Analysis 5.8. Comparison 5: Technique survival, Outcome 8: Death-censored technique survival (non-RCT)

Study or Subgroup	USPD Events	USPD Total	CSPD Events	CSPD Total	Weight	Risk Ratio M-H, Random, 95% CI
5.8.1 Death-censored technique survival (cohort studies)						
Silva 2018	34	40	64	114	11.4%	1.51 [1.23 , 1.86]
Kim 2018	161	190	24	29	12.8%	1.02 [0.86 , 1.22]
Yang 2011	130	226	63	84	13.3%	0.77 [0.65 , 0.91]
Pai 2016	59	80	58	69	13.3%	0.88 [0.74 , 1.04]
Jaivid 2017	16	17	33	33	14.3%	0.93 [0.80 , 1.08]
Serrano 2019	58	59	44	48	16.7%	1.07 [0.98 , 1.18]
Liu 2014	303	344	166	176	18.1%	0.93 [0.89 , 0.98]
Subtotal (95% CI)		**956**		**553**	**100.0%**	**0.99 [0.88 , 1.10]**
Total events:	761		452			
Heterogeneity: Tau² = 0.02; Chi² = 34.07, df = 6 (P < 0.00001); I² = 82%						
Test for overall effect: Z = 0.23 (P = 0.82)						
5.8.2 Death-censored technique survival (case-control studies)						
See 2017	16	26	51	78	100.0%	0.94 [0.67 , 1.33]
Subtotal (95% CI)		**26**		**78**	**100.0%**	**0.94 [0.67 , 1.33]**
Total events:	16		51			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.35 (P = 0.73)						
Test for subgroup differences: Chi² = 0.07, df = 1 (P = 0.80), I² = 0%						



Analysis 5.9. Comparison 5: Technique survival, Outcome 9: Death-censored technique survival: secondary analysis (cohort studies - laparotomy)

Study or Subgroup	USPD Events	USPD Total	CSPD Events	CSPD Total	Weight	Risk Ratio M-H, Random, 95% CI
5.9.1 Death-censored technique survival (cohort studies)						
Kim 2018	161	190	24	29	19.7%	1.02 [0.86 , 1.22]
Yang 2011	130	226	63	84	20.9%	0.77 [0.65 , 0.91]
Pai 2016	59	80	58	69	21.0%	0.88 [0.74 , 1.04]
Liu 2014	303	344	166	176	38.4%	0.93 [0.89 , 0.98]
Subtotal (95% CI)		**840**		**358**	**100.0%**	**0.90 [0.81 , 1.00]**
Total events:	653		311			
Heterogeneity: Tau² = 0.01; Chi² = 7.76, df = 3 (P = 0.05); I² = 61%						
Test for overall effect: Z = 1.92 (P = 0.06)						
Test for subgroup differences: Not applicable						



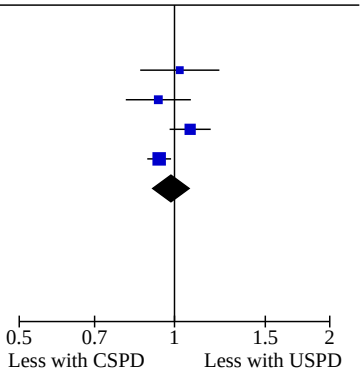
Analysis 5.10. Comparison 5: Technique survival, Outcome 10: Death-censored technique survival: sensitivity analysis (cohort studies - up to 6 months follow-up)

Study or Subgroup	USPD Events	USPD Total	CSPD Events	CSPD Total	Weight	Risk Ratio M-H, Random, 95% CI
5.10.1 Death-censored technique survival (cohort studies)						
Kim 2018	161	190	24	29	14.4%	1.02 [0.86 , 1.22]
Jaivid 2017	16	17	33	33	18.5%	0.93 [0.80 , 1.08]
Serrano 2019	58	59	44	48	28.9%	1.07 [0.98 , 1.18]
Liu 2014	303	344	166	176	38.2%	0.93 [0.89 , 0.98]
Subtotal (95% CI)		**610**		**286**	**100.0%**	**0.98 [0.91 , 1.07]**
Total events:	538		267			

Heterogeneity: Tau² = 0.00; Chi² = 7.23, df = 3 (P = 0.06); I² = 59%

Test for overall effect: Z = 0.39 (P = 0.70)

Test for subgroup differences: Not applicable



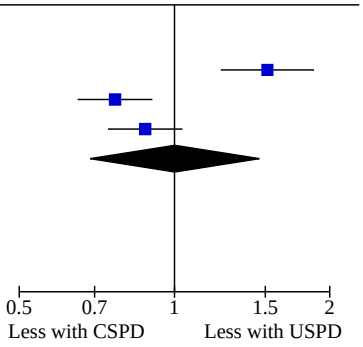
Analysis 5.11. Comparison 5: Technique survival, Outcome 11: Death-censored technique survival: sensitivity analysis (cohort studies - more than 6 months follow-up)

Study or Subgroup	USPD Events	USPD Total	CSPD Events	CSPD Total	Weight	Risk Ratio M-H, Random, 95% CI
5.11.1 Death-censored technique survival (cohort studies)						
Silva 2018	34	40	64	114	32.5%	1.51 [1.23 , 1.86]
Yang 2011	130	226	63	84	33.7%	0.77 [0.65 , 0.91]
Pai 2016	59	80	58	69	33.7%	0.88 [0.74 , 1.04]
Subtotal (95% CI)		**346**		**267**	**100.0%**	**1.00 [0.69 , 1.46]**
Total events:	223		185			

Heterogeneity: Tau² = 0.10; Chi² = 26.59, df = 2 (P < 0.00001); I² = 92%

Test for overall effect: Z = 0.01 (P = 0.99)

Test for subgroup differences: Not applicable

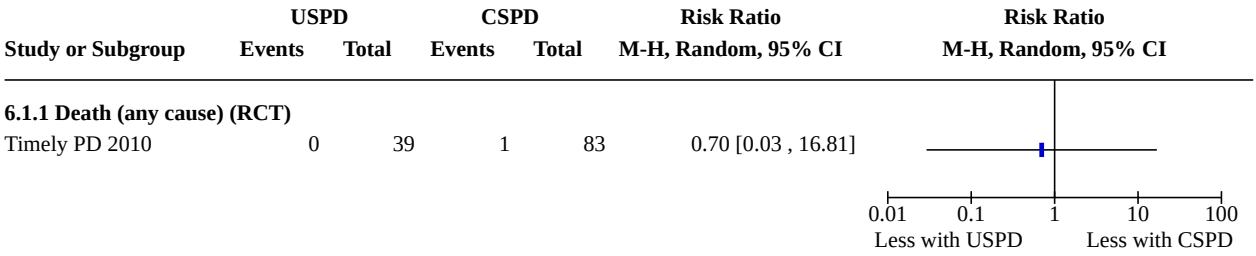


Comparison 6. Death (any cause)

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
6.1 Death (any cause) (RCT)	1		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
6.1.1 Death (any cause) (RCT)	1		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
6.2 Death (any cause) (non-RCT)	8		Risk Ratio (M-H, Random, 95% CI)	Subtotals only
6.2.1 Death (any cause) (cohort studies)	7	1509	Risk Ratio (M-H, Random, 95% CI)	1.89 [1.07, 3.32]

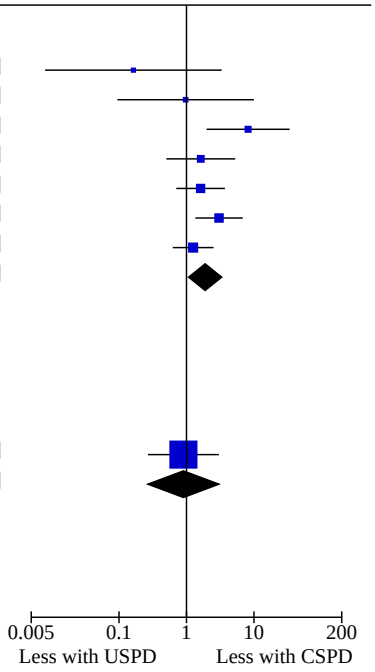
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
6.2.2 Death (any cause) (case-control studies)	1	104	Risk Ratio (M-H, Random, 95% CI)	0.90 [0.27, 3.02]
6.3 Death (any cause): secondary analysis (cohort studies - laparotomy)	4		Risk Ratio (M-H, Random, 95% CI)	Subtotals only
6.3.1 Death (any cause) (cohort studies)	4	1198	Risk Ratio (M-H, Random, 95% CI)	2.29 [1.14, 4.61]
6.4 Death (any cause): sensitivity analysis (cohort studies-up to 6 months follow-up)	4		Risk Ratio (M-H, Random, 95% CI)	Subtotals only
6.4.1 Death (any cause) (cohort studies)	4	896	Risk Ratio (M-H, Random, 95% CI)	1.75 [0.47, 6.48]
6.5 Death (any cause): sensitivity analysis (cohort studies - more than 6 months follow-up)	3		Risk Ratio (M-H, Random, 95% CI)	Subtotals only
6.5.1 Death (any cause) (cohort studies)	3	613	Risk Ratio (M-H, Random, 95% CI)	1.82 [1.01, 3.26]
6.6 Death (any cause): sensitivity analysis (cohort studies - low risk of bias)	3		Risk Ratio (M-H, Random, 95% CI)	Subtotals only
6.6.1 Death (any cause) (cohort studies)	3	418	Risk Ratio (M-H, Random, 95% CI)	1.37 [0.81, 2.30]

Analysis 6.1. Comparison 6: Death (any cause), Outcome 1: Death (any cause) (RCT)



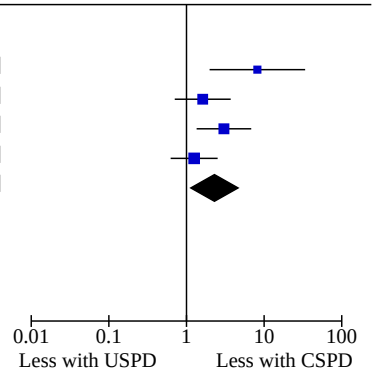
Analysis 6.2. Comparison 6: Death (any cause), Outcome 2: Death (any cause) (non-RCT)

Study or Subgroup	USPD Events	USPD Total	CSPD Events	CSPD Total	Weight	Risk Ratio M-H, Random, 95% CI
6.2.1 Death (any cause) (cohort studies)						
Serrano 2019	0	59	2	48	3.2%	0.16 [0.01 , 3.32]
Jaivid 2017	1	17	2	33	5.1%	0.97 [0.09 , 9.96]
Liu 2014	32	344	2	176	11.2%	8.19 [1.98 , 33.76]
Silva 2018	4	40	7	114	14.4%	1.63 [0.50 , 5.27]
Kim 2018	53	190	5	29	20.8%	1.62 [0.71 , 3.71]
Yang 2011	49	226	6	84	21.3%	3.04 [1.35 , 6.82]
Pai 2016	16	80	11	69	24.0%	1.25 [0.62 , 2.52]
Subtotal (95% CI)		**956**		**553**	**100.0%**	**1.89 [1.07 , 3.32]**
Total events:	155		35			
Heterogeneity: Tau² = 0.22; Chi² = 10.30, df = 6 (P = 0.11); I² = 42%						
Test for overall effect: Z = 2.21 (P = 0.03)						
6.2.2 Death (any cause) (case-control studies)						
See 2017	3	26	10	78	100.0%	0.90 [0.27 , 3.02]
Subtotal (95% CI)		**26**		**78**	**100.0%**	**0.90 [0.27 , 3.02]**
Total events:	3		10			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.17 (P = 0.86)						
Test for subgroup differences: Chi² = 1.18, df = 1 (P = 0.28), I² = 15.5%						



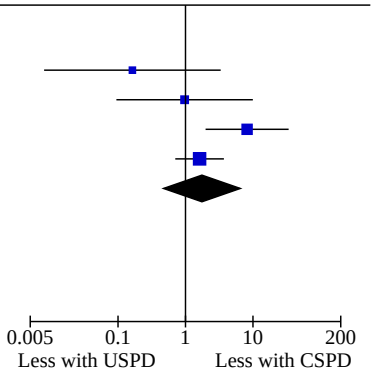
Analysis 6.3. Comparison 6: Death (any cause), Outcome 3: Death (any cause): secondary analysis (cohort studies - laparotomy)

Study or Subgroup	USPD Events	USPD Total	CSPD Events	CSPD Total	Weight	Risk Ratio M-H, Random, 95% CI
6.3.1 Death (any cause) (cohort studies)						
Liu 2014	32	344	2	176	15.6%	8.19 [1.98 , 33.76]
Kim 2018	53	190	5	29	26.9%	1.62 [0.71 , 3.71]
Yang 2011	49	226	6	84	27.3%	3.04 [1.35 , 6.82]
Pai 2016	16	80	11	69	30.2%	1.25 [0.62 , 2.52]
Subtotal (95% CI)		**840**		**358**	**100.0%**	**2.29 [1.14 , 4.61]**
Total events:	150		24			
Heterogeneity: Tau² = 0.30; Chi² = 7.45, df = 3 (P = 0.06); I² = 60%						
Test for overall effect: Z = 2.32 (P = 0.02)						
Test for subgroup differences: Not applicable						



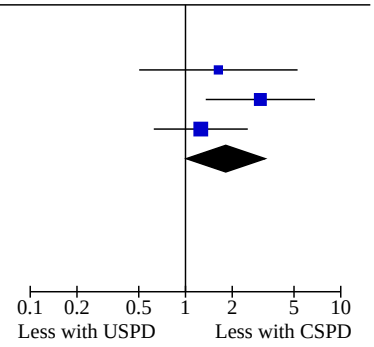
Analysis 6.4. Comparison 6: Death (any cause), Outcome 4: Death (any cause): sensitivity analysis (cohort studies-up to 6 months follow-up)

Study or Subgroup	USPD Events	USPD Total	CSPD Events	CSPD Total	Weight	Risk Ratio M-H, Random, 95% CI
6.4.1 Death (any cause) (cohort studies)						
Serrano 2019	0	59	2	48	13.3%	0.16 [0.01 , 3.32]
Jaivid 2017	1	17	2	33	18.6%	0.97 [0.09 , 9.96]
Liu 2014	32	344	2	176	29.6%	8.19 [1.98 , 33.76]
Kim 2018	53	190	5	29	38.4%	1.62 [0.71 , 3.71]
Subtotal (95% CI)		**610**		**286**	**100.0%**	**1.75 [0.47 , 6.48]**
Total events:	86		11			
Heterogeneity: Tau² = 0.98; Chi² = 7.42, df = 3 (P = 0.06); I² = 60%						
Test for overall effect: Z = 0.84 (P = 0.40)						
Test for subgroup differences: Not applicable						



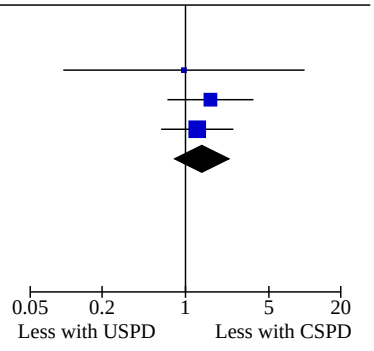
Analysis 6.5. Comparison 6: Death (any cause), Outcome 5: Death (any cause): sensitivity analysis (cohort studies - more than 6 months follow-up)

Study or Subgroup	USPD Events	USPD Total	CSPD Events	CSPD Total	Weight	Risk Ratio M-H, Random, 95% CI
6.5.1 Death (any cause) (cohort studies)						
Silva 2018	4	40	7	114	20.4%	1.63 [0.50 , 5.27]
Yang 2011	49	226	6	84	35.9%	3.04 [1.35 , 6.82]
Pai 2016	16	80	11	69	43.7%	1.25 [0.62 , 2.52]
Subtotal (95% CI)		**346**		**267**	**100.0%**	**1.82 [1.01 , 3.26]**
Total events:	69		24			
Heterogeneity: Tau² = 0.08; Chi² = 2.78, df = 2 (P = 0.25); I² = 28%						
Test for overall effect: Z = 2.00 (P = 0.05)						
Test for subgroup differences: Not applicable						



Analysis 6.6. Comparison 6: Death (any cause), Outcome 6: Death (any cause): sensitivity analysis (cohort studies - low risk of bias)

Study or Subgroup	USPD Events	USPD Total	CSPD Events	CSPD Total	Weight	Risk Ratio M-H, Random, 95% CI
6.6.1 Death (any cause) (cohort studies)						
Jaivid 2017	1	17	2	33	5.0%	0.97 [0.09 , 9.96]
Kim 2018	53	190	5	29	39.3%	1.62 [0.71 , 3.71]
Pai 2016	16	80	11	69	55.7%	1.25 [0.62 , 2.52]
Subtotal (95% CI)		**287**		**131**	**100.0%**	**1.37 [0.81 , 2.30]**
Total events:	70		18			
Heterogeneity: Tau² = 0.00; Chi² = 0.30, df = 2 (P = 0.86); I² = 0%						
Test for overall effect: Z = 1.18 (P = 0.24)						
Test for subgroup differences: Not applicable						

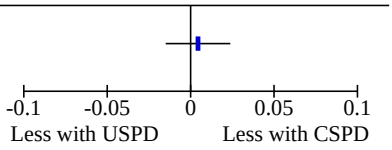


Comparison 7. Adverse events

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
7.1 Pericatheter hernia	1		Risk Difference (M-H, Random, 95% CI)	Totals not selected
7.2 Haemoperitoneum	1		Risk Difference (M-H, Random, 95% CI)	Totals not selected
7.3 Delayed wound healing	1		Risk Difference (M-H, Random, 95% CI)	Totals not selected

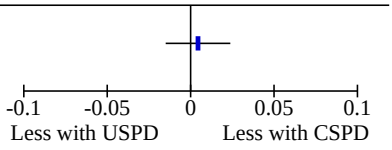
Analysis 7.1. Comparison 7: Adverse events, Outcome 1: Pericatheter hernia

	USPD		CSPD		Risk Difference	Risk Difference
Study or Subgroup	Events	Total	Events	Total	M-H, Random, 95% CI	M-H, Random, 95% CI
Yang 2011	1	226	0	84	0.00 [-0.01 , 0.02]	



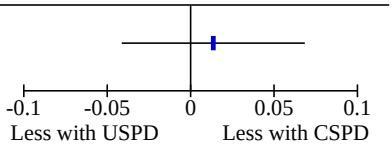
Analysis 7.2. Comparison 7: Adverse events, Outcome 2: Haemoperitoneum

	USPD		CSPD		Risk Difference	Risk Difference
Study or Subgroup	Events	Total	Events	Total	M-H, Random, 95% CI	M-H, Random, 95% CI
Yang 2011	1	226	0	84	0.00 [-0.01 , 0.02]	



Analysis 7.3. Comparison 7: Adverse events, Outcome 3: Delayed wound healing

	USPD		CSPD		Risk Difference	Risk Difference
Study or Subgroup	Events	Total	Events	Total	M-H, Random, 95% CI	M-H, Random, 95% CI
Timely PD 2010	1	39	1	83	0.01 [-0.04 , 0.07]	

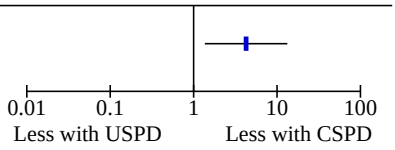


Comparison 8. Interim haemodialysis

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
8.1 Interim HD	1		Risk Ratio (M-H, Random, 95% CI)	Totals not selected

Analysis 8.1. Comparison 8: Interim haemodialysis, Outcome 1: Interim HD

Study or Subgroup	USPD Events	USPD Total	CSPD Events	CSPD Total	Risk Ratio M-H, Random, 95% CI
Timely PD 2010	8	39	4	83	4.26 [1.36 , 13.29]



ADDITIONAL TABLES

Table 1. Description of studies included in the review

Study	Country	Study design	Time frame	No. participants (DM)	Follow-up duration	Break-in periods for USPD	Break-in periods for CSPD	Insertion methods	Initial PD regimen
Ghaffari 2012	USA	Prospective cohort (SC)	2010-2011	27 (52%)	90 days	Not reported	Not reported	Percutaneous (laparoscopic for control)	Based on BSA & GFR*
Jaivid 2017	Singapore	Retrospective cohort (SC)	2015	50 (58%)	180 days	1 to 10 days	2 to 4 weeks	Percutaneous	Not available
Kim 2018	Korea	Retrospective cohort (SC)	2007-2014	87 (40%)	6 months	0.4 to 5.9 days	20 days	Laparotomy	Day 2: 0.5 L Day 5: 0.75 to 1 L
Liu 2014	China	Retrospective cohort (SC)	2001-2010	657 (26%)	6 months	≤ 7 days	> 14 days	Laparotomy	0.75 to 1.2 L
Nayak 2018 [1]	India	Case control (SC)	2016-2017	56 (not reported)	90 days	Within 48 hours of presentation	> 14 days	Not reported	Not reported
Pai 2016	Taiwan, China	Retrospective cohort (SC)	2006-2012	149 (43%)	30.5 ± 24.9 months	11 (6 to 13) days	20.7 (14 to 76) days	Laparotomy	Not reported
Povlsen 2016	Denmark	Prospective cohort (multicentre)	2005-2009	643 (not reported)	Follow-up till 2012	Not reported	Not reported	Not reported	Not reported
Salari 2018	USA	Retrospective cohort (SC)	2010-2017	159 (57%)	USPD: 986 ± 634 days CSPD: 1010 ± 732 days	Not reported	Not reported	Not reported	Not reported
See 2017	Australia	Case control (SC)	2010-2015	104 (35%)	4 weeks	4 (1 to 7) days	Not reported	Laparoscopic	1 to 1.2 L
Serrano 2019	USA	Retrospective cohort (SC)	Not reported	Not reported	6 months	7.3 days	Not reported	Not reported	Not reported

Table 1. Description of studies included in the review *(Continued)*

Silva 2018	Brazil	Prospective cohort (SC)	2010-2018	Not reported	381 days	3 to 14 days	Not reported	Percutaneously inserted	Week 1: 1 L Titrate week 4: 2 L
Timely PD 2010	Australia	RCT (multicentre)	2008-2013	122 (35%)	180 days	7 days	≥ 14 days	Laparotomy	Day 1: 1 L Day 2: 1.5 L Day 3: 2 L
Vlasak 2017	Czech Republic	Retrospective cohort (SC)	2011	89 (not reported)	4 weeks	Not reported	Not reported	Laparoscopic	Not reported
Wojtaszek 2018	Poland	Retrospective cohort (SC)	2005-2015	Not reported	USPD: 19 months CSPD: 19.5 months	3.5 ± 2.3 days	16.2 ± 1.7 days	Not reported	Not reported
Yang 2011	Taiwan, China	Retrospective cohort (SC)	2003-2007	Not reported	USPD: 823 ± 591 days CSPD: 522 ± 319 days	2.0 ± 2.7 days	40.6 ± 42.8 days	Laparotomy	Day 1: 0.5 L Day 6: 0.75 L Day 8: 1 L
Zhang 2017	China	Retrospective cohort (SC)	2014-2016	Not reported	90 days	1 to 3 days	≥ 14 days	Not reported	Not reported

BSA - body surface area; CSPD - conventional-start peritoneal dialysis; DM - diabetes mellitus; GFR - glomerular filtration rate; RCT - randomised controlled trial; SC - single centre study; USPD - urgent-start peritoneal dialysis;
* For GFR > 7 (BSA < 1.65 m^2: 500 mL, 4 cycles, BAS 1.65 to 1.8 m^2: 750 mL, 5 cycles, BSA > 1.8 m^2: 1000 mL, 6 cycles) , for GFR < 7 (BSA < 1.65 m^2: 500 mL, 6 cycles, BSA: 1.65 to 1.8 m^2: 750 mL, 6 cycles, BSA: > 1.8 m^2: 1250 mL, 6 cycles)
[1] treatment group is emergent-start PD

Table 2. Assessment of quality of studies (randomised controlled studies)

Study	Selection bias		Blinding (performance bias and detection bias)		Attrition bias	Reporting bias	Other
	Random sequence generation	Allocation concealment	Blinding of participants and personnel	Blinding of outcome assessment	Incomplete outcome of data	Selective reporting	

Table 2. Assessment of quality of studies (randomised controlled studies) *(Continued)*

Timely PD 2010	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk	Unclear

Table 3. Assessment of quality of studies (cohort studies)

Study	Selection				Comparability	Outcome			Evidence of quality
	Representativeness of exposed cohort	Selection of non-exposed cohort	Ascertainment of exposure	Outcomes not present at start		Assessment of outcome	Length of follow-up	Adequacy of follow-up	
Ghaffari 2012	*	*	*	*	--	--	--	--	4
Jaivid 2017	*	*	*	*		--	*	*	6
Kim 2018	*	*	*	*	--	*	*	--	6
Liu 2014	*	*	*	*	*	*	*	--	7
Povlsen 2016	--	--	--	*	--	--	*	--	2
Pai 2016	*	*	*	*	*	*	*	*	8
Salari 2018	*	*	--	*	--	--	*	--	4
Serrano 2019	*	*	--	*	--	--	*	*	5
Silva 2018	*	*	--	*	--	--	*	--	4
Vlasak 2017	*	*	--	*	--	--	*	--	4
Wojtaszek 2018	*	*	--	*	--	--	*	--	4
Yang 2011	*	*	*	*	--	*	*	*	7
Zhang 2017	*	*	--	*	--	--	--	--	3

Table 4. Assessment of quality of studies (case-control study)

Study	Selection				Comparability	Exposure			Quality score
	Case definition	Representativeness of cases	Control selection	Control definition		Ascertainment of exposure	Methods of ascertainment	Non-exposure rate	
Nayak 2018	--	--	*	*	--	--	--	--	2
See 2017	*	*	*	*	*	*	*	--	7

Table 5. Adverse events

Adverse events	USPD		CSPD		Study
	Events	Total	Events	Total	
Pericatheter hernia	1	226	0	84	Yang 2011
Haemoperitoneum	1	226	0	84	Yang 2011
Delayed wound healing	1	39	1	83	Timely PD 2010

USPD - urgent-start peritoneal dialysis; CSPD - conventional-start peritoneal dialysis

APPENDICES

Appendix 1. Electronic search strategies

Database	Search terms
CENTRAL	1. MeSH descriptor: [Peritoneal Dialysis] explode all trees 2. peritoneal dialysis*:ti,ab,kw (Word variations have been searched) 3. PD or CAPD or CCPD:ti,ab,kw (Word variations have been searched) 4. {or #1-#3} 5. urgent start*:ti,ab,kw (Word variations have been searched) 6. urgent initiation:ti,ab,kw (Word variations have been searched) 7. urgent*:ti,ab,kw (Word variations have been searched) 8. "unplanned":ti,ab,kw (Word variations have been searched) 9. {or #5-#8} 10.{and #4, #8}
MEDLINE	1. Renal Replacement Therapy/ 2. exp Peritoneal Dialysis/ 3. peritoneal dialysis.tw. 4. (CAPD or CCPD or APD).tw. 5. or/1-4 6. urgent.tw. 7. urgent start.tw. 8. urgent initiation.tw. 9. unplanned.tw 10.or/6-10 11.and/5,10
EMBASE	1. Peritoneal Dialysis/ 2. Continuous Ambulatory Peritoneal Dialysis/ 3. peritoneal dialysis.tw. 4. (PD or CAPD or CCPD or APD).tw. 5. peritoneal dialysis fluid/ 6. renal replacement therapy-dependent renal disease/ 7. peritoneal dialysis catheter/

(Continued)

8. or/1-7
9. urgent start$.tw.
10. urgent initiation.tw.
11. unplanned.tw.
12. or/9-11
13. and/8,12

Appendix 2. Risk of bias assessment tool

Potential source of bias	Assessment criteria
Random sequence generation Selection bias (biased allocation to interventions) due to inadequate generation of a randomised sequence	*Low risk of bias:* Random number table; computer random number generator; coin tossing; shuffling cards or envelopes; throwing dice; drawing of lots; minimisation (minimisation may be implemented without a random element, and this is considered to be equivalent to being random).
	High risk of bias: Sequence generated by odd or even date of birth; date (or day) of admission; sequence generated by hospital or clinic record number; allocation by judgement of the clinician; by preference of the participant; based on the results of a laboratory test or a series of tests; by availability of the intervention.
	Unclear: Insufficient information about the sequence generation process to permit judgement.
Allocation concealment Selection bias (biased allocation to interventions) due to inadequate concealment of allocations prior to assignment	*Low risk of bias:* Randomisation method described that would not allow investigator/participant to know or influence intervention group before eligible participant entered in the study (e.g. central allocation, including telephone, web-based, and pharmacy-controlled, randomisation; sequentially numbered drug containers of identical appearance; sequentially numbered, opaque, sealed envelopes).
	High risk of bias: Using an open random allocation schedule (e.g. a list of random numbers); assignment envelopes were used without appropriate safeguards (e.g. if envelopes were unsealed or non-opaque or not sequentially numbered); alternation or rotation; date of birth; case record number; any other explicitly unconcealed procedure.
	Unclear: Randomisation stated but no information on method used is available.
Blinding of participants and personnel Performance bias due to knowledge of the allocated interventions by participants and personnel during the study	*Low risk of bias*: No blinding or incomplete blinding, but the review authors judge that the outcome is not likely to be influenced by lack of blinding; blinding of participants and key study personnel ensured, and unlikely that the blinding could have been broken.
	High risk of bias: No blinding or incomplete blinding, and the outcome is likely to be influenced by lack of blinding; blinding of key study participants and personnel attempted, but likely that the blinding could have been broken, and the outcome is likely to be influenced by lack of blinding.
	Unclear: Insufficient information to permit judgement
Blinding of outcome assessment Detection bias due to knowledge of the allocated interventions by outcome assessors.	*Low risk of bias:* No blinding of outcome assessment, but the review authors judge that the outcome measurement is not likely to be influenced by lack of blinding; blinding of outcome assessment ensured, and unlikely that the blinding could have been broken.
	High risk of bias: No blinding of outcome assessment, and the outcome measurement is likely to be influenced by lack of blinding; blinding of outcome assessment, but likely that the blinding could have been broken, and the outcome measurement is likely to be influenced by lack of blinding.

(Continued)

	Unclear: Insufficient information to permit judgement
Incomplete outcome data Attrition bias due to amount, nature or handling of incomplete outcome data.	*Low risk of bias:* No missing outcome data; reasons for missing outcome data unlikely to be related to true outcome (for survival data, censoring unlikely to be introducing bias); missing outcome data balanced in numbers across intervention groups, with similar reasons for missing data across groups; for dichotomous outcome data, the proportion of missing outcomes compared with observed event risk not enough to have a clinically relevant impact on the intervention effect estimate; for continuous outcome data, plausible effect size (difference in means or standardised difference in means) among missing outcomes not enough to have a clinically relevant impact on observed effect size; missing data have been imputed using appropriate methods.
	High risk of bias: Reason for missing outcome data likely to be related to true outcome, with either imbalance in numbers or reasons for missing data across intervention groups; for dichotomous outcome data, the proportion of missing outcomes compared with observed event risk enough to induce clinically relevant bias in intervention effect estimate; for continuous outcome data, plausible effect size (difference in means or standardized difference in means) among missing outcomes enough to induce clinically relevant bias in observed effect size; 'as-treated' analysis done with substantial departure of the intervention received from that assigned at randomisation; potentially inappropriate application of simple imputation.
	Unclear: Insufficient information to permit judgement
Selective reporting Reporting bias due to selective outcome reporting	*Low risk of bias:* The study protocol is available and all of the study's pre-specified (primary and secondary) outcomes that are of interest in the review have been reported in the pre-specified way; the study protocol is not available but it is clear that the published reports include all expected outcomes, including those that were pre-specified (convincing text of this nature may be uncommon).
	High risk of bias: Not all of the study's pre-specified primary outcomes have been reported; one or more primary outcomes is reported using measurements, analysis methods or subsets of the data (e.g. sub-scales) that were not pre-specified; one or more reported primary outcomes were not pre-specified (unless clear justification for their reporting is provided, such as an unexpected adverse effect); one or more outcomes of interest in the review are reported incompletely so that they cannot be entered in a meta-analysis; the study report fails to include results for a key outcome that would be expected to have been reported for such a study.
	Unclear: Insufficient information to permit judgement
Other bias Bias due to problems not covered elsewhere in the table	*Low risk of bias:* The study appears to be free of other sources of bias.
	High risk of bias: Had a potential source of bias related to the specific study design used; stopped early due to some data-dependent process (including a formal-stopping rule); had extreme baseline imbalance; has been claimed to have been fraudulent; had some other problem.
	Unclear: Insufficient information to assess whether an important risk of bias exists; insufficient rationale or evidence that an identified problem will introduce bias.

WHAT'S NEW

Date	Event	Description
18 December 2020	Amended	Addition of number of participants for case-control studies for the outcome peritonitis

HISTORY

Protocol first published: Issue 1, 2018
Review first published: Issue 12, 2020

CONTRIBUTIONS OF AUTHORS

1. Draft the protocol: YC, HH, CH, JC, AT, DJ
2. Study selection: YC, HH
3. Extract data from studies: YC, HH
4. Enter data into RevMan: YC, HH
5. Carry out the analysis: YC, HH, JC, AT
6. Interpret the analysis: YC, HH, CH, JC, AT, DJ
7. Draft the final review: YC, HH, CH, JC, AT, DJ
8. Disagreement resolution: JC, DJ
9. Update the review: YC

DECLARATIONS OF INTEREST

None known.

SOURCES OF SUPPORT

Internal sources

- National Health and Medical Research Council, Australia

  DJ is supported by Practitioner Fellowship; YC is supported by Early Career Fellowship

External sources

- No sources of support supplied

DIFFERENCES BETWEEN PROTOCOL AND REVIEW

The review was conducted as specified in the protocol.

INDEX TERMS

Medical Subject Headings (MeSH)

Case-Control Studies; Catheter Obstruction [*etiology]; Catheter-Related Infections [*etiology]; Cohort Studies; Dialysis Solutions; Emergency Treatment [*adverse effects] [methods]; Hemorrhage [etiology]; Peritoneal Dialysis [*adverse effects] [methods] [mortality]; Peritonitis [etiology]; Randomized Controlled Trials as Topic; Renal Insufficiency, Chronic [*therapy]; Time Factors; Wound Healing

MeSH check words

Humans