

Additional file 10. Summary of findings tables: Effects of implementation strategies on nursing practice and patient outcomes

Table S10-1. Summary of findings: Effects of implementation strategies on compliance with desired clinical practice in healthcare professionals (primary outcome) and patient outcomes (secondary outcomes).

Population: Healthcare professionals (≥90% nurses) and patients					
Comparison	Outcomes	Effect size (95%CI)	Number of patients, healthcare professionals and studies	Quality of the evidence (GRADE)	Comments
Any implementation strategy vs None	Clinical Practice (Continuous)	SMD: 0.94 (0.72, 1.15)	70 studies 76 assessments 109 106 patients from 20 studies 6 964 healthcare professionals from 61 studies 796 clusters of healthcare professionals for 30 studies	⊕⊕⊕⊖ Moderate	<ul style="list-style-type: none"> Overall risk of bias was deemed very serious (13 low risk of bias studies out of 70) 26 cluster randomized trials (CRTs), 23 randomized controlled trials (RCTs) and 21 non-randomized controlled studies (NRCS) Inconsistency, indirectness, and imprecision were deemed not serious Large effect size
Any implementation strategy vs None	Clinical Practice (Dichotomous)	OR: 1.99 (1.68, 2.37)	57 studies 60 assessments 118 152 patients from 51 studies 13 530 healthcare professionals from 53 studies 1 024 clusters of healthcare professionals for 52 studies	⊕⊕⊕⊖ Moderate	<ul style="list-style-type: none"> Overall risk of bias was deemed serious (29 low risk of bias studies out of 57) 37 CRTs, 9 RCTs, and 11 NRCS Inconsistency was deemed serious while indirectness and imprecision were deemed not serious Moderate effect size
Any implementation strategy vs None	Patient Outcome (Continuous)	SMD: 0.23 (-0.01, 0.47)	10 assessments 10 studies 108 125 patients from 10 studies 963 healthcare professionals from 8 studies 188 clusters of healthcare professionals for 7 studies	⊕⊕⊕⊖ Low	<ul style="list-style-type: none"> Overall risk of bias was deemed serious (4 low risk of bias studies out of 10) 6 CRTs, 2 RCTs, and 2 NRCS Inconsistency was deemed serious while indirectness and imprecision were deemed not serious
Any implementation strategy vs None	Patient Outcome (Dichotomous)	OR: 1.46 (0.96, 2.22)	12 studies 12 assessments 23 818 patients from 11 studies 1 522 healthcare professionals from 7 studies 154 clusters of healthcare professionals for 9 studies	⊕⊕⊕⊖ Low	<ul style="list-style-type: none"> Overall risk of bias was deemed serious (4 low risk of bias studies out of 12) 7 CRTs, 2 RCTs, and 3 NRCS Inconsistency was deemed serious while imprecision was considered very serious, indirectness was deemed not serious
Multifaceted vs Single component	Clinical Practice (Continuous)	SMD: 0.23 (-0.01, 0.46)	12 assessments 12 studies	⊕⊕⊕⊖ Low	<ul style="list-style-type: none"> Overall risk of bias was deemed very serious (1 low risk of bias studies out of 12)

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			62 945 patients from 5 studies 2 699 healthcare professionals from 11 studies 219 clusters of healthcare professionals for 4 studies		<ul style="list-style-type: none"> 3 CRTs, 6 RCTs, and 3 NRCS Inconsistency, indirectness, and imprecision were deemed not serious
Multifaceted vs Single component	Clinical Practice (Dichotomous)	OR: 1.35 (0.76, 2.40)	14 studies 20 assessments 1 656 healthcare professionals from 10 studies 3 596 patients from 5 studies 251 clusters of healthcare professionals for 8 studies	⊕⊕⊕⊖ Low	<ul style="list-style-type: none"> Overall risk of bias was deemed not serious (9 low risk of bias studies out of 14) 9 CRTs, 4 RCTs, and 1 NRCS Inconsistency was considered serious while indirectness and imprecision were deemed not serious
Multifaceted vs Single component	Patient Outcome (Continuous)	SMD: 0.43 (0.26, 0.61)	2 studies 2 assessments 37 healthcare professionals from 1 study 507 patients from 2 studies 6 clusters of health professional for 1 study	⊕⊕⊕⊖ Very low	<ul style="list-style-type: none"> Overall risk of bias was deemed very serious (0 low risk of bias studies out of 2) 1 CRT and 1 RCT Imprecision was considered very serious while indirectness and inconsistency were deemed not serious
Multifaceted vs Single component	Patient Outcome (Dichotomous)	OR: 1.30 (0.89, 1.90)	3 studies 5 assessments 2 176 patients from 3 studies 223 healthcare professionals from 2 studies 179 clusters of healthcare professionals for 3 studies	⊕⊕⊕⊖ Low	<ul style="list-style-type: none"> Overall risk of bias was deemed not serious (2 low risk of bias studies out of 3) 3 CRTs Inconsistency was considered serious while indirectness and imprecision were deemed not serious
Group clinician education (GCE) vs no GCE	Clinical Practice (Continuous)	SMD: 0.96 (0.73, 1.19)	68 studies 72 assessments 107 893 patients from 20 studies 8 368 healthcare professionals from 61 studies 763 clusters of healthcare professionals for 28 studies	⊕⊕⊕⊖ Moderate	<ul style="list-style-type: none"> Overall risk of bias was deemed very serious (12 low risk of bias studies out of 68) 25 CRTs, 24 RCTs, and 19 NRCS Inconsistency and imprecision were deemed serious while indirectness was deemed not serious. Large effect size
Group clinician education (GCE) vs no GCE	Clinical Practice (Dichotomous)	OR: 1.81 (1.50, 2.19)	55 studies 63 assessments 100 319 patients from 46 studies 11 890 healthcare professionals from 48 studies 1 196 clusters of healthcare professionals for 53 studies	⊕⊕⊕⊖ Moderate	<ul style="list-style-type: none"> Overall risk of bias was deemed serious (25 low risk of bias studies out of 55) 39 CRTs, 6 RCTs, and 10 NRCS Inconsistency and imprecision were deemed serious while indirectness was deemed not serious Moderate effect size

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Group clinician education (GCE) vs no GCE	Patient Outcome (Continuous)	SMD: 0.14 (-0.11, 0.38)	8 studies 8 assessments 107 845 patients from 8 studies 607 healthcare professionals from 6 studies 176 clusters of healthcare professionals for 6 studies	⊕⊕⊕⊖ Moderate	<ul style="list-style-type: none"> Overall risk of bias was deemed not serious (4 low risk of bias studies out of 8) 6 CRTs and 2 RCTs Inconsistency, indirectness, and imprecision were deemed not serious
Group clinician education (GCE) vs no GCE	Patient Outcome (Dichotomous)	OR: 1.37 (1.07, 1.77)	12 studies 13 assessments 20 983 patients from 9 studies 2 054 healthcare professionals from 7 studies 284 clusters of healthcare professionals for 10 studies	⊕⊕⊕⊖ Low	<ul style="list-style-type: none"> Overall risk of bias was deemed serious (5 low risk of bias studies out of 12) 8 CRTs, 2 RCTs, and 2 NRCS Inconsistency and indirectness were deemed not serious while imprecision was deemed very serious
Individual clinician education (ICE) vs no ICE	Clinical Practice (Continuous)	SMD: 0.82 (0.60, 1.03)	62 studies 67 assessments 107 893 patients from 15 studies 5 492 healthcare professionals from 56 studies 451 clusters of healthcare professionals for 25 studies	⊕⊕⊕⊖ Low	<ul style="list-style-type: none"> Overall risk of bias was deemed very serious (11 low risk of bias studies out of 62) 23 CRTs, 22 RCTs, and 17 NRCS Inconsistency and indirectness were deemed serious while imprecision was deemed not serious Large effect size
Individual clinician education (ICE) vs no ICE	Clinical Practice (Dichotomous)	OR: 2.04 (1.62, 2.56)	53 studies 61 assessments 107 567 patients from 51 studies 8 704 healthcare professionals from 51 studies 1 003 clusters of healthcare professionals or patients for 51 studies	⊕⊕⊕⊖ Moderate	<ul style="list-style-type: none"> Overall risk of bias was deemed not serious (27 low risk of bias studies out of 53) 34 CRTs, 7 RCTs, and 12 NRCS Inconsistency was deemed serious, indirectness was deemed very serious while imprecision was deemed not serious Moderate effect size
Individual clinician education (ICE) vs no ICE	Patient Outcome (Continuous)	SMD: 0.17 (-0.02, 0.35)	9 studies 9 assessments 108 039 patients from 9 studies 950 healthcare professionals from 7 studies 192 clusters of healthcare professionals or patients for 7 studies	⊕⊕⊕⊖ Moderate	<ul style="list-style-type: none"> Overall risk of bias was deemed serious (3 low risk of bias studies out of 9) 6 CRTs, 1 RCT, and 2 NRCS Inconsistency, indirectness, and imprecision were deemed not serious
Individual clinician	Patient Outcome (Dichotomous)	OR: 1.26 (0.81, 1.94)	11 studies	⊕⊕⊕⊖ Moderate	<ul style="list-style-type: none"> Overall risk of bias was deemed serious (3 low risk of bias studies out of 11)

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education (ICE) vs no ICE			11 assessments 22 440 patients from 10 studies 1 497 healthcare professionals from 7 studies 295 clusters of healthcare professionals or patients from 9 studies		<ul style="list-style-type: none"> 7 CRTs, 1 RCT, and 3 NRCS Inconsistency and indirectness were deemed not serious while imprecision was considered serious
Reminders vs no Reminders	Clinical Practice (Continuous)	SMD: 0.61 (-0.11, 1.33)	11 studies 12 assessments 240 patients from 2 studies 922 healthcare professionals from 10 studies 7 clusters of healthcare professionals for 2 studies	⊕⊕⊕⊖ Low	<ul style="list-style-type: none"> Overall risk of bias was deemed very serious (2 low risk of bias studies out of 11) 4 CRTs, 2 RCTs, and 5 NRCS Inconsistency, indirectness, and imprecision were deemed not serious
Reminders vs no Reminders	Clinical Practice (Dichotomous)	OR: 2.44 (1.89, 3.17)	23 studies 25 assessments 30 561 patients from 12 studies 4 882 healthcare professionals from 19 studies 361 clusters of healthcare professionals for 17 studies	⊕⊕⊕⊕ High	<ul style="list-style-type: none"> Overall risk of bias was deemed not serious (15 low risk of bias studies out of 23) 16 CRTs, 5 RCTs, and 2 NRCS Inconsistency was deemed serious while indirectness and imprecision were deemed not serious Large effect size
Reminders vs no Reminders	Patient Outcome (Dichotomous)	OR: 1.00 (0.76, 1.31)	8 studies 8 assessments 15 538 patients from 6 studies 1 491 healthcare professionals from 7 studies 94 clusters of healthcare professionals for 6 studies	⊕⊕⊕⊖ Moderate	<ul style="list-style-type: none"> Overall risk of bias was deemed serious (4 low risk of bias studies out of 8) 6 CRTs and 2 NRCS Imprecision was deemed serious while indirectness and inconsistency were deemed not serious
Patient-mediated intervention (PMI) Vs no PMI	Clinical Practice (Dichotomous)	OR: 1.78 (1.13, 3.17)	8 studies 9 assessments 25 700 patients from 5 studies 6 082 healthcare professionals from 6 studies 332 clusters of healthcare professionals for 8 studies	⊕⊕⊕⊖ Low	<ul style="list-style-type: none"> Overall risk of bias was deemed serious (4 low risk of bias studies out of 8) 7 CRTs and 1 NRCS Inconsistency was deemed serious while indirectness and imprecision were deemed not serious
Patient-mediated intervention (PMI) Vs no PMI	Patient Outcome (Dichotomous)	OR: 0.97 (0.79, 1.19)	2 studies 2 assessments	⊕⊕⊕⊖ Low	<ul style="list-style-type: none"> Overall risk of bias was deemed very serious (0 low risk of bias studies out of 2) 2 CRTs

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			269 patients from 2 studies 4 935 healthcare professionals from 1 study 30 clusters of healthcare professionals for 2 studies		<ul style="list-style-type: none"> Imprecision was deemed serious while inconsistency and indirectness were deemed not serious
Audit and feedback (A&F) vs no A&F	Clinical Practice (Continuous)	SMD: -0.18 (-0.60, 0.24)	7 studies 7 assessments 7 445 patients from 2 studies 1 360 healthcare professionals from 6 studies 145 clusters of healthcare professionals for 3 studies	⊕⊕⊕⊖ Moderate	<ul style="list-style-type: none"> Overall risk of bias deemed serious (2 low risk of bias studies out of 7) 5 CRTs and 2 NRCS Inconsistency, indirectness, and Imprecision were deemed not serious
Audit and feedback (A&F) vs no A&F	Clinical Practice (Dichotomous)	OR: 1.42 (0.94, 2.13)	17 studies 22 assessments 34 489 patients from 12 studies 2 225 healthcare professionals from 12 studies 390 clusters of healthcare professionals for 15 studies	⊕⊕⊕⊖ Moderate	<ul style="list-style-type: none"> Overall risk of bias was deemed serious (8 low risk of bias studies out of 17) 13 CRTs and 4 NRCS Inconsistency was deemed serious while indirectness and imprecision were deemed not serious
Audit and feedback (A&F) vs no A&F	Patient Outcome (Continuous)	SMD: -0.21 (-0.66, 0.25)	2 studies 3 assessments 309 healthcare professionals from 1 study 8 624 patients from 2 studies 125 clusters of healthcare professionals for 2 studies	⊕⊕⊕⊖ Very Low	<ul style="list-style-type: none"> Overall risk of bias was deemed very serious (0 low risk of bias studies out of 2) 2 CRTs Inconsistency and indirectness were deemed not serious while imprecision was deemed serious.
Audit and feedback (A&F) vs no A&F	Patient Outcome (Dichotomous)	OR: 1.11 (0.74, 1.65)	8 studies 11 assessments 1 463 healthcare professionals from 6 studies 15 353 patients from 6 studies 258 clusters of healthcare professionals for 6 studies	⊕⊕⊕⊖ Low	<ul style="list-style-type: none"> Overall risk of bias was deemed serious (3 low risk of bias studies out of 8) 6 CRTs and 2 NRCS Inconsistency, indirectness, were deemed not serious while imprecision was deemed serious
Tailored intervention (TI) vs no TI	Clinical practice (Continuous)	SMD: 1.41 (0.65, 2.17)	9 studies 10 assessments 8 510 patients from 4 studies 1 162 healthcare professionals from 7 studies 125 clusters of healthcare professionals for 2 studies	⊕⊕⊕⊖ Moderate	<ul style="list-style-type: none"> Overall risk of bias deemed very serious (0 low risk of bias studies out of 9) 3 CRTs, 3 RCTs, and 3 NRCS Inconsistency deemed serious; indirectness and imprecision were deemed not serious

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					<ul style="list-style-type: none"> Large effect size
Tailored intervention (TI) vs no TI	Clinical Practice (Dichotomous)	OR: 1.90 (1.23, 2.93)	<p>14 studies</p> <p>15 assessments</p> <p>37 794 patients from 8 studies</p> <p>3 656 healthcare professionals from 9 studies</p> <p>497 clusters of healthcare professionals for 14 studies</p>	⊕⊕⊕⊕ High	<ul style="list-style-type: none"> Overall risk of bias deemed not serious (10 low risk of bias studies out of 14) 13 CRTs and 1 NRCS Inconsistency was deemed serious; indirectness and Imprecision deemed not serious Moderate effect size
Tailored intervention (TI) vs no TI	Patient Outcomes (Continuous)	SMD: 0.23 (0.09, 0.37)	<p>3 studies</p> <p>4 assessments</p> <p>9 926 patients from 3 studies</p> <p>34 healthcare professionals from 1 study</p> <p>147 clusters of healthcare professionals for 2 studies</p>	⊕⊕⊕⊖ Moderate	<ul style="list-style-type: none"> Overall risk of bias was deemed serious (1 low risk of bias studies out of 3) 2 CRTs and 1 RCT Indirectness and Imprecision deemed not serious
Tailored intervention (TI) vs no TI	Patient Outcomes (Dichotomous)	OR: 1.34 (0.96, 1.86)	<p>6 studies</p> <p>6 assessments</p> <p>9 044 patients from 4 studies</p> <p>434 healthcare professionals from 3 studies</p> <p>133 clusters of healthcare professionals for 5 studies</p>	⊕⊕⊕⊖ Moderate	<ul style="list-style-type: none"> Overall risk of bias was deemed serious (3 low risk of bias studies out of 6) 5 CRTs and 1 NRCS Inconsistency was deemed serious; indirectness and imprecision deemed not serious
Opinion leaders (OLs) vs no OLs	Clinical Practice outcomes (Continuous)	SMD: 0.41 (-0.10, 0.93)	<p>4 studies</p> <p>4 assessments</p> <p>80 patients from 2 studies</p> <p>466 healthcare professionals from 3 studies</p> <p>331 clusters of healthcare professionals for 2 studies</p>	⊕⊕⊖⊖ Low	<ul style="list-style-type: none"> Overall risk of bias was deemed very serious (0 low risk of bias studies out of 4 studies) 1 CRT and 3 NRCS Inconsistency was assessed as being serious; indirectness and Imprecision deemed not serious
Opinion leaders (OLs) vs no OLs	Clinical Practice outcomes (Dichotomous)	OR: 1.96 (1.22, 3.14)	<p>13 studies</p> <p>15 assessments</p> <p>24 675 patients from 6 studies</p> <p>7 821 healthcare professionals from 10 studies</p> <p>456 clusters of healthcare professionals for 11 studies</p>	⊕⊕⊖⊖ Low	<ul style="list-style-type: none"> Overall risk of bias was deemed low (10 of 13 studies had low risk of bias) 12 CRTs and 1 NRCS Inconsistency was assessed as being serious; indirectness and imprecision were not deemed serious
Opinion leaders (OLs) vs no OLs	Patient	OR: 0.92	<p>4 studies</p>	⊕⊕⊖⊖ Moderate	<ul style="list-style-type: none"> Overall risk of bias was deemed low (3 of 4 studies had low risk of bias)

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	Outcomes (Dichotomous)	(0.86, 1.00)	5 assessments 1 192 patients from 2 studies 902 healthcare professionals from 1 study 184 clusters of healthcare professionals for 4 studies		<ul style="list-style-type: none"> • 4 CRTs • Only serious concern was regarding imprecision, all other (inconsistency and indirectness) were not deemed serious
<p>GRADE Working Group grades of evidence:</p> <p>High quality: We are very confident that the true effect lies close to that of the estimate of the effect.</p> <p>Moderate quality: We are moderately confident in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.</p> <p>Low quality: Our confidence in the effect estimate is limited: The true effect may be substantially different from the estimate of the effect.</p> <p>Very low quality: We have very little confidence in the effect estimate: The true effect is likely to be substantially different from the estimate of effect.</p>					

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Table S10-2. Summary of findings: Effects of implementation strategies on the determinants of nurses' clinical practice (secondary outcomes).

Population: Healthcare professionals (≥90% nurses)					
Comparison	Outcome	Effect size (95% CI)	Number of healthcare professionals (studies)	Quality of the evidence (GRADE)	Comments
Any implementation strategy vs None	Attitude (Continuous)	SMD: 0.59 (0.23, 0.95)	25 studies 30 assessments 903 patients from 6 studies 2 819 healthcare professionals from 24 studies 88 clusters of healthcare professionals for 9 studies	⊕⊕⊕⊕ Very Low	<ul style="list-style-type: none"> Overall risk of bias was deemed very serious (4 low risk of bias studies out of 25) 8 CRTs, 10 RCTs, and 7 NRCS Imprecision and indirectness were considered not serious while inconsistency was deemed serious
Any implementation strategy vs None	Knowledge (Continuous)	SMD: 1.16 (0.82, 1.49)	31 studies 37 assessments 329 patients from 4 studies 3 812 healthcare professionals from 30 studies 65 clusters of healthcare professionals for 8 studies	⊕⊕⊕⊕ Low	<ul style="list-style-type: none"> Overall risk of bias was deemed serious (7 low risk of bias studies out of 31) 11 CRTs, 11 RCTs, and 9 NRCS Imprecision and indirectness were considered not serious while inconsistency was deemed serious
Any implementation strategy vs None	Skills (Continuous)	SMD: 0.97 (0.42, 1.52)	7 studies 10 assessments 160 patients from 1 study 810 healthcare professionals from 7 studies 82 clusters of healthcare professionals for 3 studies	⊕⊕⊕⊕ Low	<ul style="list-style-type: none"> Overall risk of bias was deemed very serious (1 low risk of bias studies out of 7) 4 CRTs and 3 RCTs Inconsistency, and indirectness were considered not serious while imprecision was deemed serious
Any implementation strategy vs None	Perceived control (Continuous)	SMD: 0.74 (0.35, 1.13)	18 studies 19 assessments 1 125 patients from 6 studies 1 978 healthcare professionals from 18 studies 39 clusters of healthcare professionals for 5 studies	⊕⊕⊕⊕ Low	<ul style="list-style-type: none"> Overall risk of bias was deemed very serious (1 low risk of bias studies out of 18) 4 CRTs, 9 RCTs, and 5 NRCS Inconsistency, imprecision, and indirectness were considered not serious
Any implementation strategy vs None	Social norms (Continuous)	SMD: 0.32 (-0.07, 0.72)	2 studies 2 assessments 124 healthcare professionals from 2 studies	⊕⊕⊕⊕ Very Low	<ul style="list-style-type: none"> Overall risk of bias was deemed very serious (0 low risk of bias studies out of 2) 2 NRCS Inconsistency, and indirectness were considered not serious while imprecision was deemed serious

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			140 patients from 1 study 25 clusters of healthcare professionals for 2 studies		
Any implementation strategy vs None	Intention (Continuous)	SMD: 0.53 (-0.19, 1.25)	3 studies 3 assessments 516 patients from 1 study 189 healthcare professionals from 3 studies 6 clusters of healthcare professionals for 2 studies	⊕⊕⊕⊕ Very Low	<ul style="list-style-type: none"> Overall risk of bias was deemed very serious (0 low risk of bias studies out of 3) 1 CRT, 1 RCT, and 1 NRCS Imprecision, inconsistency, and indirectness were considered not serious
Multifaceted vs Single component	Attitude (Continuous)	SMD: 0.16 (-0.13, 0.45)	3 assessments 3 studies 753 patients reported from 1 study 569 healthcare professionals reported from 3 studies 179 clusters of healthcare professionals and/or patients from 1 study	⊕⊕⊕⊕ Very Low	<ul style="list-style-type: none"> Overall risk of bias was deemed very serious (0 low risk of bias studies out of 3) 2 RCTs and 1 NRCS Inconsistency, and indirectness were considered not serious while imprecision was deemed serious
Multifaceted vs Single component	Knowledge (Continuous)	SMD: 0.73 (0.28, 1.18)	11 assessments 11 studies 786 patients reported from 2 studies 1 413 healthcare professionals reported from 11 studies 197 clusters of healthcare professionals and/or patients from 3 studies	⊕⊕⊕⊕ Low	<ul style="list-style-type: none"> Overall risk of bias was deemed very serious (2 low risk of bias studies out of 11) 2 CRTs, 6 RCTs, and 3 NRCS Imprecision, inconsistency and indirectness were considered not serious
Multifaceted vs Single component	Perceived control (Continuous)	SMD: 0.13 (-0.21, 0.47)	3 assessments 3 studies 753 patients reported from 1 study 559 healthcare professionals reported from 3 studies 179 clusters of healthcare professionals and/or patients from 1 study	⊕⊕⊕⊕ Very Low	<ul style="list-style-type: none"> Overall risk of bias was deemed very serious (0 low risk of bias studies out of 3) 2 RCTs and 1 NRCS Imprecision was considered serious, while inconsistency and indirectness were considered not serious

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Individual clinician education (ICE) vs no ICE	Intention (Continuous)	SMD: 0.16 (-0.31, 0.63)	2 studies 2 assessments 516 patients reported from 1 study 129 healthcare professionals reported from 2 studies 4 clusters of healthcare professionals and/or patients from 1 study	⊕⊕⊕⊕ Very Low	<ul style="list-style-type: none"> Overall risk of bias was deemed very serious (0 low risk of bias studies out of 2) 1 CRT and 1 RCT Inconsistency and imprecision were considered very serious while indirectness was considered not serious
Individual clinician education (ICE) vs no ICE	Attitude (Continuous)	SMD: 0.68 (0.31, 1.05)	25 studies 30 assessments 429 patients reported from 4 studies 2 672 healthcare professionals reported from 24 studies 86 clusters of healthcare professionals and/or patients from 8 studies	⊕⊕⊕⊕ Very Low	<ul style="list-style-type: none"> Overall risk of bias was deemed very serious (3 low risk of bias studies out of 25) 8 CRTs, 10 RCTs, and 7 NRCS Inconsistency was considered serious, imprecision was deemed very serious while indirectness was considered not serious
Individual clinician education (ICE) vs no ICE	Attitude (Dichotomous)	OR: 1.65 (0.71, 3.83)	2 studies 2 assessments 516 patients reported from 1 study 272 healthcare professionals reported from 2 studies 4 clusters of healthcare professionals and/or patients from 1 study	⊕⊕⊕⊕ Very Low	<ul style="list-style-type: none"> Overall risk of bias was deemed serious (1 low risk of bias studies out of 2) 1 CRT and 1 RCT Inconsistency was considered serious; imprecision was deemed very serious while indirectness was considered not serious
Individual clinician education (ICE) vs no ICE	Knowledge (Continuous)	SMD: 1.03 (0.73, 1.33)	36 studies 42 assessments 329 patients reported from 4 studies 3 725 healthcare professionals reported from 35 studies 71 clusters of healthcare professionals and/or patients from 9 studies	⊕⊕⊕⊕ Moderate	<ul style="list-style-type: none"> Overall risk of bias was deemed serious (10 low risk of bias studies out of 36) 11 CRTs, 15 RCTs, and 10 NRCS Inconsistency was considered serious while indirectness and imprecision were deemed not serious Large effect size
Individual clinician education (ICE) vs no ICE	Perceived control (Continuous)	SMD: 0.89 (0.39, 1.38)	13 studies 14 assessments 694 patients reported from 4 studies	⊕⊕⊕⊕ Moderate	<ul style="list-style-type: none"> Overall risk of bias was deemed serious (1 low risk of bias studies out of 13) 2 CRTs, 7 RCTs, and 4 NRCS Inconsistency was deemed serious while indirectness and imprecision were deemed not serious

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			1 315 healthcare professionals reported from 13 studies 35 clusters of healthcare professionals and/or patients from 3 studies		<ul style="list-style-type: none"> Large effect size
Individual clinician education (ICE) vs no ICE	Skills (Continuous)	SMD: 0.49 (0.22, 0.77)	5 studies 8 assessments 160 patients reported from 1 study 587 healthcare professionals reported from 5 studies 78 clusters of healthcare professionals and/or patients from 2 studies	⊕⊕⊕⊖ Low	<ul style="list-style-type: none"> Overall risk of bias was deemed very serious (1 low risk of bias studies out of 5) 3 CRTs and 2 RCTs Inconsistency, indirectness, and imprecision were deemed not serious
Group clinician education (GCE) vs no GCE	Intention (Continuous)	SMD: 0.43 (-0.12, 0.99)	4 studies 4 assessments 1 269 patients reported from 2 studies 458 healthcare professionals reported from 4 studies 6 clusters of healthcare professionals and/or patients from 2 studies	⊕⊕⊕⊖ Very Low	<ul style="list-style-type: none"> Overall risk of bias was deemed very serious (0 low risk of bias studies out of 4) 1 CRT, 2 RCTs, and 1 NRCS Inconsistency, indirectness, and imprecision were deemed not serious while were deemed serious
Group clinician education (GCE) vs no GCE	Attitude (Continuous)	SMD: 0.54 (0.19, 0.89)	27 studies 32 assessments 1 656 patients reported from 7 studies 3 196 healthcare professionals reported from 26 studies 88 clusters of healthcare professionals and/or patients from 9 studies	⊕⊕⊕⊖ Very Low	<ul style="list-style-type: none"> Overall risk of bias was deemed very serious (3 low risk of bias studies out of 27) 8 CRTs, 11 RCTs, and 8 NRCS Inconsistency, indirectness, and imprecision were deemed not serious while were deemed serious
Group clinician education (GCE) vs no GCE	Attitude (Dichotomous)	OR: 2.59 (0.48, 13.87)	2 studies 2 assessments 516 patients reported from 1 study 53 healthcare professionals reported from 1 study 14 clusters of healthcare professionals and/or patients from 2 studies	⊕⊕⊕⊖ Low	<ul style="list-style-type: none"> Overall risk of bias was deemed serious (1 low risk of bias studies out of 2) 2 CRTs Indirectness was deemed not serious while inconsistency and imprecision were deemed serious Large effect size
Group clinician education (GCE) vs no GCE	Knowledge (Continuous)	SMD: 1.07 (0.73, 1.40)	32 studies 42 assessments	⊕⊕⊕⊖ Moderate	<ul style="list-style-type: none"> Overall risk of bias was deemed serious (9 low risk of bias studies out of 32) 13 CRTs, 11 RCTs, and 8 NRCS

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			<p>5 702 patients reported from 7 studies</p> <p>7 287 healthcare professionals reported form 31 studies</p> <p>94 clusters of healthcare professionals and/or patients from 10 studies</p>		<ul style="list-style-type: none"> Inconsistency and indirectness were deemed not serious while imprecision was deemed serious Large effect size
Group clinician education (GCE) vs no GCE	Skills (Continuous)	SMD: 0.64 (0.33, 0.95)	<p>6 studies</p> <p>9 assessments</p> <p>160 patients reported from 1 study</p> <p>730 healthcare professionals reported form 6 studies</p> <p>78 clusters of healthcare professionals and/or patients from 2 studies</p>	⊕⊕⊕⊕ Very Low	<ul style="list-style-type: none"> Overall risk of bias was deemed very serious (1 low risk of bias studies out of 6) 3 CRTs and 3 RCTs Inconsistency, indirectness, and imprecision were deemed not serious
Group clinician education (GCE) vs no GCE	Perceived control (Continuous)	SMD: 0.75 (0.33, 1.17)	<p>16 studies</p> <p>18 assessments</p> <p>1 738 patients reported from 6 studies</p> <p>2 079 healthcare professionals reported form 16 studies</p> <p>16 clusters of healthcare professionals and/or patients from 4 studies</p>	⊕⊕⊕⊕ Very Low	<ul style="list-style-type: none"> Overall risk of bias was deemed very serious (1 low risk of bias studies out of 16) 4 CRTs, 9 RCTs, and 3 NRCS Inconsistency, indirectness, and imprecision were deemed not serious
Group clinician education (GCE) vs no GCE	Social norms (Continuous)	SMD: 0.23 (0.01, 0.45)	<p>3 studies</p> <p>3 assessments</p> <p>893 patients reported from 2 studies</p> <p>393 healthcare professionals reported form 3 studies</p> <p>25 clusters of healthcare professionals and/or patients from 2 studies</p>	⊕⊕⊕⊕ Very Low	<ul style="list-style-type: none"> Overall risk of bias was deemed very serious (0 low risk of bias studies out of 3) 1 RCT and 2 NRCS Inconsistency and indirectness were deemed not serious while imprecision was deemed serious
Reminders vs no Reminders	Attitude (Continuous)	SMD: 1.10 (-0.41, 2.60)	<p>5 studies</p> <p>5 assessments</p> <p>40 patients reported from 1 study</p> <p>580 healthcare professionals reported form 5 studies</p> <p>10 clusters of healthcare professionals and/or patients from 3 studies</p>	⊕⊕⊕⊕ Moderate	<ul style="list-style-type: none"> Overall risk of bias was deemed not serious (3 low risk of bias studies out of 5) 3 CRTs, 1 RCT, and 1 NRCS Inconsistency and indirectness were deemed not serious while imprecision was deemed serious
Reminders vs no Reminders	Knowledge (Continuous)	SMD: 1.07	<p>10 studies</p>	⊕⊕⊕⊕ Moderate	<ul style="list-style-type: none"> Overall risk of bias was deemed serious (4 low risk of bias studies out of 10)

Additional file 10. Summary of findings tables: Effects of implementation strategies on nursing practice and patient outcomes

		(0.41, 1.74)	10 assessments 100 patients reported from 2 studies 1 473 healthcare professionals reported from 10 studies 12 clusters of healthcare professionals for 4 studies		<ul style="list-style-type: none"> 4 CRTs, 2 RCTs, and 4 NRCS Inconsistency was deemed serious while indirectness, and Imprecision were deemed not serious Large effect size
Reminders vs no Reminders	Perceived control (Continuous)	SMD: 7.48 (6.74, 8.21)	3 studies 3 assessments No patients reported 246 healthcare professionals from 3 studies 2 clusters of healthcare professionals for 1 study	⊕⊕⊖⊖ Low	<ul style="list-style-type: none"> Overall risk of bias was deemed very serious (0 low risk of bias studies out of 3) 1 CRT and 2 RCTs Inconsistency was deemed very serious, imprecision was considered serious while indirectness was deemed not serious Large effect size
Audit and feedback (A&F) vs no A&F	Attitude (Continuous)	SMD: 0.20 (0.01, 0.38)	3 studies 3 assessments No patients reported 819 healthcare professionals from 3 studies 32 clusters of healthcare professionals for 2 studies	⊕⊕⊖⊖ Low	<ul style="list-style-type: none"> Overall risk of bias was deemed very serious (0 low risk of bias studies out of 3) 3 CRTs Inconsistency, indirectness, and imprecision were deemed not serious
Audit and feedback (A&F) vs no A&F	Knowledge (Continuous)	SMD: -0.17 (-0.97, 0.64)	4 studies 4 assessments 60 patients from 1 study 1 176 healthcare professionals from 4 studies 14 clusters of healthcare professionals for 2 studies	⊕⊕⊖⊖ Low	<ul style="list-style-type: none"> Overall risk of bias was deemed serious (1 low risk of bias studies out of 4) 3 CRTs and 1 NRCS Inconsistency and indirectness were deemed not serious while imprecision was deemed serious
Tailored intervention (TI) vs no TI	Attitude (Continuous)	SMD: 0.28 (-0.01, 0.57)	4 studies 4 assessments 793 patients from 2 studies 825 healthcare professionals from 4 studies 12 clusters of healthcare professionals for 1 study	⊕⊖⊖⊖ Very Low	<ul style="list-style-type: none"> Overall risk of bias was deemed very serious (0 low risk of bias study) 1 CRT, 1 RCT, and 2 NRCS Inconsistency, imprecision, and indirectness were deemed not serious
Tailored intervention (TI) vs no TI	Knowledge (Continuous)	SMD: 0.53 (-0.04, 1.09)	5 studies 5 assessments 853 patients from 3 studies	⊕⊖⊖⊖ Very Low	<ul style="list-style-type: none"> Overall risk of bias was deemed very serious (0 low risk of bias study) 1 CRT, 1 RCT, and 3 NRCS Inconsistency was deemed serious.

Additional file 10. Summary of findings tables: Effects of implementation strategies on nursing practice and patient outcomes

			885 healthcare professionals from 5 studies 12 clusters of healthcare professionals for 1 study		<ul style="list-style-type: none"> Imprecision, and indirectness) were deemed not serious
Opinion leaders (OLs) vs no OLs	Knowledge (Continuous)	SMD: 0.03 (-0.20, 0.27)	3 studies 3 assessments 33 patients from 1 study 1 018 healthcare professionals from 3 studies 20 clusters of healthcare professionals for 3 studies	⊕⊕⊕⊖ Moderate	<ul style="list-style-type: none"> Overall risk of bias was deemed low (2 of 3 studies had low risk of bias) 3 CRTs Only serious concern was regarding imprecision. Inconsistency and indirectness were deemed not serious
<p>GRADE Working Group grades of evidence:</p> <p>High quality: We are very confident that the true effect lies close to that of the estimate of the effect.</p> <p>Moderate quality: We are moderately confident in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.</p> <p>Low quality: Our confidence in the effect estimate is limited: The true effect may be substantially different from the estimate of the effect.</p> <p>Very low quality: We have very little confidence in the effect estimate: The true effect is likely to be substantially different from the estimate of effect.</p>					