

Supplementary data

Search protocol

Search specialist Kirsten Birkefoss, Danish Health Authority
 Search date 18.07.2022
 Research question Should patients have movement precautions after hip arthroplasty?

Inclusion and exclusion criteria

Language English, Danish, Norwegian, Swedish

Publication year 2013 – July 2022

Population Adults 18 and older

Publication types RCT, non-randomized studies

Note

- Search terms and inclusion/exclusion criterias are adapted to the different database languages.
- Duplicates have as thoroughly as possible been removed by the help of RefWorks.
- References found has been transferred to Covidence

Search for randomized controlled trials

Medline

#	Searches
1	"Arthroplasty, Replacement, Hip"/
2	Arthroplasty, Replacement/
3	Hip Prosthesis/
4	Joint Prosthesis/
5	(hip and (arthroplasty or replacement* or prosthes* or prosthet* or implant*)).ti,bt,ab,kf.
6	(joint adj (arthroplasty or replacement* or prosthes* or prosthet* or implant*)).ti,bt,ab,kf.
7	(hip and alloplasti*).ti,bt,ab,kf.
8	THA.ti,bt,ab,kf.
9	THR.ti,bt,ab,kf.
10	or/1-9
11	Hip dislocation/pc, rh
12	Physical immobilization/
13	Restrict*.ti,bt,ab,kf.
14	precaution*.ti,bt,ab,kf.
15	restraint*.ti,bt,ab,kf.
16	((Curb or avoid* or control* or restrain*) adj2 (movement or manev* or extended hip or hip extension)).ti,bt,ab,kf.
17	exp Assistive devices/
18	exp Self-help devices/
19	((Assistive or self help or self-help or selfhelp or protective) adj3 (Aid*1 or Appliance* or Equipment or device*)).ti,bt,ab,kf.
20	or/11-19
21	10 and 20
22	limit 21 to (randomized controlled trial or controlled clinical trial)
23	((((random* or cluster-random* or quasi-random* or control?ed or crossover or cross-over or blind* or mask*) adj4 (trial*1 or study or studies or analy*)) or rct).ti,bt,ab,kf,hw.
24	(placebo* or single-blind* or double-blind* or triple-blind*).ti,bt,kf,hw.
25	((single or double or triple) adj2 (blind* or mask*)).ti,bt,kf,hw.
26	((patient* or person* or participant* or population* or allocat* or assign*) adj3 random*).ti,bt,ab,kf.
27	or/23-26
28	21 and 27
29	22 or 28
30	limit 29 to (yr="2013-2022" and (english or danish or norwegian or swedish))

Embase

#	Searches
1	exp hip arthroplasty/
2	exp hip replacement/
3	replacement arthroplasty/
4	hip prosthesis/
5	(hip and (arthroplasty or replacement* or prosthes* or prosthet* or implant*)).ti,ab,kw.
6	(joint adj (arthroplasty or replacement* or prosthes* or prosthet* or implant*)).ti,ab,kw.
7	(hip and alloplasti*).ti,ab,kw.
8	THA.ti,ab,kw.
9	THR.ti,ab,kw.
10	or/1-9
11	Hip Dislocation/pc, rh
12	Restrict*.ti,ab,kw.
13	precaution*.ti,ab,kw.
14	restraint*.ti,ab,kw.
15	((Curb or avoid* or control* or restrain*) adj2 (movement or manev* or extended hip or hip extension)).ti,ab,kw.
16	exp self help device/
17	((Assistive or self help or self-help or selfhelp or protective) adj3 (Aid*1 or Appliance* or Equipment or device*)).ti,ab,kw.
18	or/11-17
19	10 and 18
20	limit 19 to (randomized controlled trial or controlled clinical trial)
21	((((random* or cluster-random* or quasi-random* or control?ed or crossover or cross-over or blind* or mask*) adj4 (trial*1 or study or studies or analy*)) or rct).ti,ab,kw.
22	(placebo* or single-blind* or double-blind* or triple-blind*).ti,ab,kw.
23	((single or double or triple) adj2 (blind* or mask*)).ti,ab,kw.
24	((patient* or person* or participant* or population* or allocat* or assign*) adj3 random*).ti,ab,kw.
25	or/21-24
26	19 and 25
27	20 or 26
28	limit 27 to (yr="2013-2022" and (english or danish or norwegian or swedish))

Cinahl

Limiters - Published Date: 20130101-20220731; Language: Danish, English, Norwegian, Swedish

#	Query
S21	S15 AND S20
S20	S16 OR S17 OR S18 OR S19
S19	((patient* or person* or participant* or population* or allocat* or assign*) N3 (random* or blind* or mask*))
S18	(placebo* or single-blind* or double-blind* or triple-blind* or ((single or double or triple) N1 (blind* or mask*))
S17	((((random* or cluster-random* or quasi-random* or control#ed or crossover or cross-over or blind* or mask*) N4 (trial* or study or studies or analy*)) or rct)
S16	PT Randomized Controlled Trial OR MH "Randomized Controlled Trial+" OR PT "Controlled Clinical Trial" OR MH "Controlled Clinical Trial+"
S15	S6 AND S14
S14	S7 OR S8 OR S9 OR S10 OR S11 OR S12 OR S13
S13	((Assistive or self help or self-help or selfhelp or protective) N3 (Aid or aids or Appliance* or Equipment or device*))
S12	(MH "Assistive Technology Devices+") OR (MH "Home Care Equipment and Supplies") OR (MH "Seating") OR (MH "Pillows and Cushions") OR (MH "Hip Protectors")
S11	((Curb or avoid* or control* or restrain*) N2 (movement or manev* or extended hip or hip extension))
S10	restraint*
S9	precaution*

S8 Restrict*
 S7 MH "Hip Dislocation"
 S6 S1 OR S2 OR S3 OR S4 OR S5
 S5 THR
 S4 THA
 S3 hip and alloplasti*
 S2 hip and (arthroplasty or replacement* or prosthes* or prosthet*)
 S1 MH "Arthroplasty, Replacement, Hip"

PEDRO

Abstract & Title: hip replacement* or hip arthroplasty
 Method: Clinical trial
 Published since: 2013

Search for non-randomized studies**Medline**

#	Searches
1	"Arthroplasty, Replacement, Hip"/
2	Arthroplasty, Replacement/
3	Hip Prosthesis/
4	Joint Prosthesis/
5	(hip and (arthroplasty or replacement* or prosthes* or prosthet* or implant*)).ti,ab,kf.
6	(joint adj (arthroplasty or replacement* or prosthes* or prosthet* or implant*)).ti,ab,kf.
7	(hip and alloplasti*).ti,ab,kf.
8	THA.ti,ab,kf.
9	THR.ti,ab,kf.
10	or/1-9
11	Hip dislocation/pc, rh
12	Physical immobilization/
13	Restrict*.ti,ab,kf.
14	precaution*.ti,ab,kf.
15	restraint*.ti,ab,kf.
16	((Curb or avoid* or control* or restrain*) adj2 (movement or manuev* or extended hip or hip extension)).ti,ab,kf.
17	exp Assistive devices/
18	exp Self-help devices/
19	((Assistive or self help or self-help or selfhelp or protective) adj3 (Aid*1 or Appliance* or Equipment or device*)).ti,ab,kf.
20	or/11-19
21	10 and 20
22	limit 21 to (comparative study or evaluation study or multicenter study or observational study or twin study or validation study)
23	exp Epidemiologic studies/
24	((Epidemiologic or cohort* or perspective or prospective or longitudud* or follow-up or follow up or followup or retro-spective or retrospective or case-control* or case control* or observational or cross-section* or cross section* or multi-cent* or multicent* or evaluation or comparative or intervention or provoca* or validation) adj3 (study or studies or trial*1 or analys*)).ti,ab,kf,hw.
25	or/23-24
26	21 and 25
27	22 or 26
28	limit 27 to (yr="2013-2022" and (english or danish or norwegian or swedish))

Embase

#	Searches
1	exp hip arthroplasty/
2	exp hip replacement/
3	replacement arthroplasty/
4	hip prosthesis/
5	(hip and (arthroplasty or replacement* or prosthes* or prosthet*

6	or implant*)).ti,ab,kw.
7	(joint adj (arthroplasty or replacement* or prosthes* or prosthet* or implant*)).ti,ab,kw.
8	(hip and alloplasti*).ti,ab,kw.
9	THA.ti,ab,kw.
10	THR.ti,ab,kw.
11	or/1-9
12	Hip Dislocation/pc, rh
13	Restrict*.ti,ab,kw.
14	precaution*.ti,ab,kw.
15	restraint*.ti,ab,kw.
16	((Curb or avoid* or control* or restrain*) adj2 (movement or manuev* or extended hip or hip extension)).ti,ab,kw.
17	exp self help device/
18	((Assistive or self help or self-help or selfhelp or protective) adj3 (Aid*1 or Appliance* or Equipment or device*)).ti,ab,kw.
19	or/11-17
20	10 and 18
21	Observational study/ or Multicenter study/ or Evaluation study/ or exp comparative study/ or exp case control study/ or intervention study/ or exp longitudinal study/ or prospective study/ or retrospective study/ or Follow up/ or validation study/ or cohort analysis/ or cross-sectional study/ or crossover procedure/
22	((Epidemiologic or cohort* or perspective or prospective or longitudud* or follow-up or follow up or followup or retro-spective or retrospective or case-control* or case control* or observational or cross-section* or cross section* or multi-cent* or multicent* or evaluation or comparative or intervention or provoca* or validation) adj3 (study or studies or trial*1 or analys*)).ti,ab,kw.
23	or/20-21
24	19 and 22
25	limit 23 to (yr="2013-2022" and (english or danish or norwegian or swedish))

Cinahl

#	Query	Limiters/Expanders
S19	S15 AND S18	Limiters - Published Date: 20130101-20220731; Language: Danish, English, Norwegian, Swedish
S18	S16 OR S17	
S17	((Epidemiologic or cohort* or perspective or prospective or longitudud* or follow-up or follow up or followup or retro-spective or retrospective or case-control* or case control* or observational or cross-section* or cross section* or multi-cent* or multicent* or evaluation or comparative or intervention or provoca* or validation) N3 (study or studies or trial* or analys*))	
S16	MH "Nonexperimental Studies+" or MH "Retrospective Design"	
S15	S6 AND S14	
S14	S7 OR S8 OR S9 OR S10 OR S11 OR S12 OR S13	
S13	((Assistive or self help or self-help or selfhelp or protective) N3 (Aid or aids or Appliance* or Equipment or device*))	
S12	(MH "Assistive Technology Devices+") OR (MH "Home Care Equipment and Supplies") OR (MH "Seating") OR (MH "Pillows and Cushions") OR (MH "Hip Protectors")	
S11	((Curb or avoid* or control* or restrain*) N2 (movement or manuev* or extended hip or hip extension))	
S10	restraint*	
S9	precaution*	
S8	Restrict*	
S7	MH "Hip Dislocation Rehabilitation" or MH "Hip Dislocation Prevention" or ((hip N3 dislocat*) N3 prevent*)	
S6	S1 OR S2 OR S3 OR S4 OR S5	
S5	THR	
S4	THA	
S3	hip and alloplasti*	
S2	hip and (arthroplasty or replacement* or prosthes* or prosthet*)	
S1	MH "Arthroplasty, Replacement, Hip"	

Risk of bias in individual studies

Dislocation

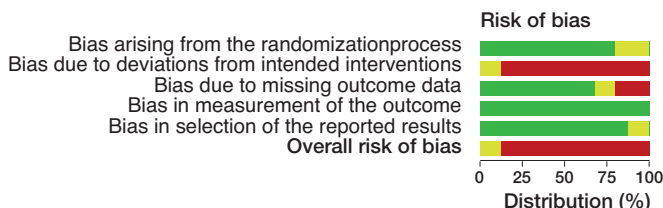


Figure 3. Weighted summary plot of the risk of bias in randomized trials, early hip dislocation. For color codes, see Table 3.

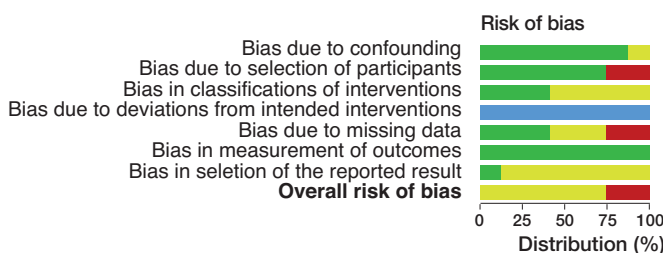


Figure 4. Weighted summary plot of the risk of bias in non-randomized studies, early hip dislocation. For color codes, see Table 4.

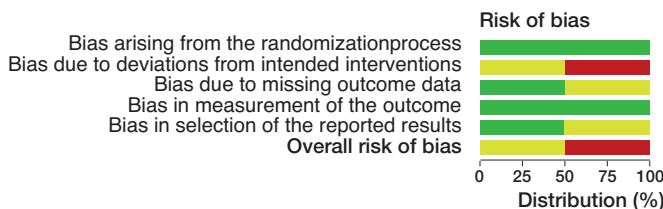


Figure 5. Weighted summary plot of the risk of bias in randomized trials, late hip dislocation. For color codes, see Table 3.

Table 5. Risk of bias in randomized trials, late hip dislocation

Study	Risk of bias domains					Total
	1	2	3	4	5	
Tetreault 2020 (35)	+	×	+	+	+	×
Mounts 2022 (38)	+	-	-	+	-	-

Judgements and domains, see Table 3.

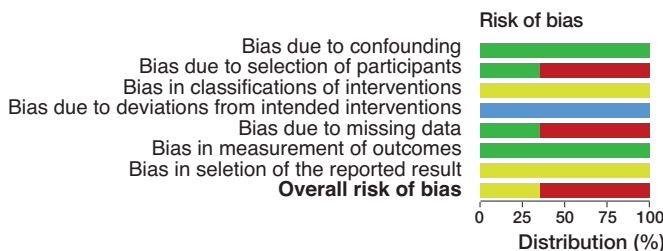


Figure 6. Weighted summary plot of the risk of bias in non-randomized studies, late hip dislocation. For color codes, see Table 4.

Table 6. Risk of bias in non-randomized studies, late hip dislocation

Study	Risk of bias domains							Overall
	1	2	3	4	5	6	7	
Allen 2018 (41)	+	×	-	?	×	+	-	×
Brown 2019 (40)	+	+	-	?	+	+	-	-

Judgements and domains, see Table 4.

Patient-reported function

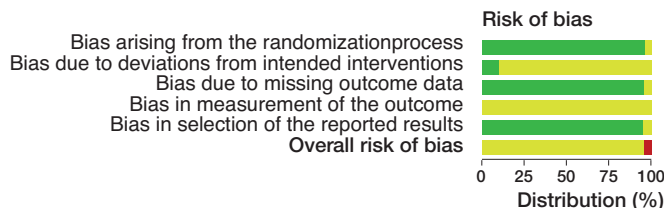


Figure 7. Weighted summary plot of the risk of bias in randomized trials, patient-reported function end of treatment. For color codes, see Table 3.

Table 7. Risk of bias in randomized trials, patient-reported function end of treatment

Study	Risk of bias domains					Total
	1	2	3	4	5	
Tetreault 2020 (35)	+	-	+	-	+	-
Dietz 2019 (36)	-	-	-	-	+	×
Peters 2019 (37)	+	+	+	-	+	-
Mounts 2022 (38)	+	+	+	-	-	-

Judgements and domains, see Table 3.

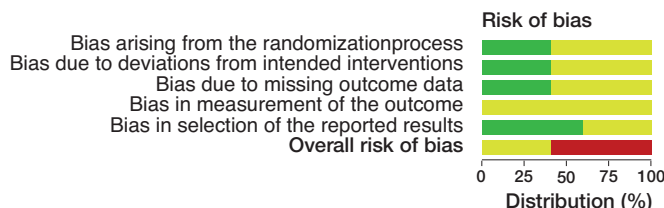


Figure 8. Weighted summary plot of the risk of bias in randomized trials, patient-reported function 1-year follow-up. For color codes, see Table 3.

Table 8. Risk of bias in randomized trials, patient-reported function 1-year follow-up

Study	Risk of bias domains					Total
	1	2	3	4	5	
Dietz 2019 (36)	-	-	-	-	+	×
Mounts 2022 (38)	+	+	+	-	-	-

Judgements and domains, see Table 3.

Table 9. Risk of bias in non-randomized studies, performance-based assessment of function end of treatment

Study	Risk of bias domains							Overall
	1	2	3	4	5	6	7	
Mikkelsen 2014 (34)	+	+	+	?	-	+	-	-

Judgements and domains, see Table 4.

Return to work

Table 10. Risk of bias in randomized trials, return to work

Study	Risk of bias domains					Total
	1	2	3	4	5	
Tetreault 2020 (35)	+	-	+	+	+	-

Judgements and domains, see Table 3.

Pain

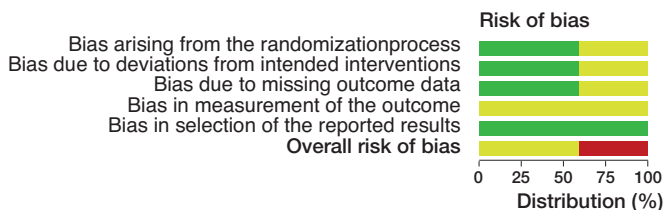


Figure 9. Weighted summary plot of the risk of bias in randomized trials, hip-related pain end of treatment. For color codes, see Table 3.

Table 11. Risk of bias in randomized trials, hip-related pain end of treatment

Study	Risk of bias domains					Total
	1	2	3	4	5	
Dietz 2019 (36)	-	-	-	-	+	-
Peters 2019 (37)	+	+	+	-	+	-

Judgements and domains, see Table 3.

Health-related quality of life

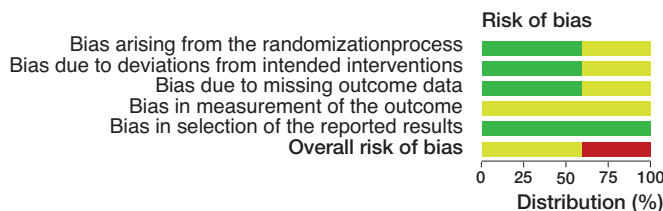


Figure 10. Weighted summary plot of the risk of bias in randomized trials, health-related quality of life. For color codes, see Table 1.

Table 12. Risk of bias in randomized trials, health-related quality of life

Study	Risk of bias domains					Total
	1	2	3	4	5	
Dietz 2019 (36)	-	-	-	-	+	-
Peters 2019 (37)	+	+	+	-	+	-

Judgements and domains, see Table 3.

Reoperation

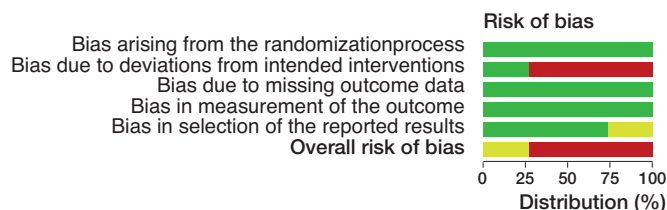


Figure 11. Weighted summary plot of the risk of bias in randomized trials, reoperation. For color codes, see Table 3.

Table 13. Risk of bias in randomized trials, reoperation

Study	Risk of bias domains					Total
	1	2	3	4	5	
Peters 2019 (37)	+	-	+	+	+	-
Mounts 2022 (38)	+	+	+	+	-	-

Judgements and domains, see Table 3.

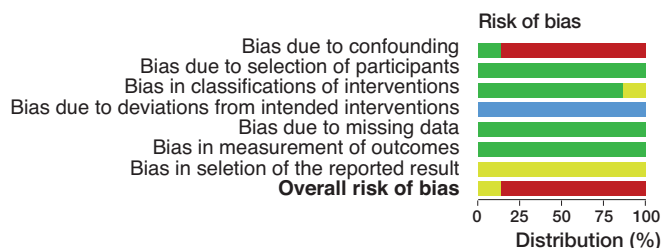


Figure 12. Weighted summary plot of the risk of bias in non-randomized studies, reoperation. For color codes, see Table 4.

Table 14. Risk of bias in randomized trials, reoperation

Study	Risk of bias domains							Overall
	1	2	3	4	5	6	7	
Weegen 2019 (42)	-	+	+	?	+	+	-	-
Brown 2019 (40)	+	+	-	?	+	+	-	-

Judgements and domains, see Table 3.

Meta-analysis forest plots

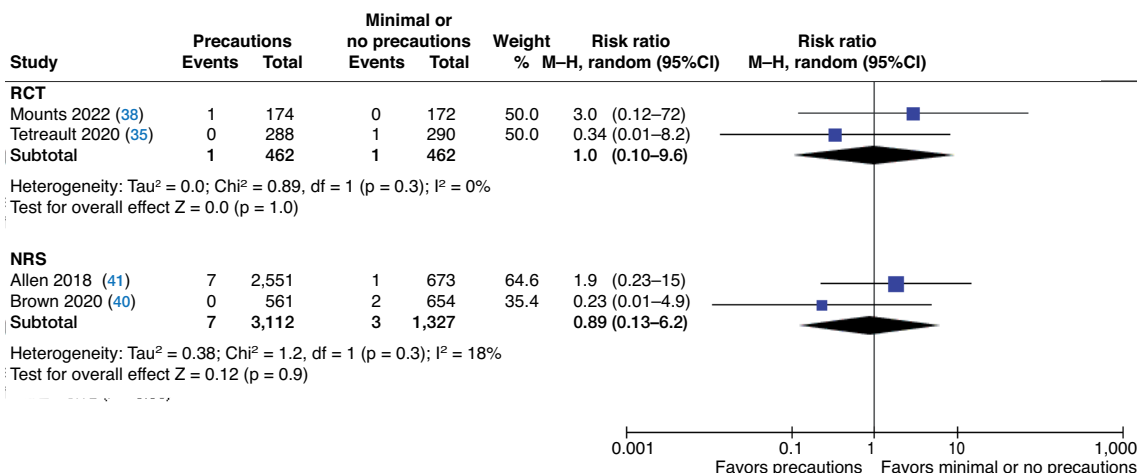


Figure 13. Random-effects meta-analysis on the effect of precautions on the relative risk of late dislocations after total hip arthroplasty. Abbreviations: M-H = Mantel-Haenszel, CI = confidence interval, RCT = randomized controlled trial, NRS = non-randomized study.

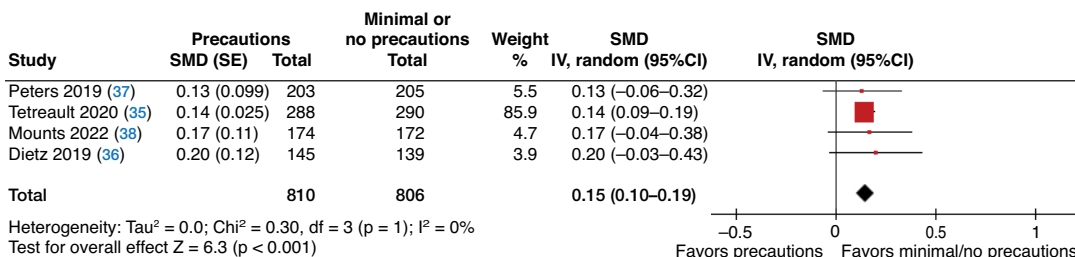


Figure 14. Random-effects meta-analysis on the effect of precautions on patient-reported function end of treatment after total hip arthroplasty. Abbreviations: SMD = standardized mean difference, SE = standard error, IV = inverse variance, CI = confidence interval.

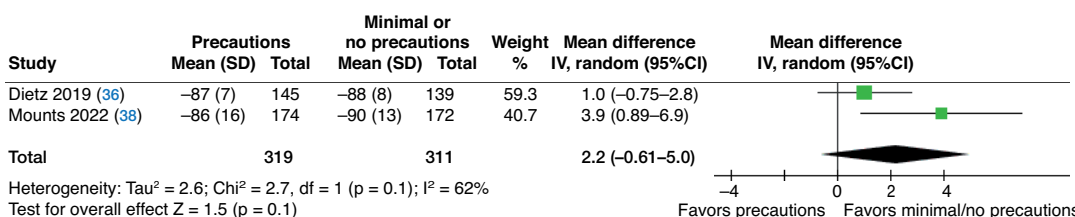


Figure 15. Random-effects meta-analysis on the effect of precautions on patient-reported function at longest follow-up after total hip arthroplasty. Abbreviations: SD = standard deviation, IV = inverse variance, CI = confidence interval.

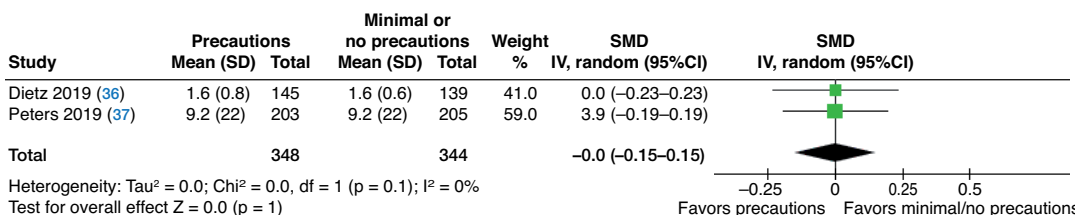


Figure 16. Random-effects meta-analysis on the effect of precautions on hip-related pain end of treatment after total hip arthroplasty. Abbreviations: SMD = standardized mean difference, SD = standard deviation, IV = inverse variance, CI = confidence interval.

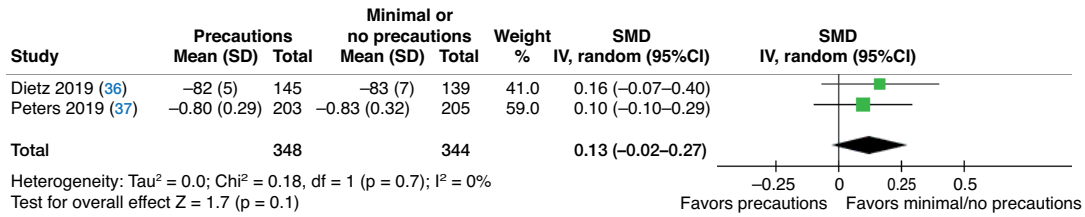


Figure 17. RRandom-effects meta-analysis on the effect of precautions on health-related quality of life end of treatment after total hip arthroplasty. Abbreviations: SMD = standardized mean difference, SD = standard deviation, IV = inverse variance, CI = confidence interval.

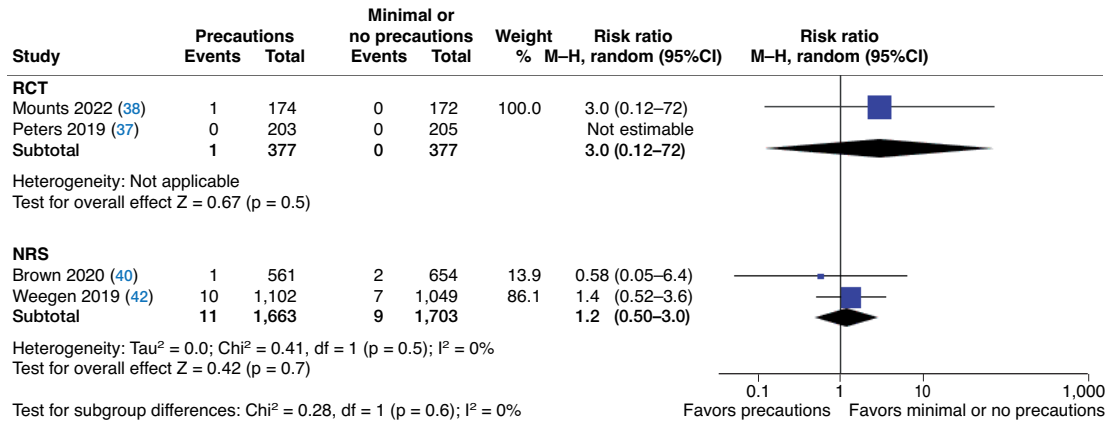


Figure 18. Random-effects meta-analysis on the effect of precautions on health-related quality of life end of treatment after total hip arthroplasty. Abbreviations: M-H = Mantel-Haenszel, CI = confidence interval, RCT = randomized controlled trial, NRS = non-randomized study.

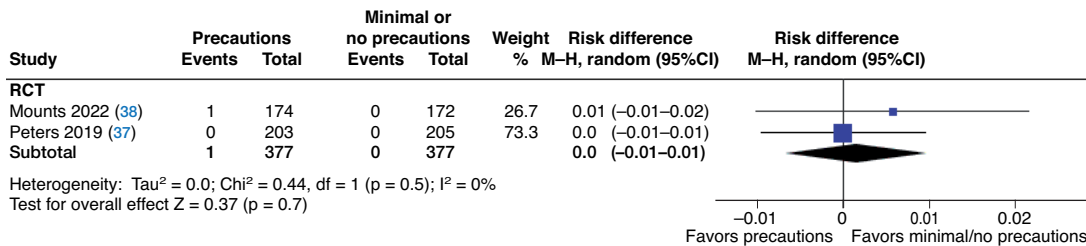


Figure 19. Random-effects meta-analysis on the effect of precautions on the risk difference of reoperation at longest follow-up after total hip arthroplasty. Abbreviations: M-H = Mantel-Haenszel, CI = confidence interval, RCT = randomized controlled trial.

Funnel plot

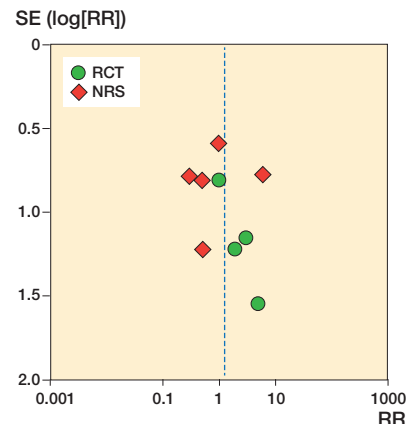


Figure 20. Funnel plot from the random-effects meta-analysis on the effect of precautions on the relative risk of late dislocations after total hip arthroplasty. early dislocation

Sensitivity analysis

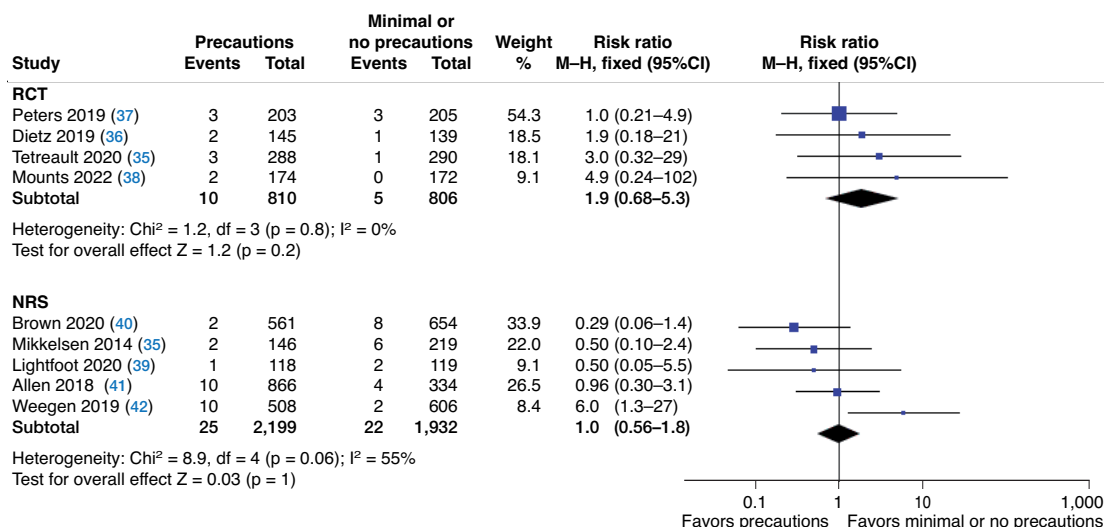


Figure 21. Fixed-effects meta-analysis on the effect of precautions on the relative risk of late dislocations after total hip arthroplasty. Abbreviations: M-H = Mantel-Haenszel, CI = confidence interval, RCT = randomized controlled trial, NRS = non-randomized study.

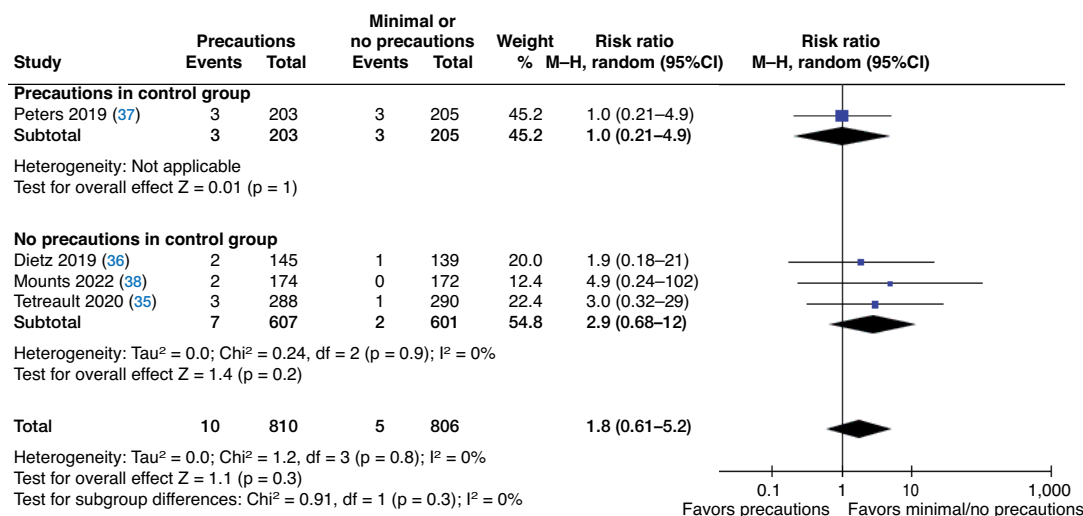


Figure 22. Subgroup analysis of randomized controlled trials with hip precautions in control group or no precautions. Random-effects meta-analysis on the effect of precautions on the relative risk of late dislocations after total hip arthroplasty. Abbreviations: M-H = Mantel-Haenszel, CI = confidence interval.

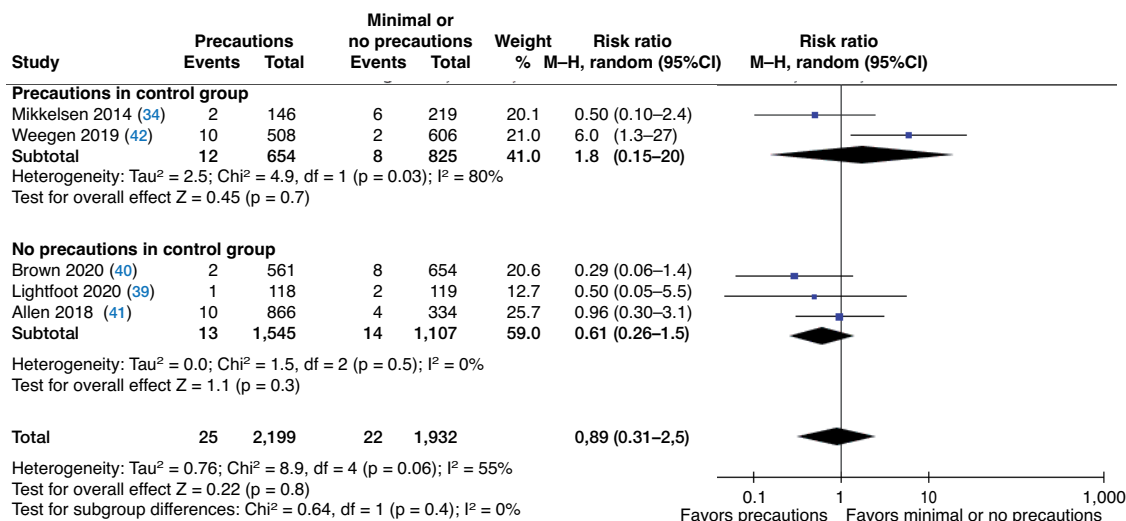


Figure 23. Subgroup analysis of non-randomized studies with hip precautions in control group or no precautions. Random-effects meta-analysis on the effect of precautions on the relative risk of late dislocations after total hip arthroplasty. M-H = Mantel-Haenszel, CI = confidence interval.

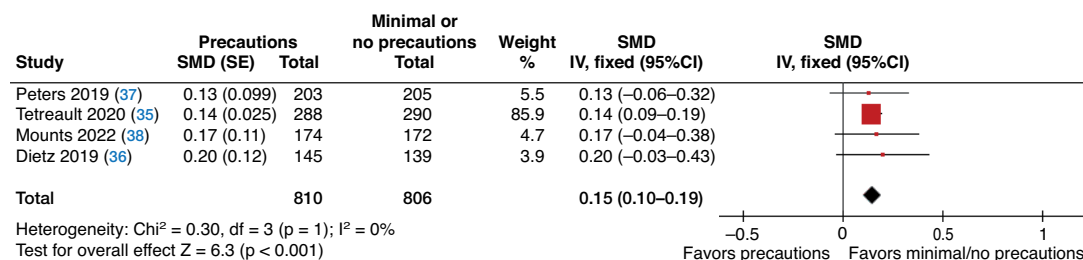


Figure 24. Fixed-effects meta-analysis on the effect of precautions on patient-reported function end of treatment after total hip arthroplasty. Abbreviations: SMD = standardized mean difference, SE = standard error, IV = inverse variance, CI = confidence interval.

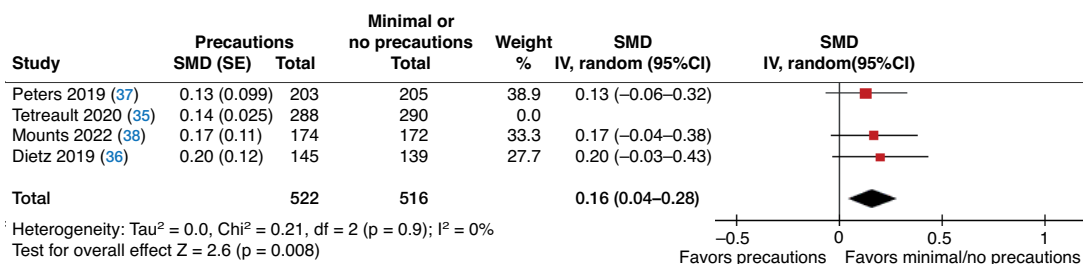


Figure 25. Random-effects meta-analysis on the effect of precautions on patient-reported function end of treatment after total hip arthroplasty. Sensitivity analysis without Tetreault et al. Abbreviations: SMD = standardized mean difference, SE = standard error, IV = inverse variance, CI = confidence interval.

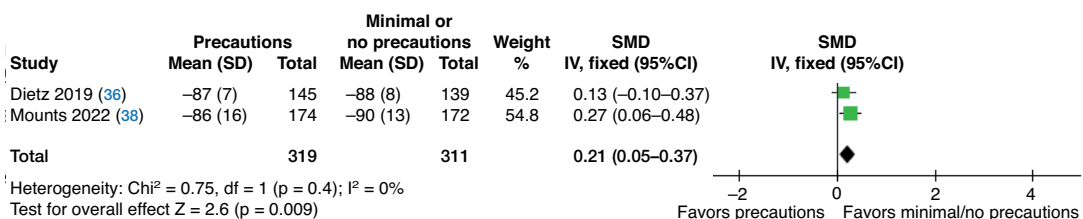


Figure 26. Fixed-effects meta-analysis on the effect of precautions on patient-reported function at longest follow-up after total hip arthroplasty. Abbreviations: SMD = standardized mean difference, SD = standard deviation, IV = inverse variance, CI = confidence interval.

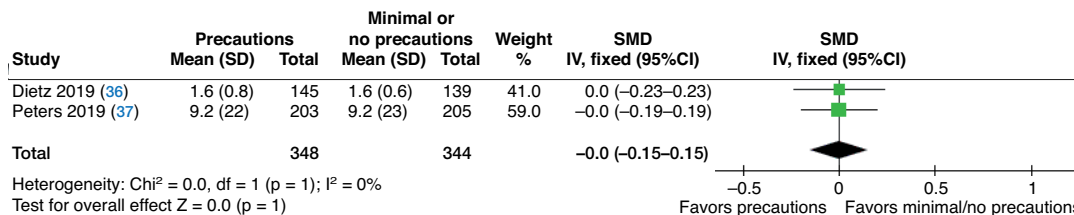


Figure 27. Fixed-effects meta-analysis on the effect of precautions on hip-related pain end of treatment after total hip arthroplasty. Abbreviations: SMD = standardized mean difference, SD = standard deviation, IV = inverse variance, CI = confidence interval.

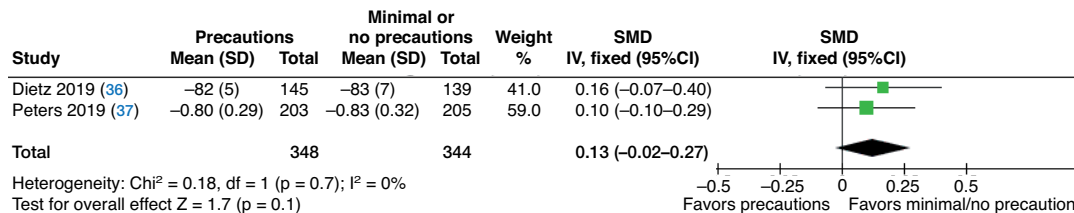


Figure 28. Fixed-effects meta-analysis on the effect of precautions on health-related quality of life end of treatment after total hip arthroplasty. Abbreviations: SMD = standardized mean difference, SD = standard deviation, IV = inverse variance, CI = confidence interval.

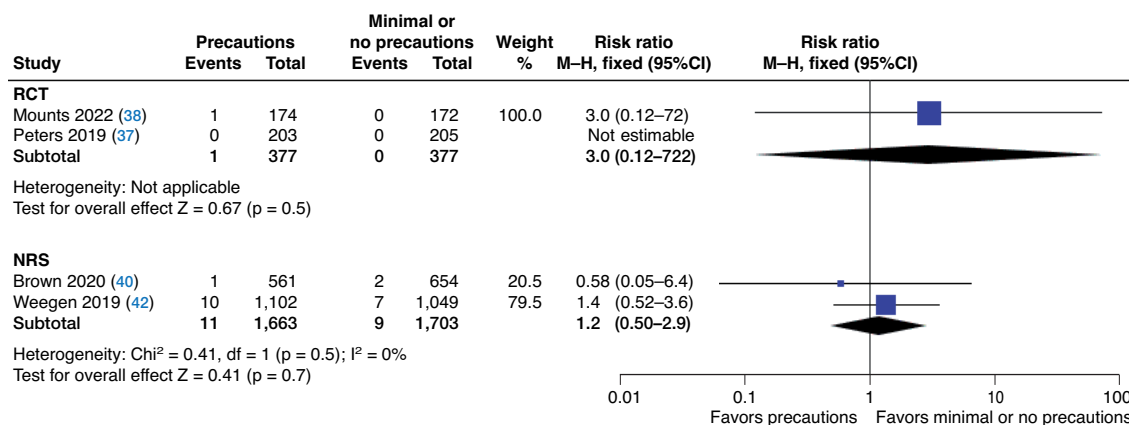


Figure 29. Fixed-effects meta-analysis on the effect of precautions on the relative risk of reoperation at longest follow-up after total hip arthroplasty. Abbreviations: M-H = Mantel-Haenszel, CI = Confidence interval, RCT = randomized controlled trial, NRS = non-randomized study.

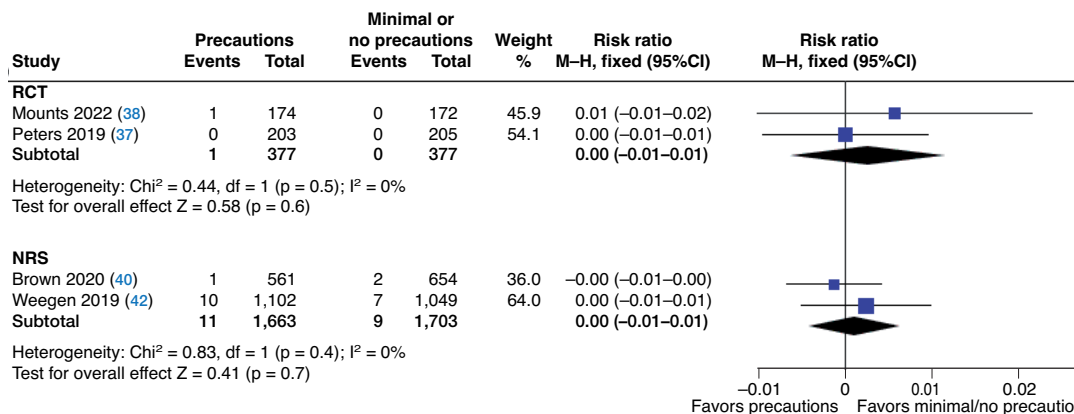


Figure 30. Fixed-effects meta-analysis on the effect of precautions on the risk difference of reoperation at longest follow-up after total hip arthroplasty. Abbreviations: M-H = Mantel-Haenszel, CI = Confidence interval, RCT = randomized controlled trial, NRS = non-randomized study.