

Table S1 Study data								
Primary author	Study period	Institution	Country	Type of study	Total patients	Mean follow-up time (months)	Mean echocardiographic follow-up (months)	Device name
Agnino	2019–2021	HUMANITAS Gavazzeni, Bergamo, Italy	Italy	Prospective cohort	59	12±0	12±0	DaVinci X
Amabile	2018–2022	Yale-New Haven Hospital	USA	Retrospective observational cohort	200	NR	NR	NR
Chemtob	2014–2019	Cleveland Clinic, Cleveland, Ohio	USA	Prospective observational cohort	605	NR	NR	NR
Chen	2005–2020	Cedars-Sinai Medical Center, Los Angeles, Calif;	USA	Retrospective observational cohort	747	62±46	20±44	NR
Chitwood	2000–2006	University Health System of Eastern Carolina and East Carolina University	USA	Prospective observational cohort	300	67.9±38	NR	DaVinci
Goldberger	2013–2021	Division of Cardiothoracic Anesthesiology, Duke University Medical Center, Durham, North Carolina, USA	USA	Retrospective observational cohort	144	NR	NR	NR
Javadikasgari	2006–2013	Cleveland Clinic, Cleveland, Ohio	USA	Prospective observational cohort	623	NR	NR	DaVinci
Kesavuori	2011–2015	Department of Cardiac Surgery, Heart and Lung Center, Helsinki University Central Hospital	Finland	Retrospective observational cohort	142	NR	13.7±14.8	DaVinci Si
Mori	2015–2021	The Society of Thoracic Surgeons Adult Cardiac Surgery Database (multicentre)	USA	Retrospective registry cohort	7692	NR	NR	NR
Navarra	2012–2016	Division of Cardiovascular and Thoracic Surgery, Cliniques Universitaires Saint-Luc, Université Catholique de Louvain	Belgium	Retrospective observational cohort	134	NR	NR	DaVinci Si
Piperata	2021	Department of Cardiology and Cardio-Vascular Surgery, Hospital Cardiologique de Haut-Leveque, Bordeaux University Hospital	France	Retrospective observational cohort	29	NR	NR	DaVinci X
Rao, 2022	2011–2020	University of Pennsylvania Health System, Philadelphia	USA	Retrospective observational cohort	62	NR	NR	NR
Sandoval	2019–2023	Department of Cardiovascular Surgery, Hospital Clinic, Barcelona	Spain	Retrospective observational cohort	124	NR	NR	DaVinci X or DaVinci Xi
Suri	2008–2015	Mayo Clinic, Rochester, Minnesota	USA	Retrospective observational cohort	487	NR	NR	NR
Wang	2007–2015	Department of Cardiovascular Surgery, Chinese People's Liberation Army General Hospital, Beijing	China	Retrospective observational cohort	84	NR	36.6±33.4	DaVinci Si

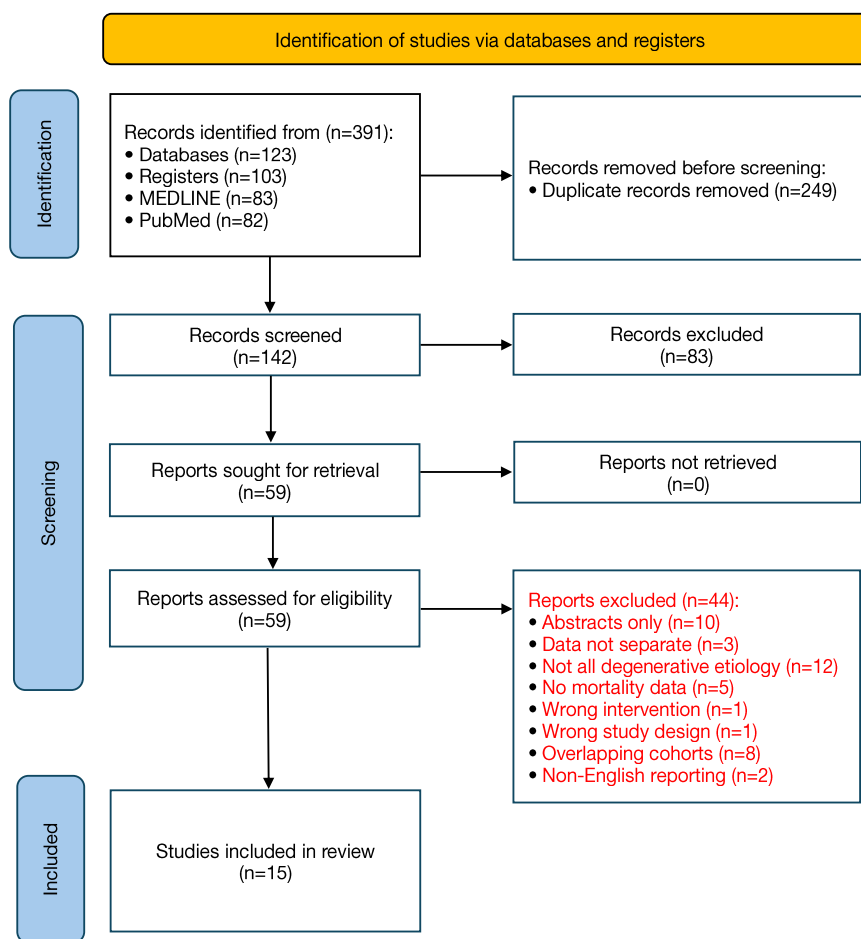


Figure S1 PRISMA flow-chart summarizing the search strategy for relevant publications.

Table S2 Operative data											
Study	Sample size	Robot model	CCT (min), mean ± SD	CPBT (min), mean ± SD	converted to replacement (n/%)	Concomitant tricuspid repair	Concomitant atrial fibrillation operation	Annuloplasty (n/%)	Resection (triangular/quadrangular/sliding) (n/%)	Neochordae (n/%)	Edge to edge repair/commissuroplasty (n/%)
Agnino	59	DaVinci X	100.5±27.3	177.3±39.5	1.7% (1)	NR	NR	20.3% (12)	5.1% (3)	10.2% (6)	10.2% (6)
Amabile	200	NR	79±5.5	122±8.8	0% (0)	12.5% (25)	21% (42)	100% (200)	39.5% (79)	79% (152)	1.5% (3)
Chemtob	605	NR	73±20	123±33	3.4% (13)	0% (0)	0% (0)	100% (605)	66% (399)	30% (183)	8.5% (51)
Chen	853	NR	81.9±20.6	124.2±27.3	NR	5.51% (47)	18.87% (161)	100% (853)	84.17% (718)	16.65% (142)	NR
Chitwood	300	DaVinci	122.1±33.3	158.7±41.8	0% (0)	0% (0)	10.3% (31)	100% (300)	24% (72)	13.3% (40)	2% (6)
Goldberger	144	NR	NR	NR	NR	4.2% (6)	13.3% (19)	100% (144)	NR	72.7% (104)	68.5% (98)
Javadikasgari	623	DaVinci	NR	NR	0.2% (1)	0% (0)	6.6% (41)	100% (623)	79% (494)	21% (128)	NR
Kesavuori	142	DaVinci Si	104.7±24.4	157.7±34.1	1.4% (2)	4.2% (6)	24.6% (35)	99.3% (139)	37.1% (52)	55.7% (78)	0% (0)
Mori	7,692	NR	92.7±36.0	141.2±53.5	1% (75)	5.8% (446)	50.9% (3,918)	NR	NR	NR	NR
Navarra	134	DaVinci Si	112±23	159±33	NR	NR	2.2% (3)	98.6% (132)	35.8% (48)	90% (121)	15% (20)
Piperata	29	DaVinci X	115.3±33.3	198.7±64.4	NR	14% (4)	7% (2)	100% (29)	0% (0)	100% (29)	28% (8)
Rao, 2022	62	NR	148±37	148	NR	NR	NR	100% (124)	49.2% (61)	26.6% (33)	7.3% (9)
Sandoval, 2024	124	DaVinci X or DaVinci Xi	114.0±54.07	183.17±103.33	NR	NR	5.6% (7)	100% (124)	22.6% (28)	82.3% (102)	NR
Suri, 2015	487	NR	54.7±15.6	78.7±20.7	0% (0)	NR	5.9% (29)	100% (198)	77.8% (154)	54% (107)	52.5% (105)
Wang, 2016	84	DaVinci Si	NR	NR	NR	NR	NR	94.1% (79)	79.8% (67)	23.8% (20)	NR

CCT, cross clamp time; CPBT, cardiopulmonary bypass time; NR, not reported.

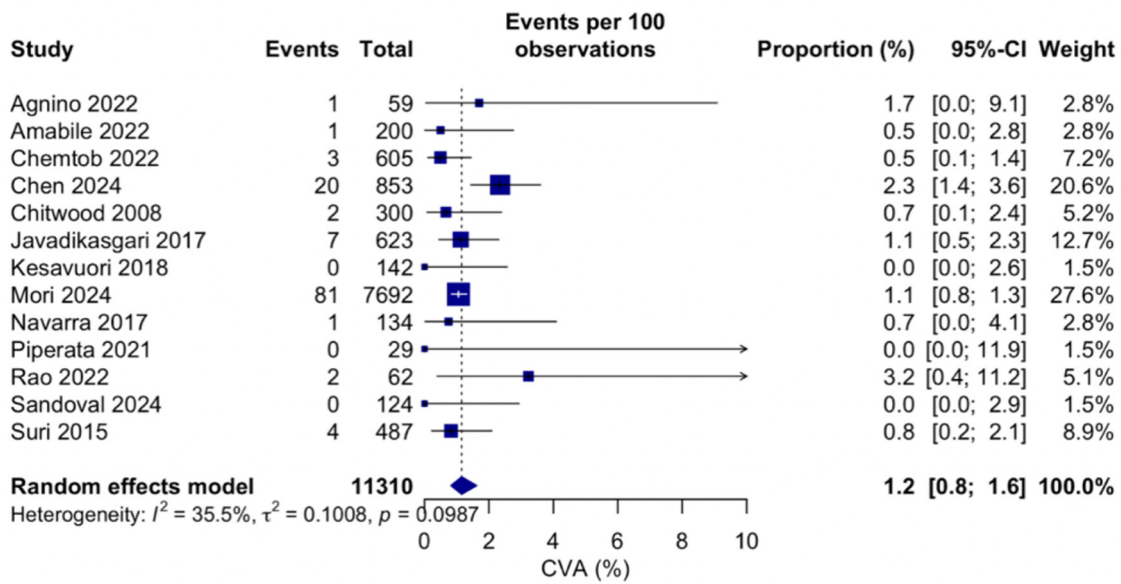


Figure S2 Forest plot for postoperative cerebrovascular accident.

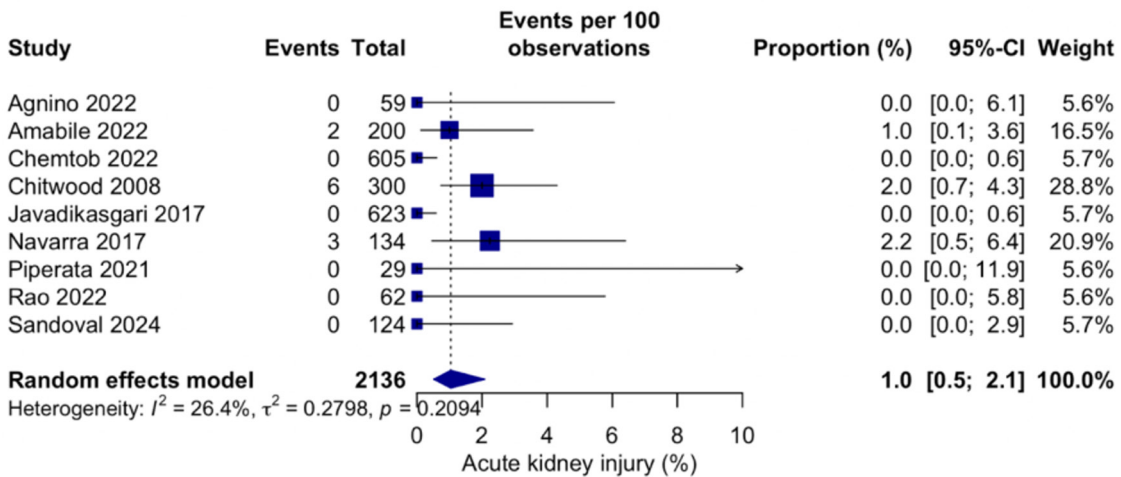


Figure S3 Forest plot for postoperative acute kidney injury.

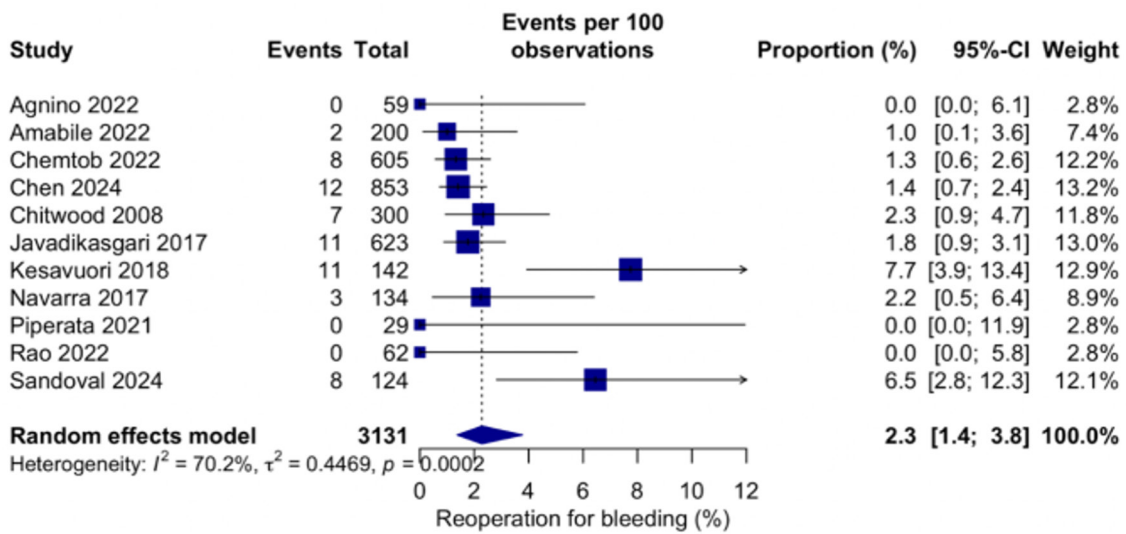


Figure S4 Forest plot for reoperation for bleeding.

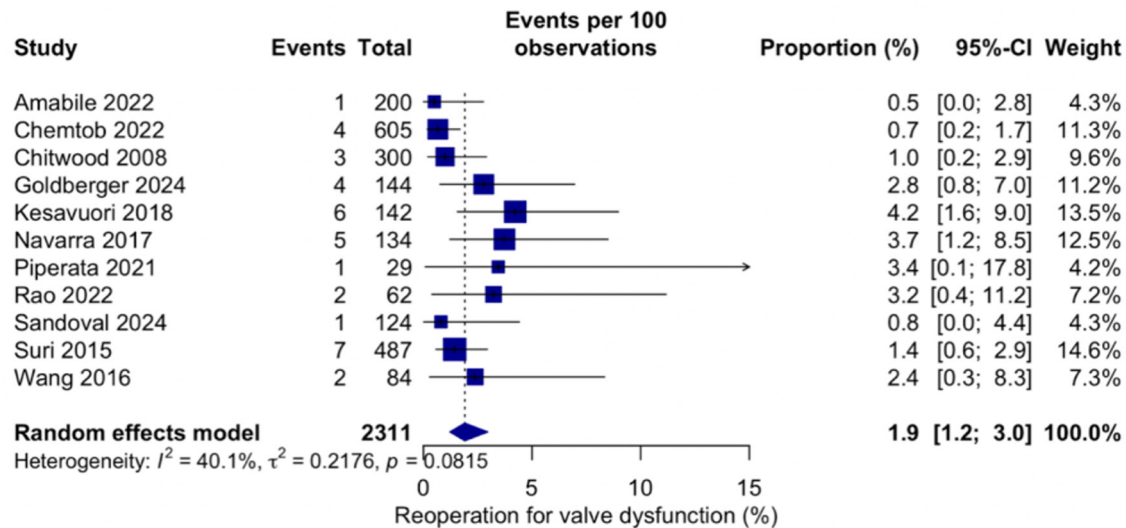


Figure S5 Forest plot for reoperation for valve dysfunction.

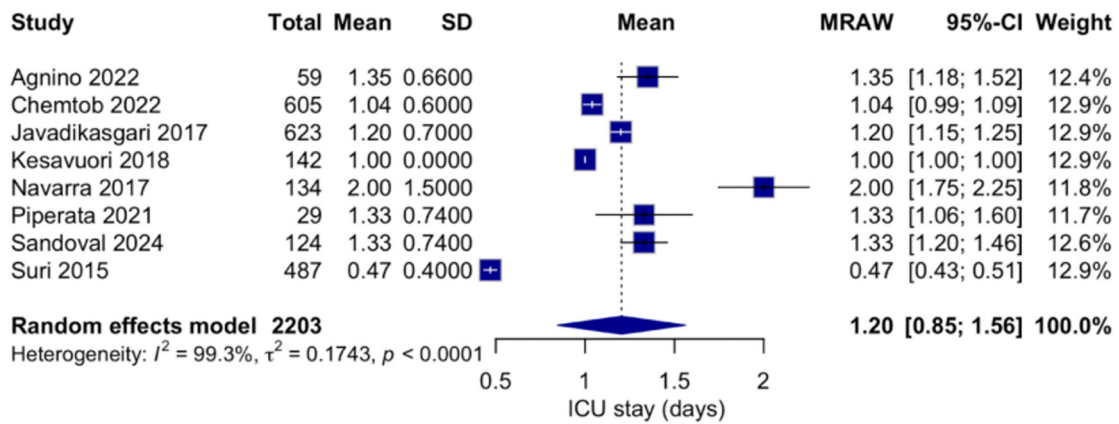


Figure S6 Forest plot for mean ICU stay.

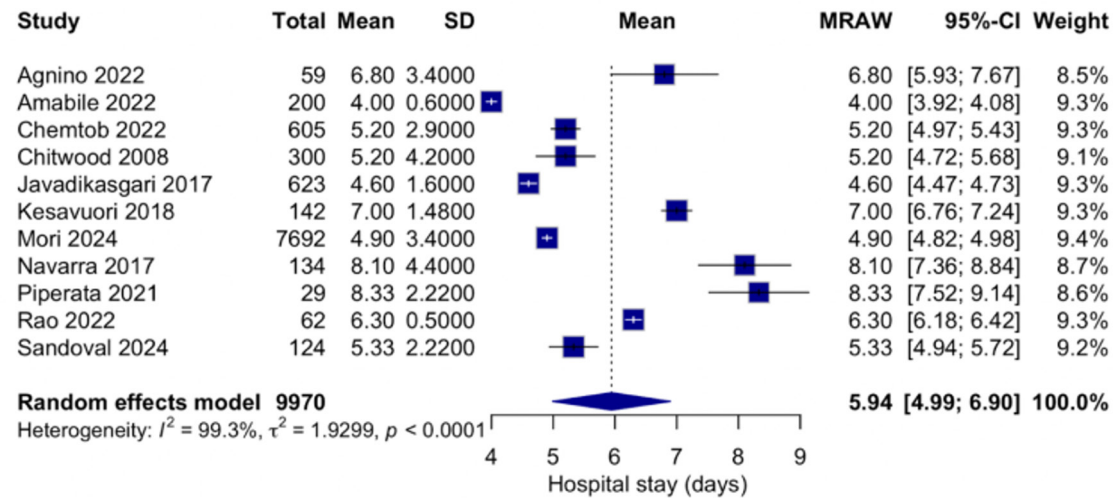


Figure S7 Forest plot for mean hospital stay.

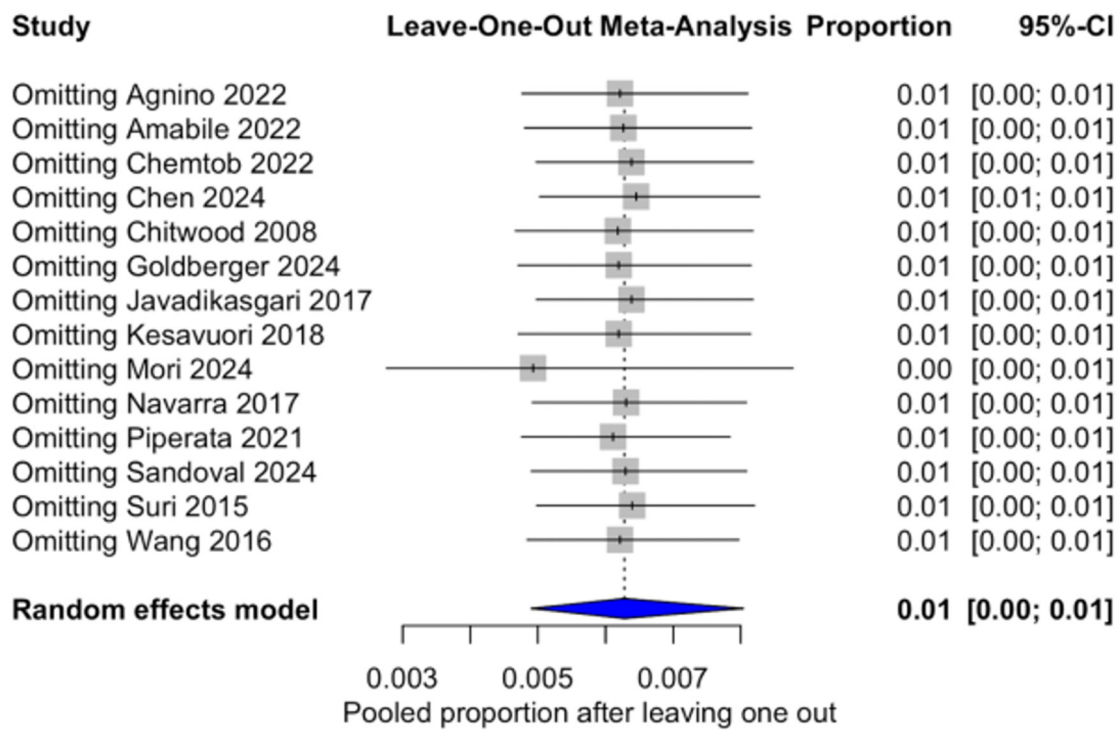


Figure S8 Leave one out analysis for short-term mortality.

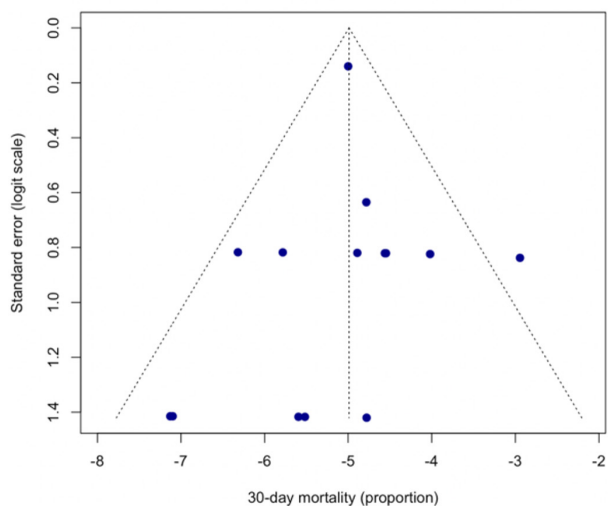


Figure S9 Funnel plot for 30-day mortality.

Outcome	Egger's P value
30-day mortality	0.713
CVA	0.968
AKI	0.0139
Dialysis	0.136
AF	0.538
Reoperation for bleeding	0.510
Reoperation for valve dysfunction	0.761
ICU stay	0.141
Hospital stay	0.103

		Risk of bias domains							
		D1	D2	D3	D4	D5	D6	D7	Overall
Study	Agnino 2022	-	-	+	+	-	+	-	-
	Amabile 2022	-	-	+	+	-	+	-	-
	Chemtob 2022	×	×	+	+	-	+	×	×
	Chen 2024	×	×	+	+	-	+	-	×
	Chitwood 2008	-	-	+	+	-	+	-	-
	Goldberger 2024	×	-	+	+	-	+	-	×
	Javadikasgari 2017	-	-	+	+	-	+	-	-
	Kesävuori 2018	-	-	+	+	-	+	-	-
	Mori 2024	+	-	+	+	-	+	-	-
	Navarra 2017	-	-	+	+	-	+	-	-
	Piperata 2021	×	×	+	-	-	+	-	×
	Rao 2022	-	-	+	+	-	+	-	-
	Sandoval 2024	×	-	+	-	-	+	-	×
	Suri 2015	-	-	+	+	-	+	-	-
	Wang 2016	×	-	+	+	×	+	-	×

Domains:
D1: Bias due to confounding.
D2: Bias due to selection of participants.
D3: Bias in classification of interventions.
D4: Bias due to deviations from intended interventions.
D5: Bias due to missing data.
D6: Bias in measurement of outcomes.
D7: Bias in selection of the reported result.

Judgement
× Serious
- Moderate
+ Low

Figure S10 ROBINS-I risk-of-bias assessment across included studies.