APPENDICES

APPENDIX A: Supplementary tables

Supplementary Table 1. Characteristics of original studies included in meta-analysis

References	Country	Treatment type	Sample size	Population characteristics		Mean tumor size, cm (SD)	Estimated blood loss (ML) mean (SD)	Number of major complications (%)
				% male	Mean age (SD)			
Jeschke, 2001[22]	Austria	LPN	51	27.5	59.8 (11.1)	2.0 (0.9)	346 (173)	NR
Matin, 2002[23]	U.S.	OPN	82	61.0	56.2 (11.5)	2.6 (NR)	217 (113)	NR
Gill, 2003[24]	U.S.	OPN	76	67.0	58.8 (11.6)	3.4 (0.8)	267 (189)	NR
		LPN	100	58.2	65.1 (11.4)	2.9 (1.5)	142 (75)	NR
Simon, 2003[25]	U.S.	LPN	19	78.9	65.5 (11.7)	2.2 (1.3)	126 (94)	0 (0.0)
Beasley, 2004[26]	Canada	OPN	22	63.6	51.1 (16.4)	2.9 (1.1)	334 (343)	NR
		LPN	27	59.3	53.5 (17.7)	2.4 (1.2)	250 (250)	NR
Yoshikawa, 2004[27]	Japan	LPN	17	76.5	55.2 (16.7)	2.5 (1.1)	401 (523)	NR
Desai, 2005[28]	U.S.	LPN	153	58.2	60.6 (13.2)	2.3 (0.7)	211 (299)	NR
Fogarty, 2005[29]	U.S.	LPN	20	75.0	65.8 (11.3)	2.6 (0.9)	211 (113)	NR
Aron, 2008[30]	U.S.	LPN	12	66.7	61.0 (13.8)	2.9 (0.7)	300 (384)	NR
		RAPN	12	66.7	64.0 (13.8)	2.4 (0.7)	329 (315)	NR
Bensalah, 2008[31]	U.S.	LPN	50	62.0	56.5 (11.7)	2.6 (0.9)	217 (178)	NR
Finley, 2008[32]	U.S.	PTA	18	NR	NR	2.7 (0.8)	NR	1 (5.5)
Gong, 2008[33]	U.S.	OPN	77	54.5	59.7 (13.6)	2.4 (0.9)	385 (270)	22 (28.6)

		LPN	76	46.1	60.1 (12.5)	2.9 (0.8)	212 (251)	7 (9.2)
DeVoe, 2009[34]	U.S.	OPN	60	56.5	60.0 (9.8)	2.6 (1.1)	353 (294)	NR
Ho, 2009[35]		LPN	40	67.3	59.2 (12.4)	2.6 (1.2)	120 (154)	NR
Kural, 2009[36]	Austria	RAPN	20	65.0	58.2 (7.9)	3.5 (0.5)	189 (32)	NR
DeVoe, 2009[34]	Turkey	LPN	20	70.0	58.9 (15.4)	3.1 (1.5)	388 (254)	NR
		RAPN	11	72.7	50.8 (13.2)	3.2 (0.7)	286 (235)	NR
Mues, 2010[37]		PTA	90	NR	67.0 (-)	2.1 (0.7)	NR	2 (2.2)
Park, 2010[38]	Korea	OPN	279	74.2	53.1 (13.2)	2.3 (0.9)	418 (370)	7 (2.5)
		LPN	273	70.0	54.6 (13.2)	2.1 (0.8)	293 (223)	8 (2.9)
Scoll, 2010[39]	U.S.	RAPN	100	68.0	55.0 (12.0)	3.5 (1.4)	127 (151)	NR
Sidana, 2010[40]	U.S.	PTA	101	64.4	68.8 (11.6)	2.4 (1.1)	NR	5 (5.0)
Lavery, 2011[41]	U.S.	LPN	18	77.8	53.6 (11.1)	2.3 (1.2)	140 (76)	NR
		RAPN	20	55.0	55.4 (11.1)	2.5 (0.9)	93 (88)	NR
Lee, 2011[42]	Korea	RAPN	69	72.5	53.5 (11.8)	2.4 (1.3)	229 (183)	NR
Seo, 2011[43]	Korea	LPN	14	57.1	53.9 (11.6)	2.0 (1.2)	284 (112)	NR
		RAPN	13	76.9	54.2 (12.4)	2.7 (1.2)	264 (164)	NR
Guillotreau, 2012[44]	U.S.	RAPN	210	58.6	57.8 (11.8)	2.4 (0.8)	200 (149)	NR
Lucas, 2012[45]	U.S.	OPN	54	70.4	58.0 (13.4)	2.3 (0.8)	250 (229)	1 (1.9)
		LPN	15	41.2	49.4 (20.3)	2.2 (1.6)	100 (123)	0 (0.0)
		RAPN	27	70.4	62.1 (12.0)	2.4 (0.5)	100 (78)	1 (3.7)
Petros, 2012[46]	U.S.	RAPN	362	67.7	60.0 (11.0)	2.3 (0.6)	167 (112)	NR

Simone, 2012[47]	Italy	LPN	101	62.4	59.0 (5.6)	2.6 (0.5)	115 (44)	0 (0.0)
Atwell, 2013[48]	U.S.	PTA	408	64.4	68.5 (11.5)	2.1 (0.5)	NR	12 (2.9)
Ceccarelli, 2013[49]	Italy	RAPN	32	68.7	60.8 (14.3)	3.6 (1.2)	187 (250)	1 (3.1)
Choi, 2013[50]	Korea	LPN	52	63.5	51.1 (11.3)	2.2 (1.1)	259 (128)	1 (1.9)
		RAPN	48	70.8	50.9 (11.4)	2.5 (1.0)	296 (146)	0 (0.0)
Kim, 2013[51]	U.S.	PTA	124	NR	72.6 (10.2)	2.7 (1.1)	NR	1 (0.8)
Masson-Lecomte, 2013[52]	France	OPN	58	69.0	60.8 (11.2)	3.1 (1.2)	415 (368)	2 (3.4)
		RAPN	42	52.4	61.7 (10.9)	2.8 (1.4)	143 (226)	0 (0.0)
Schips, 2013[53]	Italy	LPN	21	66.7	58.4 (9.0)	2.0 (0.3)	196 (195)	2 (9.5)
Tanagho, 2013[54]	U.S.	RAPN	267	54.5	57.4 (11.9)	2.9 (1.5)	136 (112)	10 (3.7)
		PTA	267	61.0	69.3 (11.0)	2.5 (1.0)	NR	1 (0.4)
Williams, 2013[55]	U.S.	LPN	59	69.5	54.6 (11.7)	3.1 (2.2)	146 (143)	0 (0.0)
		RAPN	27	63.0	55.7 (11.2)	2.5 (1.2)	180 (200)	0 (0.0)
Youn, 2013[56]	Korea	OPN	14	57.1	53.9 (16.1)	2.4 (0.8)	65 (45)	NR
Emara, 2014[57]	U.K.	RAPN	47	46.3	60.5 (9.5)	2.6 (1.0)	94 (40)	NR
Ficarra, 2014[58]	Italy	OPN	200	65.5	62.4 (11.8)	2.8 (1.1)	100 (75)	9 (4.5)
Harris, 2015[59]	U.S.	RAPN	321	NR	59.3 (11.7)	2.7 (1.3)	117 (112)	9 (2.8)
Kim, 2015[60]	Korea	LPN	195	66.7	54.7 (12.7)	2.3 (1.1)	321 (52)	NR
		RAPN	195	63.6	54.4 (13.0)	2.4 ± 1.2	200 (33)	NR
Okhunov, 2015[61]	U.S.	PTA	236	67.4	68.2 (10.6)	2.4 (1.0)	NR	1 (0.4)
	U.S.	LPN	646	61.4	57.4 (12.4)	2.0 (1.0)	NR	16 (2.5)

Zargar, 2015- Study 1[62]		RAPN	1185	59.8	59.3 (11.2)	2.3 (1.0)	NR	19 (1.6)
Zargar, 2015- Study 2[63]	U.S.	PTA	137	67.2	67.2 (11.9)	2.3 (0.9)	NR	1 (0.7)
Huang, 2016[64]	China	LPN	45	62.2	50.0 (10.4)	2.9 (0.6)	220 (132)	NR
Li, 2016[65]	Taiwan	LPN	31	61.3	53.0 (7.5)	2.9 (1.1)	171 (156)	NR
Oh, 2016[66]	Germany	OPN	385	69.6	54.9 (13.1)	2.3 (0.8)	214 (203)	27 (7.0)
		RAPN	317	72.6	52.1 (12.2)	2.2 (0.8)	167 (237)	7 (2.2)
Pantelidou, 2016[67]	U.K.	RAPN	63	NR	54.0 (7.0)	2.9 (0.1)	NR	1 (1.6)
		PTA	63	NR	61.0 (21.0)	2.1 (0.2)	NR	1 (1.6)
Robert, 2016[68]	Australia	LPN	50	54.0	56.9 (10.5)	2.5 (1.3)	NR	4 (8.0)
Han, 2017[69]	Korea	OPN	354	76.3	55.3 (12.4)	2.8 (1.4)	NR	7 (2.0)
		LPN	89	69.7	53.6 (9.7)	2.6 (1.1)	NR	3 (3.4)
		RAPN	147	73.5	52.5 (11.9)	2.4 (0.9)	NR	2 (1.4)
Luciani, 2017[70]	Italy	OPN	73	69.9	63.0 (13.0)	3.6 (2.3)	275 (362)	9 (12.3)
		LPN	70	60.0	62.0 (11.0)	3.5 (1.4)	316 (307)	12 (17.1)
		RAPN	110	60.9	61.0 (12.0)	3.6 (1.5)	245 (267)	8 (7.3)
Reynolds, 2017[71]	USA	RAPN	1307	56.2	58.1 (11.8)	2.5 (0.7)	326 (188)	47 (3.6)
Simsek, 2017[72]	Turkey	LPN	20	75.0	50.2 (11.3)	NR	219 (61)	NR
		RAPN	22	54.5	54.8 (9.6)	NR	183 (50)	NR
Azevedo, 2018[73]	Brazil	PTA	60	80.0	63.9 (12.54)	1.6 (0.82)	NR	1 (1.7)
Borghesi, 2018[74]	Italy	OPN	52	57.7	62.7 (16.0)	3.0 (1.5)	250 (153)	3 (5.8)

		RAPN	52	51.1	61.3 (16.0)	3.0 (1.5)	100 (33)	0 (0.0)
Breen, 2018[75]	U.K.	PTA	473	67.7	67.2 (11.8)	3.3 (1.1)	NR	23 (4.9)
Motoyama, 2019[76]	Japan	OPN	37	62.2	59.8 (10.6)	3.3 (1.5)	360 (632)	1 (2.7)
		RAPN	37	59.5	62.0 (12.7)	2.5 (0.8)	143 (118)	1 (2.7)
Park, 2019[77]	Korea	OPN	53	75.5	53.0 (13.2)	2.5 (0.6)	NR	NR
Furukawa, 2020[78]	Japan	RAPN	804	72.6	63.0 (11.1)	2.6 (1.0)	47 (67)	17 (2.1)
Zangiacomo, 2021[79]	Brazil	PTA	85	74.1	62.7 (11.3)	2.3 (0.8)	NR	2 (2.3)
Bersang, 2021[80]	Denmark	PTA	118	73.7	63.8 (10.4)	2.3 (0.5)	NR	2 (1.8)
Watanabe, 2021[81]	Japan	RAPN	100	64.0	62.6 (13.6)	2.5 (1.1)	111 (167)	NR
Benamran, 2022[82]	France	RAPN	20	55.0	61.3 (5.6)	2.5 (0.7)	63 (24)	1 (5.0)
Bianchi, 2022[83]	Italy	PTA	137	65.7	72.0 (10.5)	2.3 (0.8)	NR	3
Furukawa, 2022[84]	Japan	RAPN	103	74.8	61.0 (11.6)	2.7 (1.0)	61 (96)	5 (4.9)
Junker, 2022[85]	Denmark	PTA	101	71.3	69.2 (10.5)	3.1 (0.9)	NR	3
Sri, 2023[86]	U.K.	RAPN	784	68.0	54.8 (10.0)	3.1 (1.5)	158 (49)	NR

*OPN: open partial nephrectomy, LPN: conventional laparoscopic partial nephrectomy, RAPN: robot-assisted partial nephrectomy, PTA: percutaneous thermal ablation

Supplementary Table 2. Risk of bias assessment in the included studies

Study	Domain				Total ROB assessment	Comment
	Study participation	Outcome measurement	Study Attrition	Statistical Analysis and Reporting		
Jeschke, 2001[22]	No	Yes	Yes	Yes	Serious	Inadequate description of the sampling frame, recruitment, inclusion and exclusion criteria
Matin, 2002[23]	Yes	No	Yes	Yes	Serious	A clear definition of the outcomes of interest is not provided
Gill, 2003[24]	Yes	Yes	Yes	Yes	Not serious	NA
Simon, 2003[25]	No	No	Yes	Yes	Serious	Inadequate description of the sampling frame, recruitment, inclusion and exclusion criteria; a clear definition of the outcome (s) of interest is not provided
Beasley, 2004[26]	Yes	Yes	Yes	Yes	Not serious	NA
Yoshikawa, 2004[27]	No	No	Yes	Yes	Serious	Inadequate description of the sampling frame, recruitment, inclusion and exclusion criteria; a clear definition of the outcome (s) of interest is not provided
Desai, 2005[28]	Yes	Yes	Yes	Yes	Not serious	NA
Fogarty, 2005[29]	No	Yes	Yes	Yes	Serious	Inadequate description of the sampling frame
Aron, 2008[30]	Yes	Yes	Yes	Yes	Not serious	NA

Bensalah, 2008[31]	No	Yes	Yes	Yes	Serious	Inadequate description of inclusion and exclusion criteria
Finley, 2008[32]	Yes	Yes	Yes	Yes	Not serious	NA
Gong, 2008[33]	Yes	Yes	Yes	Yes	Not serious	NA
DeVoe, 2009[34]	No	No	Yes	Yes	Serious	Inadequate description of inclusion and exclusion criteria; a clear definition of the outcomes of interest is not provided
Ho, 2009[35]	Yes	Yes	Yes	Yes	Not serious	NA
Kural, 2009[36]	No	Yes	Yes	Yes	Serious	Inadequate description of inclusion and exclusion criteria
Mues, 2010[37]	No	Yes	Yes	Yes	Serious	Inadequate description of the sampling frame, recruitment, inclusion and exclusion criteria
Park, 2010[38]	Yes	Yes	Yes	Yes	Not serious	NA
Scoll, 2010[39]	Yes	Yes	Yes	Yes	Not serious	NA
Sidana, 2010[40]	Yes	Yes	Yes	Yes	Not serious	NA
Lavery, 2011[41]	Yes	Yes	Yes	Yes	Not serious	NA
Lee, 2011[42]	Yes	Yes	Yes	Yes	Not serious	NA
Seo, 2011[43]	No	Yes	Yes	Yes	Serious	Inadequate description of inclusion and exclusion criteria
Guillotreau, 2012[44]	No	Yes	Yes	Yes	Serious	Inadequate description of the sampling frame, recruitment, inclusion and exclusion criteria
Lucas, 2012[45]	Yes	Yes	Yes	Yes	Not serious	NA

Petros, 2012[46]	Yes	Yes	Yes	Yes	Not serious	NA
Simone, 2012[47]	Yes	Yes	Yes	Yes	Not serious	NA
Atwell, 2013[48]	No	Yes	Yes	Yes	Serious	Inadequate description of the sampling frame, recruitment, inclusion and exclusion criteria
Ceccarelli, 2013[49]	Yes	Yes	Yes	Yes	Not serious	NA
Choi, 2013[50]	Yes	Yes	Yes	Yes	Not serious	NA
Kim, 2013[51]	No	Yes	Yes	Yes	Serious	Inadequate description of exclusion criteria
Masson-Lecomte, 2013[52]	No	Yes	Yes	Yes	Serious	Inadequate description of the sampling frame, recruitment, inclusion and exclusion criteria
Schips, 2013[53]	No	No	Yes	Yes	Serious	Inadequate description of the sampling frame and exclusion criteria; inadequate method of outcome measurement - may not be validated or reliable
Tanagho, 2013[54]	No	Yes	Yes	Yes	Serious	Inadequate description of the inclusion and exclusion criteria
Williams, 2013[55]	No	Yes	Yes	Yes	Serious	Inadequate description of the sampling frame, recruitment, inclusion and exclusion criteria
Youn, 2013[56]	No	Yes	Yes	Yes	Serious	Inadequate description of the sampling frame, Recruitment, inclusion and exclusion criteria, and place of recruitment
Emara, 2014[57]	Yes	Yes	Yes	Yes	Not serious	NA

Ficarra, 2014[58]	No	No	Yes	Yes	Serious	Sampling frames were two different databases resulting in heterogeneity in surgical techniques; outcomes of interest were not measured in a similar way for all participants
Harris, 2015[59]	Yes	Yes	Yes	Yes	Serious	A clear definition of the outcome (s) of interest is not provided
Kim, 2015[60]	No	Yes	Yes	Yes	Serious	Inadequate description of the sampling frame, recruitment, inclusion and exclusion criteria
Okhunov, 2015[61]	No	Yes	Yes	Yes	Serious	Inadequate description of the sampling frame, recruitment, inclusion and exclusion criteria
Zargar, 2015- Study 1[62]	No	Yes	Yes	Yes	Serious	Inadequate description of the sampling frame and recruitment
Zargar, 2015- Study 2[63]	No	Yes	Yes	Yes	Serious	Inadequate description of the sampling frame and recruitment
Huang, 2016[64]	No	Yes	Yes	Yes	Serious	Inadequate participation in the study by eligible persons
Li, 2016[65]	No	Yes	Yes	Yes	Serious	Inadequate participation in the study by eligible persons
Oh, 2016[66]	Yes	Yes	Yes	Yes	Not serious	NA
Pantelidou, 2016[67]	Yes	Yes	Yes	Yes	Serious	Outcome of interest was not measured in a similar way for all participants, setting of outcome measurement

						is not the same for all study participants
Robert, 2016[68]	No	Yes	Yes	Yes	Serious	Inadequate description of the sampling frame, recruitment, inclusion and exclusion criteria
Han, 2017[69]	Yes	Yes	Yes	Yes	Not serious	NA
Luciani, 2017[70]	Yes	Yes	Yes	Yes	Not serious	NA
Reynolds, 2017[71]	Yes	Yes	Yes	Yes	Not serious	NA
Simsek, 2017[72]	No	Yes	Yes	Yes	Serious	Inadequate description of the source population
Azevedo, 2018[73]	Yes	Yes	Yes	Yes	Serious	A clear definition of the outcome (s) of interest is not provided
Borghesi, 2018[74]	No	Yes	Yes	Yes	Serious	Inadequate description of the sampling frame, recruitment, inclusion and exclusion criteria
Breen, 2018[75]	No	Yes	Yes	Yes	Serious	Inadequate description of the sampling frame, recruitment, inclusion and exclusion criteria
Motoyama, 2019[76]	Yes	Yes	Yes	Yes	Not serious	NA
Park, 2019[77]	Yes	Yes	Yes	Yes	Not serious	NA
Furukawa, 2020[78]	No	Yes	Yes	Yes	Serious	Inadequate description of the sampling frame, recruitment, inclusion and exclusion criteria
Zangiacomo, 2021[79]	Low	Low	Low	Low	Low	NA
Bersang, 2021[80]	Low	Low	Low	Low	Low	NA
Watanabe, 2021[81]	High	Low	Low	Low	High	Inadequate description of the sampling frame, recruitment, inclusion and exclusion criteria

Benamran, 2022[82]	Low	Low	Low	Low	Low	NA
Bianchi, 2022[83]	Low	Low	Low	Low	Low	NA
Furukawa, 2022[84]	Low	Low	Low	Low	Low	NA
Junker, 2022[85]	Low	Low	Low	Low	Low	NA
Sri, 2023[86]	Low	Low	Low	Low	Low	NA

Supplementary Table 3. Test of prognostic factors, Chi-squared test, Kruskal Wallis test, and Welch t-test

Prognostic factor	**Outcome**	**Intervention**	**Chi-squared/t**	**df**	**p**
Region of studies	Major complications	OPN	11.51	2	0.003
		LPN	3.51	3	0.32
		RAPN	0.21	2	0.90
		PTA	1.91	3	0.59
	EBL	OPN	0.21	2	0.90
		LPN	10.53	2	0.005
		RAPN	5.42	3	0.14
Sample size of study	Major complications	OPN	1.50	1	0.22
		LPN	7.65	1	0.006
		RAPN	0.03	1	0.87
		PTA	0.00	1	0.95
	EBL	OPN	0.06	1	0.81
		LPN	0.09	1	0.77
		RAPN	0.03	1	0.87
Risk of bias	Major complications	OPN	0.18	1	0.67
		LPN	0.03	1	0.86
		RAPN	2.61	1	0.11
		PTA	1.87	1	0.17
	EBL	OPN	0.86	1	0.35
		LPN	0.13	1	0.72
		RAPN	0.35	1	0.56

EBL: estimated blood loss; LPN: laparoscopic partial nephrectomy; OPN: open partial nephrectomy; PTA: percutaneous thermal ablation; RAPN: robot-assisted partial nephrectomy.

Supplementary Table 4. GRADE, certainty of evidence assessment										
Out-comes	**Interven-tions**	**Studies (n)**	**Patients (n)**	**Estimates (mean or proportion , 95% CI)**	**ROB**	**Inconsis-tency**	**Impre-cision**	**Indirect-ness**	**Other consider-ations**	**Certainty**
Major complications (percent)	**OPN**	10	1569	5.4 (2.9–9.9)	Not serious	Very serious[a]	Not serious	Not serious	None	⊕⊕◯◯ Low
	LPN	11	1452	4.70 (2.6–8.3)	Not serious	Very serious[b]	Not serious	Not serious	None	⊕⊕◯◯ Low
	RAPN	20	4962	2.9 (2.3–3.8)	Serious	Serious[c]	Not serious	Not serious	None	⊕⊕⊕◯ Moderate
	PTA	15	2395	2.5 (1.7–3.6)	Serious[d]	Not serious	Not serious	Not serious	None	⊕⊕⊕◯ Moderate
Estimated blood loss (ml)	**OPN**	14	1491	262 (200–324)	Not serious	Serious[e]	Not serious	Not serious	None	⊕⊕⊕◯ Moderate
	LPN	25	1496	224 (193–254)	Serious[f]	Serious[g]	Not serious	Not serious	None	⊕⊕◯◯ Low
	RAPN	29	5477	163 (136–190)	Not serious	Serious[h]	Not serious	Not serious	None	⊕⊕⊕◯ Moderate

[a]The point estimates show a range of low (1.8%) to high (28.6%) proportion of major complications after treatment procedures SRMs patients. [b] The point estimates show a range of low (0.0%) to high (17.1%) proportion of major complications after treatment procedures SRMs patients. [c]The point estimates show a range of low (0.0%) to high (7.2%) proportion of major complications after treatment procedures SRMs patients. [d]Seven studies have high risk of bias in the study participation domain and 2 studies have high risk of bias in the outcome measurement domain. [e]The point estimates show a range of low (65.8 ml) to high (418.0 ml) mean of estimated blood loss in SRMs patients. [f]Ten studies have high risk of bias in the study participation domain and 4 studies have high risk of bias in both study population and outcome measurement domains. [g]The point estimates show a range of low (100.0 ml) to high (401.2ml) mean of estimated blood loss in SRMs patients. [h]The point estimates show a range of low (46.67 ml) to high (329.0 ml) mean of estimated blood loss in SRMs patients. LPN: conventional laparoscopic partial; OPN: open partial nephrectomy; nephrectomy; PTA: percutaneous thermal ablation; RAPN: robot-assisted partial nephrectomy.

APPENDIX B: Completed ICEMAN tool

1. **Completed ICEMAN tool for assessing the credibility of geographic area analysis in studies on the proportion of major complications for patients with small renal masses undergoing open partial nephrectomy.**

Instrument for assessing the Credibility of Effect Modification Analyses (ICEMAN) in meta-analyses of prognostic studies (*Version 1.0)*

Quick instructions

- Synonyms for effect modification include prognosis *modification*, prognostic effect, and interaction.
- The instrument applies to a single proposed prognostic factor at a time; complete one form per each outcome, time-point, effect measure, and prognostic factor.
- Response options on the left indicate definitely or probably reduced, response options on the right probably or definitely increased credibility.
- Completely unclear goes under probably reduced credibility.
- It is helpful to provide a supporting comment or quotation under each question.
- The manual provides more detailed instructions and examples.

Preliminary considerations

Study reference(s): Hospital stays and procedure time after partial nephrectomy or percutaneous thermal ablation – a systematic review and meta-analysis

If available, protocol reference(s): Registration ID on PROSPERO: CRD42022308375

State a single outcome and, if applicable, time-point of interest (e.g., mortality at 1 year follow-up): Major complications

State the population of interest of interest (e.g., multiple myeloma patients): Small renal masses patients who underwent open partial nephrectomy

State a single effect measure of interest (e.g., risk ratio, proportion or mean): Proportion

State a single potential prognosis modifier/prognostic factor of interest (e.g., age or comorbidity): Geographic area of conducting studies

Credibility assessment

1: Is the analysis of prognostic factor based on comparison within rather than between studies?

[ ] Completely between [ ] Mostly between or unclear [ ] Mostly within [ ] Completely within

Prognostic factor analysis or meta-regression comparing overall effects of each individual study. This is typical for aggregate data meta-analysis.	*Prognostic factor analysis or meta-regression with most information coming from overall effects, but some studies providing within-study subgroup information*	*Most studies providing within-study prognostic factor information; or individual participant data analysis that combines within and between study information*	*All studies providing within-study prognostic factor information or individual participant data; and the analysis separates within from between study information, e.g., meta-analysis of interactions*

Comment: The analysis of prognostic factor is completely based on comparison between studies.

2: For within-study comparisons, is the prognosis *modification* similar from study to study ? [ ] Not applicable: no or one within-study comparison

[ ] Definitely not similar	[ ] Probably not similar or unclear	[ ] Mostly similar	[ ] Definitely similar
Prognosis *modification reported for two or more studies and clearly different directions*	Prognosis *modification not reported for individual studies or too imprecise to tell*	Prognosis *modification reported for two or more studies, mostly similar in direction, but considerable differences in magnitude*	Prognosis *modification reported for two or more studies, similar in direction, only some differences in magnitude*

Comment:

3: For between- study comparisons, is the number of studies large? [ ] Not applicable: no between study comparison

[ ] Very small	[ ] Rather small or unclear	[ ] Rather large	[ ] Large
1 or 2 or in smallest subgroup; 5 or less in continuous meta-regression	*3-4 in smallest subgroup; 6-10 in continuous meta-regression*	*5-9 in smallest subgroup; 11 to 15 in continuous meta-regression*	*10 or more in smallest subgroup; more than 15 in continuous meta-regression*

Comment: 10 studies are included in total and 2 studies are included in the smallest subgroup.

4: Was the direction of prognosis *modification* correctly hypothesized a priori?

[ ] Definitely no	[ ] Probably no or unclear	[ ] Probably yes	[ ] Definitely yes

Clearly post-hoc or results inconsistent with hypothesized direction or biologically very implausible	*Vague hypothesis or hypothesized direction unclear*	*No prior protocol available but unequivocal statement of a priori hypothesis with correct direction of* prognosis *modification*	*Prior protocol available and includes correct specification of direction of* prognosis *modification, e.g., based on a biologic rationale*

Comment: A prior protocol has been published on PROSPERO. The analysis of prognostic factors in different geographic areas is suggested based on experts' opinions. The hypothesis is that there might be a significant difference in the proportion of major complications between various geographic areas worldwide.

5: Does a test for interaction suggest that chance is an unlikely explanation of the apparent prognosis modification? (consider irrespective of number of prognosis modifiers)

[ ] Chance a very likely explanation	[ ] Chance a likely explanation or unclear	[ ] Chance may not explain	[ ] Chance an unlikely explanation
Interaction or meta-regression p-value >0.05	*Interaction or meta-regression p-value ≤0.05 and >0.01, or no test of interaction reported and not computable*	*Interaction or meta-regression p-value ≤0.01 and >0.005*	*Interaction or meta-regression p-value ≤0.005*

Comment: The results of test for subgroup differences showed a p-value of = 0.003.

6: Did the authors test only a small number of prognosis modifiers or consider the number in their statistical analysis?

[ ] Definitely no	[ ] Probably no or unclear	[ ] Probably yes	[ ] Definitely yes
Explicitly exploratory analysis or large number of prognosis modifiers tested (e.g., greater than 10) and multiplicity not considered in analysis	*No mention of number or 4-10 prognosis modifiers tested and number not considered in analysis*	*No protocol available but unequivocal statement of 3 or fewer prognosis modifiers tested*	*Protocol available and 3 or fewer prognosis modifiers tested or number considered in analysis*

Comment: A protocol is available and prognostic factor analysis is tested only for ROB, sample size and area.

7: Did the authors use a random effects model?

[ ] Definitely no	[ ] Probably no or unclear	[ ] Probably yes	[ ] Definitely yes

Fixed (or common) effect or fixed effects model explicitly stated	*Probably fixed effect(s) model*	*Probably random (or mixed) effects*	*Random (or mixed) effects explicitly stated*

Comment: Meta-analysis for all outcomes in all patient's population groups are based on random effects model.

8: If the prognostic factor is a continuous variable, were arbitrary cut points avoided? [ ] not applicable: not continuous

[ ] Definitely no	[ ] Probably no or unclear	[ ] Probably yes	[ ] Definitely yes
Analysis based on exploratory cut point(s), e.g., picking cut point associated with highest interaction p-value	*Analysis based on cut point(s) of unclear origin*	*Analysis based on pre-specified cut point(s), e.g., suggested by prior study*	*Analysis based on the full continuum, e.g., assuming a linear or logarithmic relationship*

Comment: Area is a nominal variable.

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9 Optional: Are there any additional considerations that may increase or decrease credibility? (manual section 3.9) [ ] not applicable

[ ] Yes, probably decrease	[ ] Yes, probably increase

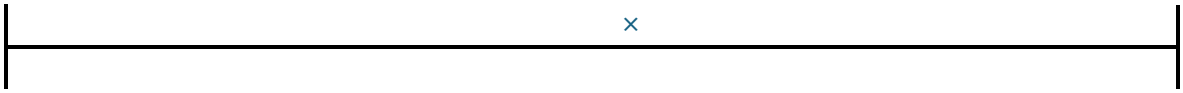
Comment:

10: How would you rate the overall credibility of the proposed prognosis modification?

The overall rating should be driven by the items that decrease credibility. The following provides a sensible strategy:

- All responses definitely or probably decrease credibility or unclear → very low
- Two or more responses definitely decrease credibility → maximum usually low even if all other responses satisfy credibility criteria
- One response definitely decreases credibility → maximum usually moderate even if all other responses satisfy credibility criteria
- Two responses probably decrease credibility → maximum usually moderate even if all other responses satisfy credibility criteria
- No response options definitely or probably decrease credibility → high very likely

Place a mark on the continuous line (or type "x" in editable version)



Very low credibility	**Low credibility**	**Moderate credibility**	**High credibility**
Very likely no prognosis modification Use overall effect for each subgroup	Likely no prognosis modification Use overall effect for each subgroup but note remaining uncertainty	Likely prognosis modification Use separate effects for each subgroup but note remaining uncertainty	Very likely prognosis modification Use separate effects for each subgroup

Comment: The credibility of prognostic factor analysis is considered low based on the responses.

2. Completed ICEMAN tool for assessing the credibility of sample size analysis in studies on the proportion of major complications for patients with small renal masses undergoing conventional laparoscopic partial nephrectomy

Instrument for assessing the Credibility of Effect Modification Analyses (ICEMAN) in meta-analyses of prognostic studies (*Version 1.0)*

Quick instructions

- Synonyms for effect modification include prognosis *modification*, prognostic effect, and interaction.
- The instrument applies to a single proposed prognostic factor at a time; complete one form per each outcome, time-point, effect measure, and prognostic factor.
- Response options on the left indicate definitely or probably reduced, response options on the right probably or definitely increased credibility.
- Completely unclear goes under probably reduced credibility.
- It is helpful to provide a supporting comment or quotation under each question.
- The manual provides more detailed instructions and examples.

Preliminary considerations

Study reference(s): Major complications and blood loss after invasive treatments of small renal masses, a systematic review and meta-analysis

If available, protocol reference(s): Registration ID on PROSPERO: CRD42022308375

State a single outcome and, if applicable, time-point of interest (e.g., mortality at 1 year follow-up): Major complications

State the population of interest of interest (e.g., multiple myeloma patients): Small renal masses patients who underwent conventional laparoscopic partial nephrectomy

State a single effect measure of interest (e.g., risk ratio, proportion or mean): Proportion

State a single potential prognosis modifier/prognostic factor of interest (e.g., age or comorbidity): Sample size of included studies

Credibility assessment

1: Is the analysis of prognostic factor based on comparison within rather than between studies?

[■] Completely between [ ] Mostly between or [ ] Mostly within [ ] Completely within unclear

Prognostic factor analysis or meta-regression comparing overall effects of each individual study. This is typical for aggregate data meta-analysis.	*Prognostic factor analysis or meta-regression with most information coming from overall effects, but some studies providing within-study subgroup information*	*Most studies providing within-study prognostic factor information; or individual participant data analysis that combines within and between study information*	*All studies providing within-study prognostic factor information or individual participant data; and the analysis separates within from between study information, e.g., meta-analysis of interactions*

Comment: The analysis of prognostic factor is completely based on comparison between studies.

2: For within-study comparisons, is the prognosis *modification* similar from study to study ? [ ] Not applicable: no or one within-study comparison

[ ] Definitely not similar	[ ] Probably not similar or unclear	[ ] Mostly similar	[ ] Definitely similar
Prognosis *modification reported for two or more studies and clearly different directions*	Prognosis *modification not reported for individual studies or too imprecise to tell*	Prognosis *modification reported for two or more studies, mostly similar in direction, but considerable differences in magnitude*	Prognosis *modification reported for two or more studies, similar in direction, only some differences in magnitude*

Comment:

3: For between- study comparisons, is the number of studies large? [ ] Not applicable: no between study comparison

[ ] Very small	[ ] Rather small or unclear	[ ] Rather large	[ ] Large
1 or 2 or in smallest subgroup; 5 or less in continuous meta-regression	*3-4 in smallest subgroup; 6-10 in continuous meta-regression*	*5-9 in smallest subgroup; 11 to 15 in continuous meta-regression*	*10 or more in smallest subgroup; more than 15 in continuous meta-regression*

Comment: 11 studies are included in total and 3 studies are included in the smallest subgroup.

4: Was the direction of prognosis *modification* correctly hypothesized a priori?

[ ] Definitely no	[ ] Probably no or unclear	[ ] Probably yes	[ ] Definitely yes

Clearly post-hoc or results inconsistent with hypothesized direction or biologically very implausible	*Vague hypothesis or hypothesized direction unclear*	*No prior protocol available but unequivocal statement of a priori hypothesis with correct direction of* prognosis *modification*	*Prior protocol available and includes correct specification of direction of* prognosis *modification, e.g., based on a biologic rationale*

Comment: A prior protocol has been published on PROSPERO. The analysis of prognostic factors based on different sample sizes (less than 100 patients included considered as small sample size and more than 100 patients considered as large sample size) is suggested based on experts' opinions. The hypothesis of effect of this prognostic factor is not clear.

5: Does a test for interaction suggest that chance is an unlikely explanation of the apparent prognosis modification? (consider irrespective of number of prognosis modifiers)

[ ] Chance a very likely explanation	[ ] Chance a likely explanation or unclear	[ ] Chance may not explain	[ ] Chance an unlikely explanation
Interaction or meta-regression p-value >0.05	*Interaction or meta-regression p-value ≤0.05 and >0.01, or no test of interaction reported and not computable*	*Interaction or meta-regression p-value ≤0.01 and >0.005*	*Interaction or meta-regression p-value ≤0.005*

Comment: The results of test for subgroup differences showed a p-value of = 0.006.

6: Did the authors test only a small number of prognosis modifiers or consider the number in their statistical analysis?

[ ] Definitely no	[ ] Probably no or unclear	[ ] Probably yes	[ ] Definitely yes
Explicitly exploratory analysis or large number of prognosis modifiers tested (e.g., greater than 10) and multiplicity not considered in analysis	*No mention of number or 4-10 prognosis modifiers tested and number not considered in analysis*	*No protocol available but unequivocal statement of 3 or fewer prognosis modifiers tested*	*Protocol available and 3 or fewer prognosis modifiers tested or number considered in analysis*

Comment: A protocol is available and prognostic factor analysis is tested only for ROB, sample size and area.

7: Did the authors use a random effects model?

[ ] Definitely no	[ ] Probably no or unclear	[ ] Probably yes	[ ] Definitely yes

Fixed (or common) effect or fixed effects model explicitly stated	*Probably fixed effect(s) model*	*Probably random (or mixed) effects*	*Random (or mixed) effects explicitly stated*

Comment: Meta-analysis for all outcomes in all patient's population groups are based on random effects model.

8: If the prognostic factor is a continuous variable, were arbitrary cut points avoided? [ ] not applicable: not continuous

[ ] Definitely no	[ ] Probably no or unclear	[ ] Probably yes	[ ] Definitely yes
Analysis based on exploratory cut point(s), e.g., picking cut point associated with highest interaction p-value	*Analysis based on cut point(s) of unclear origin*	*Analysis based on pre-specified cut point(s), e.g., suggested by prior study*	*Analysis based on the full continuum, e.g., assuming a linear or logarithmic relationship*

Comment: Sample size is a binomial variable (small/large).

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9 Optional: Are there any additional considerations that may increase or decrease credibility? (manual section 3.9) [ ] not applicable

[ ] Yes, probably decrease	[ ] Yes, probably increase

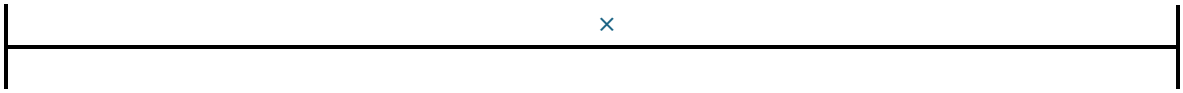
Comment:

10: How would you rate the overall credibility of the proposed prognosis modification?

The overall rating should be driven by the items that decrease credibility. The following provides a sensible strategy:

- All responses definitely or probably decrease credibility or unclear → very low
- Two or more responses definitely decrease credibility → maximum usually low even if all other responses satisfy credibility criteria
- One response definitely decreases credibility → maximum usually moderate even if all other responses satisfy credibility criteria
- Two responses probably decrease credibility → maximum usually moderate even if all other responses satisfy credibility criteria
- No response options definitely or probably decrease credibility → high very likely

Place a mark on the continuous line (or type "x" in editable version)



Very low credibility	**Low credibility**	**Moderate credibility**	**High credibility**
Very likely no prognosis modification Use overall effect for each subgroup	Likely no prognosis modification Use overall effect for each subgroup but note remaining uncertainty	Likely prognosis modification Use separate effects for each subgroup but note remaining uncertainty	Very likely prognosis modification Use separate effects for each subgroup

Comment: The credibility of prognostic factor analysis is considered low based on the responses.

3. Completed ICEMAN tool for assessing the credibility of geographic area analysis in studies on the estimated blood loss for patients with small renal masses undergoing conventional laparoscopic partial nephrectomy

Instrument for assessing the Credibility of Effect Modification Analyses (ICEMAN) in meta-analyses of prognostic studies (*Version 1.0)*

Quick instructions

- Synonyms for effect modification include prognosis *modification*, prognostic effect, and interaction.
- The instrument applies to a single proposed prognostic factor at a time; complete one form per each outcome, time-point, effect measure, and prognostic factor.
- Response options on the left indicate definitely or probably reduced, response options on the right probably or definitely increased credibility.
- Completely unclear goes under probably reduced credibility.
- It is helpful to provide a supporting comment or quotation under each question.
- The manual provides more detailed instructions and examples.

Preliminary considerations

Study reference(s): Hospital stays and procedure time after partial nephrectomy or percutaneous thermal ablation – a systematic review and meta-analysis

If available, protocol reference(s): Registration ID on PROSPERO: CRD42022308375

State a single outcome and, if applicable, time-point of interest (e.g., mortality at 1 year follow-up): Estimated blood loss

State the population of interest of interest (e.g., multiple myeloma patients): Small renal masses patients who underwent conventional laparoscopic partial nephrectomy

State a single effect measure of interest (e.g., risk ratio, proportion or mean): Mean

State a single potential prognosis modifier/prognostic factor of interest (e.g., age or comorbidity): Geographic area of conducting studies

Credibility assessment

1: Is the analysis of prognostic factor based on comparison within rather than between studies?

[ ] Completely between [ ] Mostly between or unclear [ ] Mostly within [ ] Completely within

Prognostic factor analysis or meta-regression comparing overall effects of each individual study. This is typical for aggregate data meta-analysis.	*Prognostic factor analysis or meta-regression with most information coming from overall effects, but some studies providing within-study subgroup information*	*Most studies providing within-study prognostic factor information; or individual participant data analysis that combines within and between study information*	*All studies providing within-study prognostic factor information or individual participant data; and the analysis separates within from between study information, e.g., meta-analysis of interactions*

Comment: The analysis of prognostic factor is completely based on comparison between studies.

2: For within-study comparisons, is the prognosis *modification* similar from study to study ? [ ] Not applicable: no or one within-study comparison

[ ] Definitely not similar	[ ] Probably not similar or unclear	[ ] Mostly similar	[ ] Definitely similar
Prognosis *modification reported for two or more studies and clearly different directions*	Prognosis *modification not reported for individual studies or too imprecise to tell*	Prognosis *modification reported for two or more studies, mostly similar in direction, but considerable differences in magnitude*	Prognosis *modification reported for two or more studies, similar in direction, only some differences in magnitude*

Comment:

3: For between- study comparisons, is the number of studies large? [ ] Not applicable: no between study comparison

[ ] Very small	[ ] Rather small or unclear	[ ] Rather large	[ ] Large
1 or 2 or in smallest subgroup; 5 or less in continuous meta-regression	*3-4 in smallest subgroup; 6-10 in continuous meta-regression*	*5-9 in smallest subgroup; 11 to 15 in continuous meta-regression*	*10 or more in smallest subgroup; more than 15 in continuous meta-regression*

Comment: 25 studies are included in total and 4 studies are included in the smallest subgroup.

4: Was the direction of prognosis *modification* correctly hypothesized a priori?

[ ] Definitely no	[ ] Probably no or unclear	[ ] Probably yes	[ ] Definitely yes

Clearly post-hoc or results inconsistent with hypothesized direction or biologically very implausible	*Vague hypothesis or hypothesized direction unclear*	*No prior protocol available but unequivocal statement of a priori hypothesis with correct direction of* prognosis *modification*	*Prior protocol available and includes correct specification of direction of* prognosis *modification, e.g., based on a biologic rationale*

Comment: A prior protocol has been published on PROSPERO. The analysis of prognostic factors in different geographic areas is suggested based on experts' opinions. The hypothesis is that there is a significant difference in the estimated blood loss between various geographic areas worldwide. Previous studies conducted in Asian countries have shown higher estimated blood loss compared to other studies and Europe has lower estimated blood loss.

5: Does a test for interaction suggest that chance is an unlikely explanation of the apparent prognosis modification? (consider irrespective of number of prognosis modifiers)

[ ] Chance a very likely explanation	[ ] Chance a likely explanation or unclear	[ ] Chance may not explain	[ ] Chance an unlikely explanation
Interaction or meta-regression p-value >0.05	*Interaction or meta-regression p-value ≤0.05 and >0.01, or no test of interaction reported and not computable*	*Interaction or meta-regression p-value ≤0.01 and >0.005*	*Interaction or meta-regression p-value ≤0.005*

Comment: The results of test for subgroup differences showed a p-value of = 0.0052.

6: Did the authors test only a small number of prognosis modifiers or consider the number in their statistical analysis?

[ ] Definitely no	[ ] Probably no or unclear	[ ] Probably yes	[ ] Definitely yes
Explicitly exploratory analysis or large number of prognosis modifiers tested (e.g., greater than 10) and multiplicity not considered in analysis	*No mention of number or 4-10 prognosis modifiers tested and number not considered in analysis*	*No protocol available but unequivocal statement of 3 or fewer prognosis modifiers tested*	*Protocol available and 3 or fewer prognosis modifiers tested or number considered in analysis*

Comment: A protocol is available and prognostic factor analysis is tested only for ROB, sample size and area.

7: Did the authors use a random effects model?

[ ] Definitely no	[ ] Probably no or unclear	[ ] Probably yes	[ ] Definitely yes
Fixed (or common) effect or fixed effects model explicitly stated	*Probably fixed effect(s) model*	*Probably random (or mixed) effects*	*Random (or mixed) effects explicitly stated*

Comment: Meta-analysis for all outcomes in all patient's population groups are based on random effects model.

8: If the prognostic factor is a continuous variable, were arbitrary cut points avoided? [ ] not applicable: not continuous

[ ] Definitely no	[ ] Probably no or unclear	[ ] Probably yes	[ ] Definitely yes
Analysis based on exploratory cut point(s), e.g., picking cut point associated with highest interaction p-value	*Analysis based on cut point(s) of unclear origin*	*Analysis based on pre-specified cut point(s), e.g., suggested by prior study*	*Analysis based on the full continuum, e.g., assuming a linear or logarithmic relationship*

Comment: Area is a nominal variable.

---

9 Optional: Are there any additional considerations that may increase or decrease credibility? (manual section 3.9) [ ] not applicable

[ ] Yes, probably decrease	[ ] Yes, probably increase

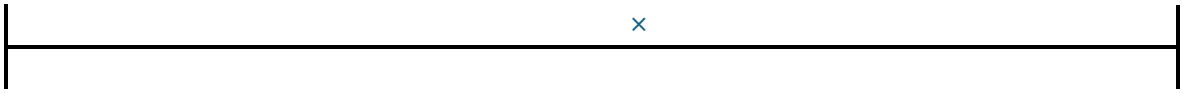
Comment:

10: How would you rate the overall credibility of the proposed prognosis modification?

The overall rating should be driven by the items that decrease credibility. The following provides a sensible strategy:

- All responses definitely or probably decrease credibility or unclear → very low
- Two or more responses definitely decrease credibility → maximum usually low even if all other responses satisfy credibility criteria
- One response definitely decreases credibility → maximum usually moderate even if all other responses satisfy credibility criteria
- Two responses probably decrease credibility → maximum usually moderate even if all other responses satisfy credibility criteria
- No response options definitely or probably decrease credibility → high very likely

Place a mark on the continuous line (or type "x" in editable version)



Very low credibility	**Low credibility**	**Moderate credibility**	**High credibility**
Very likely no prognosis modification Use overall effect for each subgroup	Likely no prognosis modification Use overall effect for each subgroup but note remaining uncertainty	Likely prognosis modification Use separate effects for each subgroup but note remaining uncertainty	Very likely prognosis modification Use separate effects for each subgroup

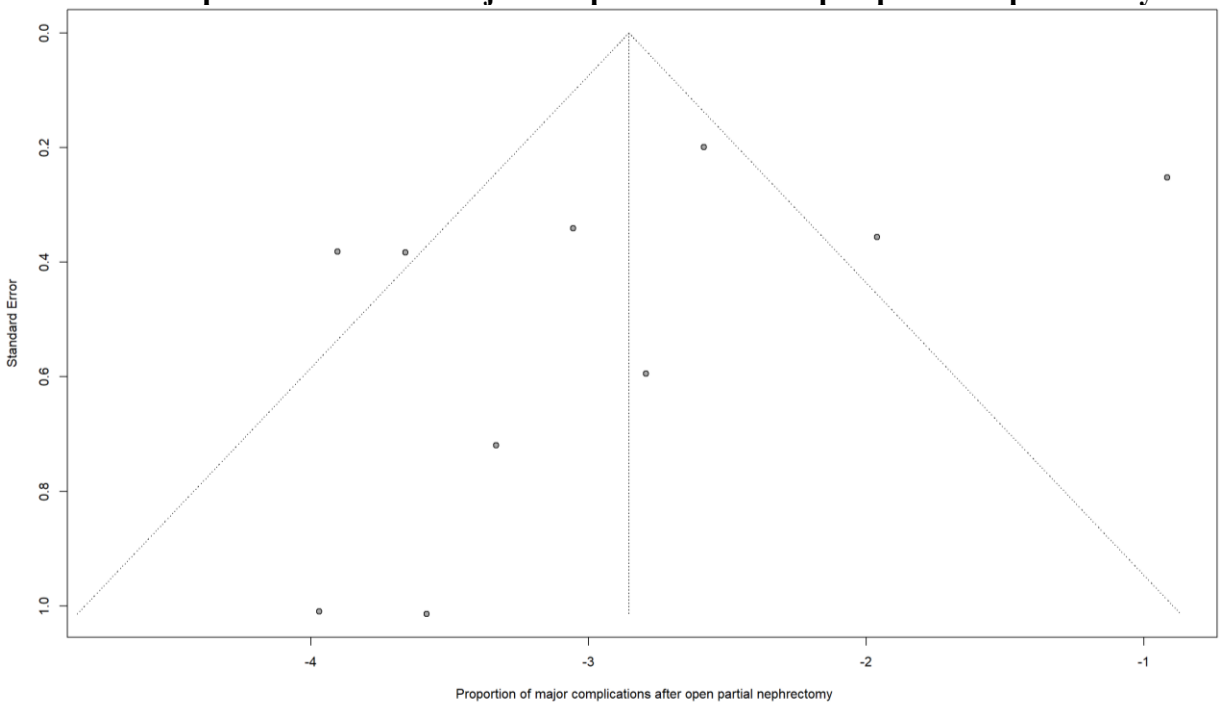
Comment: The credibility of prognostic factor analysis is considered low based on the responses.

APPENDIX C: Publication bias evaluation

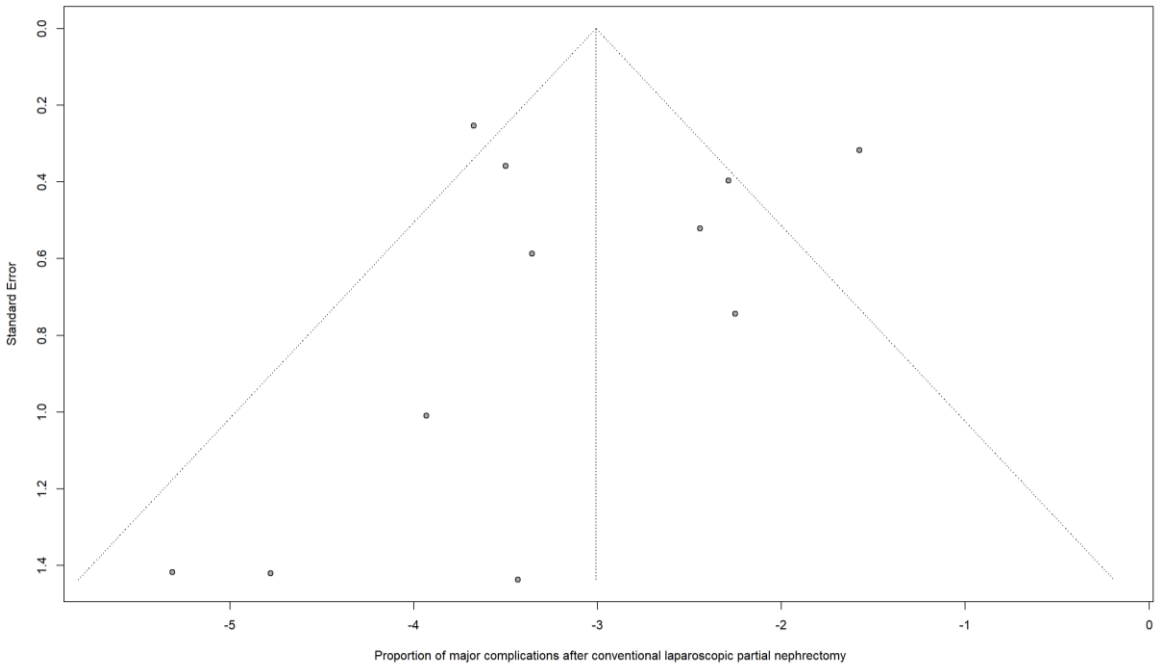
1. Rank correlation test of funnel plot asymmetry, Begg test results

Group of study		z-value	P.V
Outcome	**Intervention**		
Major complication	OPN	-0.54	0.5858
	LPN	-0.63	0.5312
	RAPN	-0.52	0.6037
	TA	-1.53	0.1250
EBL	OPN	0.05	0.9563
	LPN	1.07	0.2827
	RAPN	0.9	0.3679

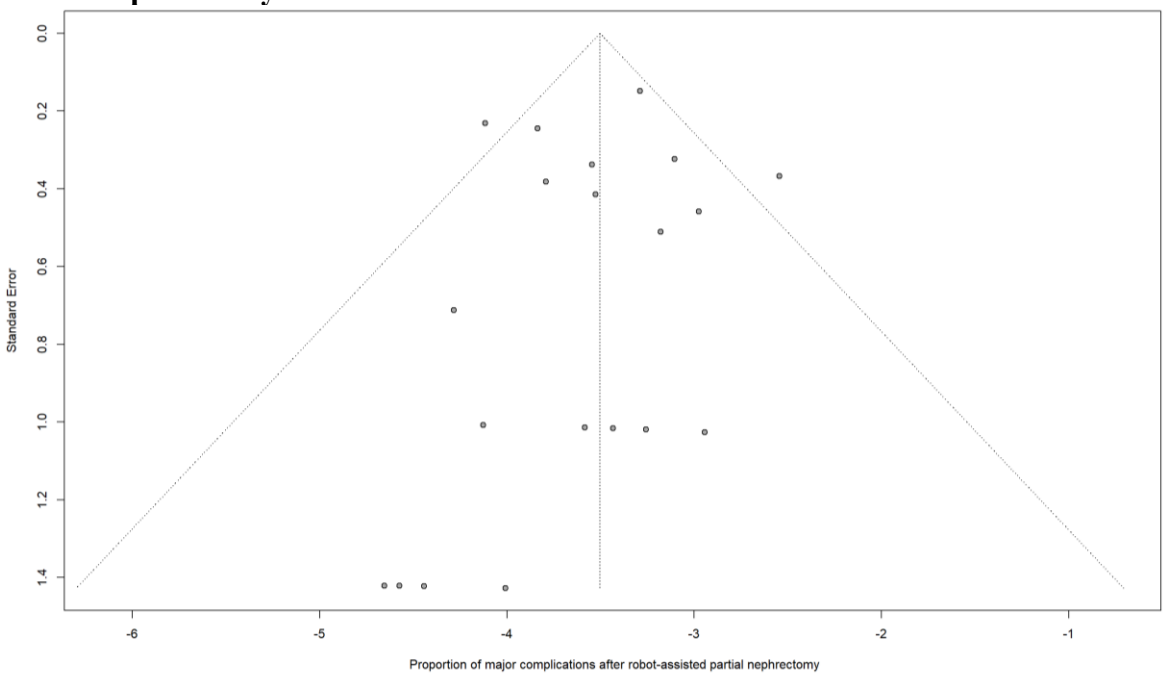
2. Funnel plot of studies on major complications after open partial nephrectomy



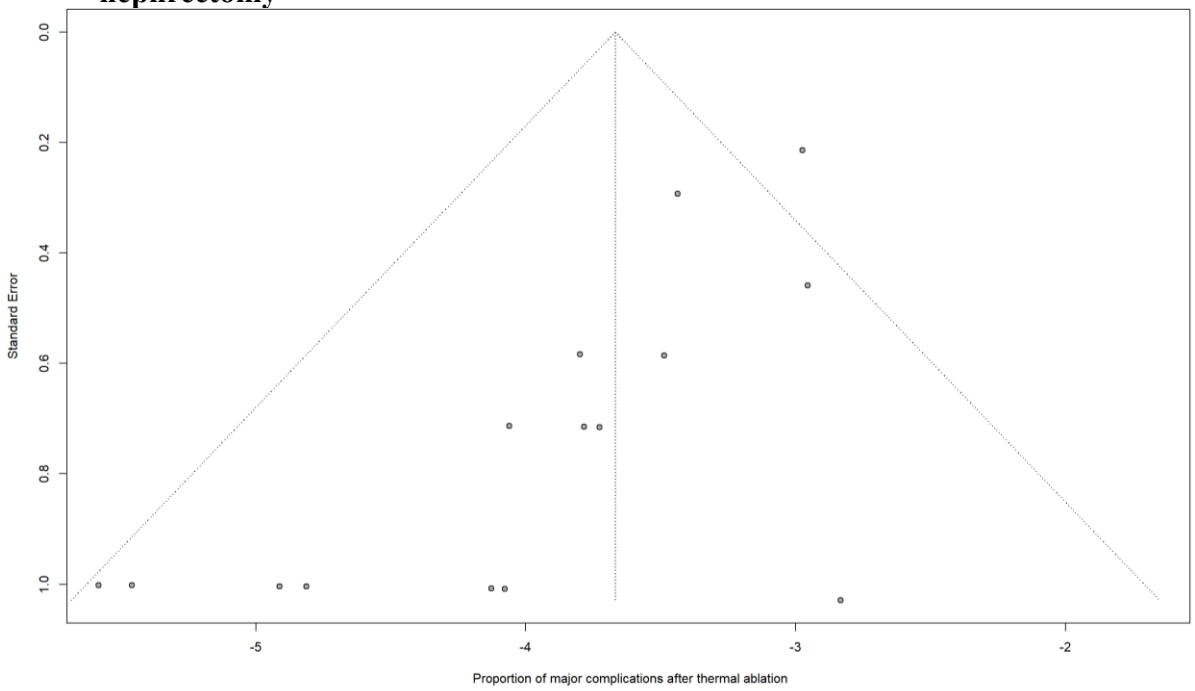
3. **Funnel plot of studies on major complications after conventional laparoscopic partial nephrectomy**



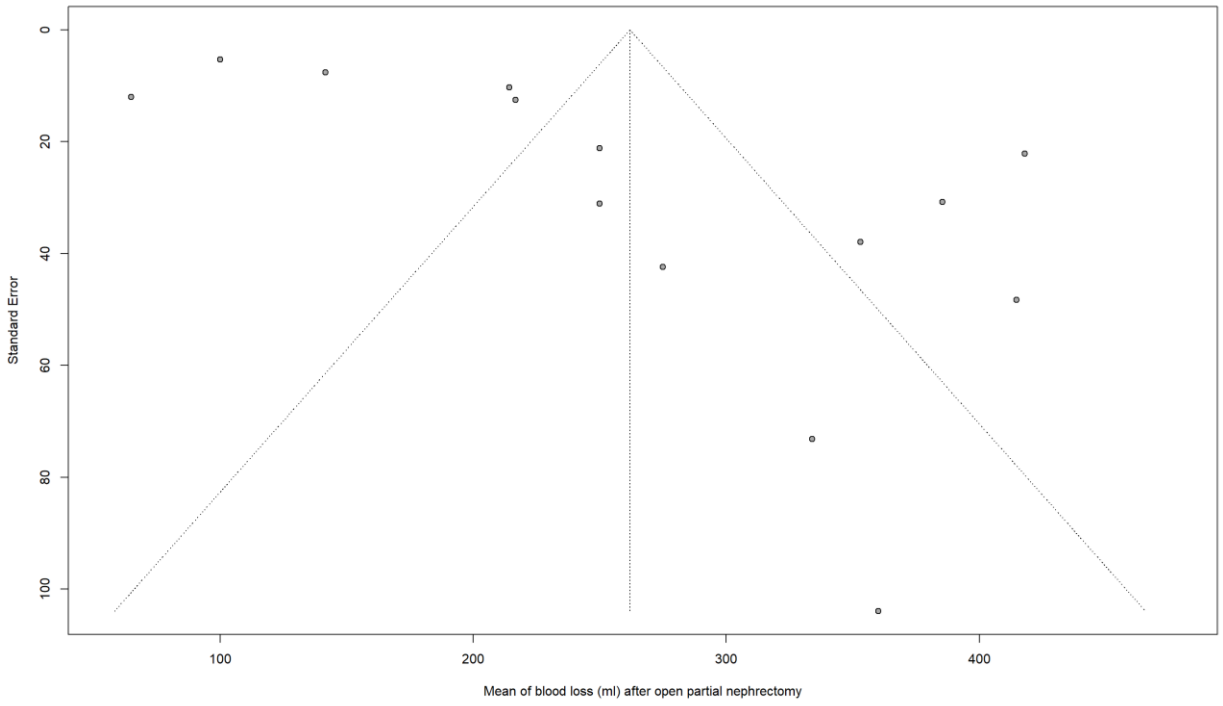
4. **Funnel plot of studies on major complications after robot-assisted partial nephrectomy**



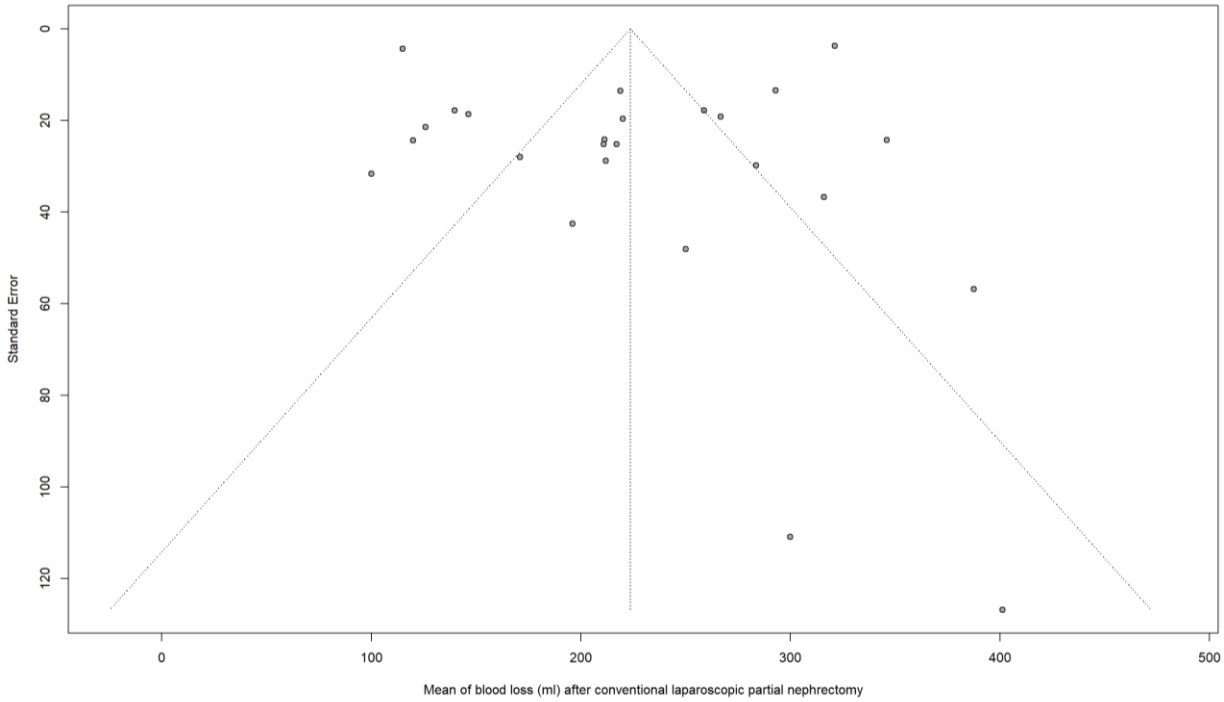
5. **Funnel plot of studies on major complications after thermal ablation partial nephrectomy**



6. **Funnel plot of studies on estimated blood loss after open partial nephrectomy**



7. Funnel plot of studies on estimated blood loss after conventional laparoscopic partial nephrectomy



8. Funnel plot of studies on estimated blood after robot-assisted partial nephrectomy