KCE REPORT 280S

Federaal Kenniscentrum voor de Gezondheidszorg
Centre Fédéral d'Expertise des Soins de Santé
Belgian Health Care Knowledge Centre

ROUTINE PREOPERATIVE TESTING IN ADULTS UNDERGOING ELECTIVE NON-CARDIOTHORACIC SURGERY

APPENDIX

KCE REPORT 280S
GOOD CLINICAL PRACTICE

Federaal Kenniscentrum voor de Gezondheidszorg
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ROUTINE PREOPERATIVE TESTING IN ADULTS UNDERGOING ELECTIVE NON-CARDIOTHORACIC SURGERY

APPENDIX

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COLOPHON

Title:	Routine preoperative testing in adults undergoing elective non-cardiothoracic surgery – Supplement
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1. COMPOSITION OF THE GUIDELINE DEVELOPMENT GROUP

1.1. Composition of the Guideline Development Group

Clinicians	Field of expertise, affiliations
Jean-François Brichant	Anaesthesiology, ULG Liège
Marc Jacquemin	Clinical Biology, UZ Leuven
Denis Tack	Radiology, CHU Charleroi
Hans Van Brabandt	Cardiology, KCE
Erik Vandermeulen	Anaesthesiology, UZ Leuven

1.2. Composition of the KCE expert team

KCE member	Specific role
Domonique Paulus	Program Director
Sabine Stordeur	Principal Coordinator
Joan Vlayen	Principal Investigator; endocrinology
Nadia Benahmed	Scientific research and methodological support
Jo Robays	Scientific research
Nicolas Fairon	Literature searches

2. SEARCH STRATEGIES

2.1. Chest X-Ray

2.1.1. PICOS

Patient	Adults undergoing elective non-cardiothoracic surgery
Intervention	Preoperative chest X-ray
Comparison	No preoperative chest X-ray
Outcome	All-cause mortality, cardiac events, quality of life, complications, length of stay, readmission, intensive care unit admission
Settings	Studies published in 2011 and after

2.1.2. Medline

Date	**15-12-2015**	
Database	Medline using Ovid, In-Process & Other Non-Indexed Citations and Ovid MEDLINE(R) <1946 to Present>, Ovid MEDLINE(R) Daily Update <November 18, 2015>	
Search Strategy		
1	exp Ambulatory Care/	47935
2	ambulatory care.mp.	54854
3	exp Ambulatory Surgical Procedures/	10610
4	Ambulatory Surgical Procedures.mp.	10665
5	exp Surgical Procedures, Elective/	9499
6	Surgical Procedures, Elective.mp.	7
7	exp Preoperative Care/	61831
8	(preop or pre-op or pre-operative or preoperative).mp.	230982
9	exp General Surgery/	36276
10	surgery.mp.	999896

11	elective surg*.mp.	17056
12	ambulatory surg*.mp.	11895
13	exp Perioperative Period/	59318
14	Perioperative Period.mp.	6784
15	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14	1230674
16	exp Diagnostic Tests, Routine/	7911
17	Diagnostic Tests, Routine.mp.	7918
18	(Laboratory Techniques and Procedures).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]	1512
19	diagnostic test*.mp.	40348
20	laboratory test*.mp.	32278
21	exp "Sensitivity and Specificity"/	465661
22	exp ROC Curve/	36036
23	exp Predictive Value of Tests/	161217
24	exp Mass Screening/	108240
25	(Mass Screening or sensitivit*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]	977987
26	specificit*.mp.	904789
27	predictive value*.mp.	211659
28	accuracy.mp.	267231
29	likelihood ratio*.mp.	10729
30	screening.mp.	435482
31	false negative*.mp.	37922
32	exp Mortality/	309087
33	mortality.mp.	572714
34	exp Morbidity/	416506
35	morbidity.mp.	287826

36	exp Postoperative Complications/	453095
37	(Postoperative Complications or risk factors).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]	1074904
38	exp Risk Factors/	635052
39	or/16-38	4041508
40	15 and 39	396626
41	limit 40 to yr="2011 -Current"	111739
42	exp Radiography, Thoracic/	34503
43	((chest or thoracic or thorax) adj3 (xray* or x-ray* or radiograph* or radiogram* or roentgenography)).ab,ti.	40133
44	42 or 43	67318
45	41 and 44	461

2.1.3. Embase

Date	**10-12-2015**	
Database	Embase	
Search Strategy		
1	'ambulatory care'/exp	41299
2	'ambulatory surgery'/exp	11058
3	'elective surgery'/exp	23400
4	'preoperative care'/exp	35200
5	'general surgery'/exp	10852
6	'ambulatory surgery'/exp	11058
7	'perioperative period'/exp	31710
8	((preoperative OR ambulatory) NEAR/3 care):ab,ti	13855
9	((elective OR general OR ambulatory) NEAR/3 (surgery OR surgical)):ab,ti	49399
10	preop:ab,ti OR 'pre op':ab,ti OR 'pre operative':ab,ti OR preoperative:ab,ti	265198

11	#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10	420689
12	'diagnostic test'/exp	767415
13	'laboratory test'/exp	124582
14	'abnormal laboratory result'/exp	2904
15	'sensitivity and specificity'/exp	230747
16	'receiver operating characteristic'/exp	61315
17	'prediction and forecasting'/exp	885093
18	'diagnostic accuracy'/exp	196016
19	'false negative result'/exp	10173
20	'likelihood ratio':ab,ti	9998
21	'mortality'/exp	762197
22	'morbidity'/exp	268621
23	'postoperative complication'/exp	531125
24	'risk factor'/exp	707440
25	'preoperative complication'/exp	552
26	'mass screening'/exp	175802
27	'screening'/exp	526947
28	((diagnostic OR laboratory) NEAR/3 test*):ab,ti	108701
29	mortality:ti	111814
30	morbidity:ti	30051
31	'risk factor':ab,ti OR 'risk factors':ab,ti	555236
32	sensitivity:ab,ti	728281
33	predictivity:ab,ti	1640
34	'sensitive value':ab,ti	22
35	'area under the curve':ab,ti	34058
36	(roc NEAR/3 curve*):ab,ti	33450

37	'false negative':ab,ti	29621
38	'false negatives':ab,ti	6105
39	screening:ab,ti	492603
40	'predictive value':ab,ti	91576
41	accuracy:ab,ti	320587
42	#12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19 OR #20 OR #21 OR #22 OR #23 OR #24 OR #25 OR #26 OR #27 OR #28 OR #29 OR #30 OR #31 OR #32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39 OR #40 OR #41	4973708
43	#11 AND #42	177205
44	#43 AND [2011-2016]/py	71396
45	#44 NOT [medline]/lim	38563
46	#45 NOT ([conference abstract]/lim OR [conference paper]/lim OR [conference review]/lim OR [editorial]/lim)	13141
47	'thorax radiography'/exp	138859
48	((chest OR thoracic OR thorax) NEAR/3 (radiogram* OR xray* OR 'x ray' OR 'x rays' OR radiograph* OR roentgenography)):ab,ti	57036
49	#47 OR #48	158113
50	#46 AND #49	203

2.1.4. Cochrane library

Date	14-12-2015	
Database	Cochrane database using Wiley	
Search Strategy		
#1	[mh "Ambulatory Care"]	3524
#2	((preoperative or ambulatory) near/3 care):ab,ti	605
#3	[mh "Ambulatory Surgical Procedures"]	1474
#4	((elective or general or ambulatory) near/3 (surgery or surgical)):ab,ti	7729
#5	preop:ab,ti or 'pre op':ab,ti or 'pre operative':ab,ti or preoperative:ab,ti	17052
#6	[mh "Surgical Procedures, Elective"]	1471
#7	[mh "Preoperative Care"]	5237
#8	[mh "General Surgery"]	315
#9	surgery:ab,ti	72871
#10	[mh "Perioperative Period"]	5930
#11	Perioperative Period:ab,ti	1932
#12	#1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 or #9 or #10 or #11	89406
#13	[mh "Diagnostic Tests, Routine"]	331
#14	[mh "Sensitivity and Specificity"]	16393
#15	[mh "ROC Curve"]	1160
#16	[mh "Predictive Value of Tests"]	6411
#17	[mh "Mass Screening"]	5234
#18	[mh Mortality]	11414
#19	[mh Morbidity]	12322
#20	[mh "Postoperative Complications"]	29667
#21	[mh "Risk Factors"]	20588
#22	((diagnostic or laboratory) near/3 test*):ab,ti	4893

#23	mortality:ti	4099
#24	morbidity:ti	2038
#25	'risk factor':ab,ti or 'risk factors':ab,ti	27746
#26	sensitivity:ab,ti	23892
#27	predictivity:ab,ti	27
#28	'sensitive value':ab,ti	1117
#29	'area under the curve':ab,ti	10950
#30	(roc near/3 curve*):ab,ti	828
#31	'false negative':ab,ti	1155
#32	'false negatives':ab,ti	157
#33	screening:ab,ti	16599
#34	'predictive value':ab,ti	4809
#35	accuracy:ab,ti	9974
#36	likelihood ratio*:ab,ti	2035
#37	screening:ab,ti	16599
#38	#13 or #14 or #15 or #16 or #17 or #18 or #19 or #20 or #21 or #22 or #23 or #24 or #25 or #26 or #27 or #28 or #29 or #30 or #31 or #32 or #33 or #34 or #35 or #36 or #37	153486
#39	#12 and #38	26598
#40	#12 and #38 Publication Year from 2011 to 2015	6340
#41	((chest or thoracic or thorax) near/3 (radiogram* or xray* or 'x ray' or 'x rays' or radiograph* or roentgenography)):ab,ti	1313
#42	[mh "Radiography, Thoracic"]	358
#43	#41 or #42	1499
#44	#40 and #43	21

Of the 21 results found, only 2 came from Cochrane Database of Systematic Reviews, the others (19) came from CENTRAL.

2.2. Haemostasis tests

2.2.1. PICOS

Patient	Adults undergoing elective non-cardiothoracic surgery
Intervention	Preoperative haemostasis tests
Comparison	No preoperative haemostasis tests
Outcome	All-cause mortality, cardiac events, quality of life, complications, length of stay, readmission, intensive care unit admission
Settings	Studies published in 2011 and after

2.2.2. Medline

Date	**12-07-2016**	
Database	Medline OvidSP	
Search strategy		
1	exp "Ambulatory Care"/	47287
2	((preoperative or ambulatory) adj3 care).ab,ti.	11232
3	exp "Ambulatory Surgical Procedures"/	10526
4	((elective or general or ambulatory) adj3 (surgery or surgical)).ab,ti.	37654
5	(preop or 'pre op' or 'pre operative' or preoperative).ab,ti.	200578
6	exp "Surgical Procedures, Elective"/	9740
7	exp "Preoperative Care"/	61144
8	exp "General Surgery"/	35867
9	surgery.ab,ti.	852289
10	exp "Perioperative Period"/	62713
11	Perioperative Period.ab,ti.	5570
12	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11	1104347
13	exp "Diagnostic Tests, Routine"/	8422

14	exp "Sensitivity and Specificity"/	463151
15	exp "ROC Curve"/	36109
16	exp "Predictive Value of Tests"/	159282
17	exp "Mass Screening"/	106858
18	exp Mortality/	306627
19	exp Morbidity/	421255
20	exp "Postoperative Complications"/	448773
21	exp "Risk Factors"/	626011
22	((diagnostic or laboratory) adj3 test*).ab,ti.	79284
23	mortality.ti.	91753
24	morbidity.ti.	24866
25	('risk factor' or 'risk factors').ab,ti.	407264
26	sensitivity.ab,ti.	598866
27	predictivity.ab,ti.	1217
28	'sensitive value'.ab,ti.	18
29	'area under the curve'.ab,ti.	29327
30	(roc adj3 curve*).ab,ti.	19958
31	'false negative'.ab,ti.	22848
32	'false negatives'.ab,ti.	4782
33	screening.ab,ti.	376491
34	'predictive value'.ab,ti.	65926
35	accuracy.ab,ti.	268199
36	likelihood ratio*.ab,ti.	10700
37	screening.ab,ti.	376491
38	13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37	3166436

39	12 and 38	324209
40	limit 39 to yr="2011 -Current"	92045
41	exp hemostasis/	103027
42	exp "Hemostasis, Surgical"/	17287
43	exp "Hematologic Tests"/	224054
44	exp "Blood Coagulation Tests"/	36252
45	exp "Blood Coagulation"/	53265
46	'bleeding time'.ab,ti.	4444
47	'prothrombin time'.ab,ti.	9823
48	'bleeding time'.ab,ti.	4444
49	'international normalized ratio'.ab,ti.	4985
50	'thromboplastin time'.ab,ti.	8337
51	hemostasis.ab,ti.	20290
52	41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51	340613
53	40 and 52	2067
54	remove duplicates from 53	2040
55	or/41-45	321984
56	exp *hemostasis/	58705
57	exp *"Hemostasis, Surgical"/	9966
58	exp *"Hematologic Tests"/	46271
59	exp *"Blood Coagulation Tests"/	10513
60	exp *"Blood Coagulation"/	31990
61	56 or 57 or 58 or 59 or 60	110978
62	or/46-51	40616
63	('bleeding time' or 'prothrombin time' or 'bleeding time' or 'international normalized ratio' or 'thromboplastin time' or hemostasis).ti.	8396
64	61 or 63	113058

65	40 and 64	640
66	remove duplicates from 65	630
67	1 or 2 or 3 or 4 or 5 or 6 or 7 or 10 or 11	382887
68	38 and 67	127947
69	64 and 68	1143
70	limit 69 to yr="2011 -Current"	304
71	limit 70 to systematic reviews	18
72	remove duplicates from 71	18
73	limit 66 to systematic reviews	33
74	73 not 72	15
75	**limit 54 to systematic reviews**	**109**
76	75 not 73	76
77	remove duplicates from 70	300
78	**66 not 75**	**597**
79	**54 not (78 or 75 or 77)**	**1334**
Notes	109 + 597 + 1334 = 2040	

2.2.3. Embase

Date	**24-03-2016**	
Database	Embase	
Search Strategy		
1	'ambulatory care'/exp	41717
2	((preoperative OR ambulatory) NEAR/3 care):ab,ti	14094
3	'ambulatory surgery'/exp	11189
4	((elective OR general OR ambulatory) NEAR/3 (surgery OR surgical)):ab,ti	50457
5	preop:ab,ti OR 'pre op':ab,ti OR 'pre operative':ab,ti OR preoperative:ab,ti	271494

6	'elective surgery'/exp	23916
7	'preoperative care'/exp	35624
8	'general surgery'/exp	11479
9	surgery:ab,ti	1173326
10	'perioperative period'/exp	32576
11	'perioperative period':ab,ti	7772
12	#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11	1409209
13	'diagnostic test'/exp	782548
14	'sensitivity and specificity'/exp	236879
15	'receiver operating characteristic'/exp	64756
16	'predictive value'/exp	86073
17	'mass screening'/exp	178948
18	'mortality'/exp	781775
19	'morbidity'/exp	275535
20	'postoperative complication'/exp	541270
21	'risk factors'/exp	724154
22	((diagnostic OR laboratory) NEAR/3 test*):ab,ti	111236
23	mortality.ti	0
24	morbidity.ti	0
25	'risk factor':ab,ti OR 'risk factors':ab,ti	571652
26	sensitivity:ab,ti	746942
27	predictivity:ab,ti	1694
28	'sensitive value':ab,ti	22
29	'area under the curve':ab,ti	35510
30	(roc NEAR/3 curve*):ab,ti	35113
31	'false negative':ab,ti	30187

32	'false negatives':ab,ti	6233
33	screening:ab,ti	504894
34	'predictive value':ab,ti	94286
35	accuracy:ab,ti	329567
36	'likelihood ratio':ab,ti OR 'likelihood ratios':ab,ti	13848
37	#13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19 OR #20 OR #21 OR #22 OR #23 OR #24 OR #25 OR #26 OR #27 OR #28 OR #29 OR #30 OR #31 OR #32 OR #33 OR #34 OR #35 OR #36	4339216
38	#12 AND #37	456862
39	#12 AND #37 AND [2011-2016]/py	194812
40	#39 NOT [medline]/lim	111161
41	#40 NOT ([conference abstract]/lim OR [conference paper]/lim OR [conference review]/lim)	36920
42	'hemostasis'/exp	60745
43	'blood examination'/exp	209922
44	'blood clotting test'/exp	13868
45	'blood clotting'/exp	200674
46	'bleeding time':ab,ti	5831
47	'prothrombin time':ab,ti	13563
48	'international normalized ratio':ab,ti	6586
49	'thromboplastin time':ab,ti	10748
50	hemostasis:ab,ti	28374
51	#42 OR #43 OR #44 OR #45 OR #46 OR #47 OR #48 OR #49 OR #50	465822
52	**#41 AND #51**	**1268**
53	'meta-analysis'/exp OR 'meta-analysis' OR 'systematic review'/exp OR 'systematic review'	235419
54	#52 AND #53	54
Notes	Line 54 for systematic reviews, line 52 for all other studies	

2.2.4. Cochrane library

Date	25-03-2016	
Database	Cochrane database using Wiley	
Search Strategy		
#1	[mh "Ambulatory Care"]	3664
#2	((preoperative or ambulatory) near/3 care):ab,ti	631
#3	[mh "Ambulatory Surgical Procedures"]	1534
#4	((elective or general or ambulatory) near/3 (surgery or surgical)):ab,ti	7947
#5	(preop or 'pre op' or 'pre operative' or preoperative):ab,ti	17633
#6	[mh "Surgical Procedures, Elective"]	1663
#7	[mh "Preoperative Care"]	5477
#8	[mh "General Surgery"]	343
#9	surgery:ab,ti	75705
#10	[mh "Perioperative Period"]	6734
#11	Perioperative Period:ab,ti	2016
#12	#1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 or #9 or #10 or #11	93042
#13	[mh "Diagnostic Tests, Routine"]	352
#14	[mh "Sensitivity and Specificity"]	17833
#15	[mh "ROC Curve"]	1288
#16	[mh "Predictive Value of Tests"]	7035
#17	[mh "Mass Screening"]	5443
#18	[mh Mortality]	12336
#19	[mh Morbidity]	13674
#20	[mh "Postoperative Complications"]	31978
#21	[mh "Risk Factors"]	22632

#22	((diagnostic or laboratory) near/3 test*):ab,ti	5102
#23	mortality.ti	1
#24	morbidity.ti	1
#25	('risk factor' or 'risk factors'):ab,ti	27587
#26	sensitivity:ab,ti	25293
#27	predictivity:ab,ti	27
#28	'sensitive value':ab,ti	1165
#29	'area under the curve':ab,ti	11438
#30	(roc near/3 curve*):ab,ti	900
#31	'false negative':ab,ti	1208
#32	'false negatives':ab,ti	163
#33	screening:ab,ti	17454
#34	'predictive value':ab,ti	5124
#35	accuracy:ab,ti	10586
#36	likelihood ratio*:ab,ti	2152
#37	#13 or #14 or #15 or #16 or #17 or #18 or #19 or #20 or #21 or #22 or #23 or #24 or #25 or #26 or #27 or #28 or #29 or #30 or #31 or #32 or #33 or #34 or #35 or #36	159474
#38	#12 and #37	28332
#39	[mh hemostasis]	4414
#40	[mh "Hemostasis, Surgical"]	1299
#41	[mh "Hematologic Tests"]	10981
#42	[mh "Blood Coagulation Tests"]	1910
#43	[mh "Blood Coagulation"]	2140
#44	'bleeding time':ab,ti	6496
#45	'prothrombin time':ab,ti	1376
#46	'bleeding time':ab,ti	6496

#47	'international normalized ratio':ab,ti	914
#48	'thromboplastin time':ab,ti	1152
#49	hemostasis:ab,ti	1659
#50	#39 or #40 or #41 or #42 or #43 or #44 or #45 or #46 or #47 or #48 or #49	22653
#51	#38 and #50	1662
#52	#38 and #50 Publication Year from 2011 to 2016	530
Notes	Among the 530, 115 were from Cochrane Database of Systematic Reviews, 400 from CENTRAL, 12 from DARE, 1 from HTA Database, and 2 from NHS Economic Evaluations Database.	

2.3. Urinalysis

2.3.1. PICOS

Patient	Adults undergoing elective non-cardiothoracic surgery
Intervention	Preoperative urinalysis
Comparison	No preoperative urinalysis
Outcome	All-cause mortality, cardiac events, quality of life, complications, length of stay, readmission, intensive care unit admission
Settings	Studies published in 2011 and after

2.3.2. Medline

Date	19-04-2016	
Database	Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations and Ovid MEDLINE(R) <1946 to Present>, Ovid MEDLINE(R) Daily Update <April 18, 2016>	
Search Strategy		
1	exp Ambulatory Surgical Procedures/	10550
2	exp Elective Surgical Procedures/	9814
3	exp Preoperative Care/	61367
4	exp Preoperative Period/	3425
5	exp Perioperative Period/	63362
6	(preop or pre-op or pre-operative$ or preoperative$ or perioperative$).ab,ti,kw,kf,jw.	288008
7	("before surgery" or "prior to surgery" or "before operation" or "prior to operation" or "before the operation").ab,ti.	50320
8	1 or 2 or 3 or 4 or 5 or 6 or 7	410044
9	exp General Surgery/	35958
10	exp Ambulatory Care/	47459
11	9 and 10	62
12	((elective or ambulatory) adj3 (surger* or surgical)).ab,ti,jn,kw.	21848
13	8 or 11 or 12	420477
14	urinalysis/	6027
15	urine specimen collection/	180
16	antibody-coated bacteria test, urinary/	150
17	Urine/an, mi, cy	10130
18	urinalysis.ab,ti,jw,kw,kf.	6305
19	(urine adj3 (test* or analys*)).ab,ti,kw.	13365
20	dip?stick?.ab,ti,kw,kf.	2604
21	14 or 15 or 16 or 17 or 18 or 19 or 20	34334

22	reagent strips/	3020
23	Urine/	35253
24	urine.ab,ti,fs.	302924
25	22 and (23 or 24)	1077
26	leucocyturia.ab,ti,kw.	105
27	bacteriuria.ab,ti,kw.	5210
28	bacteriuria/	7207
29	Hematuria/	10907
30	hematuria.ab,ti,kw.	13833
31	urine culture.ab,ti.	2616
32	pyuria.ab,ti.	1536
33	urinary tract infection/ur	1307
34	("urinary tract infection" adj3 screen*).ab,ti,kw.	114
35	proteinuria.ab,ti,kw.	31975
36	proteinuria/	21621
37	or/26-36	69407
38	21 or 25 or 37	97770
39	13 and 38	1855
40	limit 39 to yr="2001 -Current"	1082
41	limit 40 to animals	51
42	limit 40 to humans	918
43	40 not (41 not 42)	1043
44	43 not editorial.pt.	1040
45	remove duplicates from 44	1030

2.3.3. Embase

Date	19-04-2016	
Database	Embase	
Search Strategy		
1	'ambulatory surgical procedures'/exp	11238
2	'elective surgical procedures'/exp	24080
3	'preoperative care'/exp	35784
4	'preoperative assessment'/exp	80946
5	'preoperative period'/exp	224658
6	'perioperative period'/exp	32825
7	preop:ab,ti OR 'pre op':ab,ti OR 'pre operative$':ab,ti OR preoperative$:ab,ti OR perioperative$:ab,ti	340702
8	'before surgery':ab,ti OR 'prior to surgery':ab,ti OR 'before operation':ab,ti OR 'prior to operation':ab,ti OR 'before the operation':ab,ti	65860
9	#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8	546029
10	'general surgery'/exp	11646
11	'ambulatory care'/exp	41946
12	#10 AND #11	25
13	((elective OR ambulatory) NEAR/3 (surger* OR surgical)):ab,ti	29283
14	#9 OR #12 OR #13	556801
15	'urinalysis'/de	74429
16	'antibody-coated bacteria test, urinary'/de	30157
17	urinalysis:ab,ti	9488
18	(urine NEAR/3 (test* OR analys*)):ab,ti	18622
19	dipstick*:ab,ti OR 'dip stick*':ab,ti	3753
20	#15 OR #16 OR #17 OR #18 OR #19	119430
21	'reagent strips'/de	2914
22	'urine'/de	152973

23	urine:ab,ti OR urine:lnk	244037
24	#21 AND (#22 OR #23)	672
25	leucocyturia:ab,ti	167
26	bacteriuria:ab,ti	6308
27	'bacteriuria'/exp	7837
28	'hematuria'/exp	34972
29	hematuria:ab,ti	18991
30	'urine culture':ab,ti OR 'urine culture'/exp	10901
31	pyuria:ab,ti	2155
32	('urinary tract infection' NEAR/3 screen*):ab,ti	142
33	proteinuria:ab,ti	43236
34	'proteinuria'/exp	77647
35	'leucocyturia'/exp	804
36	'pyuria'/exp	2905
37	'urine tract infection'/exp AND diagnosis:lnk	16650
38	#25 OR #26 OR #27 OR #28 OR #29 OR #30 OR #31 OR #32 OR #33 OR #34 OR #35 OR #36 OR #37	151637
39	#20 OR #24 OR #38	254042
40	#14 AND #39	5070
41	#40 NOT [medline]/lim	2121
42	#41 AND [2001-2016]/py	2002
43	#42 NOT ([conference abstract]/lim OR [conference paper]/lim OR [conference review]/lim OR [editorial]/lim)	820
44	#43 AND ([animal cell]/lim OR [animal experiment]/lim OR [animal model]/lim OR [animal tissue]/lim)	11
45	#43 AND [humans]/lim	803
46	#43 NOT (#44 NOT #45)	810

2.3.4. Cochrane library

Date	19-04-2016	
Database	Cochrane database using Wiley	
Search Strategy		
#1	[mh "Ambulatory Surgical Procedures"]	1534
#2	[mh "Elective Surgical Procedures"]	1663
#3	[mh "Preoperative Care"]	5480
#4	[mh "Preoperative Period"]	185
#5	[mh "Perioperative Period"]	6748
#6	(preop or pre-op or pre-operative$ or preoperative$ or perioperative$):ab,ti	22863
#7	("before surgery" or "prior to surgery" or "before operation" or "prior to operation" or "before the operation"):ab,ti	7563
#8	#1 or #2 or #3 or #4 or #5 or #6 or #7	36779
#9	[mh "General Surgery"]	343
#10	[mh "Ambulatory Care"]	3665
#11	#9 and #10	1
#12	((elective or ambulatory) near/3 (surger* or surgical)):ab,ti	6285
#13	#8 or #11 or #12	40286
#14	[mh urinalysis]	241
#15	[mh "urine specimen collection"]	6
#16	[mh "antibody-coated bacteria test, urinary"]	16
#17	[mh Urine/AN,MI,CY]	186
#18	urinalysis:ab,ti	692
#19	(urine near/3 (test* or analys*)):ab,ti	1000
#20	(dipstick* or dip-stick*):ab,ti	139
#21	#14 or #15 or #16 or #17 or #18 or #19 or #20	2117
#22	[mh "reagent strips"]	95

#23	[mh Urine]	630
#24	urine:ab,ti	13924
#25	[mh /UR]	8854
#26	#22 and (#23 or #24 or #25)	37
#27	leucocyturia:ab,ti	10
#28	bacteriuria:ab,ti	668
#29	[mh bacteriuria]	464
#30	[mh Hematuria]	173
#31	hematuria:ab,ti	416
#32	urine culture:ab,ti	501
#33	pyuria:ab,ti	120
#34	[mh "urinary tract infection"/UR]	81
#35	("urinary tract infection" near/3 screen*):ab,ti	7
#36	proteinuria:ab,ti	1956
#37	[mh proteinuria]	1948
#38	#27 or #28 or #29 or #30 or #31 or #32 or #33 or #34 or #35 or #36 or #37	4907
#39	#21 or #26 or #38	6663
#40	#13 and #39	259
#41	#40 Publication Year from 2001 to 2016	155
Notes	CENTRAL 151 DARE 2 NHS Economic Evaluation Database 2	

2.4. Liver tests

2.4.1. PICOS

Patient	Adults undergoing elective non-cardiothoracic surgery
Intervention	Preoperative liver tests
Comparison	No preoperative liver tests
Outcome	All-cause mortality, cardiac events, quality of life, complications, length of stay, readmission, intensive care unit admission
Settings	Studies published in 2011 and after

2.4.2. Medline

Date	**25-04-2016**	
Database	Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations and Ovid MEDLINE(R) 1946 to Present	
Search Strategy		
1	exp Ambulatory Surgical Procedures/	10550
2	exp Elective Surgical Procedures/	9813
3	exp Preoperative Care/	61359
4	exp Preoperative Period/	3423
5	exp Perioperative Period/	63344
6	(preop or pre-op or pre-operative$ or preoperative$ or perioperative$).ab,ti,kw,kf,jw.	287848
7	("before surgery" or "prior to surgery" or "before operation" or "prior to operation" or "before the operation").ab,ti.	50301
8	1 or 2 or 3 or 4 or 5 or 6 or 7	409859
9	exp General Surgery/	35958
10	exp Ambulatory Care/	47455
11	9 and 10	62
12	((elective or ambulatory) adj3 (surger* or surgical)).ab,ti,jn,kw.	21836
13	8 or 11 or 12	420279

14	Liver Function Tests/	26495
15	(liver adj2 test$).tw.	15125
16	14 or 15	37178
17	13 and 16	1588
18	liver test$.tw.	1633
19	14 or 18	27728
20	13 and 19	1119
21	13 and 14	1081
22	17 not 21	507

2.4.3. Embase

Date	**03 -05 -2016**	
Database	Embase	
Search Strategy		
#1	'ambulatory surgery'/exp	11,257
#2	'elective surgery'/exp	24,159
#3	'preoperative care'/exp	35,843
#4	'preoperative period'/exp	225,301
#5	'perioperative period'/exp	32,982
#6	preop:ab,ti OR 'pre op':ab,ti OR 'pre operative*':ab,ti OR preoperative*:ab,ti OR perioperative*:ab,ti	386,150
#7	'before surgery':ab,ti OR 'prior to surgery':ab,ti OR 'before operation':ab,ti OR 'prior to operation':ab,ti OR 'before the operation':ab,ti	66,104
#8	'ambulatory surgery'/exp OR 'elective surgery'/exp OR 'preoperative care'/exp OR 'preoperative period'/exp OR 'perioperative period'/exp OR preop:ab,ti OR 'pre op':ab,ti OR 'pre operative*':ab,ti OR preoperative*:ab,ti OR perioperative*:ab,ti OR 'before surgery':ab,ti OR 'prior to surgery':ab,ti OR 'before operation':ab,ti OR 'prior to operation':ab,ti OR 'before the operation':ab,ti	579,823

#9	'general surgery'/exp	11,683
#10	'ambulatory care'/exp	42,005
#11	'general surgery'/exp AND 'ambulatory care'/exp	25
#12	((elective OR ambulatory) NEAR/3 (surger* OR surgical)):ab,ti	29,355
#13	'ambulatory surgery'/exp OR 'elective surgery'/exp OR 'preoperative care'/exp OR 'preoperative period'/exp OR 'perioperative period'/exp OR preop:ab,ti OR 'pre op':ab,ti OR 'pre operative*':ab,ti OR preoperative*:ab,ti OR perioperative*:ab,ti OR 'before surgery':ab,ti OR 'prior to surgery':ab,ti OR 'before operation':ab,ti OR 'prior to operation':ab,ti OR 'before the operation':ab,ti OR ('general surgery'/exp AND 'ambulatory care'/exp) OR ((elective OR ambulatory) NEAR/3 (surger* OR surgical)):ab,ti	590,307
#14	'liver function test'/exp	38,090
#15	(liver NEAR/2 test*):ab,ti	22,744
#16	'liver function test'/exp OR (liver NEAR/2 test*):ab,ti	49,039
#17	'ambulatory surgery'/exp OR 'elective surgery'/exp OR 'preoperative care'/exp OR 'preoperative period'/exp OR 'perioperative period'/exp OR preop:ab,ti OR 'pre op':ab,ti OR 'pre operative*':ab,ti OR preoperative*:ab,ti OR perioperative*:ab,ti OR 'before surgery':ab,ti OR 'prior to surgery':ab,ti OR 'before operation':ab,ti OR 'prior to operation':ab,ti OR 'before the operation':ab,ti OR ('general surgery'/exp AND 'ambulatory care'/exp) OR ((elective OR ambulatory) NEAR/3 (surger* OR surgical)):ab,ti AND ('liver function test'/exp OR (liver NEAR/2 test*):ab,ti)	1,990
#18	'ambulatory surgery'/exp OR 'elective surgery'/exp OR 'preoperative care'/exp OR 'preoperative period'/exp OR 'perioperative period'/exp OR preop:ab,ti OR 'pre op':ab,ti OR 'pre operative*':ab,ti OR preoperative*:ab,ti OR perioperative*:ab,ti OR 'before surgery':ab,ti OR 'prior to surgery':ab,ti OR 'beforevoperation':ab,ti OR 'prior to operation':ab,ti OR 'before the operation':ab,ti OR ('general surgery'/exp AND 'ambulatory care'/exp) OR ((elective OR ambulatory) NEAR/3 (surger* OR surgical)):ab,ti AND ('liver function test'/exp OR (liver NEAR/2 test*):ab,ti) AND [embase]/lim NOT [medline]/lim	610

2.4.4. Cochrane library

Date	03-05-2016	
Database	Cochrane database using Wiley	
Search Strategy		
1	MeSH descriptor: [Liver Function Tests] explode all trees	1098
2	Limit 1 to Cochrane reviews	1
3	Limit 1 to Other reviews	21

2.5. Coronary imaging – Stress echocardiography

2.5.1. PICOS

Patient	Adults undergoing elective non-cardiothoracic surgery
Intervention	Preoperative stress echocardiography
Comparison	No preoperative stress echocardiography
Outcome	All-cause mortality, cardiac events, quality of life, complications, length of stay, readmission, intensive care unit admission
Settings	Studies published in 2011 and after

2.5.2. Medline

Date	02-05-2016	
Database	Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE(R) Daily and Ovid MEDLINE(R) 1946 to Present	
Search Strategy		
1	exp Ambulatory Surgical Procedures/	10562
2	exp Elective Surgical Procedures/	9856
3	exp Preoperative Care/	61446
4	exp Preoperative Period/	3459
5	exp Perioperative Period/	63620
6	(preop or pre-op or pre-operative$ or preoperative$ or perioperative$).ab,ti,kw,kf,jw.	293528
7	("before surgery" or "prior to surgery" or "before operation" or "prior to operation" or "before the operation").ab,ti.	51237
8	1 or 2 or 3 or 4 or 5 or 6 or 7	416336
9	exp General Surgery/	35983
10	exp Ambulatory Care/	47521
11	9 and 10	62
12	((elective or ambulatory) adj3 (surger* or surgical)).ab,ti,jn,kw.	22174
13	8 or 11 or 12	426963
14	Stress echography.tw.	12
15	Echocardiography, Stress/	2396
16	Stress echocardiograph$.tw.	3517
17	Exercise Test/	54128
18	Exercise test$.tw.	20982
19	treadmill test$.tw.	3677
20	stress test$.tw.	11519
21	effort test$.tw.	384
22	exp Ultrasonography/	270519

23	Ultrasonography.tw.	72057
24	Echocardiography.tw.	86424
25	exp Heart/	446074
26	22 or 23	317239
27	25 and 26	48007
28	24 or 27	112038
29	17 or 18 or 19 or 20 or 21	70381
30	28 and 29	5960
31	14 or 15 or 16 or 30	8705
32	8 and 31	515

2.5.3. Embase

Date	**03-05-2016**	
Database	Embase	
Search Strategy		
#1	ambulatory surgery'/exp	11257
#4	'preoperative period'/exp	225301
#5	'perioperative period'/exp	32982
#6	preop:ab,ti OR 'pre op':ab,ti OR 'pre operative*':ab,ti OR preoperative*:ab,ti OR perioperative*:ab,ti	386150
#7	'before surgery':ab,ti OR 'prior to surgery':ab,ti OR 'before operation':ab,ti OR 'prior to operation':ab,ti OR 'before the operation':ab,ti	66104
#8	'ambulatory surgery'/exp OR 'elective surgery'/exp OR 'preoperative care'/exp OR 'preoperative period'/exp OR 'perioperative period'/exp OR preop:ab,ti OR 'pre op':ab,ti OR 'pre operative*':ab,ti OR preoperative*:ab,ti OR perioperative*:ab,ti OR 'before surgery':ab,ti OR 'prior to surgery':ab,ti OR 'before operation':ab,ti OR 'prior to operation':ab,ti OR 'before the operation':ab,ti	579823
#9	'general surgery'/exp	11683
#10	'ambulatory care'/exp	42005

#11	'general surgery'/exp AND 'ambulatory care'/exp	25
#12	((elective OR ambulatory) NEAR/3 (surger* OR surgical)):ab,ti	29355
#13	'ambulatory surgery'/exp OR 'elective surgery'/exp OR 'preoperative care'/exp OR 'preoperative period'/exp OR 'perioperative period'/exp OR preop:ab,ti OR 'pre op':ab,ti OR 'pre operative*':ab,ti OR preoperative*:ab,ti OR perioperative*:ab,ti OR 'before surgery':ab,ti OR 'prior to surgery':ab,ti OR 'before operation':ab,ti OR 'prior to operation':ab,ti OR 'before the operation':ab,ti OR ('general surgery'/exp AND 'ambulatory care'/exp) OR ((elective OR ambulatory) NEAR/3 (surger* OR surgical)):ab,ti	590307
#14	'stress'/exp OR stress AND echography:ab,ti	164
#15	'stress echocardiography'/exp	6275
#16	'stress'/exp OR stress AND echocardiograph*:ab,ti	14250
#17	'exercise test'/exp	47444
#19	'exercise'/exp OR exercise AND test*:ab,ti	116027
#2	'elective surgery'/exp	24159
#20	'treadmill'/exp OR treadmill AND test*:ab,ti	18180
#21	'stress'/exp OR stress AND test*:ab,ti	148727
#22	'effort'/exp OR effort AND test*:ab,ti	84301
#23	'echography'/exp	602009
#24	ultrasonography:ab,ti	93712
#25	echocardiography:ab,ti	132130
#26	'heart'/exp	691108
#27	'echography'/exp OR ultrasonography:ab,ti	623232
#28	'heart'/exp AND ('echography'/exp OR ultrasonography:ab,ti)	96418
#29	echocardiography:ab,ti OR ('heart'/exp AND ('echography'/exp OR ultrasonography:ab,ti))	179030
#3	'preoperative care'/exp	35843

#30	'exercise test'/exp OR ('exercise'/exp OR exercise AND test*:ab,ti) OR ('treadmill'/exp OR treadmill AND test*:ab,ti) OR ('stress'/exp OR stress AND test*:ab,ti) OR ('effort'/exp OR effort AND test*:ab,ti)	280427
#31	echocardiography:ab,ti OR ('heart'/exp AND ('echography'/exp OR ultrasonography:ab,ti)) AND ('exercise test'/exp OR ('exercise'/exp OR exercise AND test*:ab,ti) OR ('treadmill'/exp OR treadmill AND test*:ab,ti) OR ('stress'/exp OR stress AND test*:ab,ti) OR ('effort'/exp OR effort AND test*:ab,ti))	10746
#32	'heart function test'/exp	31051
#33	echocardiography:ab,ti OR ('heart'/exp AND ('echography'/exp OR ultrasonography:ab,ti)) AND 'heart function test'/exp	2956
#34	echocardiography:ab,ti OR ('heart'/exp AND ('echography'/exp OR ultrasonography:ab,ti)) AND ('exercise test'/exp OR ('exercise'/exp OR exercise AND test*:ab,ti) OR ('treadmill'/exp OR treadmill AND test*:ab,ti) OR ('stress'/exp OR stress AND test*:ab,ti) OR ('effort'/exp OR effort AND test*:ab,ti)) OR (echocardiography:ab,ti OR ('heart'/exp AND ('echography'/exp OR ultrasonography:ab,ti)) AND 'heart function test'/exp)	12288
#35	'ambulatory surgery'/exp OR 'elective surgery'/exp OR 'preoperative care'/exp OR 'preoperative period'/exp OR 'perioperative period'/exp OR preop:ab,ti OR 'pre op':ab,ti OR 'pre operative*':ab,ti OR preoperative*:ab,ti OR perioperative*:ab,ti OR 'before surgery':ab,ti OR 'prior to surgery':ab,ti OR 'before operation':ab,ti OR 'prior to operation':ab,ti OR 'before the operation':ab,ti OR ('general surgery'/exp AND 'ambulatory care'/exp) OR ((elective OR ambulatory) NEAR/3 (surger* OR surgical)):ab,ti AND (echocardiography:ab,ti OR ('heart'/exp AND ('echography'/exp OR ultrasonography:ab,ti)) AND ('exercise test'/exp OR ('exercise'/exp OR exercise AND test*:ab,ti) OR ('treadmill'/exp OR treadmill AND test*:ab,ti) OR ('stress'/exp OR stress AND test*:ab,ti) OR ('effort'/exp OR effort AND test*:ab,ti)) OR (echocardiography:ab,ti OR ('heart'/exp AND ('echography'/exp OR ultrasonography:ab,ti)) AND 'heart function test'/exp))	604
#36	'ambulatory surgery'/exp OR 'elective surgery'/exp OR 'preoperative care'/exp OR 'preoperative period'/exp OR 'perioperative period'/exp OR preop:ab,ti OR 'pre op':ab,ti OR 'pre operative*':ab,ti OR preoperative*:ab,ti OR perioperative*:ab,ti OR 'before surgery':ab,ti OR 'prior to surgery':ab,ti OR 'before operation':ab,ti OR 'prior to operation':ab,ti OR 'before the operation':ab,ti OR ('general surgery'/exp AND 'ambulatory care'/exp) OR ((elective OR ambulatory) NEAR/3 (surger* OR surgical)):ab,ti AND (echocardiography:ab,ti OR ('heart'/exp AND ('echography'/exp OR ultrasonography:ab,ti)) AND ('exercise test'/exp OR ('exercise'/exp OR exercise AND test*:ab,ti) OR ('treadmill'/exp OR treadmill AND test*:ab,ti) OR ('stress'/exp OR stress AND test*:ab,ti) OR ('effort'/exp OR effort AND test*:ab,ti)) OR (echocardiography:ab,ti OR ('heart'/exp AND ('echography'/exp OR ultrasonography:ab,ti)) AND 'heart function test'/exp)) AND [embase]/lim NOT [medline]/lim	207

2.5.4. Cochrane library

Date	03-05-2016	
Database	Cochrane database using Wiley	
Search Strategy		
1	"MeSH descriptor: [Echocardiography, Stress] explode all trees" Limit to "other reviews"	125
	DARE 12 CENTRAL 94 HTA database 6 NHS EED 13	

2.6. Coronary imaging – CT Scan

2.6.1. PICOS

Patient	Adults undergoing elective non-cardiothoracic surgery
Intervention	Preoperative coronary CT
Comparison	No preoperative coronary CT
Outcome	All-cause mortality, cardiac events, quality of life, complications, length of stay, readmission, intensive care unit admission
Settings	Studies published in 2011 and after

2.6.2. Medline

Date	02-05-2016	
Database	Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE(R) Daily and Ovid MEDLINE(R) 1946 to Present	
Search Strategy		
1	exp Ambulatory Surgical Procedures/	10562
2	exp Elective Surgical Procedures/	9856
3	exp Preoperative Care/	61446
4	exp Preoperative Period/	3459
5	exp Perioperative Period/	63620
6	(preop or pre-op or pre-operative$ or preoperative$ or perioperative$).ab,ti,kw,kf,jw.	293528
7	("before surgery" or "prior to surgery" or "before operation" or "prior to operation" or "before the operation").ab,ti.	51237
8	1 or 2 or 3 or 4 or 5 or 6 or 7	416336
9	exp General Surgery/	35983
10	exp Ambulatory Care/	47521
11	9 and 10	62
12	((elective or ambulatory) adj3 (surger* or surgical)).ab,ti,jn,kw.	22174
13	8 or 11 or 12	426963
14	exp Heart/	446074
15	Tomography, X-Ray Computed/	316824
16	Four-Dimensional Computed Tomography/	790
17	exp Tomography, Spiral Computed/	10912
18	15 or 16 or 17	327650
19	14 and 18	7541

20	13 and 19	405
21	exp Coronary Disease/ra [Radiography]	22256
22	13 and 21	793
23	22 not 20	779

2.6.3. Embase

Date	**03-05-2016**	
Database	Embase	
Search Strategy		
#1	'ambulatory surgery'/exp	11257
#2	'elective surgery'/exp	24159
#3	'preoperative care'/exp	35843
#4	'preoperative period'/exp	225301
#5	'perioperative period'/exp	32982
#6	preop:ab,ti OR 'pre op':ab,ti OR 'pre operative*':ab,ti OR preoperative*:ab,ti OR perioperative*:ab,ti	386150
#7	'before surgery':ab,ti OR 'prior to surgery':ab,ti OR 'before operation':ab,ti OR 'prior to operation':ab,ti OR 'before the operation':ab,ti	66104
#8	'ambulatory surgery'/exp OR 'elective surgery'/exp OR 'preoperative care'/exp OR 'preoperative period'/exp OR 'perioperative period'/exp OR preop:ab,ti OR 'pre op':ab,ti OR 'pre operative*':ab,ti OR preoperative*:ab,ti OR perioperative*:ab,ti OR 'before surgery':ab,ti OR 'prior to surgery':ab,ti OR 'before operation':ab,ti OR 'prior to operation':ab,ti OR 'before the operation':ab,ti	579823
#9	'general surgery'/exp	11683
#10	'ambulatory care'/exp	42005
#11	'general surgery'/exp AND 'ambulatory care'/exp	25
#12	((elective OR ambulatory) NEAR/3 (surger* OR surgical)):ab,ti	29355
#13	'ambulatory surgery'/exp OR 'elective surgery'/exp OR 'preoperative care'/exp OR 'preoperative period'/exp OR 'perioperative period'/exp OR preop:ab,ti OR 'pre op':ab,ti OR 'pre operative*':ab,ti OR preoperative*:ab,ti OR perioperative*:ab,ti OR 'before surgery':ab,ti OR	590307

	'prior to surgery':ab,ti OR 'before operation':ab,ti OR 'prior to operation':ab,ti OR 'before the operation':ab,ti OR ('general surgery'/exp AND 'ambulatory care'/exp) OR ((elective OR ambulatory) NEAR/3 (surger* OR surgical)):ab,ti	
#14	'heart'/exp	691108
#15	'computer assisted tomography'/exp	711050
#16	ct AND scan:ab,ti	88498
#17	'computer assisted tomography'/exp OR (ct AND scan:ab,ti)	728426
#18	'heart'/exp AND ('computer assisted tomography'/exp OR (ct AND scan:ab,ti))	30066
#19	'ambulatory surgery'/exp OR 'elective surgery'/exp OR 'preoperative care'/exp OR 'preoperative period'/exp OR 'perioperative period'/exp OR preop:ab,ti OR 'pre op':ab,ti OR 'pre operative*':ab,ti OR preoperative*:ab,ti OR perioperative*:ab,ti OR 'before surgery':ab,ti OR 'prior to surgery':ab,ti OR 'before operation':ab,ti OR 'prior to operation':ab,ti OR 'before the operation':ab,ti OR ('general surgery'/exp AND 'ambulatory care'/exp) OR ((elective OR ambulatory) NEAR/3 (surger* OR surgical)):ab,ti AND 'heart'/exp AND ('computer assisted tomography'/exp OR (ct AND scan:ab,ti))	1586
#20	'ambulatory surgery'/exp OR 'elective surgery'/exp OR 'preoperative care'/exp OR 'preoperative period'/exp OR 'perioperative period'/exp OR preop:ab,ti OR 'pre op':ab,ti OR 'pre operative*':ab,ti OR preoperative*:ab,ti OR perioperative*:ab,ti OR 'before surgery':ab,ti OR 'prior to surgery':ab,ti OR 'before operation':ab,ti OR 'prior to operation':ab,ti OR 'before the operation':ab,ti OR ('general surgery'/exp AND 'ambulatory care'/exp) OR ((elective OR ambulatory) NEAR/3 (surger* OR surgical)):ab,ti AND 'heart'/exp AND ('computer assisted tomography'/exp OR (ct AND scan:ab,ti)) AND [embase]/lim NOT [medline]/lim	761

2.6.4. Cochrane library

Date	03-05-2016	
Database	Cochrane database using Wiley	
Search Strategy		
1	MeSH descriptor: [Heart] explode all trees	6217
2	MeSH descriptor: [Tomography, X-Ray Computed] explode all trees	4792
3	#1 and #2	79
4	Limit to “Other reviews	3

2.7. Coronary imaging – Scintigraphy

2.7.1. PICOS

Patient	Adults undergoing elective non-cardiothoracic surgery
Intervention	Preoperative myocardial scintigraphy
Comparison	No preoperative myocardial scintigraphy
Outcome	All-cause mortality, cardiac events, quality of life, complications, length of stay, readmission, intensive care unit admission
Settings	Studies published in 2011 and after

2.7.2. Medline

Date	02-05-2016	
Database	Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE(R) Daily and Ovid MEDLINE(R) 1946 to Present	
Search Strategy		
1	exp Ambulatory Surgical Procedures/	10562
2	exp Elective Surgical Procedures/	9856
3	exp Preoperative Care/	61446

4	exp Preoperative Period/	3459
5	exp Perioperative Period/	63620
6	(preop or pre-op or pre-operative$ or preoperative$ or perioperative$).ab,ti,kw,kf,jw.	293528
7	("before surgery" or "prior to surgery" or "before operation" or "prior to operation" or "before the operation").ab,ti.	51237
8	1 or 2 or 3 or 4 or 5 or 6 or 7	416336
9	exp General Surgery/	35983
10	exp Ambulatory Care/	47521
11	9 and 10	62
12	((elective or ambulatory) adj3 (surger* or surgical)).ab,ti,jn,kw.	22174
13	8 or 11 or 12	426963
14	Exercise Test/	54128
15	Exercise test$.tw.	20982
16	treadmill test$.tw.	3677
17	stress test$.tw.	11519
18	effort test$.tw.	384
19	exp Heart/	446074
20	exp Radionuclide Imaging/	123307
21	exp Heart/ri [Radionuclide Imaging]	11810
22	Coronary Angiography/	53190
23	Scintigraphy.tw.	35685
24	gamma camera.tw.	5180
25	radioisotope.tw.	8051
26	radionuclide.tw.	23201

27	scintiphotography.tw.	161
28	20 or 23 or 24 or 25 or 26 or 27	173387
29	19 and 28	13251
30	21 or 22 or 29	68165
31	14 or 15 or 16 or 17 or 18	70381
32	30 and 31	6653
33	13 and 32	245

2.7.3. Embase

Date	**03-05-2016**	
Database	Embase	
Search Strategy		
#2	'ambulatory surgery'/exp	11257
#3	'elective surgery'/exp	4159
#4	'preoperative care'/exp	35843
#5	'preoperative period'/exp	225301
#6	'perioperative period'/exp	32982
#7	preop:ab,ti OR 'pre op':ab,ti OR 'pre operative*':ab,ti OR preoperative*:ab,ti OR perioperative*:ab,ti	386150
#8	'before surgery':ab,ti OR 'prior to surgery':ab,ti OR 'before operation':ab,ti OR 'prior to operation':ab,ti OR 'before the operation':ab,ti	66104
#9	'ambulatory surgery'/exp OR 'elective surgery'/exp OR 'preoperative care'/exp OR 'preoperative period'/exp OR 'perioperative period'/exp OR preop:ab,ti OR 'pre op':ab,ti OR 'pre operative*':ab,ti OR preoperative*:ab,ti OR perioperative*:ab,ti OR 'before surgery':ab,ti OR 'prior to surgery':ab,ti OR 'before operation':ab,ti OR 'prior to operation':ab,ti OR 'before the operation':ab,ti	579823

#10	'general surgery'/exp	11683
#11	'ambulatory care'/exp	42005
#12	'general surgery'/exp AND 'ambulatory care'/exp	25
#13	((elective OR ambulatory) NEAR/3 (surger* OR surgical)):ab,ti	29355
#14	'ambulatory surgery'/exp OR 'elective surgery'/exp OR 'preoperative care'/exp OR 'preoperative period'/exp OR 'perioperative period'/exp OR preop:ab,ti OR 'pre op':ab,ti OR 'pre operative*':ab,ti OR preoperative*:ab,ti OR perioperative*:ab,ti OR 'before surgery':ab,ti OR 'prior to surgery':ab,ti OR 'before operation':ab,ti OR 'prior to operation':ab,ti OR 'before the operation':ab,ti OR ('general surgery'/exp AND 'ambulatory care'/exp) OR ((elective OR ambulatory) NEAR/3 (surger* OR surgical)):ab,ti	590307
#15	'exercise test'/exp	47444
#16	'exercise'/exp OR exercise AND test*:ab,ti	116027
#17	'treadmill'/exp OR treadmill AND test*:ab,ti	18180
#18	'stress'/exp OR stress AND test*:ab,ti	148727
#19	'effort'/exp OR effort AND test*:ab,ti	84301
#23	'heart'/exp	691108
#29	'heart function test'/exp	31051
#30	'exercise test'/exp OR ('exercise'/exp OR exercise AND test*:ab,ti) OR ('treadmill'/exp OR treadmill AND test*:ab,ti) OR ('stress'/exp OR stress AND test*:ab,ti) OR ('effort'/exp OR effort AND test*:ab,ti)	280427
#31	'heart'/exp AND ('exercise test'/exp OR ('exercise'/exp OR exercise AND test*:ab,ti) OR ('treadmill'/exp OR treadmill AND test*:ab,ti) OR ('stress'/exp OR stress AND test*:ab,ti) OR ('effort'/exp OR effort AND test*:ab,ti))	18203
#32	'heart function test'/exp OR ('heart'/exp AND ('exercise test'/exp OR ('exercise'/exp OR exercise AND test*:ab,ti) OR ('treadmill'/exp OR treadmill AND test*:ab,ti) OR ('stress'/exp OR stress AND test*:ab,ti) OR ('effort'/exp OR effort AND test*:ab,ti)))	48036
#34	'heart scintiscanning'/exp	19094
#35	'angiocardiography'/exp	91689
#36	scintigraphy:ab,ti OR gamma:ab,ti AND camera:ab,ti OR radioisotope:ab,ti OR radionuclide:ab,ti OR scintiphotography:ab,ti	46893

#37	'heart'/exp AND (scintigraphy:ab,ti OR gamma:ab,ti AND camera:ab,ti OR radioisotope:ab,ti OR radionuclide:ab,ti OR scintiphotography:ab,ti)	4627
#38	'heart scintiscanning'/exp OR 'angiocardiography'/exp OR ('heart'/exp AND (scintigraphy:ab,ti OR gamma:ab,ti AND camera:ab,ti OR radioisotope:ab,ti OR radionuclide:ab,ti OR scintiphotography:ab,ti))	108940
#39	'heart function test'/exp OR ('heart'/exp AND ('exercise test'/exp OR ('exercise'/exp OR exercise AND test*:ab,ti) OR ('treadmill'/exp OR treadmill AND test*:ab,ti) OR ('stress'/exp OR stress AND test*:ab,ti) OR ('effort'/exp OR effort AND test*:ab,ti))) AND ('heart scintiscanning'/exp OR 'angiocardiography'/exp OR ('heart'/exp AND (scintigraphy:ab,ti OR gamma:ab,ti AND camera:ab,ti OR radioisotope:ab,ti OR radionuclide:ab,ti OR scintiphotography:ab,ti)))	5334
#40	'heart function test'/exp OR ('heart'/exp AND ('exercise test'/exp OR ('exercise'/exp OR exercise AND test*:ab,ti) OR ('treadmill'/exp OR treadmill AND test*:ab,ti) OR ('stress'/exp OR stress AND test*:ab,ti) OR ('effort'/exp OR effort AND test*:ab,ti))) AND ('heart scintiscanning'/exp OR 'angiocardiography'/exp OR ('heart'/exp AND (scintigraphy:ab,ti OR gamma:ab,ti AND camera:ab,ti OR radioisotope:ab,ti OR radionuclide:ab,ti OR scintiphotography:ab,ti))) AND [embase]/lim NOT [medline]/lim	1556

2.7.4. Cochrane library

Date	**03-05-2016**	
Database	Cochrane database using Wiley	
Search Strategy		
1	MeSH descriptor: [Heart] explode all trees	6217
2	MeSH descriptor: [Radionuclide Imaging] explode all trees	3507
3	#1 and #2	325
4	Limit to Other reviews	2

3. QUALITY APPRAISAL

3.1. Quality appraisal tools

3.1.1. Guidelines

The AGREE II evaluation score was used to critically appraise guidelines retrieved (Table 1).

Table 1 – AGREE II instrument

Critical appraisal of clinical practice guidelines - AGREE II
Domain 1. Scope and Purpose
1. The overall objective(s) of the guideline is (are) specifically described.
2. The health question(s) covered by the guideline is (are) specifically described.
3. The population (patients, public, etc.) to whom the guideline is meant to apply is specifically described.
Domain 2. Stakeholder Involvement
4. The guideline development group includes individuals from all the relevant professional groups.
5. The views and preferences of the target population (patients, public, etc.) have been sought.
6. The target users of the guideline are clearly defined.
Domain 3. Rigour of Development
7. Systematic methods were used to search for evidence.
8. The criteria for selecting the evidence are clearly described.
9. The strengths and limitations of the body of evidence are clearly described.
10. The methods for formulating the recommendations are clearly described.
11. The health benefits, side effects, and risks have been considered in formulating the recommendations.
12. There is an explicit link between the recommendations and the supporting evidence.
13. The guideline has been externally reviewed by experts prior to its publication.
14. A procedure for updating the guideline is provided.
Domain 4. Clarity of Presentation
15. The recommendations are specific and unambiguous.
16. The different options for management of the condition or health issue are clearly presented.

Critical appraisal of clinical practice guidelines - AGREE II
17. Key recommendations are easily identifiable.
Domain 5. Applicability
18. The guideline describes facilitators and barriers to its application.
19. The guideline provides advice and/or tools on how the recommendations can be put into practice.
20. The potential resource implications of applying the recommendations have been considered.
21. The guideline presents monitoring and/ or auditing criteria.
Domain 6. Editorial Independence
22. The views of the funding body have not influenced the content of the guideline.
23. Competing interests of guideline development group members have been recorded and addressed.

3.1.2. Systematic reviews

AMSTAR criteria were used to assess systematic reviews (Table 2).

Table 2 – AMSTAR checklist

Question	Answer
1. Was an 'a priori' design provided? The research question and inclusion criteria should be established before the conduct of the review.	☐ Yes ☐ No ☐ Can't answer ☐ Not applicable
2. Was there duplicate study selection and data extraction? There should be at least two independent data extractors and a consensus procedure for disagreements should be in place.	☐ Yes ☐ No ☐ Can't answer ☐ Not applicable
3. Was a comprehensive literature search performed? At least two electronic sources should be searched. The report must include years and databases used (e.g. Central, EMBASE, and MEDLINE). Key words and/or MESH terms must be stated and where feasible the search strategy should be provided. All searches	☐ Yes ☐ No ☐ Can't answer ☐ Not applicable

should be supplemented by consulting current contents, reviews, textbooks, specialized registers, or experts in the particular field of study, and by reviewing the references in the studies found.	
4. Was the status of publication (i.e. grey literature) used as an inclusion criterion? The authors should state that they searched for reports regardless of their publication type. The authors should state whether or not they excluded any reports (from the systematic review), based on their publication status, language etc.	☐ Yes ☐ No ☐ Can't answer ☐ Not applicable
5. Was a list of studies (included and excluded) provided? A list of included and excluded studies should be provided.	☐ Yes ☐ No ☐ Can't answer ☐ Not applicable
6. Were the characteristics of the included studies provided? In an aggregated form such as a table, data from the original studies should be provided on the participants, interventions and outcomes. The ranges of characteristics in all the studies analyzed e.g. age, race, sex, relevant socioeconomic data, disease status, duration, severity, or other diseases should be reported.	☐ Yes ☐ No ☐ Can't answer ☐ Not applicable
7. Was the scientific quality of the included studies assessed and documented? 'A priori' methods of assessment should be provided (e.g., for effectiveness studies if the author(s) chose to include only randomized, double-blind, placebo controlled studies, or allocation concealment as inclusion criteria); for other types of studies alternative items will be relevant.	☐ Yes ☐ No ☐ Can't answer ☐ Not applicable
8. Was the scientific quality of the included studies used appropriately in formulating conclusions? The results of the methodological rigor and scientific quality should be considered in the analysis and the conclusions of the review, and explicitly stated in formulating recommendations.	☐ Yes ☐ No ☐ Can't answer ☐ Not applicable
9. Were the methods used to combine the findings of studies appropriate? For the pooled results, a test should be done to ensure the studies were combinable, to assess their homogeneity (i.e. Chi-squared test for homogeneity, I^2). If heterogeneity exists a random effects model should be used and/or the clinical appropriateness of combining should be taken into consideration (i.e. is it sensible to combine?).	☐ Yes ☐ No ☐ Can't answer ☐ Not applicable
10. Was the likelihood of publication bias assessed?	☐ Yes

An assessment of publication bias should include a combination of graphical aids (e.g., funnel plot, other available tests) and/or statistical tests (e.g., Egger regression test).	☐ No ☐ Can't answer ☐ Not applicable
11. Was the conflict of interest stated? Potential sources of support should be clearly acknowledged in both the systematic review and the included studies.	☐ Yes ☐ No ☐ Can't answer ☐ Not applicable

3.1.3. Primary studies for therapeutic interventions

To assess risk of bias of randomised controlled trials, we used Cochrane Collaboration's tool (Table 3).

Table 3 – Cochrane Collaboration's tool for assessing risk of bias

Domain	Support for judgement	Review authors' judgement
Selection bias		
Random sequence generation	Describe the method used to generate the allocation sequence in sufficient detail to allow an assessment of whether it should produce comparable groups	Selection bias (biased allocation to interventions) due to inadequate generation of a randomised sequence
Allocation concealment	Describe the method used to conceal the allocation sequence in sufficient detail to determine whether intervention allocations could have been foreseen in advance of, or during, enrolment	Selection bias (biased allocation to interventions) due to inadequate concealment of allocations prior to assignment
Performance bias		
Blinding of participants and personnel Assessments should be made for each main outcome (or class of outcomes)	Describe all measures used, if any, to blind study participants and personnel from knowledge of which intervention a participant received. Provide any information relating to whether the intended blinding was effective	Performance bias due to knowledge of the allocated interventions by participants and personnel during the study
Detection bias		
Blinding of outcome assessment	Describe all measures used, if any, to blind outcome assessors from knowledge of which intervention a	Detection bias due to knowledge of the allocated interventions by outcome assessors

Domain	Support for judgement	Review authors' judgement
Assessments should be made for each main outcome (or class of outcomes)	participant received. Provide any information relating to whether the intended blinding was effective	
Attrition bias		
Incomplete outcome data Assessments should be made for each main outcome (or class of outcomes)	Describe the completeness of outcome data for each main outcome, including attrition and exclusions from the analysis. State whether attrition and exclusions were reported, the numbers in each intervention group (compared with total randomized participants), reasons for attrition/exclusions where reported, and any reinclusions in analyses performed by the review authors	Attrition bias due to amount, nature or handling of incomplete outcome data
Reporting bias		
Selective reporting	State how the possibility of selective outcome reporting was examined by the review authors, and what was found	Reporting bias due to selective outcome reporting
Other bias		
Other sources of bias	State any important concerns about bias not addressed in the other domains in the tool If particular questions/entries were prespecified in the review's protocol, responses should be provided for each question/entry	Bias due to problems not covered elsewhere in the table

To conduct the quality appraisal of comparative cohort studies, the following tool was used (Table 4).

Table 4 – Quality appraisal of selected primary studies (cohort studies)

Domains	Options	Ref 1	Ref 2	Ref 3	Ref 4
Domain 1: Selection bias					
• Can selection bias sufficiently be excluded?	Yes/No/Insufficient info to assess				
• Are the most important confounding factors identified, are they adequately measured and are they adequately taken into account in the study design and/or analysis?	Yes/No/Insufficient info to assess				
Domain 2: Detection bias					
• Is the exposure clearly defined and is the method for assessment of exposure adequate and similar in study groups?	Yes/No/Insufficient info to assess				
• Are the outcomes clearly defined and is the method for assessment of the outcomes adequate and similar in study groups?	Yes/No/Insufficient info to assess				
• Is the likelihood that some eligible subjects might have the outcome at the time of enrolment	Yes/No/Insufficient info to assess				

Domains	Options	Ref 1	Ref 2	Ref 3	Ref 4
assessed and taken into account in the analysis?					
• Is the assessment of outcome made blind to exposure status?	Yes/No/Insufficient info to assess				
If no to question 6, does this have an impact on the assessment of the outcome?	Yes/No/ Not possible in this type of exposure /Insufficient info to assess				
• Is the follow-up sufficiently long to measure all relevant outcomes?	Yes/No/Insufficient info to assess				
Domain 3: Attrition bias					
• Can selective loss-to-follow-up be sufficiently excluded?	Yes/No/Insufficient info to assess				

3.2. Guidelines quality appraisal

The AGREE II instrument was used to evaluate the methodological quality of the NICE guideline {National Institute for Health and Care Excellence, 2016 #148} and the guidelines provided by the GDG. Each guideline was scored by a single KCE expert (Table 5). In case of doubt, a second KCE expert was consulted.

Table 5 – AGREE scores of identified guidelines

Source	Title	Standardised Score						Final Appraisal
		Scope	Stakeholder involvement	Rigour of development	Clarity	Applicability	Editorial Independence	
NICE 2016	Preoperative tests (update). Routine preoperative tests for elective surgery	83,3	61,1	89,6	83,3	20,8	66,7	6
ACC/AHA 2014	2014 ACC/AHA Guideline on Perioperative Cardiovascular Evaluation and Management of Patients Undergoing Noncardiac Surgery	66,7	77,8	35,4	83,3	12,5	83,3	4
ESC/ESA 2014	2014 ESC/ESA Guidelines on non-cardiac surgery: cardiovascular assessment and management	66,7	55,6	25,0	83,3	12,5	83,3	4
EAU 2015	Guidelines on Urological Infections	38,9	11,1	16,7	44,4	0,0	50,0	3

3.3. Selecting studies and quality appraisal

Just as the NICE guideline, the review of Johansson et al. was already identified through the pre-assessment before the start of the actual guideline development, and provided information for several research questions. Therefore, the quality appraisal of this review is provided below in Table 6.

The selection process and quality appraisal of additional studies is discussed below by research question.

Table 6 – AMSTAR appraisal of Johansson et al.

Question	Answer
1. Was an 'a priori' design provided? The research question and inclusion criteria should be established before the conduct of the review.	☐ Yes
2. Was there duplicate study selection and data extraction? There should be at least two independent data extractors and a consensus procedure for disagreements should be in place.	☐ Yes
3. Was a comprehensive literature search performed? At least two electronic sources should be searched. The report must include years and databases used (e.g. Central, EMBASE, and MEDLINE). Key words and/or MESH terms must be stated and where feasible the search strategy should be provided. All searches should be supplemented by consulting current contents, reviews, textbooks, specialized registers, or experts in the particular field of study, and by reviewing the references in the studies found.	☐ Yes
4. Was the status of publication (i.e. grey literature) used as an inclusion criterion? The authors should state that they searched for reports regardless of their publication type. The authors should state whether or not they excluded any reports (from the systematic review), based on their publication status, language etc.	☐ No
5. Was a list of studies (included and excluded) provided? A list of included and excluded studies should be provided.	☐ No
6. Were the characteristics of the included studies provided? In an aggregated form such as a table, data from the original studies should be provided on the participants, interventions and outcomes. The ranges of characteristics in all the studies analyzed e.g. age, race, sex, relevant socioeconomic data, disease status, duration, severity, or other diseases should be reported.	☐ Yes
7. Was the scientific quality of the included studies assessed and documented? 'A priori' methods of assessment should be provided (e.g., for effectiveness studies if the author(s) chose to include only randomized, double-blind, placebo controlled studies, or allocation concealment as inclusion criteria); for other types of studies alternative items will be relevant.	☐ No

8. Was the scientific quality of the included studies used appropriately in formulating conclusions? The results of the methodological rigor and scientific quality should be considered in the analysis and the conclusions of the review, and explicitly stated in formulating recommendations.	☐ Yes
9. Were the methods used to combine the findings of studies appropriate? For the pooled results, a test should be done to ensure the studies were combinable, to assess their homogeneity (i.e. Chi-squared test for homogeneity, I^2). If heterogeneity exists a random effects model should be used and/or the clinical appropriateness of combining should be taken into consideration (i.e. is it sensible to combine?).	☐ Yes
10. Was the likelihood of publication bias assessed? An assessment of publication bias should include a combination of graphical aids (e.g., funnel plot, other available tests) and/or statistical tests (e.g., Egger regression test).	☐ No
11. Was the conflict of interest stated? Potential sources of support should be clearly acknowledged in both the systematic review and the included studies.	☐ No

3.3.1. Chest X-ray

Selection of studies

On Nov 18, 2015 a search was performed to identify studies comparing preoperative chest X-ray versus no chest X-ray in adults undergoing elective non-cardiothoracic surgery. MEDLINE (including PreMedline), Embase and the Cochrane Library were searched.

Based on title and abstract 637 studies were excluded (Figure 1). The full-text of 4 studies was evaluated. Two studies were finally included (Table 7).

Figure 1 – Flowchart of study selection: chest X-ray

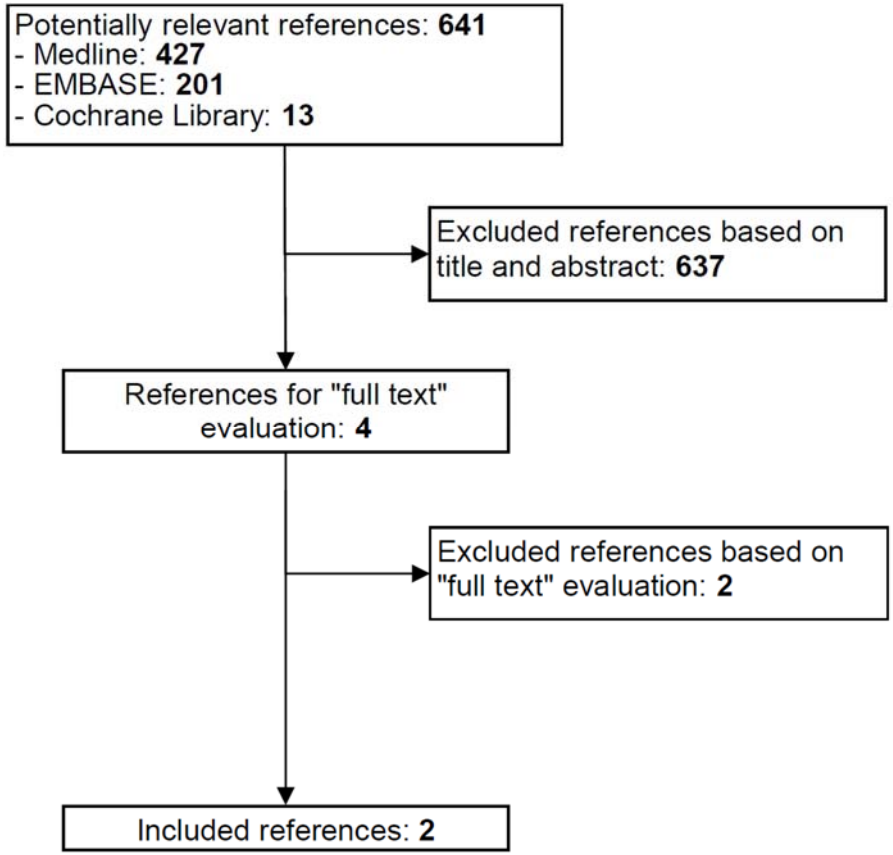


Table 7 – Included studies: chest X-ray

Reference
De la Matta Martin M, Herrera Gonzalez A, Lopez Conejos JA, Lopez Romero JL. Utilidad de la radiografia de torax preoperatoria en pacientes fumadores sometidos a reseccion transuretral de cancer vesical. Rev Esp Anestesiol Reanim. 2011;58(4):203-10.
Fritsch G, Flamm M, Hepner DL, Panisch S, Seer J, Soennichsen A. Abnormal pre-operative tests, pathologic findings of medical history, and their predictive value for perioperative complications. Acta Anaesthesiol Scand. 2012;56(3):339-50.

3.3.2. Haemostasis tests

Selection of studies

On Mar 21, 2016 a search was performed to identify studies comparing preoperative haemostasis tests versus no haemostasis tests in adults undergoing elective non-cardiothoracic surgery. MEDLINE (including PreMedline), Embase and the Cochrane Library were searched.

Based on title and abstract 3809 studies were excluded (Figure 2). The full-text of 29 studies was evaluated. Five studies were finally included (Table 8).

Figure 2 – Flowchart of study selection: haemostasis tests

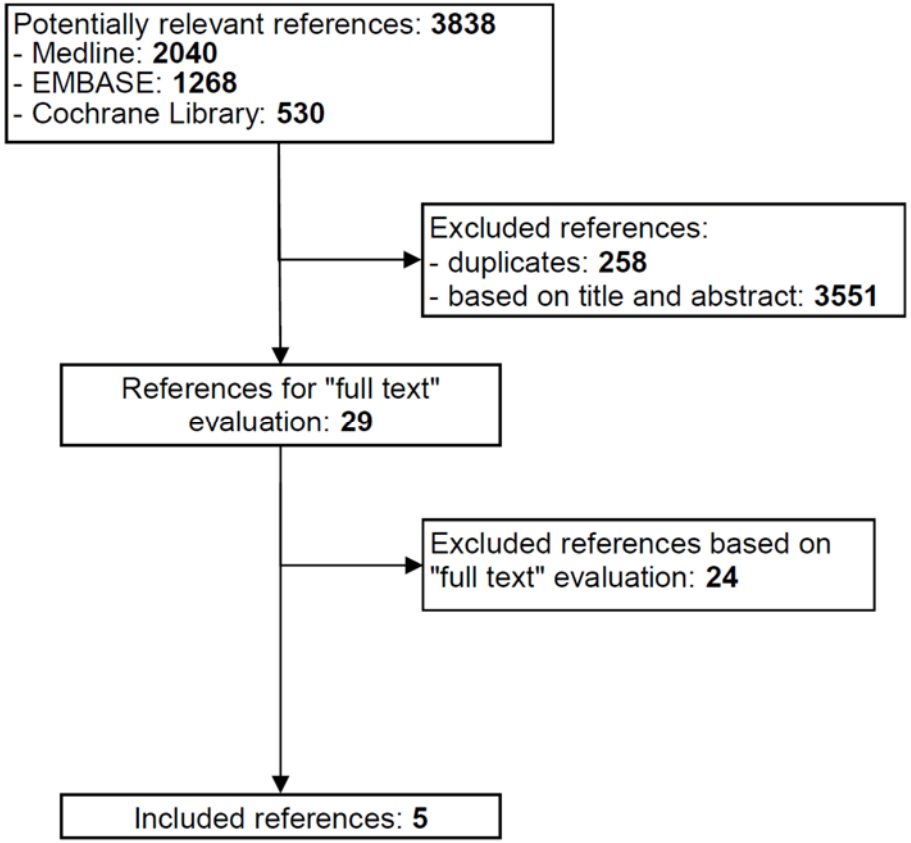


Table 8 – Included studies: haemostasis tests

Reference
Fischer JP, Shang EK, Nelson JA, Wu LC, Serletti JM, Kovach SJ. Patterns of preoperative laboratory testing in patients undergoing outpatient plastic surgery procedures. Aesthet. surg. j. 2014;34(1):133-41.
Seicean A, Schiltz NK, Seicean S, Alan N, Neuhauser D, Weil RJ. Use and utility of preoperative hemostatic screening and patient history in adult neurosurgical patients. J Neurosurg. 2012;116(5):1097-105.
Sousa Soares DD, Marques Brandão RR, Nogueira Mourão MR, Fernandes de Azevedo VL, Vieira Figueiredo A, Santana Trindade E. Relevance of Routine Testing in Low-risk Patients Undergoing Minor and Medium Surgical Procedures. Rev. Bras. Anestesiol. 2013;63(2):197-201.
Tamim H, Habbal M, Saliba A, Musallam K, Al-Taki M, Hoballah J, et al. Preoperative INR and postoperative major bleeding and mortality: A retrospective cohort study. J Thromb Thrombolysis. 2016;41(2):301-11.
Weil IA, Seicean S, Neuhauser D, Schiltz NK, Seicean A. Use and Utility of Hemostatic Screening in Adults Undergoing Elective, Non-Cardiac Surgery. PLoS ONE. 2015;10(12):e0139139.

Quality appraisal of selected studies

Table 9 – Quality appraisal of selected primary studies (cohort studies): haemostasis tests

Domains	Fischer 2014	Weil IA 2015	Seicean 2012	Sousa Soares 2013	Tamim 2016
Domain 1: Selection bias					
• Can selection bias sufficiently be excluded?	Yes	Yes	Yes	No	Yes
• Are the most important confounding factors identified, are they adequately measured and are they adequately taken into account in the study design and/or analysis?	Yes	Yes	Yes	No	Yes
Domain 2: Detection bias					
• Is the exposure clearly defined and is the method for	Yes	Yes	Yes	No	Yes

Domains	Fischer 2014	Weil IA 2015	Seicean 2012	Sousa Soares 2013	Tamim 2016
assessment of exposure adequate and similar in study groups?					
• Are the outcomes clearly defined and is the method for assessment of the outcomes adequate and similar in study groups?	Yes	Yes	Yes	No	Yes
• Is the likelihood that some eligible subjects might have the outcome at the time of enrolment assessed and taken into account in the analysis?	Yes	Yes	Yes	Unclear	Yes
• Is the assessment of outcome made blind to exposure status?	No	No	No	No	No
If no to question 6, does this have an impact on the assessment of the outcome?	No	No	No	No	No
• Is the follow-up sufficiently long to measure all relevant outcomes?	Yes	Yes	Yes	Yes	Yes
Domain 3: Attrition bias					
• Can selective loss-to-follow-up be sufficiently excluded?	Yes	Yes	Yes	Yes	Yes

3.3.3. *Urinalysis*

Selection of studies

On Apr 19, 2016 a search was performed to identify studies comparing preoperative urinalysis versus no urinalysis in adults undergoing elective non-cardiothoracic surgery. MEDLINE (including PreMedline), Embase and the Cochrane Library were searched.

Based on title and abstract 1931 studies were excluded (Figure 3). The full-text of 64 studies was evaluated. Eight studies were finally included (Table 10).

Figure 3 – Flowchart of study selection: urinalysis

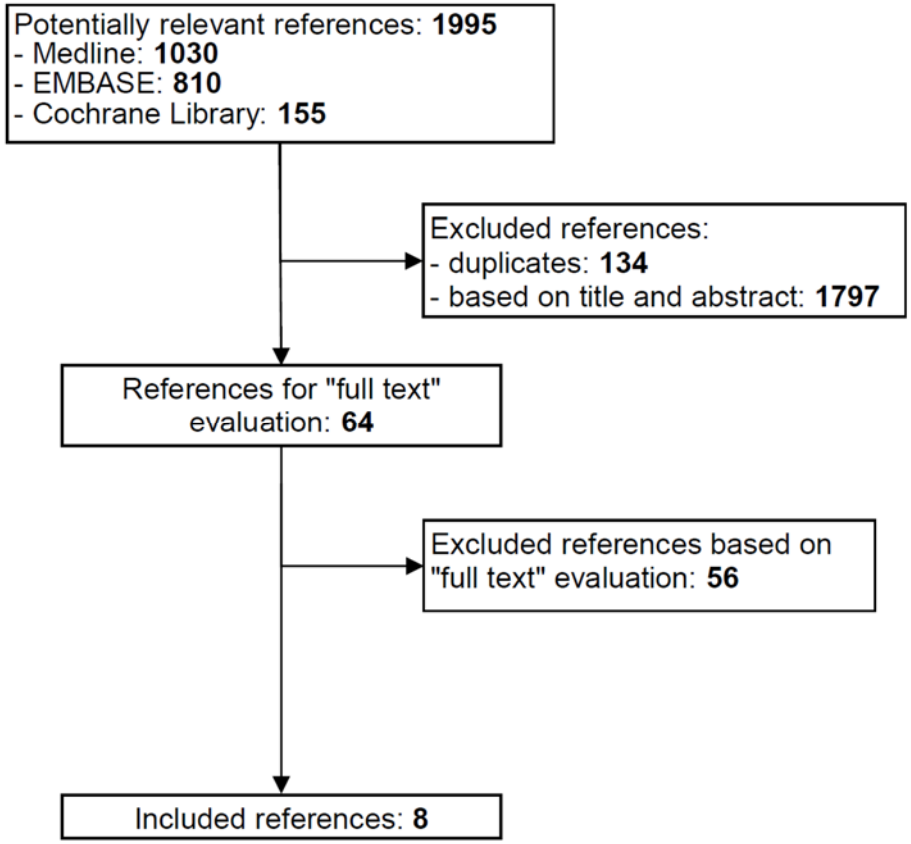


Table 10 – Included studies: urinalysis

Reference
Gou W, Chen J, Jia Y, Wang Y. Preoperative asymptomatic leucocyturia and early prosthetic joint infections in patients undergoing joint arthroplasty. J Arthroplasty. 2014;29(3):473-6.
Gutierrez J, Smith A, Geavlete P, Shah H, Kural AR, de Sio M, et al. Urinary tract infections and post-operative fever in percutaneous nephrolithotomy. World J Urol. 2013;31(5):1135-40.
Hwang EC, Jung SI, Kwon DD, Lee G, Bae JH, Na YG, et al. A prospective Korean multicenter study for infectious complications in patients undergoing prostate surgery: risk factors and efficacy of antibiotic prophylaxis. J Korean Med Sci. 2014;29(9):1271-7.
Koras O, Bozkurt IH, Yonguc T, Degirmenci T, Arslan B, Gunlusoy B, et al. Risk factors for postoperative infectious complications following percutaneous nephrolithotomy: a prospective clinical study. Urolithiasis. 2015;43(1):55-60.
Korets R, Graversen JA, Kates M, Mues AC, Gupta M. Post-percutaneous nephrolithotomy systemic inflammatory response: a prospective analysis of preoperative urine, renal pelvic urine and stone cultures. J Urol. 2011;186(5):1899-903.
Mishra S, Sinha L, Ganesamoni R, Ganpule A, Sabnis RB, Desai M. Renal deterioration index: preoperative prognostic model for renal functional outcome after treatment of bilateral obstructive urolithiasis in patients with chronic kidney disease. J Endourol. 2013;27(11):1405-10.
Shah P, Ganpule A, Mishra S, Sabnis R, Desai MR. Prospective study of preoperative factors predicting intraoperative difficulty during laparoscopic transperitoneal simple nephrectomy. Urol Ann. 2015;7(4):448-53.
Sousa R, Muñoz-Mahamud E, Quayle J, Da Costa LD, Casals C, Scott P, et al. Is asymptomatic bacteriuria a risk factor for prosthetic joint infection? Clin. Infect. Dis. 2014;59(1):41-7.

Quality appraisal of selected studies

Table 11 – Quality appraisal of selected primary studies (cohort studies) for urine culture

For Mishra 2013 see Table 12

Domains	Gutierrez 2013	Hwang 2014	Koras 2015	Korets 2011	Shah 2015	Sousa 2014
Domain 1: Selection bias						
• Can selection bias sufficiently be excluded?	Yes	Yes	Yes	Yes	Yes	Yes
• Are the most important confounding factors identified, are they adequately measured and are they adequately taken into account in the study design and/or analysis?	Yes	Yes	Insufficient information to answer	Insufficient information to answer	Yes	Yes
Domain 2: Detection bias						
• Is the exposure clearly defined and is the method for assessment of exposure adequate and similar in study groups?	Yes	Yes	Yes	Yes	Yes	Yes
• Are the outcomes clearly defined and is the method for assessment of the outcomes adequate and similar in study groups?	No (fever was used as a proxy of infection)	Yes	Yes	Yes	No (difficulty of surgery is not assessed by a validated tool)	Yes

Domains	Gutierrez 2013	Hwang 2014	Koras 2015	Korets 2011	Shah 2015	Sousa 2014
• Is the likelihood that some eligible subjects might have the outcome at the time of enrolment assessed and taken into account in the analysis?	Insufficient information to answer	Yes	Yes	Yes	No	Yes
• Is the assessment of outcome made blind to exposure status?	Yes	No	No	No	Insufficient information to answer	Insufficient information to answer
If no to question 6, does this have an impact on the assessment of the outcome?		No	No	No	No	No
• Is the follow-up sufficiently long to measure all relevant outcomes?	Yes	Yes	Insufficient information to answer	Insufficient information to answer	Yes	Yes
Domain 3: Attrition bias						
• Can selective loss-to-follow-up be sufficiently excluded?	Yes	Yes	Yes	Yes	Yes	Yes

Table 12 – Quality appraisal of selected primary studies (cohort studies) for other urinalysis

Domains	Gou 2014	Mishra 2013
Domain 1: Selection bias		
• Can selection bias sufficiently be excluded?	Yes	Insufficient information to answer and inconsistency in reporting
• Are the most important confounding factors identified, are they adequately measured and are they adequately taken into account in the study design and/or analysis?	Yes	Yes
Domain 2: Detection bias		
• Is the exposure clearly defined and is the method for assessment of exposure adequate and similar in study groups?	Yes	Yes
• Are the outcomes clearly defined and is the method for assessment of the outcomes adequate and similar in study groups?	Yes	Yes
• Is the likelihood that some eligible subjects might have the outcome at the time of enrolment assessed and taken into account in the analysis?	Yes	Yes
• Is the assessment of outcome made blind to exposure status?	Insufficient information to answer	No
If no to question 6, does this have an impact on the assessment of the outcome?	No	No
• Is the follow-up sufficiently long to measure all relevant outcomes?	Yes	Yes
Domain 3: Attrition bias		
• Can selective loss-to-follow-up be sufficiently excluded?	Yes	Yes

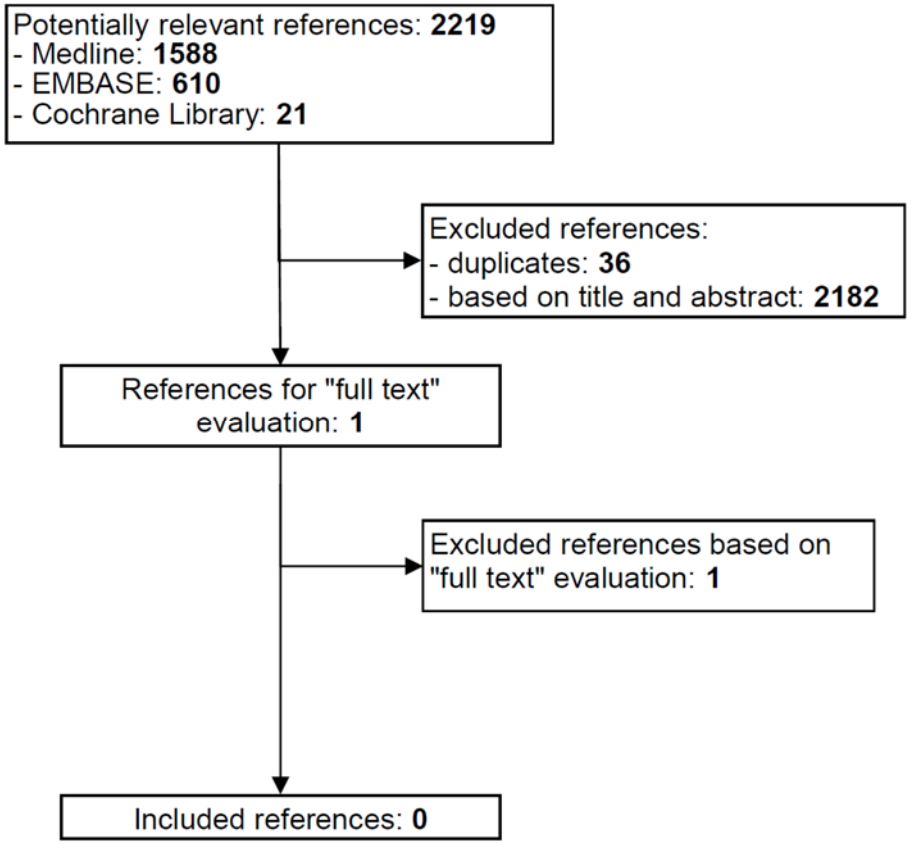
3.3.4. Liver tests

Selection of studies

On Apr 25, 2016 a search was performed to identify studies comparing preoperative liver tests versus no liver tests in adults undergoing elective non-cardiothoracic surgery. MEDLINE (including PreMedline), Embase and the Cochrane Library were searched.

Based on title and abstract 2218 studies were excluded (Figure 4). The full-text of 1 study was evaluated. No study was finally included.

Figure 4 – Flowchart of study selection: liver tests



3.3.5. Cardiac tests: coronary CT, stress echocardiography, nuclear scintigraphy imaging

Selection of studies

On May 2, 2016 a search was performed to identify studies comparing preoperative cardiac imaging tests versus no tests in adults undergoing elective non-cardiothoracic surgery. MEDLINE (including PreMedline), Embase and the Cochrane Library were searched. Pre-transplant evaluations were excluded for this question, because of the very specific preoperative assessment for these patients.

Based on title and abstract 2218 studies were excluded (Figure 5). The full-text of 85 studies was evaluated. Twelve studies were finally included (Table 13).

Figure 5 – Flowchart of study selection: cardiac imaging tests

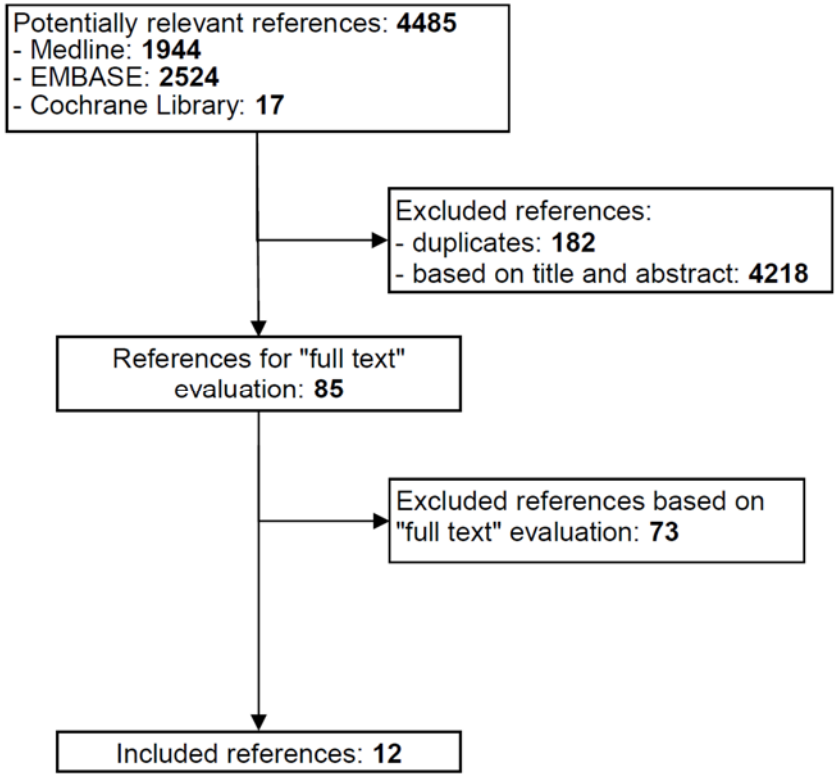


Table 13 – Included studies: cardiac imaging

Reference
Beattie WS, Abdelnaem E, Wijeysundera DN, Buckley DN. A meta-analytic comparison of preoperative stress echocardiography and nuclear scintigraphy imaging. Anesth Analg. 2006;102(1):8-16.
Budde RP, Huo F, Cramer MJ, Doevendans PA, Bots ML, Moll FL, et al. Simultaneous aortic and coronary assessment in abdominal aortic aneurysm patients by thoraco-abdominal 64-detector-row CT angiography: estimate of the impact on preoperative management: a pilot study. Eur J Vasc Endovasc Surg. 2010;40(2):196-201.
Etchells E, Meade M, Tomlinson G, Cook D. Semiquantitative dipyridamole myocardial stress perfusion imaging for cardiac risk assessment before noncardiac vascular surgery: a meta-analysis. J Vasc Surg. 2002;36(3):534-40.
Hwang JW, Kim EK, Yang JH, Chang SA, Song YB, Hahn JY, et al. Assessment of perioperative cardiac risk of patients undergoing noncardiac surgery using coronary computed tomographic angiography. Circulation. Cardiovascular imaging. 2015;8(3).
Kertai MD, Boersma E, Bax JJ, Heijenbrok-Kal MH, Hunink MG, L'Talien G J, et al. A meta-analysis comparing the prognostic accuracy of six diagnostic tests for predicting perioperative cardiac risk in patients undergoing major vascular surgery. Heart. 2003;89(11):1327-34.
Lerakis S, Kalogeropoulos AP, El-Chami MF, Georgiopoulou VV, Abraham A, Lynch SA, et al. Transthoracic dobutamine stress echocardiography in patients undergoing bariatric surgery. Obes Surg. 2007;17(11):1475-81.
Mantha S, Roizen MF, Barnard J, Thisted RA, Ellis JE, Foss J. Relative effectiveness of four preoperative tests for predicting adverse cardiac outcomes after vascular surgery: a meta-analysis. Anesth Analg. 1994;79(3):422-33.
Palombo D, Vola M, Lucertini G, Mazzei R, Ferrero E, Grana A, et al. Cardiac risk assessment of asymptomatic patients by stress echocardiography before infrarenal aortic aneurysm surgery. J Cardiovasc Surg (Torino). 2005;46(1):31-6.
Schouten O, Dunkelgrun M, Feringa HH, Kok NF, Vidakovic R, Bax JJ, et al. Myocardial damage in high-risk patients undergoing elective endovascular or open infrarenal abdominal aortic aneurysm repair. Eur J Vasc Endovasc Surg. 2007;33(5):544-9.
Shaw LJ, Eagle KA, Gersh BJ, Miller DD. Meta-analysis of intravenous dipyridamole-thallium-201 imaging (1985 to 1994) and dobutamine echocardiography (1991 to 1994) for risk stratification before vascular surgery. J Am Coll Cardiol. 1996;27(4):787-98.
Watanabe F, Hataji O, Ito K, D'Alessandro-Gabazza CN, Naito M, Morooka H, et al. Three-dimensional computed tomography angiography for the preoperative evaluation of coronary artery disease in lung cancer patients. World Journal of Surgical Oncology. 2013;11(164).
Yokoshima T, Honma H, Kusama Y, Munakata K, Takano T, Nakanishi K. Improved stratification of perioperative cardiac risk in patients undergoing noncardiac surgery using new indices of dobutamine stress echocardiography. J Cardiol. 2004;44(3):101-11.

Table 14 – Included primary studies stress echocardiography (including those included in the SRs)

Reference	Beattie 2006	Kertai 2003	Shaw 1996	Mantha 1994
Studies already included in SRs				
Ballal 1999	X			
Boersma 2001	X	X		
Bossone 1999	X			
Das 2000	X			
Davila-Roman 1993	X	X	X	
Day 2000	X			
Eichelberger 1993	X	X	X	X
Kontos 1996	X			
Lacroix 2000	X			
Lalka 1992	X	X	X	X
Lane 1991	X			
Langan 1993	X	X	X	
Lin 2001	X			
Mocini 1995	X			
Mondillo 2002	X			
Pasquet 1998	X	X		
Plotkin 2001	X			
Poldermans 1993		X	X	X
Poldermans 1995, 1997	X	X		
Rossi 1998	X	X		
Shafritz 1997	X	X		

Reference	Beattie 2006	Kertai 2003	Shaw 1996	Mantha 1994
Sicari 1999	X	X		
Tischler 1991	X	X		
Torres 2002	X			
Van Damme 1997	X			
Zamorano 2002	X			
Update				
Lerakis 2007				
Palombo 2005				
Schouten 2007				
Yokoshima 2004				

Table 15 – Included primary studies nuclear scintigraphy (including those included in the SRs)

Reference	Beattie 2006	Kertai 2003	Etchells 2002	Shaw 1996	Mantha 1994
Studies already included in SRs					
Antalffy 1995	X		X		
Baron 1994	X	X		X	
Boucher 1985	X	X		X	
Bry 1994	X	X	X	X	
Chen 2002	X				
Coley 1992	X				
Cutler 1987	X	X			
DeVirgillio 1996	X				
DeVirgillio 2000	X				
Eagle 1989		X		X	X
Erickson 1996	X	X			
Fleisher 1992	X				
Fletcher 1988	X	X			
Hashimoto 2003	X				
Hendel 1995	X	X		X	
Huang 1998	X		X		
Klonaris 1998	X	X			
Kontos 1996a	X				
Kontos 1996b	X				
Kresowik 1993	X			X	
Lacroix 2000	X				

Reference	Beattie 2006	Kertai 2003	Etchells 2002	Shaw 1996	Mantha 1994
Lane 1989	X	X	X	X	X
Lette 1990	X		X		X
Levinson 1990	X		X		
Lin 2001	X				
Madsen 1992	X	X			
Mangano 1991	X	X		X	X
Marshall 1995	X				
Marwick 1995			X		
McEnroe 1990	X	X		X	
McPhail 1993		X			X
Mistry 1998	X				
Mocini 1995	X				
Mondillo 2002	X				
Nguyen 1997	X				
Ombrellaro 1995	X	X			
Pasquet 1998	X				
Patel 2003	X				
Sachs 1988	X	X			X
Seeger 1994	X				
Shaw 1992	X				
Stratmann 1996a	X		X		
Stratmann 1996b	X				
Strawn 1991	X	X			

Reference	Beattie 2006	Kertai 2003	Etchells 2002	Shaw 1996	Mantha 1994
Van Damme 1997	X				
Vandenberg 1996	X				
Vanzetto 1996	X	X	X		
Vanzetto 1999	X				
Vaquette 2003	X				
Watters 1991	X	X			
Younis 1990	X	X		X	
Zarich 1996	X				

Quality appraisal of selected studies

Table 16 – Methodological quality of the included systematic reviews (AMSTAR)

Systematic review	A priori study design	Duplicate study selection and data extraction	Compre-hensive literature search	Publica-tion status not used as inclusion	List of in- and excluded studies	Charac-teristics of included studies provided	Study quality assessed and docu-mented	Quality assess-ment used in conclus-ions	Approp-riate methods to combine findings	Likelihood of publica-tion bias assessed	Conflict of interest stated
Beattie 2006	**Y**	**Y**	**N**	**N**	**N**	**Y**	**Y**	**N**	**N**	**N**	**N**
Etchells 2002	**Y**	**Y**	**N**	**Y**	**N**	**Y**	**Y**	**Y**	**N**	**N**	**N**
Kertai 2003	**Y**	**Y**	**N**	**N**	**N**	**Y**	**N**	**N**	**N**	**N**	**N**
Mantha 1994	**Y**	**?**	**N**	**N**	**N**	**Y**	**Y**	**N**	**N**	**N**	**N**
Shaw 1996	**Y**	**?**	**N**	**N**	**N**	**Y**	**N**	**N**	**N**	**N**	**N**

Figure 6 – Methodological quality of the included RCT (Risk of Bias tool)

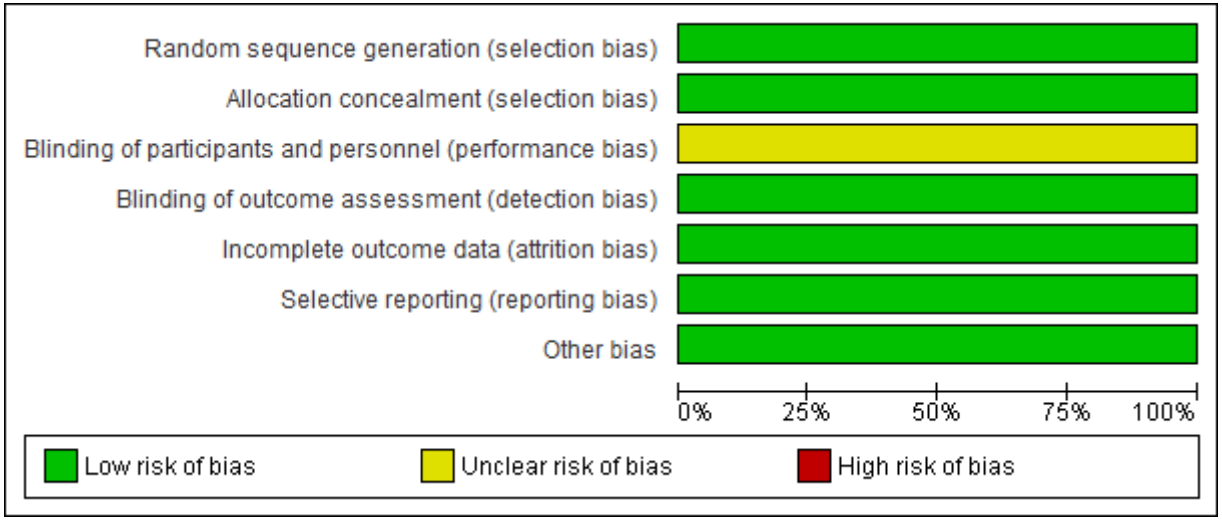


Table 17 – Quality appraisal of selected primary studies (cohort studies): stress echocardiography

Domains	Palombo 2005	Schouten 2007	Yokoshima 2004	Lerakis 2007
Domain 1: Selection bias				
• Can selection bias sufficiently be excluded?	Y	N	N	N
• Are the most important confounding factors identified, are they adequately measured and are they adequately taken into account in the study design and/or analysis?	N	N	Y	N
Domain 2: Detection bias				
• Is the exposure clearly defined and is the method for assessment of exposure adequate and similar in study groups?	Y	Y	Y	Y

Domains	Palombo 2005	Schouten 2007	Yokoshima 2004	Lerakis 2007
• Are the outcomes clearly defined and is the method for assessment of the outcomes adequate and similar in study groups?	Y	Y	Y	Y
• Is the likelihood that some eligible subjects might have the outcome at the time of enrolment assessed and taken into account in the analysis?	N	N	?	N
• Is the assessment of outcome made blind to exposure status?	N	N	N	N
If no to question 6, does this have an impact on the assessment of the outcome?	N	N	N	N
• Is the follow-up sufficiently long to measure all relevant outcomes?	Y	Y	Y	Y
Domain 3: Attrition bias				
• Can selective loss-to-follow-up be sufficiently excluded?	Y	Y	Y	N

Table 18 – Quality appraisal of selected primary studies (cohort studies): coronary CT

Domains	Budde 2010	Watanabe 2013	Hwang 2015
Domain 1: Selection bias			
• Can selection bias sufficiently be excluded?	N	N	N
• Are the most important confounding factors identified, are they adequately measured and are they adequately taken into account in the study design and/or analysis?	N	N	N
Domain 2: Detection bias			
• Is the exposure clearly defined and is the method for assessment of exposure adequate and similar in study groups?	Y	Y	Y
• Are the outcomes clearly defined and is the method for assessment of the outcomes adequate and similar in study groups?	N	N	Y
• Is the likelihood that some eligible subjects might have the outcome at the time of enrolment assessed and taken into account in the analysis?	N	N	N
• Is the assessment of outcome made blind to exposure status?	N	N	N
If no to question 6, does this have an impact on the assessment of the outcome?	?	?	N
• Is the follow-up sufficiently long to measure all relevant outcomes?	?	?	Y
Domain 3: Attrition bias			
• Can selective loss-to-follow-up be sufficiently excluded?	Y	Y	Y

4. EVIDENCE TABLES BY CLINICAL QUESTION

4.1. Haemostasis tests

Table 19 – Evidence table of studies regarding haemostasis tests

Fischer 2014	
Methods	
• **Design**	Retrospective study
• **Source of funding and competing interest**	None
• **Setting**	Population-based, nationwide (American College of Surgeon [ACS] National Surgical Quality Improvement Program [NSQIP] database)
• **Sample size**	N = 8 645
• **Duration and follow-up**	2005-2010; follow-up not reported
• **Statistical analysis**	• Multivariate logistic regression analysis was used to determine factors predictive of the use of preoperative laboratory testing and the effect of preoperative laboratory testing on the incidence of postoperative complications • Logistic regression was performed using backward selection methods, with a cutoff of p<0.10. All tests were 2-tailed, and statistical significance was defined as p<0.05 • Analyses for haemostatic tests were done for the tests as one group
Patient characteristics	
• **Eligibility criteria**	• Patients who underwent outpatient plastic surgery procedures
• **Exclusion criteria**	• Patients with age <18 years, incomplete data for sex or ethnicity, American Society of Anesthesiologists (ASA) physical status class 4 or 5, emergent operations, acute renal failure, impaired sensorium, ventilatory support, or sepsis
• **Patient & disease characteristics**	• Age, mean: no testing 66y, testing 49y (p<0.0001) • Female: 77.8 vs. 84.6% (p<0.0001) • ASA 1: 21.6 vs. 16.8%; ASA 2: 64.9% vs. 62.9%; ASA 3: 13.4% vs. 20.3%; p<0.0001
Interventions	Preoperative haemostatic tests: PTT, PT, INR
Results	
• **Testing vs. no testing (all tests, not only haemostatic tests)**	The use of preoperative testing was not associated with major postoperative complications (0.42% vs 0.21%, p=0.178) or wound complications (2.1% vs 1.7%, p=0.150)
• **Multivariate analysis**	Neither the performance of preoperative testing nor the presence of abnormal results was associated with postoperative complications
Limitations and other comments	
• **Limitations**	Good study Main limitation is retrospective design

Seicean 2012		
Methods		
• **Design**		Retrospective study (prospectively collected database)
• **Source of funding and competing interest**		Conflicts of interest not reported Funding by Agency for Healthcare Research and Quality Institutional Training Grant No. T32-HS00059-14, and the Melvin Burkhardt chair in neurosurgical oncology and the Karen Colina Wilson research endowment within the Rose Ella Burkhardt Brain Tumor and Neuro-Oncology Center of the Cleveland Clinic Foundation
• **Setting**		ACS NSQIP database, US (multicentre)
• **Sample size**		N = 11804
• **Duration and follow-up**		2006-2009
• **Statistical analysis**		• Frequency distributions were used to describe the entire NSQIP neurosurgery patient population, and data and cross-tabulation tables were used to compare outcomes across the different predictor values. • Pearson chi-square tests were used to compare differences in outcomes across groups according to the number of hemostatic tests undergone and individual predictor variables. In cases in which some data cells had fewer than 5 observations, the Fisher exact test was used instead. • Logistic regression was used to model the ability of hemostatic laboratory tests and patient history to predict the outcomes of interest and to test the ability of patient history to predict hemostatic laboratory results.
Patient characteristics		
• **Eligibility criteria**		• Adult patients who had undergone neurosurgery
• **Exclusion criteria**		• Not reported
• **Patient & disease characteristics**		• Age, mean: 55.2y • Female: 47.8% • Bleeding disorder : 2.9% ; history indicative of potentially abnormal hemostasis: 10.9%
Interventions		Preoperative haemostatic tests: INR, aPTT, platelet count
Results		
• **Intraoperative transfusion**	**RBC**	• Patients with 1 abnormal result: OR = 1.9 (1.5-2.4) • Patients with 2 or 3 abdnormal results: OR = 3.45 (2.3-5.3) • Patients with a history indicative of potentially abnormal hemostasis: OR = 2.4 (2.0-2.9)
• **Postoperative transfusion**	**RBC**	• Patients with 2 or 3 abdnormal results: OR = 8.47 (1.9-39.0) • Patients with a history indicative of potentially abnormal hemostasis: OR = 3.2 (1.1-8.9)
• **Return to operating room**		• Patients with 1 abnormal result: OR = 1.7 (1.3-2.3) • Patients with 2 or 3 abdnormal results: OR = 2.41 (1.4-4.1) • Patients with a history indicative of potentially abnormal hemostasis: OR = 2.0 (1.6-2.5)
• **Mortality**		• Patients with 1 abnormal result: OR = 4.7 (3.3-6.8)

	• Patients with 2 or 3 abdnormal results: OR = 13.1 (7.9-21.7) • Patients with a history indicative of potentially abnormal hemostasis: OR = 8.2 (6.1-11.0)
Limitations and other comments	
• **Limitations**	Good study Main limitation is retrospective design

Sousa Soares 2013	
Methods	
• **Design**	Prospective cross-sectional study
• **Source of funding and competing interest**	Not reported
• **Setting**	Single centre, Brasil
• **Sample size**	N = 800
• **Duration and follow-up**	Mar – Dec 2009; follow-up not reported
• **Statistical analysis**	• Descriptive statistics
Patient characteristics	
• **Eligibility criteria**	• Patients aged 1-45y • ASA 1 • Minor-medium elective surgery
• **Exclusion criteria**	• Not reported
• **Patient & disease characteristics**	• Female: 56.6% • ASA 1: 100%
Interventions	Preoperative haemostatic tests: no details
Results	
• **Change in management**	709/800 (88.6%) underwent coagulation tests, 11 had abnormal results (1.6%), 8 (1.1%) had a change in management (without further details)
Limitations and other comments	
• **Limitations**	Few details Potential selection bias

Tamim 2016	
Methods	
• **Design**	Retrospective study
• **Source of funding and competing interest**	None
• **Setting**	Population-based, nationwide (American College of Surgeon [ACS] National Surgical Quality Improvement Program [NSQIP] database)
• **Sample size**	N = 636 231
• **Duration and follow-up**	2008-2011; follow-up not reported
• **Statistical analysis**	• Associations between different characteristics were assessed using the χ^2 test, independent sample *t* test, or ANOVA • To control for potentially confounding effects of patients' characteristics, multivariate logistic regression analyses were carried out • The ability of INR to detect outcomes and to discriminate between patients who developed the outcome and those who did not was assessed using receiving operative characteristic (ROC) curves. The Youden index was calculated to determine the best INR cut-off for both major bleeding and mortality
Patient characteristics	
• **Eligibility criteria**	• Patients who underwent major surgery
• **Exclusion criteria**	• Patients not having INR recorded in their files
• **Patient & disease characteristics**	• Age, mean: 60y • Female: 52.6% • ASA 1-2: 39.0%; ASA 3: 48.6%; ASA 4-5: 12.4%
Interventions	Preoperative haemostatic tests: INR
Results	
• **Major bleeding**	OR (INR=2 vs. 1): 1.22 (95%CI 1.18-1.25)
• **Perioperative transfusion**	OR (INR=2 vs. 1): 1.09 (95%CI 0.90-1.31)
• **Mortality**	OR (INR=2 vs. 1): 1.51 (95%CI 1.41-1.62)
• **AUC and cut-off point**	• Major bleeding: AUC=0.611, best cut-off = 1.10 • Mortality: AUC=0.760, best cut-off = 1.13
Limitations and other comments	
• **Limitations**	Good study Main limitation is retrospective design

Weil 2015	
Methods	
• **Design**	Retrospective study
• **Source of funding and competing interest**	None
• **Setting**	Population-based, nationwide (American College of Surgeon [ACS] National Surgical Quality Improvement Program [NSQIP] database)
• **Sample size**	N = 2 020 533
• **Duration and follow-up**	2006-2012; follow-up not reported
• **Statistical analysis**	• Pearson's chi-square tests were used to compare differences in outcomes across groups according to number of hemostatic tests undergone and individual predictor variables • Logistic regression was used to model the ability of hemostatic lab tests and patient history to predict the outcomes of interest, and to test the ability of patient history to predict hemostatic lab results
Patient characteristics	
• **Eligibility criteria**	• Adult patients who underwent an elective, non-cardiac surgery
• **Exclusion criteria**	• Patients undergoing an emergency operation • Patients undergoing cardiac surgery • Patients with sepsis • Patients who received preoperative transfusion
• **Patient & disease characteristics**	• Age, mean: 56y • Female: 58.2% • ASA 1-2: 56.2%; ASA 3-4: 43.8%; ASA 5: 0.02%
Interventions	Preoperative haemostatic tests: INR, aPTT, platelet count
Results	
• **Perioperative RBC transfusion**	1 abnormal test: OR=1.9 (95%CI 1.86-1.93); 2-3 abnormal tests: OR=2.8 (2.7-2.8)
• **Return to operating room**	1 abnormal test: OR=1.8 (95%CI 1.8-1.9); 2-3 abnormal tests: OR=3.0 (2.9-3.1)
• **30-day mortality**	1 abnormal test: OR=3.0 (95%CI 2.8-3.1); 2-3 abnormal tests: OR=6.7 (6.4-7.0)
• **Unplanned readmission**	1 abnormal test: OR=1.6 (95%CI 1.5-1.6); 2-3 abnormal tests: OR=2.2 (2.1-2.3)
Limitations and other comments	
• **Limitations**	Good study Main limitation is retrospective design

4.2. Urinalysis

4.2.1. Urine culture

Table 20 – Evidence table of intervention studies regarding urine culture in patients with elective surgery.

Gutierrez 2013	
Methods	
• **Design**	Prospective cohort
• **Source of funding and competing interest**	Supported by Olympus No competing financial interests exist.
• **Setting**	96 centres in Asia (n=1 308), Europe (n=3 071), North America (n=695) and South America (n=280)
• **Sample size**	5 354 patients included in analysis
• **Duration and follow-up**	1y ; follow-up not reported
• **Statistical analysis**	Univariate and multivariate analyses using backward regression analysis
Patient characteristics	
• **Eligibility criteria**	Patients eligible for percutaneous nephrolithotomy as primary indication or following the failure of previous treatment
• **Exclusion criteria**	Patients without available preoperative urine samples or without antibiotic prophylaxis (n=449)
• **Patient & disease characteristics**	• Age, mean (±SD): 49.2y (±15.6) • Female: 43.6% • BMI, mean (±SD): 26.7 kg/m² (±5.2) • Diabetes: 13.5% • ASA score: ASA1 54.1%, ASA2 34.3%, ASA3 10.7%, ASA4 0.9% • Positive preoperative urine cultures: 16.2% • Preoperative nephrostomy: 8.0% • Staghorn stone: 27.2%
Interventions	
	Patients with percutaneous nephrolitholomy
Results	

• **Postoperative fever (≥38.5°C)** *as a proxy of infection*	Patients age (y) OR (95% IC)= 0.99 (0.99-1.00) Diabetes OR (95% IC)= 1.38 (1.05-1.81) Positive urine culture OR (95% IC)= 2.12 (1.69-2.65) Pre-operative nephrostomy OR (95% IC)= 1.61 (1.19-2.17) Staghorn calculus OR (95% IC)= 1.59 (1.28-1.96) Female sex, operative time (min), residual stone, post-operative nephrostomy, prednisone treatment: ns *All OR are adjusted OR*
Limitations and other comments	
• **Limitations**	Utilization of fever as proxy of infection

Hwang 2014	
Methods	
• **Design**	Prospective cohort
• **Source of funding and competing interest**	Supported by Korean Urological Association (KUA-2012-002) No competing interests
• **Setting**	Multiple institutions in Korea
• **Sample size**	n=424
• **Duration and follow-up**	18 Months, 2 weeks
• **Statistical analysis**	Univariate and multivariate logistic regression analyses (stepwise backward procedure)
Patient characteristics	
• **Eligibility criteria**	All patients undergoing a prostate related surgery who received initial intravenous antibiotics 30 to 60 min preoperatively and midstream urine sample on 3 to 5 days preoperatively, at 4 to 8 hr after postoperative removal of catheter and 1 to 2 weeks postoperatively
• **Exclusion criteria**	No follow up urinalysis and urine culture
• **Patient & disease characteristics**	• Mean age (± SD) : 69.1y (± 7.0) • Transurethral prostate surgery: 50.7% • Open or laparoscopic prostate surgery: 49.3% • Mean post void residuals (± SD) : 91.1y (± 127.5) • Mean operation time (min) (± SD) : 165.1y (± 91.6)

	• Recent urinary tract infection: 8.0% • Preoperative urinary tract infection: 7.5% • Diabetes mellitus: 17.9% • Postoperative infectious complications: 34.9%
Interventions	
	Patients with prostate related surgery after prophylactic antibiotics
Results	
• **Predictive factors for infections complications**	Diabetes mellitus OR (95% IC)= 1.99 (1.09-3.65) Post void residuals (continuous, ml) OR (95% IC)= 1.03 (1.00-1.05) Operation time (continuous, ml) OR (95% IC)= 1.08 (1.03-1.13) *Recent urinary tract infection and preoperative urinary tract infection: ns in univariate analysis* *All OR are adjusted OR*
Limitations and other comments	
• **Limitations**	Good study

Koras 2014		
Methods		
• **Design**	Prospective cohort	
• **Source of funding and competing interest**	Source of funding not stated No competing interests	
• **Setting**	Department of urology, Izmir Bozyaka training and research hospital, Turkey	
• **Sample size**	n=303	
• **Duration and follow-up**	Not mentioned	
• **Statistical analysis**	Student t, Mann-Whitney U Chi-square, fisher's exact test Logistic regression model	
Patient characteristics		
• **Eligibility criteria**	All patients undergoing percutaneous nephrolithotomy performed by 2 surgeons	
• **Exclusion criteria**	Not mentioned	
• **Patient & disease characteristics**	• Patients with systemic inflammatory response syndrome : 27.4% • Patients with sepsis: 7.6%	
Interventions		
	Patients with percutaneous nephrolithotomy after prophylactic antibiotics	
Results		
• **Systemic inflammatory response syndrome**	Stone burden (≥ 800 mm²)	OR (95% IC)= 2.80 (1.27-6.18)
	Operation time (≥ 120 min)	OR (95% IC)= 1.88 (0.84-4.19)
	Irrigation rate (≥ 550 ml/min)	OR (95% IC)= 1.48 (0.69-3.17)
	Recurrent urinary tract infection	OR (95% IC)= 2.08 (1.03-4.20)
	Access n°≥2	OR (95% IC)= 0.56 (0.19-1.6)
	Blood transfusion	OR (95% IC)= 1.18 (0.38-3.69)
	Infection stone	OR (95% IC)= 15.75 (1.75-141.56)
	Positive pre-operative urine culture and positive renal pelvic urine culture: ns in univariate analysis	
	All OR are adjusted OR	
• **Sepsis**	Stone burden (≥ 800 mm²)	OR (95% IC)= 16.76 (3.62-77.66)
	Operation time (≥ 120 min)	OR (95% IC)= 1.05 (0.20-5.52)

	Recurrent urinary tract infection OR (95% IC)= 23.71 (3.75-150.04) Access n°≥2 OR (95% IC)= 1.45 (0.19-11.09) Blood transfusion OR (95% IC)= 1.19 (0.17-8.50) Infection stone OR (95% IC)= 18.63 (2.37-146.29) Fluoroscopy time (≥ 120 s) OR (95% IC)= 1.01 (0.99-1.02) Previous ipsilateral surgery OR (95% IC)= 4.03 (0.82-19.78) Residual stone OR (95% IC)= 0.26 (0.04-1.71) Positive pre-operative urine culture OR (95% IC)= 1.03 (0.18-5.73) *Positive renal pelvic urine culture: ns in univariate analysis* *All OR are adjusted OR*
Limitations and other comments	
• **Limitations**	Study performed in one centre Overall baseline characteristics not reported (only reporting according the occurrence of systemic inflammatory response syndrome or sepsis), gender was not reported Large confidence intervals

Korets 2011	
Methods	
• **Design**	Prospective cohort
• **Source of funding and competing interest**	Not mentioned
• **Setting**	Department of urology, Columbia University, USA
• **Sample size**	n=198
• **Duration and follow-up**	2y ; follow-up not reported
• **Statistical analysis**	• Demographic data: 2-tailes student T, chi-square, Kruskal-Wallis and Mann-Whitney U tests • Spearman's correlation test • Logistic regression modeling for association between clinical variables and post-percutaneous nephrolothotomy
Patient characteristics	
• **Eligibility criteria**	All patients undergoing percutaneous nephrolithotomy

• **Exclusion criteria**	None mentioned	
• **Patient & disease characteristics**	• Age, mean (±IQR): 56.4y (46.9-67.0) • Female: 49.0% • Recurrent urinary tract infections: 16.2% • Diabetes: 18.7% • Positive preoperative bladder urine culture: 23.5% • Positive renal pelvic urine cultures: 11.2% • Stone culture: 20.4%	
Interventions		
	Patients with percutaneous nephrolithotomy after prophylactic antibiotics	
Results		
• **Post-operative systemic inflammatory response**	Female gender	OR (95% IC)= 1.55 (0.87-2.28)
	Multiple renal punctures	OR (95% IC)= 4.75 (1.41-15.21)
	Stone burden (≥ 10 cm² vs < 10 cm²)	OR (95% IC)= 5.07 (1.76-16.65)
	Struvite calculi	OR (95% IC)= 2.19 (0.91-7.38)
	Positive renal pelvic urine culture	OR (95% IC)= 1.74 (0.62-4.21)
	Positive stone culture	OR (95% IC)= 2.55 (0.43-3.95)
	All OR are adjusted OR	
Limitations and other comments		
• **Limitations**	Study performed in only one centre by one surgeons Pre-operative bladder urine culture was assessed but not analysed in univariate and multivariate analysis	

Shah 2016	
Methods	
• **Design**	Prospective study
• **Source of funding and competing interest**	Nil None
• **Setting**	Single centre, India
• **Sample size**	N = 77
• **Duration and follow-up**	15 months; follow-up not reported
• **Statistical analysis**	• Univariate analyses using *t* test or χ^2 test were used to assess the association between predictive factors and difficulty during surgery • Multivariate analysis was performed using stepwise multiple regression analysis to assess the predictive value of pre-operative features of patients
Patient characteristics	
• **Eligibility criteria**	All patients planned for laparoscopic simple nephrectomy for benign conditions
• **Exclusion criteria**	All patients that refused to give informed consent
• **Patient & disease characteristics**	• Age, mean (±SD): 43y (±17) • Female: 46.7% • BMI, mean (±SD): 22.17 kg/m² (±4.41) • Positive urine culture: 23.4% • Presence of pyonephrosis: 24.7%
Interventions	
	Patients undergoing laparoscopic transperitoneal simple nephrectomy
Results	
• **Difficulty during the surgery measured by score assessed by one surgeon on a 10 point scale (10=most difficult)**	• Pyonephrosis: beta coefficients (95% CI)= 0.522 (0.286-0.758) • BMI<25 kg/m²: beta coefficients (95% CI)= –0.263 (–0.445- –0.0.024) • Positive urine culture: ns • Other preoperative features: ns
Limitations and other comments	
• **Limitations**	Low sample size Single centre study Outcome not measured with a validated tool

Sousa 2014	
Methods	
• **Design**	Retrospective cohort
• **Source of funding and competing interest**	Funding not mentioned No competing interests
• **Setting**	Three institutions in UK, Portugal and Spain
• **Sample size**	N = 2 497
• **Duration and follow-up**	1y; at least 12 months
• **Statistical analysis**	Univariate analyses: Mann-Whitney test, Khi², Fisher exact tests Multivariate logistic regression using Hosmer-Lemeshow test to assess model fit
Patient characteristics	
• **Eligibility criteria**	All patients undergoing total hip arthroplasty (n=1 284) or knee arthroplasty (n=1 247)
• **Exclusion criteria**	None mentioned
• **Patient & disease characteristics**	• Age, mean: 68.0y • Female: 63.0% • Asymptomatic bacteriuria (ASB): 12.1%
Interventions	
	Retrospective data collection of BMI, diabetes mellitus, ASA score, duration of surgery and ASB defined as urinary symptoms and urine culture showed bacterial growth (≥105 colony-forming units/min)
Results	
• **Prostetic Joint infection**	Knee location OR (95% IC)= 1.39 (1.11-1.72) ASB OR (95% IC)= 3.95 (1.52-10.26) Postoperative urinary tract infection OR (95% IC)= 6.64 (1.24-35.64) ASA score ≥3 OR (95% IC)= 2.12 (0.92-4.95) *All OR are adjusted OR*
Limitations and other comments	
• **Limitations**	Main limitation is retrospective design Missing data on duration of surgery and diabetes mellitus in one centre

4.2.2. Other urinalysis

Table 21 – Evidence table of intervention studies regarding urinalysis other than urine culture in patients with elective surgery

Gou 2014		
Methods		
• **Design**	Retrospective study	
• **Source of funding and competing interest**	Not mentioned Can be found at http://dx.doi.org/10.1016/j.arth.2013.07.028.	
• **Setting**	Chinese PLA General Hospital – Beijing (1 surgeon)	
• **Sample size**	N=771	
• **Duration and follow-up**	2y; mean follow-up (± SD): 13.6 months (± 2.4)	
• **Statistical analysis**	Univariate analyses: Khi², Fisher exact tests, Scheffe's post-hoc test Multivariate logistic regression	
Patient characteristics		
• **Eligibility criteria**	Patients with primary total knee arthroplasty or total hip arthroplasty	
• **Exclusion criteria**	Patients with a history of urinary system disease or kidney transplant, those who had undergone recent urinary tract instrumentation, or who showed symptoms of urinary tract infection or the use of antimicrobial drugs within the previous 30 days	
• **Patient & disease characteristics**	• Mean age (± SD): 53.7y (± 15.5) • Female: 61.2% • Preoperative asymptomatic leucocyturia (ASL): 17.7%	
Interventions		
	Patients with total knee arthroplasty (n=455) or with total hip arthroplasty (n=540)	
Results		
• **Early prosthetic joint infections**	Diabetes	OR (95% IC)= 69.65 (11.855-409.233)
	Preoperative ASL	OR (95% IC)= 1.04 (0.138-7.833)
	Gender	OR (95% IC)= 0.57 (0.087-3.773)
	Age	OR (95% IC)= 1.06 (0.987-1.138)
	Hypertension	OR (95% IC)= 0.42 (0.080-2.234)
	Steroids	OR (95% IC)= 0.63 (0.037-10.922)

	All OR are adjusted OR
Limitations and other comments	
• **Limitations**	Retrospective design Small sample size in a single centre (only 7 patients diagnosed with the outcome under study)

Mishra 2013	
Methods	
• **Design**	Prospective cohort
• **Source of funding and competing interest**	Source of funding not mentioned No competing financial interests
• **Setting**	Department of urology, Muljibhai Patel Urological hospital, India
• **Sample size**	N=167
• **Duration and follow-up**	2y; at least 1y
• **Statistical analysis**	Univariate and multivariate logistic regression (forward stepwise)
Patient characteristics	
• **Eligibility criteria**	Patients treated for obstructive nephrolithiasis and followed at least 1 year
• **Exclusion criteria**	Patients with acute renal filure, pediatric patients, solitary kidney with renal insufficiency
• **Patient & disease characteristics**	• Mean age (± SD): 48.06y (± 14.09) • Female: 21.3% • Chronic kidney disease: 67.5% • Mean combined cortical width (± SD): 23.04 mm (± 8.52) • Proteinuria (urine dipstick method): 0 (n=64), 1 (n=69), >1 (n=36) • Positive preoperative urine culture: 20.4% • Mean serum creatinine at 5 days of deobstruction (± SD): 3.35 mg% (± 2.16) • Treatment failure: 29%
Interventions	
	Percutaneous nephrolithotomy or antegrade ureteroscopy

Results		
• **Treatment failure**	Combined cortical width	OR (95% IC)= 0.84 (0.77-0.90)
	Nadir glomerular filtration rate	OR (95% IC)= 1.37 (1.06-1.78)
	Proteinuria	OR (95% IC)= 2.07 (1.19-3.58)
	Urine culture	OR (95% IC)= 4.96 (1.68-14.63)
	All OR are adjusted OR	
Limitations and other comments		
• **Limitations**	Reported number of patients was inconsistently reported in abstract and full text Large confident interval around OR for urine culture	

4.3. Cardiac tests: coronary CT, stress echocardiography, nuclear scintigraphy imaging

Table 22 – Evidence table of systematic reviews regarding cardiac tests: coronary CT, stress echocardiography, nuclear scintigraphy imaging

Beattie 2006	
Methods	
• **Design**	Systematic review + meta-analysis
• **Source of funding and competing interest**	Not reported
• **Search date**	Mar 2005
• **Searched databases**	Medline
• **Included study designs**	Cohort studies
• **Number of included studies**	• Stress echocardiography: N=25 • Nuclear scintigraphy: N=50
• **Statistical analysis**	• ROC curves from the quantitative studies were combined meta-analytically using the random-effects model • Sensitivity analysis was planned a priori for the effect of study quality and in patients having vascular procedures • Heterogeneity, defined as the variation among the results of individual trials beyond that expected by chance, was evaluated using the I^2 test
Patient characteristics	

• **Eligibility criteria**	• Studies assessing cardiac risk for any type of non-cardiac surgery • Using stress echocardiography and/or nuclear scintigraphy	
• **Exclusion criteria**	Not reported	
Interventions: Stress echocardiography, nuclear scintigraphy imaging		
Results		
30-day myocardial infarction and/or death	Stress echocardiography	Nuclear scintigraphy
• **Unadjusted event rate**	7.5%	8.1%
• **LR+**	4.09 (95%CI 3.21-6.56)	1.83 (95%CI 1.59-2.10)
• **LR-**	0.23 (95%CI 0.17-0.32)	0.44 (95%CI 0.36-0.54)
• **ROC**	0.80 (95%CI 0.76-0.84)	0.75 (95%CI 0.70-0.81)
Limitations and other comments		
• **Limitations**	Only Medline Studies to heterogeneous to combine	

Kertai 2003	
Methods	
• **Design**	Systematic review + meta-analysis
• **Source of funding and competing interest**	Not reported
• **Search date**	Apr 2001
• **Searched databases**	Medline
• **Included study designs**	Cohort studies
• **Number of included studies**	• Stress echocardiography: N=12 • Nuclear scintigraphy: N=23
• **Statistical analysis**	• Differences in baseline clinical characteristics between the study populations were evaluated using X^2 statistics • To account for a possible source of heterogeneity in diagnostic threshold between studies, pooled results weighted by the sample size of each study were calculated using a random effect model, based on a single treatment effect and standard error for each of a set of studies

Patient characteristics			
• **Eligibility criteria**	• Studies evaluating the predictive performance of six non-invasive tests used for perioperative cardiac risk stratification in patients undergoing major vascular surgery • Studies were included if perioperative (30 day) data on cardiac death and non-fatal myocardial infarction or the composite were reported, and if the absolute numbers of true positive, false negative, true negative, and false positive observations were available (including positivity thresholds), or were derivable from the data presented • Studies in which preoperative coronary revascularisation occurred as a result of a positive test result were only included if patients who underwent such procedures could be excluded or analysed separately		
• **Exclusion criteria**	Not reported		
Interventions: Stress echocardiography, nuclear scintigraphy imaging			
Results			
Perioperative cardiac death and non-fatal myocardial infaction	Dipyridamole stress echocardiography	Dobutamine stress echocardiography	Myocardial perfusion scintigraphy
• **Sensitivity**	74% (95%CI 53-94%)	85% (95%CI 74-97%)	83% (95%CI 77-89%)
• **Specificity**	86% (95%CI 80-93%)	70% (95%CI 62-79%)	49% (95%CI 41-57%)
Limitations and other comments			
• **Limitations**	Only Medline Only English language Studies to heterogeneous to combine		

Table 23 – Evidence table of primary studies regarding cardiac tests: coronary CT, stress echocardiography, nuclear scintigraphy imaging

Falcone 2003	
Methods	
• **Design**	RCT
• **Source of funding and competing interest**	Supported by a grant from The Mid-Atlantic Affiliate American Heart Association, Grant-in-Aid; conflict of interest not reported
• **Setting**	Single centre, US
• **Sample size**	N = 99
• **Duration and follow-up**	Inclusion from Aug 1997 to Dec 1999; 12-month follow-up
• **Statistical analysis**	• Continuous data were compared between study groups (those who underwent preoperative cardiac stress testing and those who did not undergo such testing) by unpaired Student t test or the Wilcoxon rank sum test • Categorical data were compared by chi-square or Fisher exact test. The association between these groups and other cardiovascular risk indicators was evaluated by logistic regression. Univariate odds ratios and associated 95% confidence intervals were estimated.
Patient characteristics	
• **Eligibility criteria**	• Patients undergoing elective abdominal aortic, infrainguinal, and carotid vascular surgery
• **Exclusion criteria**	• Prior complete cardiac evaluation by their primary physician or cardiologist • Cardiac revascularization within 1 year • Patients with high-risk clinical predictors such as unstable coronary syndromes, severe valvular disease, or decompensated congestive heart failure
• **Patient & disease characteristics**	• Mean age: 65y • Male: 67% • Prior myocardial infarction: 24% • Prior CABG: 12% • Prior PTCA: 4%
Interventions	
• **Intervention**	Preoperative dobutamine stress echocardiography (N=41), dobutamine thallium scintigraphy 5n=4) or adenosine thallium scintigraphy (N=1)
• **Control**	No preoperative cardiac stress testing (N=53)
Results	

• **Immediate postoperative adverse outcomes**	• One non-cardiac death (respiratory failure) on postoperative day 7 in a patient randomized to no stress test who had undergone aortobifemoral revascularization • No cardiac deaths before hospital discharge • Before hospital discharge there were 3 (4%) nonfatal adverse postoperative cardiac outcomes including congestive heart failure in 1 patient randomized to cardiac stress testing and elevated troponin I levels in 2 patients who did not undergo stress testing • In the group of patients who underwent cardiac stress testing, the PPV of cardiac events was 0%, the NPV 92%
• **12-month postoperative adverse outcomes**	• One patient randomized to no stress test had an episode of congestive heart failure 1 month postoperatively • One patient had a presumed cardiac death 9 months postoperatively (unwitnessed arrest)
Limitations and other comments	
• **Limitations**	Unclear blinding of patients

Palombo 2005	
Methods	
• **Design**	Prospective cohort study
• **Source of funding and competing interest**	Not reported
• **Setting**	Unclear
• **Sample size**	N = 91
• **Duration and follow-up**	Inclusion between Dec 1998 and Jan 2002;
• **Statistical analysis**	• Diagnostic accuracy was calculated by comparing echocardiography to coronary angiography • Univariate analysis to compare group with negative echocardiography to group with positive echocardiography • Statistical analysis was made using Fisher's exact test
Patient characteristics	
• **Eligibility criteria**	• Patients undergoing elective abdominal aneurysm repair, asymptomatic for coronary artery disease • At least one risk factor for coronary artery disease (family history of myocardial infarction, age >70 years, history of smoking, history of myocardial infarction, hypertension, reduced exercise capacity, cerebrovascular disease, diabetes requiring pharmacological therapy, renal failure)
• **Exclusion criteria**	• Indication for endovascular treatment

	• Suprarenal or juxtarenal aortic aneurysm • Occlusive aortic disease • Emergency procedures
• **Patient & disease characteristics**	• Mean age: 71.9y • Males: 92.3% • History of myocardial infarction: 18.7% • History of CABG or PTCA: 11%
Interventions	Dobutamine stress echocardiography
Results	
• **Test results**	Stress echocardiography was positive in 9 cases, including 7 presenting critical coronary artery disease on the basis of coronary angiography
• **Diagnostic accuracy**	Sensitivity, specificity, positive predictive value and negative predictive value were found to be 100%, 98%, 78% and 100%, respectively
• **Prognostic accuracy**	Sensitivity, specificity, positive predictive value and negative predictive value for the prediction of major cardiac events (heart failure, fatal or non-fatal myocardial infarction, and major ventricular arrhythmia) were found to be 100%, 91%, 11% and 100%, respectively
Limitations and other comments	
• **Limitations**	• Only univariate analysis • No blinded assessment of outcomes

Schouten 2007	
Methods	
• **Design**	Retrospective cohort study
• **Source of funding and competing interest**	• One author supported by an unrestricted research grant from the Netherlands Organization of Health Research and Development (ZonMW), The Hague, the Netherlands and by an unrestricted research grant from ''Lijf & Leven'' Foundation, Rotterdam, the Netherlands • One author supported by an unrestricted research grant from the Netherlands Heart Foundation (#2003B143) • Conflicts of interest not reported
• **Setting**	Single tertiary centre, the Netherlands
• **Sample size**	N = 77
• **Duration and follow-up**	Inclusion Jan 2000 to Jan 2006; follow-up until 30 days postoperatively
• **Statistical analysis**	• Differences in the incidence of the endpoints were evaluated by a Chi-square test
Patient characteristics	
• **Eligibility criteria**	• Patients with 3 or more cardiac risk factors who underwent elective abdominal aneurysm repair
• **Exclusion criteria**	• Open repair requiring suprarenal aortic clamping or renal artery bypass
• **Patient & disease characteristics**	• Mean age: open repair 73.6y, endovascular 73.3y • Males: 92% vs. 97% • Myocardial infarction: 82% each • CVA or TIA: 34% vs. 23% • Previous CABG or PCI: 37% vs. 44%
Interventions	Dobutamine stress echocardiography
Results	
• **Postoperative events**	• Three (8%) patients in the open repair group died within 30 days after surgery, whereas in the endovascular group all patients survived • The incidence of the combined endpoint of cardiovascular death or nonfatal MI for patients in the open group was 13% versus 0% in the endovascular group • Patients with no, or only limited, stress-induced myocardial ischemia at preoperative dobutamine stress echocardiography had a lower incidence of perioperative myocardial infarction than patients with extensive stress-induced ischemia: 3% vs 21%, p=0.03
Limitations and other comments	
• **Limitations**	• Patients with high-risk profile; retrospective inclusion • No multivariate analysis • No blinded assessment of outcomes

Lerakis 2007	
Methods	
• **Design**	Cohort study, probably retrospective (review of records)
• **Source of funding and competing interest**	Partially supported by an educational grant from Bristol-Myers Squibb; conflicts of interest not reported
• **Setting**	Single university centre, US
• **Sample size**	N = 611
• **Duration and follow-up**	Inclusion Feb 2000 to Jul 2005; 6 months follow-up
• **Statistical analysis**	• Rates between subgroups were compared by the chi-square test
Patient characteristics	
• **Eligibility criteria**	• Patients referred for bariatric surgery
• **Exclusion criteria**	• Not reported
• **Patient & disease characteristics**	• Mean age: 42y • Males: 13.4% • Previous coronary artery disease: 7.5%
Interventions	Dobutamine stress echocardiography (N=590)
Results	
• **Test results**	Seven patients had a positive dobutamine stress echocardiography, and 5 of these underwent subsequent coronary angiography. Only 1 patient (with previous history of coronary artery disease) was found with significant coronary artery disease which was managed medically. Non-significant coronary artery disease was found in 2 patients, the remaining 2 patients had normal coronary arteries. Angiography was deferred in 1 patient who proceeded to surgery on medical treatment. One patient declined surgery.
• **30-day mortality**	• 0.5% (N=3) • No difference in mortality based on preoperative dobutamine stress echocardiography results: negative dobutamine stress echocardiography 0.19%, positive dobutamine stress echocardiography 0%, inconclusive dobutamine stress echocardiography 1.8%, p=0.36
Limitations and other comments	
• **Limitations**	• Retrospective inclusion • No multivariate analysis • No blinded assessment of outcomes • Selective loss-to-follow-up cannot be excluded

Yokoshima 2004	
Methods	
• **Design**	Retrospective cohort study
• **Source of funding and competing interest**	Not reported
• **Setting**	Single centre, Japan
• **Sample size**	N = 122
• **Duration and follow-up**	Inclusion Nov 1996 to Mar 2001; follow-up until 1 month postoperatively
• **Statistical analysis**	• Univariate analysis of categorical variables: X^2 test and Fisher's exact text • Univariate analysis of continuous variables: Student's t-test • Stepwise logistic regression to identify predictors of cardiac events; all variables (regardless of their significance in univariate analysis) were entered • ROC curves for optimal cut-off point for prediction of cardiac events
Patient characteristics	
• **Eligibility criteria**	• Patients scheduled for non-cardiac intermediate-risk surgery • Intermediate predictors of coronary artery disease (mild angina pectoris, prior myocardial infarction, compensated or prior congestive heart failure, diabetes mellitus)
• **Exclusion criteria**	• Not reported
• **Patient & disease characteristics**	• Mean age 68y • Males: 59.8%
Interventions	Standard and semiquantitative dobutamine stress echocardiography
Results	
• **Postoperative cardiac events**	• Perioperative cardiac events were defined as events during the operation or within 1 month postoperatively, including fatal arrhythmias, heart failure, angina pectoris, myocardial infarction and cardiac death • Eight perioperative cardiac events occurred, including two deaths
• **Prognostic accuracy**	Sensitivity, specificity, positive predictive value and negative predictive value for the prediction of perioperative cardiac events were 100%, 52%, 13%, and 100%, respectively, for standard dobutamine stress echocardiography, and 100%, 76%, 23%, and 100%, respectively, for semiquantitative dobutamine stress echocardiography
Limitations and other comments	
• **Limitations**	• Retrospective inclusion • No blinded assessment of outcomes

Budde 2010	
Methods	
• **Design**	Retrospective cohort study
• **Source of funding and competing interest**	Funding not reported; no conflicts of interest
• **Setting**	Single university centre, the Netherlands
• **Sample size**	N = 28
• **Duration and follow-up**	Not reported
• **Statistical analysis**	Not reported
Patient characteristics	
• **Eligibility criteria**	• Patients who underwent ECG-gated thoraco-abdominal CT angiography prior to abdominal aorta aneurysm repair
• **Exclusion criteria**	• Not reported
• **Patient & disease characteristics**	• Mean age: 72y • Males: 82%
Interventions	CT angiography
Results	
• **Test results**	17 patients (61%) had significant coronary disease (>50% stenosis) including left main (N=4), single (N=7) and multiple (N=6) vessel disease
• **Change in management**	Based on CT findings, patient management would have been changed in 4 out of the 28 patients (14%; 95%CI 1-27%) by adding coronary angiography. In five patients who underwent coronary artery bypass grafting previously, CT did not change management but confirmed graft patency
Limitations and other comments	
• **Limitations**	• Retrospective inclusion, selection based on receiving of test • No multivariate analysis • No blinded assessment of outcomes • Outcomes not clearly defined

Watanabe 2013	
Methods	
• **Design**	Cohort, probably retrospective
• **Source of funding and competing interest**	Funding not reported; no conflicts of interest
• **Setting**	Single university centre, Japan
• **Sample size**	N = 120
• **Duration and follow-up**	Inclusion Nov 2009 to Sept 2012; follow-up not reported
• **Statistical analysis**	Not reported
Patient characteristics	
• **Eligibility criteria**	• Patients admitted for surgical intervention of lung tumors
• **Exclusion criteria**	• Not reported
• **Patient & disease characteristics**	• Age >75y: 44% • Males: 58%
Interventions	CT angiography
Results	
• **Test results**	Seventy-one patients had normal findings, and forty-nine patients showed coronary stenosis
• **Change in management**	Among the 49 patients with coronary stenosis, 24 with slight stenosis underwent lung tumor resection, 23 had coronary angiography for severe stenosis before lung surgery and 2 were not eligible for lung resection because of very severe coronary stenosis, corresponding to a change in management in 21% of the patients
Limitations and other comments	
• **Limitations**	• Retrospective inclusion • No multivariate analysis • No blinded assessment of outcomes • Outcomes not clearly defined

Hwang 2015	
Methods	
• **Design**	Cohort study, probably retrospective
• **Source of funding and competing interest**	None disclosed
• **Setting**	Single university centre, South-Korea
• **Sample size**	N = 844
• **Duration and follow-up**	Inclusion Jan 2006 to Oct 2012; follow-up until 30 days after surgery
• **Statistical analysis**	• Continuous and categorical variables were compared using Mann–Whitney, Kruskal–Wallis, or X^2 test • The dose-dependent response between PMCE risk and clinical score or coronary CTA scores was assessed by Jonckheere–Terpstra test • Optimal cutoff of each scoring system was derived from Youden J statistic
Patient characteristics	
• **Eligibility criteria**	• Patients who underwent clinically indicated coronary CTA for screening of CAD before elective surgery
• **Exclusion criteria**	• Patients who had history of coronary revascularization • Patients who underwent removal of thymoma adjacent to left ventricle • Patients with inadequate CTA image
• **Patient & disease characteristics**	• Median age: 67y • Males: 62%
Interventions	CT angiography
Results	
• **Postoperative events**	• Perioperative major cardiac event (PMCE), defined as cardiac death, myocardial infarction, or pulmonary edema within 30 days postoperatively, developed in 25 patients (3.0%) • The risk of PMCE was 14.0% in patients with significant CT findings compared to 2.2% in patients without significant CT findings regardless of revised cardiac risk index score
• **Prognostic accuracy**	On the basis of revised cardiac risk index and coronary CT, the risk of PMCE could be estimated with a sensitivity, specificity, positive predictive value, and negative predictive value of 76%, 73%, 8%, and 99%, respectively
Limitations and other comments	
• **Limitations**	• Retrospective inclusion, selection based on receiving of test • No multivariate analysis • No blinded assessment of outcomes

5. GRADE PROFILES

5.1. Resting electrocardiogram

See NICE guideline.

5.2. Resting echocardiography

See NICE guideline.

5.3. Cardiopulmonary exercise testing

See NICE guideline.

5.4. Chest X-ray

No comparative studies.

5.5. Polysomnography

See NICE guideline.

5.6. Lung function tests and arterial blood gas analysis

See NICE guideline.

5.7. Full blood count test

See NICE guideline.

5.8. Kidney function tests

See NICE guideline.

5.9. Haemostasis tests

See NICE guideline.

5.10. Glycated haemoglobin test (HbA1c)

See NICE guideline.

5.11. Liver function tests

No comparative studies.

5.12. Urinalysis

No comparative studies.

5.13. Stress echocardiography

Table 24 – Clinical evidence profile: Stress echocardiography vs. no echocardiography in patients undergoing vascular surgery

Quality assessment							Summary of Findings				
Participants (studies) Follow up	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Publication bias**	**Overall quality of evidence**	**Study event rates (%)**		**Relative effect** (95% CI)	**Anticipated absolute effects**	
							With Control	With Intervention		Risk with Control	Risk difference with Intervention (95% CI)
All-cause mortality (CRITICAL OUTCOME)											
99 (1 study)	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[1]	undetected	⨁⨁⨀⨀ **LOW** due to imprecision	0/46 (0%)	1/53 (1.9%)	RR 0.38 (0.02 to 9.18)	-	
Cardiac events (IMPORTANT OUTCOME)											
99 (1 study)	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[1]	undetected	⨁⨁⨀⨀ **LOW** due to imprecision	2/46 (4.3%)	3/53 (5.7%)	RR 0.77 (0.13 to 4.40)	-	
Quality of life (IMPORTANT OUTCOME)											
No evidence											
Complications (IMPORTANT OUTCOME)											
99 (1 study)	no serious risk of bias	no serious inconsistency	no serious indirectness	very serious[1]	undetected	⨁⨁⨀⨀ **LOW** due to imprecision	0	0	-	-	
Length of stay (IMPORTANT OUTCOME)											
No evidence											

Readmission (IMPORTANT OUTCOME)
No evidence
ICU admission (IMPORTANT OUTCOME)
No evidence

[1] *Very broad CI and/or very low event rate.*

5.14. Myocardial scintigraphy

No comparative studies.

5.15. Coronary CT angiography

No comparative studies.

6. EXTERNAL REVIEW

6.1. Evaluation of the recommendations

Recommendations	Score		SoR	Score		LoE	Comment	Final formulation
Resting electrocardiogram								
Preoperative ECG is recommended for patients who have risk factor(s) and are scheduled for intermediate- or high-risk surgery	5: 8 NA: 1	100%	Strong	5: 7 4: 1 NA: 1	100%	Very low		Preoperative ECG is recommended for patients who have risk factor(s) and are scheduled for **elective** intermediate- or high-risk **non-cardiothoracic** surgery
Preoperative ECG may be considered for patients who have risk factor(s) and are scheduled for low-risk surgery.	5: 4 4: 3 NA: 2	100%	Weak	5: 3 4: 3 NA: 3	100%	Very low		Preoperative ECG may be considered for patients who have risk factor(s) and are scheduled for **elective** low-risk **non-cardiothoracic** surgery.
Preoperative ECG may be considered for patients who have no risk factors, are above 65 years of age, and are scheduled for intermediate-risk surgery.	5: 5 4: 3 NA: 1	100%	Weak	5: 3 4: 4 NA: 2	100%	Very low		Preoperative ECG may be considered for patients who have no risk factors, are above 65 years of age, and are scheduled for **elective** intermediate-risk **non-cardiothoracic** surgery.
Routine preoperative ECG is not recommended for patients who have no risk factors and are scheduled for low-risk surgery.	5: 6 NA: 3	100%	Strong	5: 7 NA: 2	100%	Very low		Routine preoperative ECG is not recommended for patients who have no risk factors and are scheduled for **elective** low-risk **non-cardiothoracic** surgery.
Resting echocardiography								
Do not routinely offer resting echocardiography before surgery.	5: 6 4: 1 NA: 2	100%	Strong	5: 6 4: 1 NA: 2	100%	Very low	- for lung surgery, in some patients it is recommended	Do not routinely offer resting echocardiography before **elective non-cardiothoracic** surgery.
Cardiopulmonary exercise testing								
Routine cardiopulmonary exercise testing is not recommended before el	5: 5 4: 1 **1: 1** NA: 2	86%	Strong	5: 5 4: 1 **1: 1** NA: 2	86%	Very low	- In some patients for lung resection tghis is indicated	Routine cardiopulmonary exercise testing is not recommended before elective non-cardi**othoracic** surgery
Chest X-ray								
Chest X-ray before surgery without clinical indication is not recommended	5: 6 4: 2 NA: 1	100%	Strong	5: 5 4: 3 NA: 1	100%	Low		Chest X-ray before **elective non-cardiothoracic** surgery without clinical indication is not recommended
Polysomnography								
Polysomnography before surgery, including bariatric surgery, is not routinely recommended	5: 4 4: 2 NA: 3	100%	Strong	5: 5 4: 2 NA: 2	100%	Very low		Polysomnography before **elective non-cardiothoracic** surgery, including bariatric surgery, is not routinely recommended
Lung function tests and arterial blood gas analysis								
Lung function tests or arterial blood gas analysis are not routinely recommended before elective non-cardiac surgery	5: 4 4: 3 NA: 2	100%	Strong	5: 4 4: 2 **1: 1** NA: 2	86%	Very low	- for lung resection is it indicated -> I would suggest to exclude lungh resection for these guidelines - A la première lecture (recommandations seules), je n'ai pas compris pourquoi la recommandation contenait deux interventions. La confusion a été levée à la lecteur du texte du corps du document rappelant que les gaz artériels étaient bien un moyen d'évaluer la fonction pulmonaire... Peut-être revoir la forme pour lever cette confusion pour le généraliste (qui fait des spirométries mais pas des gaz du sang)?	Lung function tests **(including** arterial blood gas analysis**)** are not routinely recommended before elective non-cardi**othoracic** surgery
Full blood count test								
Preoperative full blood count testing is not routinely recommended in patients undergoing elective minor non-cardiac surgery.	5: 5 4: 2 NA: 2	100%	Strong	5: 5 4: 2 NA: 2	100%	Very low		Preoperative full blood count testing is not routinely recommended in patients undergoing elective minor non-cardi**othoracic** surgery.
Preoperative full blood count testing is not routinely recommended in patients undergoing elective intermediate non-cardiac surgery, although it can be considered in patients with ASA 3-4.	5: 3 4: 4 NA: 2	100%	Weak	5: 3 4: 3 **1: 1** NA: 2	86%	Very low	- please explain what intermediate risk surgery is	Preoperative full blood count testing is not routinely recommended in patients undergoing elective intermediate non-cardi**othoracic** surgery, although it can be considered in patients with ASA 3-4.
Preoperative full blood count testing is recommended in patients undergoing elective major or complex non-cardiac surgery	5: 6 NA: 3	100%	Strong	5: 5 NA: 4	100%	Very low		Preoperative full blood count testing is recommended in patients undergoing elective major or complex non-cardi**othoracic** surgery

Recommendations	Score		SoR	Score		LoE	Comment	Final formulation
Kidney function tests								
Kidney function tests are recommended in all patients undergoing elective major or complex non-cardiac surgery and in patients with ASA 3-4 undergoing elective intermediate non-cardiac surgery.	5: 6 4: 1 NA: 2	100%	Strong	5: 6 4: 1 NA: 2	100%	Very low		Kidney function tests are recommended in all patients undergoing elective major or complex non-cardiac surgery and in patients with ASA 3-4 undergoing elective intermediate non-cardiothoracic surgery.
Kidney function tests are not recommended in patients with ASA 1 undergoing elective minor or intermediate non-cardiac surgery.	5: 5 4: 2 NA: 2	100%	Strong	5: 4 4: 2 NA: 3	100%	Very low		Kidney function tests are not recommended in patients with ASA 1 undergoing elective minor or intermediate non-cardiothoracic surgery.
Kidney function tests can be considered in patients with ASA 2 undergoing elective minor or intermediate non-cardiac surgery and in patients with ASA 3-4 undergoing elective minor non-cardiac surgery, if renal function impairment is suspected	5: 4 4: 2 NA: 3	100%	Weak	5: 2 4: 2 3: 1 1: 1 NA: 3	67%	Very low	- I would say "strong" since you include in your recommendation " if renal function impairment is suspected." I can't imagine I would not do a renal function test in a pt in whom I suspect renal failure.	Kidney function tests are recommended if renal function impairment is suspected in patients with ASA 2 undergoing elective minor or intermediate non-cardiothoracic surgery and in patients with ASA 3-4 undergoing elective minor non-cardiothoracic surgery.
Haemostasis tests								
Do not routinely offer haemostasis tests before elective non-cardiac surgery.	5: 3 4: 3 2: 1 NA: 2	86%	Strong	5: 3 4: 3 2: 1 NA: 2	86%	Very low	- When epidural is indicated for surgery, haemostasis will be needed	Do not routinely offer haemostasis tests before elective non-cardiothoracic surgery.
Consider haemostasis tests in people with antecedent(s) of abnormal bleeding, either spontaneously or after trauma or surgery, and in people with chronic liver disease having elective intermediate or major or complex non-cardiac surgery	5: 5 4: 2 NA: 2	100%	Weak	5: 5 4: 2 NA: 2	100%	Very low	... no need to include patients that are treated with anticoagulants?	Consider haemostasis tests in people with antecedent(s) of abnormal bleeding, either spontaneously or after trauma or surgery, and in people with chronic liver disease having elective intermediate or major or complex non-cardiothoracic surgery
Glycated haemoglobin test (HbA1c)								
People with diabetes who are being referred for surgery from primary care should have their most recent HbA1c test results included in their referral information.	5: 3 4: 4 NA: 2	100%	Weak	5: 4 4: 3 NA: 2	100%	Low		People with diabetes who are being referred for elective non-cardiothoracic surgery from primary care should have their most recent HbA1c test results included in their referral information.
Offer HbA1c testing to people with diabetes having surgery if they have not been tested in the last 3 months.	5: 2 4: 4 NA: 3	100%	Weak	5: 1 4: 3 NA: 5	100%	Low		Offer HbA1c testing to people with diabetes having elective non-cardiothoracic surgery if they have not been tested in the last 3 months.
Do not offer HbA1c testing before surgery to people without diabetes	5: 6 4: 1 NA: 2	100%	Strong	5: 6 4: 1 NA: 2	100%	Low		Do not offer HbA1c testing before elective non-cardiothoracic surgery to people without diabetes
Liver function tests								
Routine preoperative liver function testing without clinical indication is not recommended.	5: 6 4: 1 NA: 2	100%	Strong	5: 6 4: 1 NA: 2	100%	Very low		Routine preoperative liver function testing without clinical indication is not recommended before elective non-cardiothoracic surgery.
Urinalysis								
Routine preoperative urinalysis and urine culture is not recommended.	5: 7 NA: 2	100%	Strong	5: 7 NA: 2	100%	Very low		Routine preoperative urinalysis and urine culture is not recommended before elective non-cardiothoracic surgery.
Preoperative urinalysis and urine culture can be considered in patients undergoing urinary tract or prosthetic joint surgery.	5: 5 4: 2 NA: 2	100%	Weak	5: 5 4: 2 NA: 2	100%	Very low		Preoperative urinalysis and urine culture can be considered in patients undergoing elective urinary tract or prosthetic joint surgery.
Noninvasive cardiac stress imaging								
Noninvasive stress imaging can be considered for patients at elevated risk for non-cardiac surgery with poor functional capacity, if it will change management.	5: 3 4: 4 NA: 2	100%	Weak	5: 3 4: 3 NA: 3	100%	Very low	- I think we can give a stronger recommendation: poor functional capacity does not allow to assess cardia reserve, so imaging can provide useful information.	Noninvasive stress imaging can be considered for patients at elevated risk for elective non-cardiothoracic surgery with poor functional capacity, if it will change management.
Routine noninvasive stress imaging is not recommended before low-risk surgery, regardless of the patient's clinical risk.	5: 6 4: 1 NA: 2	100%	Strong	5: 6 4: 1 NA: 2	100%	Very low		Routine noninvasive stress imaging is not recommended before elective low-risk non-cardiothoracic surgery, regardless of the patient's clinical risk.
Coronary CT angiography								
Preoperative coronary CT is not routinely recommended in patients undergoing elective non-cardiac surgery.	5: 8 NA: 1	100%	Strong	5: 8 NA: 1	100%	Very low		Preoperative coronary CT is not routinely recommended in patients undergoing elective non-cardiothoracic surgery.

6.2. CEBAM validation

The CEBAM validation took place on Mon Nov 7th. The conclusions were:

The guideline can be validated in its current form provided that the major comment below is addressed.
Major comments:

- Check the clarity of the recommendations to make sure it is clear in which situation (eg risk factors) which tests are needed.

Minor comments:

- Add a paragraph concerning the motivation for this guideline.
- Explain reasons to use ESC and ACC guidelines instead of NICE guideline.
- Explain arguments to formulate weak versus strong recommendations.

6.3. Internal review

The internal review took place on Mon Nov 7th.
One comment led to changes of some recommendations, i.e. to use the passive voice for all recommendations consistently.