National Clinical Guidelines Centre

Draft for consultation

Preoperative tests (update)

Preoperative tests: Routine preoperative tests for elective surgery (update)

Clinical guideline <...>

Appendix G: Literature search strategies

September 2015

Draft

Commissioned by the National Institute for Health and Care Excellence

Disclaimer

Healthcare professionals are expected to take NICE clinical guidelines fully into account when exercising their clinical judgement. However, the guidance does not override the responsibility of healthcare professionals to make decisions appropriate to the circumstances of each patient, in consultation with the patient and, where appropriate, their guardian or carer.

Copyright

National Clinical Guideline Centre, 2015.

National Institute for Health and Care Excellence

Contents

Appendix G: Literature search strategies 5

Appendix G: Literature search strategies

G.1 Contents

Introduction	**Search methodology**
Section G.2	**Standard population search strategy** This population was used for all search questions unless stated
Section G.3	**Study filter terms**
G.3.1	Systematic reviews (SR)
G.3.2	Randomised controlled trials (RCT)
G.3.3	Observational studies (OBS)
G.3.4	Prognostic filters
G.3.5	Diagnostic filters
G.3.6	Health economic studies (HE)
G.3.7	Excluded study designs and publication types
Section G.4	**Searches for specific questions with intervention** (and population where different from G.1)
G.4.1	Cardiopulmonary exercise test
G.4.2	Electrocardiogram
G.4.3	Glycated haemoglobin
G.4.4	Non-invasive cardiac testing
G.4.5	Polysomnography
Error! Reference source not found.	Tests in predicting outcome or altering perioperative management
Section G.5	**Health economics searches**
G.5.1	Health economic reviews

Search strategies used for the preoperative tests guideline are outlined below and were run in accordance with the methodology in the NICE guidelines manual 2012.{NICE2012} All searches were run up to **8 July 2015** unless otherwise stated. Any studies added to the databases after this date (even those published prior to this date) were not included unless specifically stated in the text. We do not routinely search for electronic, ahead of print or 'online early' publications. Where possible searches were limited to retrieve material published in English.

Table 1: Database date parameters

Database	Dates searched
Medline	1946 – 8 July 2015
Embase	1974 – 6 July 2015

Database	Dates searched
The Cochrane Library	Cochrane Reviews to 2015 Issue 7 of 12 CENTRAL to 2015 Issue 6 of 12 DARE, HTA and NHSEED to 2015 2 of 4

Searches for the **clinical reviews** were run in Medline (OVID), Embase (OVID) and the Cochrane Library (Wiley).

Searches for **intervention and diagnostic studies** were usually constructed using a PICO format where population (P) terms were combined with Intervention (I) and sometimes Comparison (C) terms. An intervention can be a drug, a procedure or a diagnostic test. Outcomes (O) are rarely used in search strategies for interventions. Search filters were also added to the search where appropriate.

Searches for **prognostic studies** were usually constructed combining population terms with prognostic variable terms and sometimes outcomes. Search filters were added to the search where appropriate.

Searches for the **health economic reviews** were run in Medline (OVID), Embase (OVID), the NHS Economic Evaluations Database (NHS EED), the Health Technology Assessment (HTA) database and the Health Economic Evaluation Database (HEED). Searches in NHS EED and HEED were constructed using population terms only. For Medline and Embase an economic filter (instead of a study type filter) was added to the same clinical search strategy. The Health Economic Evaluation Database (HEED) ceased production in 2014 with access ceasing in January 2015. For the final dates of HEED searches, please see individual economic questions.

G.2 Population search strategies

Medline search terms

1.	surgical procedures, elective/
2.	elective surg*.ti.
3.	ambulatory surgical procedures/
4.	ambulatory surg*.ti.
5.	exp ambulatory care/
6.	preoperative care/
7.	preoperative period/
8.	perioperative nursing/ or perioperative care/ or perioperative period/
9.	(pre-operative* or preoperative* or preop or pre-op or pre-surg* or presurg* or perioperative* or peri-operative*).ti.
10.	((before or prior or advance) adj4 (surg* or operat* or anaesthes* or anesthes* or elective or ambulatory)).ti.
11.	(day adj2 surg*).ti.
12.	outpatient surg*.ti.
13.	or/1-12

Embase search terms

1.	*elective surgery/
2.	elective surg*.ti.

3.	*ambulatory surgery/
4.	ambulatory surg*.ti.
5.	*ambulatory care/
6.	*preoperative care/ or *preoperative evaluation/
7.	*preoperative period/
8.	*perioperative period/
9.	(pre-operative* or preoperative* or preop or pre-op or pre-surg* or presurg* or perioperative* or peri-operative*).ti.
10.	((before or prior or advance) adj4 (surg* or operat* or anaesthes* or anesthes* or elective or ambulatory)).ti.
11.	(day adj2 surg*).ti.
12.	outpatient surg*.ti.
13.	or/1-12

Cochrane search terms

#1.	mesh descriptor: [surgical procedures, elective] this term only
#2.	elective surg*:ti
#3.	mesh descriptor: [ambulatory surgical procedures] this term only
#4.	ambulatory surg*:ti
#5.	mesh descriptor: [ambulatory care] explode all trees
#6.	mesh descriptor: [preoperative care] this term only
#7.	mesh descriptor: [preoperative period] this term only
#8.	mesh descriptor: [perioperative nursing] this term only
#9.	mesh descriptor: [perioperative care] this term only
#10.	mesh descriptor: [perioperative period] this term only
#11.	(pre-operative* or preoperative* or preop or pre-op or pre-surg* or presurg* or perioperative* or peri-operative*):ti
#12.	((before or prior or advance) near/4 (surg* or operat* or anaesthes* or anesthes* or operat* or elective or ambulatory)):ti
#13.	(day near/2 surg*):ti
#14.	outpatient next surg*:ti
#15.	{or #1-#14}

G.3 Study filter search terms

G.3.1 Systematic review search terms

Medline search terms

1.	meta-analysis/
2.	meta-analysis as topic/
3.	(meta analy* or metanaly* or metaanaly* or meta regression).ti,ab.
4.	((systematic* or evidence*) adj3 (review* or overview*)).ti,ab.
5.	(reference list* or bibliograph* or hand search* or manual search* or relevant journals).ab.
6.	(search strategy or search criteria or systematic search or study selection or data extraction).ab.
7.	(search* adj4 literature).ab.

8.	(medline or pubmed or cochrane or embase or psychlit or psyclit or psychinfo or psycinfo or cinahl or science citation index or bids or cancerlit).ab.
9.	cochrane.jw.
10.	((multiple treatment* or indirect or mixed) adj2 comparison*).ti,ab.
11.	or/1-10

Embase search terms

1.	systematic review/
2.	meta-analysis/
3.	(meta analy* or metanaly* or metaanaly* or meta regression).ti,ab.
4.	((systematic* or evidence*) adj3 (review* or overview*)).ti,ab.
5.	(reference list* or bibliograph* or hand search* or manual search* or relevant journals).ab.
6.	(search strategy or search criteria or systematic search or study selection or data extraction).ab.
7.	(search* adj4 literature).ab.
8.	(medline or pubmed or cochrane or embase or psychlit or psyclit or psychinfo or psycinfo or cinahl or science citation index or bids or cancerlit).ab.
9.	cochrane.jw.
10.	((multiple treatment* or indirect or mixed) adj2 comparison*).ti,ab.
11.	or/1-10

G.3.2 Randomised controlled trials (RCTs) search terms

Medline search terms

1.	randomized controlled trial.pt.
2.	controlled clinical trial.pt.
3.	randomi#ed.ab.
4.	placebo.ab.
5.	drug therapy.fs.
6.	randomly.ab.
7.	trial.ab.
8.	groups.ab.
9.	or/1-8

Embase search terms

1.	random*.ti,ab.
2.	factorial*.ti,ab.
3.	(crossover* or cross over*).ti,ab.
4.	((doubl* or singl*) adj blind*).ti,ab.
5.	(assign* or allocat* or volunteer* or placebo*).ti,ab.
6.	crossover procedure/
7.	double blind procedure/
8.	single blind procedure/
9.	randomized controlled trial/
1	or/1-9

G.3.3 Observational studies search terms

Medline search terms

1.	epidemiologic studies/
2.	exp case control studies/
3.	exp cohort studies/
4.	cross-sectional studies/
5.	case control.ti,ab.
6.	(cohort adj (study or studies or analys*)).ti,ab.
7.	((follow up or observational or uncontrolled or non randomi#ed or nonrandomi#ed or epidemiologic*) adj (study or studies)).ti,ab.
8.	((longitudinal or retrospective or prospective or cross sectional) and (study or studies or review or analys* or cohort*)).ti,ab.
9.	or/1-8

Embase search terms

1.	clinical study/
2.	exp case control study/
3.	family study/
4.	longitudinal study/
5.	retrospective study/
6.	prospective study/
7.	cross-sectional study/
8.	cohort analysis/
9.	follow-up/
10.	cohort*.ti,ab.
11.	9 and 10
12.	case control.ti,ab.
13.	(cohort adj (study or studies or analys*)).ti,ab.
14.	((follow up or observational or uncontrolled or non randomi#ed or nonrandomi#ed or epidemiologic*) adj (study or studies)).ti,ab.
15.	((longitudinal or retrospective or prospective or cross sectional) and (study or studies or review or analys* or cohort*)).ti,ab.
16.	or/1-8,11-15

G.3.4 Prognostic filters

Medline search terms

1.	predict.ti.
2.	(validat* or rule*).ti,ab.
3.	(predict* and (outcome* or risk* or model*)).ti,ab.
4.	((history or variable* or criteria or scor* or characteristic* or finding* or factor*) and (predict* or model* or decision* or identif* or prognos*)).ti,ab.
5.	decision*.ti,ab. and logistic models/
6.	(decision* and (model* or clinical*)).ti,ab.

7.	(prognostic and (history or variable* or criteria or scor* or characteristic* or finding* or factor* or model*)).ti,ab.
8.	(stratification or discrimination or discriminate or c statistic or "area under the curve" or auc or calibration or indices or algorithm or multivariable).ti,ab.
9.	roc curve/
10.	or/1-9

Embase search terms

1.	predict.ti.
2.	(validat* or rule*).ti,ab.
3.	(predict* and (outcome* or risk* or model*)).ti,ab.
4.	((history or variable* or criteria or scor* or characteristic* or finding* or factor*) and (predict* or model* or decision* or identif* or prognos*)).ti,ab.
5.	decision*.ti,ab. and statistical model/
6.	(decision* and (model* or clinical*)).ti,ab.
7.	(prognostic and (history or variable* or criteria or scor* or characteristic* or finding* or factor* or model*)).ti,ab.
8.	(stratification or discrimination or discriminate or c statistic or "area under the curve" or auc or calibration or indices or algorithm or multivariable).ti,ab.
9.	receiver operating characteristic/
10.	or/1-9

G.3.5 Diagnostic filters

Medline search terms

1.	exp "sensitivity and specificity"/
2.	(sensitivity or specificity).ti,ab.
3.	((pre test or pretest or post test) adj probability).ti,ab.
4.	(predictive value* or ppv or npv).ti,ab.
5.	likelihood ratio*.ti,ab.
6.	likelihood function/
7.	(roc curve* or auc).ti,ab.
8.	(diagnos* adj2 (performance* or accurac* or utilit* or value* or efficien* or effectiveness)).ti,ab.
9.	gold standard.ab.
10.	or/1-9

Embase search terms

1.	exp "sensitivity and specificity"/
2.	(sensitivity or specificity).ti,ab.
3.	((pre test or pretest or post test) adj probability).ti,ab.
4.	(predictive value* or ppv or npv).ti,ab.
5.	likelihood ratio*.ti,ab.
6.	(roc curve* or auc).ti,ab.
7.	(diagnos* adj2 (performance* or accurac* or utilit* or value* or efficien* or effectiveness)).ti,ab.
8.	diagnostic accuracy/
9.	diagnostic test accuracy study/

10.	gold standard.ab.
11.	or/1-10

G.3.6 Health economics search terms

Medline search terms

1.	economics/
2.	value of life/
3.	exp "costs and cost analysis"/
4.	exp economics, hospital/
5.	exp economics, medical/
6.	economics, nursing/
7.	economics, pharmaceutical/
8.	exp "fees and charges"/
9.	exp budgets/
10.	budget*.ti,ab.
11.	cost*.ti.
12.	(economic* or pharmaco?economic*).ti.
13.	(price* or pricing*).ti,ab.
14.	(cost* adj2 (effective* or utilit* or benefit* or minimi* or unit* or estimat* or variable*)).ab.
15.	(financ* or fee or fees).ti,ab.
16.	(value adj2 (money or monetary)).ti,ab.
17.	or/1-16

Embase search terms

1.	health economics/
2.	exp economic evaluation/
3.	exp health care cost/
4.	exp fee/
5.	budget/
6.	funding/
7.	budget*.ti,ab.
8.	cost*.ti.
9.	(economic* or pharmaco?economic*).ti.
10.	(price* or pricing*).ti,ab.
11.	(cost* adj2 (effective* or utilit* or benefit* or minimi* or unit* or estimat* or variable*)).ab.
12.	(financ* or fee or fees).ti,ab.
13.	(value adj2 (money or monetary)).ti,ab.
14.	or/1-13

G.3.7 Excluded study designs and publication types

The following study designs and publication types were removed from retrieved results using the NOT operator.

Medline search terms

1.	letter/
2.	editorial/
3.	news/
4.	exp historical article/
5.	anecdotes as topic/
6.	comment/
7.	case report/
8.	(letter or comment*).ti.
9.	or/1-8
10.	randomized controlled trial/ or random*.ti,ab.
11.	9 not 10
12.	animals/ not humans/
13.	exp animals, laboratory/
14.	exp animal experimentation/
15.	exp models, animal/
16.	exp rodentia/
17.	(rat or rats or mouse or mice).ti.
18.	or/11-17

Embase search terms

1.	letter.pt. or letter/
2.	note.pt.
3.	editorial.pt.
4.	case report/ or case study/
5.	(letter or comment*).ti.
6.	or/1-5
7.	randomized controlled trial/ or random*.ti,ab.
8.	6 not 7
9.	animal/ not human/
10.	nonhuman/
11.	exp animal experiment/
12.	exp experimental animal/
13.	animal model/
14.	exp rodent/
15.	(rat or rats or mouse or mice).ti.
16.	or/8-15

G.4 Searches for specific questions

G.4.1 Cardiopulmonary exercise test

- What is the clinical and cost effectiveness of using cardiopulmonary exercise test (CPET) as a preoperative test in improving patient outcomes in adults and young people with mild to severe comorbidities undergoing grade 3 or 4 (major/complex) non-cardiac elective surgery?

Search constructed by combining the columns in the following table using the AND Boolean operator. Exclusion filter applied using NOT Boolean operator.

Population	Intervention or exposure	Comparison	Study design filter	Date parameters and other limits
Adults undergoing grade 3 or 4 (major/complex) elective surgery	Cardiopulmonary exercise test	n/a	n/a	See Table 1. Date of last search: 08/07/2015. English only Exclusion filter applied in Medline and Embase

Medline search terms

1	Surgical Procedures, Elective/
2	elective surg*.ti,ab.
3	Ambulatory Surgical Procedures/
4	ambulatory surg*.ti,ab.
5	exp Ambulatory Care/
6	Preoperative Care/
7	preoperative period/
8	Perioperative Nursing/ or Perioperative Care/ or Perioperative Period/
9	(pre-operative* or preoperative* or preop or pre-op or pre-surg* or presurg* or perioperative* or peri-operative*).ti,ab.
10	((before or prior or advance) adj4 (surg* or operat* or anaesthes* or anesthes* or elective or ambulatory)).ti,ab.
11	(day adj2 surg*).ti,ab.
12	outpatient surg*.ti,ab.
13	or/1-12
14	limit 13 to english language
15	letter/
16	editorial/
17	news/
18	exp historical article/
19	Anecdotes as Topic/
20	comment/
21	case report/
22	(letter or comment*).ti.
23	or/15-22
24	randomized controlled trial/ or random*.ti,ab.
25	23 not 24
26	animals/ not humans/
27	exp Animals, Laboratory/
28	exp Animal Experimentation/
29	exp Models, Animal/
30	exp Rodentia/
31	(rat or rats or mouse or mice).ti.
32	or/25-31

33	14 not 32
34	Exercise Test/
35	(exercise test* or CPX or CPET or CPEX).ti,ab.
36	or/34-35
37	33 and 36
38	oxygen consumption/ or anaerobic threshold/
39	anaerobic threshold.ti,ab.
40	(VO2 or ((oxygen or O2) adj2 (volume or level* or measure* or inhale* or uptake or consum*))).ti,ab.
41	(VCO2 or ((carbon dioxide or CO2) adj2 (volume or level* or measure* or exhale* or produc*))).ti,ab.
42	(ventilatory equivalent* or VE).ti,ab.
43	or/38-42
44	33 and 43
45	37 or 44

Embase search terms

1	*elective surgery/
2	elective surg*.ti,ab.
3	*ambulatory surgery/
4	ambulatory surg*.ti,ab.
5	*ambulatory care/
6	*preoperative care/ or *preoperative evaluation/
7	*preoperative period/
8	*perioperative period/
9	(pre-operative* or preoperative* or preop or pre-op or pre-surg* or presurg* or perioperative* or peri-operative*).ti,ab.
10	((before or prior or advance) adj4 (surg* or operat* or anaesthes* or anesthes* or elective or ambulatory)).ti,ab.
11	(day adj2 surg*).ti,ab.
12	outpatient surg*.ti,ab.
13	or/1-12
14	limit 13 to english language
15	letter.pt. or letter/
16	note.pt.
17	editorial.pt.
18	case report/ or case study/
19	(letter or comment*).ti.
20	or/15-19
21	randomized controlled trial/ or random*.ti,ab.
22	20 not 21
23	animal/ not human/
24	nonhuman/
25	exp Animal Experiment/
26	exp Experimental Animal/
27	animal model/
28	exp Rodent/

29	(rat or rats or mouse or mice).ti.
30	or/22-29
31	14 not 30
32	exercise test/
33	(exercise test* or CPX or CPET or CPEX).ti,ab.
34	32 or 33
35	31 and 34
36	oxygen consumption/ or anaerobic threshold/
37	(VO2 or ((oxygen or O2) adj2 (volume or level* or measure* or inhale* or uptake or consum*))).ti,ab.
38	(VCO2 or ((carbon dioxide or CO2) adj2 (volume or level* or measure* or exhale* or produc*))).ti,ab.
39	(ventilatory equivalent* or VE).ti,ab.
40	or/36-39
41	31 and 40
42	35 or 41

Cochrane search terms

#1.	*standard population (see G.2)*
#2.	MeSH descriptor: [Exercise Test] this term only
#3.	exercise next test*:ti,ab
#4.	(cpx or cpet or cpex):ti,ab
#5.	{or #2-#4}
#6.	#1 and #5
#7.	MeSH descriptor: [Oxygen Consumption] this term only
#8.	MeSH descriptor: [Anaerobic Threshold] this term only
#9.	(vo2 or ((oxygen or o2) near/2 (volume or level* or measure* or inhale* or uptake or consum*))):ti,ab
#10.	(vco2 or ((carbon dioxide or co2) near/2 (volume or level* or measure* or exhale* or produc*))):ti,ab
#11.	(ventilatory equivalent* or ve):ti,ab
#12.	{or #7-#11}
#13.	#1 and #12
#14.	#6 or #13

G.4.2 Resting electrocardiogram (ECG)

- What is the clinical and cost effectiveness of using resting electrocardiogram (ECG) as a preoperative test in improving patient outcomes in adults and young people with mild to severe comorbidities undergoing non-cardiac elective surgery?

Search constructed by combining the columns in the following table using the AND Boolean operator. Exclusion filter applied using NOT Boolean operator.

Population	Intervention or exposure	Comparison	Study design filter	Date parameters and other limits
Adults undergoing grade 3 or 4	Electrocardiogram	n/a	n/a	See Table 1 Search limit from 2002 onwards.

Population	Intervention or exposure	Comparison	Study design filter	Date parameters and other limits
(major/complex) elective surgery				Date of last search: 08/07/2015. English only Exclusion filter applied in Medline and Embase

Medline search terms

1.	*standard population (see G.2)*
2.	*electrocardiography, ambulatory/ or *electrocardiography/
3.	(ecg or ekg).ti,ab.
4.	(("12" or twelve) adj2 lead).ti,ab.
5.	(electrocardiogram* or electro cardiogram* or electro-cardiogram*).ti,ab.
6.	(electrocardiograph* or electro cardiograph*or electro-cardiograph*).ti,ab.
7.	or/2-6
8.	1 and 7

Embase search terms

1.	*standard population (see G.2)*
2.	*electrocardiography monitoring/ or *electrocardiography/ or *electrocardiogram/ or *ambulatory monitoring/
3.	(ecg or ekg).ti,ab.
4.	(("12" or twelve) adj2 lead).ti,ab.
5.	(electrocardiogram* or electro cardiogram* or electro-cardiogram*).ti,ab.
6.	(electrocardiograph* or electro cardiograph*or electro-cardiograph*).ti,ab.
7.	or/2-6
8.	1 and 7

Cochrane search terms

#1.	*standard population (see G.2)*
#2.	MeSH descriptor: [Electrocardiography, Ambulatory] this term only
#3.	MeSH descriptor: [Electrocardiography] this term only
#4.	(ecg or ekg):ti,ab
#5.	(("12" or twelve) near/2 lead):ti,ab
#6.	(electrocardiogram* or electro cardiogram* or electro-cardiogram*):ti,ab
#7.	(electrocardiograph* or electro cardiograph*or electro-cardiograph*):ti,ab
#8.	{or #2-#8}

G.4.3 Glycated haemoglobin

Searches for the following four questions were run as one search:

- What is the clinical and cost effectiveness of using HbA1c (glycated haemoglobin) as a preoperative test in improving patient outcomes in adults and young people with mild to severe comorbidities undergoing non-cardiac elective surgery?

- Does HbA1c (glycated haemoglobin) predict prognosis (patient outcomes after surgery) of people with mild to severe comorbidities undergoing grade 3 or 4 non-cardiac elective surgery?
- What is the clinical and effectiveness of using HbA1c (glycated haemoglobin) as a preoperative test in improving patient outcomes in adults and young people with diabetes and mild to severe comorbidities undergoing non-cardiac elective surgery?
- Does HbA1c (glycated haemoglobin) predict prognosis (patient outcomes after surgery) of people with diabetes and mild to severe comorbidities undergoing grade 3 or 4 non-cardiac elective surgery?

Search constructed by combining the columns in the following table using the AND Boolean operator. Exclusion filter applied using NOT Boolean operator.

Population	Intervention or exposure	Comparison	Study design filter	Date parameters and other limits
Adults undergoing grade 3 or 4 (major) elective surgery	Glycated haemoglobin	n/a	n/a	See Table 1. Date of last search: 08/07/2015. English only Exclusion filter applied in Medline and Embase

Medline search terms

1.	*standard population (see G.2)*
2.	(hba1c or hba or ghb or hbaic or a1c or hba1).ti,ab.
3.	((glycosylated or glycated or glycoslated) adj3 (haemoglobin or hemoglobin)).ti,ab.
4.	hemoglobin a, glycosylated/
5.	or/2-4
6.	((blood or random or tolerance) adj3 (glucose or sugar*)).ti,ab.
7.	(rbs or rbg).ti,ab.
8.	glucose tolerance test/
9.	blood glucose/
10.	or/6-10
11.	1 and (5 or 10)

Embase search terms

1.	*standard population (see G.2)*
2.	(hba1c or hba or ghb or hbaic or a1c or hba1).ti,ab.
3.	((glycosylated or glycated or glycoslated) adj3 (haemoglobin or hemoglobin)).ti,ab.
4.	hemoglobin a1c/
5.	or/2-4
6.	glucose blood level/
7.	((blood or random or tolerance) adj3 (glucose or sugar*)).ti,ab.
8.	(rbs or rbg).ti,ab.
9.	glucose tolerance test/
10.	or/6-9
11.	1 and (5 or 10)

Cochrane search terms

#1.	*standard population (see G.2)*
#2.	(hba1c or hba or ghb or hbaic or a1c or hba1):ti,ab
#3.	((glycosylated or glycated or glycoslated) near/3 (haemoglobin or hemoglobin)):ti,ab
#4.	MeSH descriptor: [Hemoglobin A, Glycosylated] this term only
#5.	{or #2-#4}
#6.	((blood or random or tolerance) near/3 (glucose or sugar*)):ti,ab
#7.	(rbs or rbg):ti,ab
#8.	mesh descriptor: [glucose tolerance test] this term only
#9.	mesh descriptor: [blood glucose] this term only
#10.	{or #6-#9}
#11.	#5 or #10
#12.	#1 and #11

G.4.4 Non-invasive cardiac testing: Resting echocardiography

- What is the usefulness of resting echocardiogram as a preoperative test in altering perioperative management for adults and young people with mild to severe comorbidities undergoing grade 3 or 4 (major/complex) elective surgery?

Search constructed by combining the columns in the following table using the AND Boolean operator. Exclusion filter applied using NOT Boolean operator.

Population	Intervention or exposure	Comparison	Study design filter	Date parameters and other limits
Adults undergoing grade 3 or 4 (major) elective surgery	Non-invasive cardiac testing	n/a	n/a	See Table 1. Search limit from 2000 onwards. Date of last search: 08/07/2015. English only Exclusion filter applied in Medline and Embase

Medline search terms

1.	*standard population (see G.2)*
2.	echocardiography/ or echocardiography, doppler/ or echocardiography, three-dimensional/ or echocardiography, four-dimensional/ or echocardiography, transesophageal/
3.	echo*.ti,ab.
4.	2 or 3
5.	1 and 4

Embase search terms

1.	*standard population (see G.2)*

2.	*echocardiography/ or *contrast echocardiography/ or *doppler echocardiography/ or *four dimensional echocardiography/ or *intracardiac echocardiography/ or *m mode echocardiography/ or *three dimensional echocardiography/ or *tissue doppler imaging/ or *transesophageal echocardiography/ or *transthoracic echocardiography/ or *two dimensional echocardiography/
3.	echo*.ti,ab.
4.	2 or 3
5.	1 and 4

Cochrane search terms

#1.	*standard population (see G.2)*
#2.	MeSH descriptor: [Echocardiography] this term only
#3.	MeSH descriptor: [Echocardiography, Doppler] this term only
#4.	MeSH descriptor: [Echocardiography, Three-Dimensional] this term only
#5.	MeSH descriptor: [Echocardiography, Four-Dimensional] this term only
#6.	MeSH descriptor: [Echocardiography, Transesophageal] this term only
#7.	{or #2-#6}

G.4.5 Polysomnography

- What is the clinical and cost effectiveness of using polysomnography as a preoperative test (to detect obstructive sleep apnoea) in improving patient outcomes in adults and young people with obesity undergoing grade 3 or 4 (major/complex) elective non-cardiac surgery?

Search constructed by combining the columns in the following table using the AND Boolean operator. Exclusion filter applied using NOT Boolean operator.

Population	Intervention or exposure	Comparison	Study design filter	Date parameters and other limits
Adults undergoing grade 3 or 4 (major/complex) elective surgery	Polysomnography	n/a	n/a	See Table 1. Date of last search: 08/07/2015. English only Exclusion filter applied in Medline and Embase

Medline search terms

1.	*standard population (see G.2)*
2.	(sleep adj2 (apnea* or apnoea* or hypopnea*)).ti,ab.
3.	sleep disordered breathing.ti,ab.
4.	exp sleep apnea syndromes/
5.	osa.ti,ab.
6.	or/2-5
7.	polysomnography/
8.	(polysomnogra* or somnogra*).ti,ab.
9.	oximetry.ti,ab.
10.	(sleep adj2 (stud* or test* or assess* or monitor* or observ*)).ti,ab.
11.	or/7-10

12.	1 and (6 or 11)

Embase search terms

1.	*standard population (see G.2)*
2.	*polysomnography/
3.	(polysomnograph* or somnograph*).ti,ab.
4.	(sleep adj2 (stud* or test* or assess* or monitor* or observ*)).ti,ab.
5.	oximetry.ti,ab.
6.	or/2-5
7.	(sleep adj2 (apnea* or apnoea* or hypopnea*)).ti,ab.
8.	sleep disordered breathing.ti,ab.
9.	osa.ti,ab.
10.	exp *sleep disordered breathing/
11.	or/7-10
12.	1 and (6 or 11)

Cochrane search terms

#1.	*standard population (see G.2)*
#2.	MeSH descriptor: [polysomnography] explode all trees
#3.	(polysomnograph* or somnograph*):ti,ab
#4.	(sleep near/2 (stud* or test* or assess* or monitor* or observ*)):ti,ab
#5.	oximetry:ti,ab
#6.	(stop bang or stopbang):ti,ab
#7.	(sleep near/2 (apnea* or apnoea* or hypopnea*)):ti,ab
#8.	sleep disordered breathing:ti,ab
#9.	MeSH descriptor: [sleep apnea syndromes] explode all trees
#10.	{or #2-#9}
#11.	#1 and #10

G.4.6 Health technology assessment (full blood count, kidney function and pulmonary function tests)

Searches for the following three questions were run as one search:

- What is the usefulness of the following tests in predicting outcome or altering perioperative management for adults and young people undergoing any type of elective surgery:
  a. full blood count (haemoglobin, white blood cell count and platelet count) (FBC)
  b. kidney function tests (urea, estimated glomerular filtration rate and electrolyte tests) (U&Es)
  c. pulmonary function tests (also including blood gas analysis) (PFTs)

Search constructed by combining the columns in the following table using the AND Boolean operator. Exclusion filter applied using NOT Boolean operator.

Population	Intervention or exposure	Comparison	Study design filter	Date parameters and other limits
Adults undergoing grade 3 or 4 (major/complex)	Full blood count OR Kidney function	n/a	The following filters were used in Medline and Embase only: OBS, RCT, SR, DIAG	See Table 1. Search limit from 2009 onwards. Date of last

Population	Intervention or exposure	Comparison	Study design filter	Date parameters and other limits
elective surgery	tests OR Pulmonary function tests			search: 08/07/2015. English only Exclusion filter applied in Medline and Embase
Obesity OR Diabetes	Full blood count OR Kidney function tests OR Pulmonary function tests	n/a	The following filters were used in Medline and Embase only: OBS, RCT, SR, DIAG	See Table 1. Date of last search: 08/07/2015. English only Exclusion filter applied in Medline and Embase

Medline search terms

1.	*standard population (see G.2)*
2.	exp *obesity/
3.	exp *overweight/
4.	(obesity or obese).ti,ab.
5.	(overweight or over-weight or over weight).ti,ab.
6.	((body mass index or bmi) adj2 >30).ti,ab.
7.	or/2-6
8.	exp diabetes mellitus/
9.	diabet*.ti,ab.
10.	8 or 9
11.	7 or 10
12.	hemoglobins/
13.	(hemoglobin* or haemoglobin*).ti,ab.
14.	platelet count/
15.	platelet count.ti,ab.
16.	exp blood cell count/
17.	leukocyte count/
18.	((blood or leukocyte* or leucocyte* or erythrocyte* or thrombocyte* or wbc* or rbc*) adj2 count*).ti,ab.
19.	(blood adj (exam or test)).ti,ab.
20.	(fbc or cbc or fbe).ti,ab.
21.	hematologic tests/
22.	((haematolog* or hematolog*) adj2 (test* or exam*)).ti,ab.
23.	or/12-22
24.	urea/
25.	urinalysis/
26.	electrolytes/
27.	u&e.ti,ab.

28.	electrolyte*.ti,ab.
29.	(urinalysis or dipstick*).ti,ab.
30.	(urine adj2 (analys* or test*)).ti,ab.
31.	diagnostic techniques, urological/
32.	blood urea nitrogen/
33.	blood urea nitrogen.ti,ab.
34.	kidney function tests/
35.	creatinine/
36.	creatinine.ti,ab.
37.	(estimate glomerular filtration rate or egfr or gfr).ti,ab.
38.	glomerular filtration rate/
39.	((kidney or renal) adj2 test*).ti,ab.
40.	or/24-39
41.	((pulmonary or lung or respirat*) adj2 (test* or assess* or evaluat* or measur*)).ti,ab.
42.	exp respiratory function tests/
43.	blood gas*.ti,ab.
44.	(forced expiratory adj2 (rate* or volume*)).ti,ab.
45.	(fev1 or fev 1 or fvc).ti,ab.
46.	((vital or lung or breath*) adj capacity).ti,ab.
47.	(lung adj2 volume*).ti,ab.
48.	spirometry.ti,ab.
49.	(cpet or cpx or cpex).ti,ab.
50.	pulmonary gas exchange.ti,ab.
51.	vitalogra*.ti,ab.
52.	vo2.ti,ab.
53.	oxygen consumption/
54.	(oxygen adj (uptake or consumption)).ti,ab.
55.	(dlco or diffusing capacity*).ti,ab.
56.	oximetry.ti,ab.
57.	(capnomet* or capnogra*).ti,ab.
58.	plethysmography.ti,ab.
59.	lung compliance.ti,ab.
60.	ventilation-perfusion.ti,ab.
61.	maximal voluntary ventilation.ti,ab.
62.	or/41-61
63.	exercise test/
64.	exercise test*.ti,ab.
65.	63 or 64
66.	(respiratory or lung or pulmonary).ti,ab.
67.	65 and 66
68.	1 and (23 or 40 or 62 or 67)
69.	(2009* or 2010*or 2011* or 2012* or 2013* or 2014* or 2015*).ed,dc.
70.	68 and 69
71.	11 and 68

72.	70 or 71

Embase search terms

1.	*standard population (see G.2)*
2.	exp *obesity/
3.	(obesity or obese).ti,ab.
4.	(overweight or over-weight or over weight).ti,ab.
5.	((body mass index or bmi) adj2 >30).ti,ab.
6.	or/2-5
7.	exp *diabetes mellitus/
8.	diabet*.ti,ab.
9.	or/7-8
10.	6 or 9
11.	*hemoglobin/
12.	(hemoglobin* or haemoglobin*).ti,ab.
13.	platelet count.ti,ab.
14.	exp *blood cell count/
15.	((blood or leukocyte* or leucocyte* or erythrocyte* or thrombocyte* or wbc* or rbc*) adj2 count*).ti,ab.
16.	(blood adj (exam* or test*)).ti,ab.
17.	(fbc or cbc or fbe).ti,ab.
18.	*blood examination/
19.	((haematolog* or hematolog*) adj2 (test* or exam*)).ti,ab.
20.	or/11-19
21.	*urea/
22.	*urinalysis/
23.	*electrolyte/
24.	u&e*.ti,ab.
25.	electrolyte*.ti,ab.
26.	(urinalys* or dipstick*).ti,ab.
27.	(urine adj2 (analys* or test*)).ti,ab.
28.	*urologic examination/
29.	*urea nitrogen blood level/
30.	blood urea nitrogen.ti,ab.
31.	*kidney function test/
32.	exp *kidney function/
33.	creatinine urine level/ or creatinine/
34.	*creatinine blood level/
35.	*creatinine clearance/
36.	creatinine.ti,ab.
37.	(estimate glomerular filtration rate or egfr or gfr).ti,ab.
38.	*glomerulus filtration rate/
39.	((kidney or renal) adj2 test*).ti,ab.
40.	or/21-39
41.	((pulmonary or lung or respirat*) adj2 (test* or assess* or evaluat* or measur*)).ti,ab.

42.	exp *lung function test/
43.	exp *blood gas/
44.	(forced expiratory adj2 (rate* or volume*)).ti,ab.
45.	(fev1 or fev 1 or fvc).ti,ab.
46.	exp *lung volume/
47.	((vital or lung or breath*) adj capacity).ti,ab.
48.	(lung adj2 volume*).ti,ab.
49.	spirometry.ti,ab.
50.	(cpet or cpx or cpex).ti,ab.
51.	pulmonary gas exchange.ti,ab.
52.	exp *lung function/
53.	vitalogra*.ti,ab.
54.	vo2.ti,ab.
55.	*oxygen consumption/
56.	(oxygen adj (uptake or consumption)).ti,ab.
57.	(dlco or diffusing capacity*).ti,ab.
58.	exp *respiratory tract parameters/
59.	oximetry.ti,ab.
60.	exp *oximetry/
61.	(capnomet* or capnogra*).ti,ab.
62.	plethysmography.ti,ab.
63.	*plethysmography/
64.	lung compliance.ti,ab.
65.	ventilation-perfusion.ti,ab.
66.	cardiopulmonary exercise test/
67.	maximal voluntary ventilation.ti,ab.
68.	or/41-67
69.	*exercise test/
70.	exercise test*.ti,ab.
71.	69 or 70
72.	(respiratory or lung or pulmonary).ti,ab.
73.	71 and 72
74.	1 and (20 or 40 or 68 or 73)
75.	(2009* or 2010* or 2011* or 2012* or 2013* or 2014* or 2015*).dd.
76.	74 and 75
77.	10 and 74
78.	76 or 77

Cochrane search terms

#1.	*standard population (see G.2)*
#2.	mesh descriptor: [obesity] explode all trees
#3.	mesh descriptor: [overweight] explode all trees
#4.	(obesity or obese):ti,ab
#5.	(overweight or over-weight or over weight):ti,ab
#6.	((body mass index or bmi) near/2 >30):ti,ab

#7.	{or #2-#6}
#8.	mesh descriptor: [diabetes mellitus] explode all trees
#9.	diabet*:ti,ab
#10.	{or #8-#9}
#11.	#7 or #10
#12.	mesh descriptor: [hemoglobins] this term only
#13.	(hemoglobin* or haemoglobin*):ti,ab
#14.	mesh descriptor: [platelet count] this term only
#15.	platelet count:ti,ab
#16.	mesh descriptor: [blood cell count] explode all trees
#17.	mesh descriptor: [leukocyte count] this term only
#18.	((blood or leukocyte* or leucocyte* or erythrocyte* or thrombocyte* or wbc* or rbc*) near/2 count*):ti,ab
#19.	(blood next (exam* or test*)):ti,ab
#20.	(fbc or cbc or fbe):ti,ab
#21.	mesh descriptor: [hematologic tests] this term only
#22.	((haematolog* or hematolog*) near/2 (test* or exam*)):ti,ab
#23.	{or #12-#22}
#24.	mesh descriptor: [urea] this term only
#25.	mesh descriptor: [urinalysis] this term only
#26.	mesh descriptor: [electrolytes] this term only
#27.	u&e*:ti,ab
#28.	electrolyte*:ti,ab
#29.	(urinalys* or dipstick*):ti,ab
#30.	(urine near/2 (analys* or test*)):ti,ab
#31.	mesh descriptor: [diagnostic techniques, urological] this term only
#32.	mesh descriptor: [blood urea nitrogen] this term only
#33.	blood urea nitrogen:ti,ab
#34.	mesh descriptor: [kidney function tests] this term only
#35.	mesh descriptor: [creatinine] this term only
#36.	creatinine:ti,ab
#37.	(estimate glomerular filtration rate or egfr or gfr):ti,ab
#38.	mesh descriptor: [glomerular filtration rate] this term only
#39.	((kidney or renal) near/2 test*):ti,ab
#40.	{or #24-#39}
#41.	((pulmonary or lung or respirat*) near/2 (test* or assess* or evaluat* or measur*)):ti,ab
#42.	mesh descriptor: [respiratory function tests] explode all trees
#43.	blood gas*:ti,ab
#44.	(forced expiratory near/2 (rate* or volume*)):ti,ab
#45.	(fev1 or fev next 1 or fvc):ti,ab
#46.	((vital or lung or breath*) next capacity):ti,ab
#47.	lung near/2 volume*:ti,ab
#48.	spirometry:ti,ab
#49.	(cpet or cpx or cpex):ti,ab

#50.	pulmonary gas exchange:ti,ab
#51.	vitalogra*:ti,ab
#52.	vo2:ti,ab
#53.	mesh descriptor: [oxygen consumption] this term only
#54.	(oxygen next (uptake or consumption)):ti,ab
#55.	(dlco or diffusing capacity*):ti,ab
#56.	oximetry:ti,ab
#57.	(capnomet* or capnogra*):ti,ab
#58.	plethysmography:ti,ab
#59.	lung compliance:ti,ab
#60.	ventilation-perfusion:ti,ab
#61.	maximal voluntary ventilation:ti,ab
#62.	mesh descriptor: [exercise test] this term only
#63.	exercise test*:ti,ab
#64.	#62 or #63
#65.	(respiratory or lung or pulmonary):ti,ab
#66.	#64 and #65
#67.	{or #41-#61}
#68.	{or #66-#67}
#69.	#23 or #40 or #68
#70.	#1 and #69 publication year from 2009 to 2015
#71.	#1 and #11 and #69
#72.	#70 or #71

G.5 Health economics search

G.5.1 Health economic reviews

Economic searches were conducted in Medline, Embase, HEED and CRD for NHS EED and HTA.

Population	Intervention or exposure	Comparison	Study design filters	Date parameters and other limits
Adults undergoing grade 3 or 4 (major) elective surgery	n/a	n/a	The following filters were used in Medline and Embase only: HE	Date of last search: 08/07/2015. English only

Medline search terms

1	See G.2 for Medline terms

Embase search terms

1	See G.2 for Embase terms

CRD search terms

#1.	(MeSH DESCRIPTOR Surgical Procedures, Elective)
#2.	(MeSH DESCRIPTOR Ambulatory Surgical Procedures)
#3.	((ambulatory surg*)):TI

#4.	((elective surg*)):TI
#5.	(MeSH DESCRIPTOR Ambulatory Care EXPLODE ALL TREES)
#6.	(MeSH DESCRIPTOR Preoperative Care)
#7.	(MeSH DESCRIPTOR Preoperative Period)
#8.	(MeSH DESCRIPTOR Perioperative Nursing)
#9.	(MeSH DESCRIPTOR Perioperative Care)
#10.	(MeSH DESCRIPTOR Perioperative Period)
#11.	((pre-operative* or preoperative* or preop or pre-op or pre-surg* or presurg* or perioperative* or peri-operative*)):TI
#12.	(((before or prior or advance) near4 (surg* or operat* or anaesthes* or anesthes* or elective or ambulatory))):TI
#13.	((day near2 surg*)):TI
#14.	((outpatient surg*)):TI
#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
#16.	(*) IN NHSEED
#17.	(*) IN HTA
#18.	#15 AND #16
#19.	#15 AND #17

HEED search terms

1.	TI=before or prior or advance
2.	TI=surg* or operat* or anaesthes* or anesthes* or elective or ambulatory
3.	CS=1 AND 2
4.	TI=ambulatory AND surg*
5.	TI=elective AND surg*
6.	TI=pre-operative or preoperative or preop or pre-op or pre-surgery or pre-surgical or pre-surgeries or presurgery or presurgical or presurgeries or perioperative or peri-operative
7.	TI=outpatient AND surg*
8.	TI=day AND surg*
9.	TI=before or prior or advance
10.	jd=2000 OR 2001 OR 2002 OR 2003 OR 2004 OR 2005 OR 2006 or 2007 or 2008 or 2009 or 2010 OR 2011 OR 2012 OR 2013 OR 2014
11.	CS=9 AND 10

G.5.2 Economic review of cardiopulmonary exercise test

Economic searches were conducted in Medline, Embase, HEED and CRD for NHS EED and HTA.

Population	Intervention or exposure	Comparison	Study design filters	Date parameters and other limits
Adults undergoing grade 3 or 4 (major) elective surgery	Cardiopulmonary exercise test	n/a	The following filters were used in Medline and Embase only: HE	Search limit from 2000 onwards. Date of last search: 08/07/2015. English only

Medline search terms

1	Surgical Procedures, Elective/
2	elective surg*.ti,ab.
3	Ambulatory Surgical Procedures/
4	ambulatory surg*.ti,ab.
5	exp Ambulatory Care/
6	Preoperative Care/
7	preoperative period/
8	Perioperative Nursing/ or Perioperative Care/ or Perioperative Period/
9	(pre-operative* or preoperative* or preop or pre-op or pre-surg* or presurg* or perioperative* or peri-operative*).ti,ab.
10	((before or prior or advance) adj4 (surg* or operat* or anaesthes* or anesthes* or elective or ambulatory)).ti,ab.
11	(day adj2 surg*).ti,ab.
12	outpatient surg*.ti,ab.
13	or/1-12
14	limit 13 to english language
15	letter/
16	editorial/
17	news/
18	exp historical article/
19	Anecdotes as Topic/
20	comment/
21	case report/
22	(letter or comment*).ti.
23	or/15-22
24	randomized controlled trial/ or random*.ti,ab.
25	23 not 24
26	animals/ not humans/
27	exp Animals, Laboratory/
28	exp Animal Experimentation/
29	exp Models, Animal/
30	exp Rodentia/
31	(rat or rats or mouse or mice).ti.
32	or/25-31
33	14 not 32
34	Exercise Test/
35	(exercise test* or CPX or CPET or CPEX).ti,ab.
36	or/34-35
37	33 and 36
38	oxygen consumption/ or anaerobic threshold/
39	(VO2 or ((oxygen or O2) adj2 (volume or level* or measure* or inhale* or uptake or consum*))).ti,ab.
40	(VCO2 or ((carbon dioxide or CO2) adj2 (volume or level* or measure* or exhale* or produc*))).ti,ab.
41	(ventilatory equivalent* or VE).ti,ab.
42	or/38-41

43	33 and 42
44	37 or 43

Embase search terms

1	*elective surgery/
2	elective surg*.ti,ab.
3	*ambulatory surgery/
4	ambulatory surg*.ti,ab.
5	*ambulatory care/
6	*preoperative care/ or *preoperative evaluation/
7	*preoperative period/
8	*perioperative period/
9	(pre-operative* or preoperative* or preop or pre-op or pre-surg* or presurg* or perioperative* or peri-operative*).ti,ab.
10	((before or prior or advance) adj4 (surg* or operat* or anaesthes* or anesthes* or elective or ambulatory)).ti,ab.
11	(day adj2 surg*).ti,ab.
12	outpatient surg*.ti,ab.
13	or/1-12
14	limit 13 to english language
15	letter.pt. or letter/
16	note.pt.
17	editorial.pt.
18	case report/ or case study/
19	(letter or comment*).ti.
20	or/15-19
21	randomized controlled trial/ or random*.ti,ab.
22	20 not 21
23	animal/ not human/
24	nonhuman/
25	exp Animal Experiment/
26	exp Experimental Animal/
27	animal model/
28	exp Rodent/
29	(rat or rats or mouse or mice).ti.
30	or/22-29
31	14 not 30
32	exercise test/
33	(exercise test* or CPX or CPET or CPEX).ti,ab.
34	32 or 33
35	31 and 34
36	oxygen consumption/ or anaerobic threshold/
37	(VO2 or ((oxygen or O2) adj2 (volume or level* or measure* or inhale* or uptake or consum*))).ti,ab.
38	(VCO2 or ((carbon dioxide or CO2) adj2 (volume or level* or measure* or exhale* or produc*))).ti,ab.

39	(ventilatory equivalent* or VE).ti,ab.
40	or/36-39
41	31 and 40
42	35 or 41

CRD search terms

1	MeSH DESCRIPTOR oxygen consumption
2	MeSH DESCRIPTOR anaerobic threshold
3	((VO2 or ((oxygen or O2) near2 (volume or level* or measure* or inhale* or uptake or consum*))))
4	((VCO2 or ((carbon dioxide or CO2) near2 (volume or level* or measure* or exhale* or produc*))))
5	((ventilatory equivalent* or VE))
6	#1 OR #2 OR #3 OR #4 OR #5
7	MeSH DESCRIPTOR Exercise Test
8	((exercise test* or CPX or CPET or CPEX))
9	#7 OR #8
1	#6 OR #9
1	* IN NHSEED
1	* IN HTA
1	#10 AND #11
1	#10 AND #12

HEED search terms

1.	AX=exercise test WITHIN 4 or AX= exercise tests WITHIN 4 or AX= exercise testing WITHIN 4
2.	AX=CPX or CPET or CPEX
3.	CS=1 OR 2