Clinical practice guideline

The management of inadvertent perioperative hypothermia in adults

APPENDICES A–H

October 2007

Draft for consultation

APPENDIX A: REGISTERED STAKEHOLDERS

Addenbrooke's NHS Trust
Aintree Hospitals NHS Trust
Association for Perioperative Practice
Association of Anaesthetists of Great Britain and Ireland
Association of Paediatric Anaesthetists of Great Britain and Ireland
Association of the British Pharmaceutical Industry (ABPI)
Barnsley Acute Trust
Barnsley PCT
Brighton & Sussex University Hospitals Trust
British Association of Day Surgery
British Association of Paediatric Surgeons
British Geriatrics Society
British National Formulary (BNF)
BUPA
Caldedale PCT
CASPE
Central Medical Supplies Ltd
Commission for Social Care Inspection
Connecting for Health
Conwy & Denbighshire NHS Trust
Coventry and Warwickshire Cardiac Network
David Lewis Centre, The
Department of Health
Department of Health, Social Security and Public Safety of Northern Ireland
East and North Hertfordshire NHS Trust
Great Ormond Street Hospital for Children NHS Trust
Guys & St Thomas NHS Trust
Health and Safety Executive
Health Protection Agency
Health Protection Scotland
Healthcare Commission
Heart of England NHS Foundation Trust
Inditherm Medical
KCI Medical Ltd
Kimal Plc
Kimberly-Clark Health Care
King's College Hospital NHS Trust
Luton and Dunstable Hospital NHS Trust

Maidstone and Tunbridge Wells NHS Trust
Medicines and Healthcare Products Regulatory Agency (MHRA)
National Association of Assistants in Surgical Practice
National Patient Safety Agency
National Public Health Service – Wales
NCCHTA
NCEPOD
NHS Health and Social Care Information Centre
NHS Plus
NHS Purchasing & Supply Agency
NHS Quality Improvement Scotland
Northwest London Hospitals NHS Trust
Nottingham City PCT
Papworth Hospital NHS Trust
Pennine Healthcare
PERIGON (formerly The NHS Modernisation Agency)
Peterborough & Stamford NHS Hospitals Trust
Queen Victoria Hospital NHS Foundation Trust
Regional Public Health Group - London
Royal Brompton and Harefield NHS Trust
Royal College of Anaesthetists
Royal College of Midwives
Royal College of Nursing (RCN)
Royal College of Paediatrics and Child Health
Royal College of Pathologists
Royal College of Surgeons of England
Royal Society of Medicine
Scottish Intercollegiate Guidelines Network (SIGN)
Sheffield South West PCT
Sheffield Teaching Hospitals NHS Trust
Society of Cardiothoracic Surgeons
Staffordshire Moorlans PCT
Stockport PCT
Tameside and Glossop Acute Services NHS Trust
Tyco Healthcare
University College London Hospitals NHS Trust
University Hospital Birmingham NHSFT
University of Cardiff
Walsall Teaching PCT
Welsh Assembly Government (formerly National Assembly for Wales)

Welsh Scientific Advisory Committee (WSAC)
Withybush Hospital
York Hospitals NHS Trust

APPENDIX B: SEARCH STRATEGIES AND DATABASES SEARCHED

This appendix details the search strategies used in the identification of relevant studies for the guideline on Inadvertent Perioperative Hypothermia (IPH). A broad search was carried out initially to encompass the whole topic of this guideline. This was supplemented where necessary with more specific searches.

The National Collaborating Centre for Nursing and Supportive Care (NCC-NSC) conducted all searches on the following databases: Medline, Embase, Cinahl (using the OVID interface) and The Cochrane Library.

All searches were performed for articles published since the inception of each database.

Search filters were applied where appropriate, including filters for randomised controlled trials (RCT) and systematic reviews (SR). The RCT filter used was based on that recommended by Cochrane (Higgins, 2005). An exclusions filter was designed to remove irrelevant results.

The search strategies are reproduced below. Note that the searches make use of the controlled vocabulary which varies between databases and between search interfaces. Amendments were made where necessary in order to take these variations into account.

Where possible, searches were restricted to articles written in English. All searches were updated to August 2007.

Hand searching was not undertaken by the NCC-NSC following NICE advice that exhaustive searching on every guideline review topic is not practical (Mason et al., 2002). Reference lists of articles were checked for further articles of potential relevance.

RCT Filter

The following filter is based on that recommended in the Cochrane Handbook (Higgins, 2005).

Medline

1	randomized controlled trial.pt.
2	controlled clinical trial.pt.
3	randomized controlled trials/
4	random allocation/
5	double blind method/
6	single blind method/
7	or/1-6
8	animals/ not humans/
9	7 not 8
10	clinical trial.pt.
11	exp clinical trials/
12	(clin$ adj25 trial$).ti,ab.
13	((singl$ or doubl$ or trebl$ or tripl$) adj25 (blind$ or mask$)).ti,ab.
14	placebos/
15	placebo$.ti,ab.
16	random$.ti,ab.
17	research design/
18	or/10-17
19	18 not 8
20	19 not 9
21	9 or 20

Embase

1 exp randomized controlled trial/
2 (random$ or placebo$).ti,ab.
3 ((singl$ or doubl$ or trebl$ or tripl$) adj25 (blind$ or mask$)).ti,ab.
4 (clin$ adj25 trial$).ti,ab.
5 exp comparative study/
6 exp evaluation/
7 exp follow up/
8 exp prospective study/
9 (control$ or prospective$ or volunteer$).ti,ab.
10 or/1-9
11 exp human/
12 10 and 11

Cinahl

1 exp clinical trials/
2 clinical trial.pt.
3 (clin$ adj25 trial$).ti,ab.
4 ((singl$ or doubl$ or trebl$ or tripl$) adj25 (blind$ or mask$)).ti,ab.
5 (random$ or placebo$).ti,ab.
6 random assignment/
7 placebos/
8 quantitative studies/
9 (control$ or prospective$ or volunteer$).ti,ab.
10 or/1-9

SR Filter

Medline / Embase

1	review.pt. or review.ti.
2	(systematic$ or evidence$ or methodol$ or quantitativ$ or analys$ or assessment$).ti,sh,ab.
3	1 and 2
4	meta-analysis.pt.
5	meta-analysis/
6	(meta-analy$ or metanaly$ or metaanaly$ or meta analy$).ti,ab.
7	((systematic$ or evidence$ or methodol$ or quantitativ$) adj5 (review$ or survey$ or overview$)).ti,ab,sh.
8	((pool$ or combined or combining) adj2 (data or trials or studies or results)).ti,ab.
9	or/3-8

Cinahl

1 review.pt. or review.ti. or "systematic review".pt.
2 (systematic$ or evidence$ or methodol$ or quantitativ$ or analys$ or assessment$).ti,sh,ab.
3 1 and 2
4 meta-analysis/
5 (meta-analy$ or metanaly$ or metaanaly$ or meta analy$).ti,ab.
6 ((systematic$ or evidence$ or methodol$ or quantitativ$) adj5 (review$ or survey$ or overview$)).ti,ab,sh.
7 ((pool$ or combined or combining) adj2 (data or trials or studies or results)).ti,ab.
8 or/1-7

Exclusions Filter

The following filter was designed to remove irrelevant results from searches. If used it was combined into search strategies using the NOT operator.

Medline / Embase / Cinahl

1	letter.pt.
2	letter/
3	letter$/
4	editorial.pt.
5	historical article.pt.
6	anecdote.pt.
7	commentary.pt.
8	note.pt.
9	case report/
10	case report$.pt.
11	case study/
12	case study.pt.
13	exp animal/ not human/
14	nonhuman/
15	exp animal studies/
16	animals, laboratory/
17	exp experimental animal/
18	exp animal experiment/
19	exp animal model/
20	exp rodentia/
21	exp rodents/
22	exp rodent/
23	or/1-22

Broad IPH Search

The following search strategies were combined with the exclusions filter described above. They were limited by RCT and SR study design filters.

Medline

1 exp hypothermia/
2 exp body temperature regulation/
3 hypo?therm$.mp.
4 normo?therm$.mp.
5 thermo?regulat$.mp.
6 ((thermal or temperature) adj2 (regulat$ or manage$ or maintain$)).mp.
7 exp piloerection/
8 exp shivering/
9 shiver$.mp.
10 (low$ adj2 temperature$).mp.
11 thermo?genesis.mp.
12 (pre?warm$ or re?warm$).mp.
13 (warm$ adj3 (patient$ or passive$ or active$ or fluid$ or gas$ or skin or surg$)).mp.
14 (warm$ adj device$).mp.
15 (core adj2 (thermal or temperature$)).mp.
16 exp hyperthermia, induced/
17 (heat adj2 (preserv$ or loss or retention or retain$ or balance)).mp.
18 or/1-17

Embase

1 exp hypothermia/
2 accidental hypothermia/
3 thermoregulation/
4 hypo?therm$.mp.
5 normo?therm$.mp.
6 thermo?regulat$.mp.
7 ((thermal or temperature) adj2 (regulat$ or manage$ or maintain$)).mp.
8 piloerection.mp.
9 shivering/
10 shiver$.mp.
11 (low$ adj2 temperature$).mp.
12 thermo?genesis.mp.
13 exp thermogenesis/
14 (pre?warm$ or re?warm$).mp.
15 warming/
16 (warm$ adj3 (patient$ or passive$ or active$ or fluid$ or gas$ or skin or surg$)).mp.
17 (warm$ adj device$).mp.
18 (core adj2 (thermal or temperature$)).mp.
19 hyperthermic therapy/
20 (heat adj2 (preserv$ or loss or retention or retain$ or balance)).mp.
21 or/1-20

Cinahl

1 exp hypothermia/
2 exp body temperature regulation/
3 hypo?therm$.mp.
4 normo?therm$.mp.
5 thermo?regulat$.mp.
6 ((thermal or temperature) adj2 (regulat$ or manage$ or maintain$)).mp.
7 piloerection.mp.
8 shivering/
9 shiver$.mp.
10 (low$ adj2 temperature$).mp.
11 thermo?genesis.mp.
12 (pre?warm$ or re?warm$).mp.
13 warming techniques/
14 (warm$ adj3 (patient$ or passive$ or active$ or fluid$ or gas$ or skin or surg$)).mp.
15 (warm$ adj device$).mp.
16 (core adj2 (thermal or temperature$)).mp.
17 hyperthermia, induced/
18 (heat adj2 (preserv$ or loss or retention or retain$ or balance)).mp.
19 or/1-18

The Cochrane Library

#1 hypo*therm* or normo*therm* or thermo*regulat* or thermo*genesis or piloerection or shiver* or pre*warm* or re*warm*
#2 ((thermal or temperature) near/2 (regulat* or manage* or maintain*))
#3 low* near/2 temperature*
#4 (warm* near/3 (patient* or passive* or active* or fluid* or gas* or skin or surg*))
#5 warm* next device*
#6 (core near/2 (thermal or temperature*))
#7 ((local* or therap* or induce*) near/2 hyperthermia)
#8 (heat near/2 (preserv* or loss or retention or retain* or balance))
#9 (#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8)

Physiology of IPH

The following “quick and dirty” search was used to retrieve supplementary papers on the physiology of IPH and mechanisms of heat loss.

Medline

1 exp *body temperature regulation/ph
2 limit 1 to (humans and english language)
3 limit 2 to "review articles"
4 heat loss.mp.
5 limit 4 to (humans and english language and "review articles")
6 3 and 4
7 (mechanism$ adj2 heat los$).ti,ab.
8 limit 7 to (humans and english language)
9 2 and 7
10 exp *anesthesia/
11 10 or su.fs.
12 3 and 11
13 5 or 6 or 8 or 8 or 12

Risk Factors for IPH

Medline

1 (risk$ adj2 (factor$ or assessment$)).mp.
2 (logistic$ adj model$).mp.
3 exp risk/
4 exp causality/
5 et.fs.
6 or/1-4
7 exp hypothermia/et
8 hypo?therm$.ti,ab.
9 normo?therm$.ti,ab.
10 thermo?regulat$.ti,ab.
11 or/7-10
12 6 and 11
13 exp hypothermia/
14 or/1-5
15 13 and 14
16 12 or 15
17 exp anesthesia/
18 su.fs.
19 exp surgical procedures, operative/
20 or/17-19
21 16 and 20

Embase

1 (risk$ adj2 (factor$ or assessment$)).mp.
2 (logistic$ adj model$).mp.
3 exp risk/
4 exp etiology/
5 et.fs.
6 or/1-4
7 exp hypothermia/et
8 accidental hypothermia/et
9 hypo?therm$.ti,ab.
10 normo?therm$.ti,ab.
11 thermo?regulat$.ti,ab.
12 or/7-11
13 6 and 12
14 exp hypothermia/
15 accidental hypothermia/
16 or/1-5
17 (14 or 15) and 16
18 13 or 17
19 exp anesthesia/
20 exp anesthesia complication/
21 exp surgery/
22 su.fs.
23 or/19-22
24 18 and 23

Cinahl

1	(risk$ adj2 (factor$ or assessment$)).mp.
2	(logistic$ adj model$).mp.
3	exp risk factors/
4	et.fs.
5	rf.fs.
6	or/1-5
7	exp hypothermia/et, rf
8	hypo?therm$.ti,ab.
9	normo?therm$.ti,ab.
10	thermo?regulat$.ti,ab.
11	or/7-10
12	or/1-3
13	11 and 12
14	exp hypothermia/
15	6 and 14
16	13 or 15

The Cochrane Library

#1	(hypo*therm* or normo*therm* or thermo*regulat* or thermo*genesis):ti,ab,kw
#2	risk* near/2 (factor* or assessment*):ti,ab,kw
#3	(logistic* next model*):ti,ab,kw
#4	(risk next factor*):ti,kw,ab
#5	(causality or aetiology or etiology):ti,ab,kw
#6	(#2 OR #3 OR #4 OR #5)
#7	(#1 AND #6)

Health Economics Filter

For this review the broad IPH searches above were combined with the following filters for health economics studies. They were also combined with the exclusions filter described above.

Medline

1 exp "costs and cost analysis"/
2 economics/
3 exp economics, hospital/
4 exp economics, medical/
5 exp economics, nursing/
6 exp economics, pharmaceutical/
7 exp "fees and charges"/
8 exp budgets/
9 ec.fs.
10 (economic$ or pharmacoeconomic$ or cost$ or price$ or pricing$ or budget$).ti,ab.
11 (value adj2 (money or monetary)).ti,ab.
12 (expenditure not energy).ti,ab.
13 or/1-13
14 ((metabolic or energy or oxygen) adj1 cost$).ti,ab.
15 14 not 13
16 exp quality-adjusted life years/
17 exp "quality of life"/
18 (qaly$ or qald$ or qale$ or qtime$).tw.
19 daly$.tw.
20 adjusted life$.tw.
21 or/16-20
22 15 or 21

Embase

1 health economics/
2 exp economic evaluation/
3 exp health care cost/
4 exp pharmacoeconomics/
5 exp fee/
6 budget/
7 (economic$ or pharmacoeconomic$ or cost$ or price$ or pricing$ or budget$).ti,ab.
8 (value adj2 (money or monetary$)).ti,ab.
9 (expenditure not energy).ti,ab.
10 or/1-9
11 ((metabolic or energy or oxygen) adj1 cost$).ti,ab.
12 10 not 11
13 quality adjusted life year/
14 quality of life/
15 (qaly$ or qald$ or qale$ or qtime$).tw.
16 daly$.tw.
17 adjusted life$.tw.
18 or/13-17
19 12 or 18

Cinahl

1 exp economics/
2 exp financial management/
3 exp financial support/
4 exp financing organized/
5 exp business/
6 or/2-5
7 1 not 6
8 health resource allocation/
9 health resource utilization/
10 8 or 9
11 7 or 10
12 budgets/
13 ec.fs.
14 (economic$ or pharmacoeconomic$ or cost$ or pric$ or pricing$ or budget$).ti,ab.
15 (value adj2 (money or monetary)).ti,ab.
16 (expenditure not energy).ti,ab.
17 or/11-16
18 ((metabolic or energy or oxygen) adj1 cost$).ti,ab.
19 17 not 18
20 exp "quality of life"/
21 (qaly$ or qald$ or qale$ or qtime$ or daly$).tw.
22 adjusted life$.tw.
23 or/20-22
24 19 or 23

NHS Economic Evaluations Database (NHS EED)

The broad IPH search on The Cochrane Library was repeated to get references specifically from NHS EED.

Detection and Monitoring

The following searches were combined with the exclusions filter described above. They were limited by age group to include all adults.

Medline

1 exp tympanic membrane/
2 exp esophagus/
3 exp pulmonary artery/
4 exp temporal arteries/
5 exp nasopharynx/
6 exp mouth mucosa/
7 exp rectum/
8 exp axilla/
9 exp urinary bladder/
10 or/1-9
11 body temperature/
12 exp thermometers/
13 or/11-12
14 10 and 13
15 monitoring, physiologic/
16 monitoring, intraoperative/
17 or/15-16
18 13 and 17
19 ((core or body) adj temperature$ adj3 (monitor$ or measur$)).ti,ab.
20 hypothermia/di
21 exp postoperative complications/di
22 exp intraoperative complications/di
23 or/20-22
24 13 and 23
25 14 or 18 or 19 or 24
26 exp surgical procedures, operative/
27 su.fs.
28 exp anesthesia/
29 or/26-28
30 25 and 29

Embase

1 eardrum/
2 esophagus/
3 pulmonary artery/
4 temporal artery/
5 nasopharynx/
6 mouth mucosa/
7 rectum/
8 axilla/
9 bladder/
10 or/1-9
11 core temperature/
12 exp body temperature/
13 exp thermometer/
14 or/11-13
15 10 and 14

16 monitoring/
17 exp patient monitoring/
18 exp temperature measurement/
19 or/16-18
20 14 and 19
21 ((core or body) adj temperature$ adj3 (monitor$ or measur$)).ti,ab.
22 hypothermia/di
23 accidental hypothermia/di
24 exp postoperative complication/di
25 peroperative complication/di
26 or/22-25
27 14 and 26
28 15 or 20 or 21 or 27
29 exp anesthesia/
30 exp anesthesia complication/
31 exp surgery/
32 su.fs.
33 or/29-32
34 28 and 33

Cinahl

1 tympanic membrane/
2 esophagus/
3 pulmonary artery/
4 temporal arteries/
5 nasopharynx.mp.
6 mouth mucosa/
7 rectum/
8 axilla/
9 bladder/
10 or/1-9
11 exp body temperature/
12 exp thermometers/
13 or/11-12
14 10 and 13
15 monitoring, physiologic/
16 intraoperative monitoring/
17 body temperature determination/
18 or/15-17
19 13 and 18
20 ((core or body) adj temperature$ adj3 (monitor$ or measur$)).ti,ab.
21 hypothermia/di
22 exp postoperative complications/di
23 exp intraoperative complications/di
24 or/21-23
25 13 and 24
26 14 or 19 or 20 or 25
27 exp surgery, operative/
28 su.fs.
29 exp anesthesia/
30 or/27-29
31 26 and 30

The Cochrane Library

#1	((tympanic NEXT membrane*) or eardrum* or oesophag* or esophag* or (pulmonary NEXT artery) or (temporal NEXT arter*) or nasopharyn* or (mouth NEXT mucosa) or oral or rectum or rectal or axilla* or bladder):kw,ab,ti
#2	(thermometer*):ti,kw,ab
#3	((body NEXT temperature*) or (core NEXT temperature*)):ti,kw,ab
#4	(monitor* or measure* or determin*):kw,ab,ti
#5	(#1 AND (#2 OR #3))
#6	(#3 AND #4)
#7	(sensitiv* or diagnos*):kw,ab,ti
#8	(hypotherm* or normotherm*):kw,ab,ti
#9	(#7 AND #8)
#10	(#5 OR #6 OR #9)
#11	(surg* or operat* or anesthe* or anaesthe*):ti,kw,ab
#12	(#10 AND #11)
#13	(newborn* or neonat* or child*):ti,ab,kw
#14	(#12 AND NOT #13)

Adverse Effects of Warming Devices

The following “quick and dirty” search was used to retrieve supplementary papers on the adverse effects of warming devices.

Medline

1 (warm$ adj3 device$).mp.
2 ae.fs.
3 1 and 2
4 *heating/ae
5 *rewarming/ae
6 or/3-5

Embase

1 (warm$ adj3 device$).mp.
2 ae.fs.
3 co.fs.
4 1 and (2 or 3)

Pharmacological Prevention and Treatment of IPH / Shivering

The following search strategies were combined with the exclusions filter described above. They were limited by RCT and SR study design filters.

Medline

1 shivering/
2 tremor/
3 (shiver$ or shake$ or shaking or tremor$).ti,ab.
4 or/1-3
5 exp anesthesia/
6 (anaesthe$ or anesthe$).ti,ab.
7 or/5-6
8 exp surgical procedures, operative/
9 su.fs.
10 (surger$ or surgical).ti,ab.
11 or/8-10
12 7 or 11
13 4 and 12

Embase

1 shivering/
2 exp tremor/
3 (shiver$ or shake$ or shaking or tremor$).ti,ab.
4 or/1-3
5 exp anesthesia/
6 exp anesthesia complication/
7 (anaesthe$ or anesthe$).ti,ab.
8 exp surgery/
9 su.fs.
10 (surger$ or surgical).ti,ab.
11 or/5-10
12 4 and 11

Cinahl

1 shivering/
2 tremor/
3 (shiver$ or shake$ or shaking or tremor$).ti,ab.
4 or/1-3
5 exp anesthesia/
6 (anaesthe$ or anesthe$).ti,ab.
7 exp surgery, operative/
8 su.fs.
9 (surger$ or surgical).ti,ab.
10 or/5-9
11 4 and 10

The Cochrane Library

#1	(shiver* or shake* or shaking or tremor*):ti,ab,kw
#2	(anaesthe* or anesthe*):ti,kw,ab
#3	(surger* or surgical):ti,ab,kw
#4	(#2 OR #3)
#5	(#1 AND #4)

APPENDIX C: CHARACTERISTICS OF INCLUDED STUDIES

C1: RISK FACTORS PHARMACOLOGICAL AGENTS

Study	*Participants*	*Interventions*
Alfonsi 1998 Trial held in France RCT	Inclusion and exclusion criteria: 18-40 yearss; lower limb orthopaedic surgery that lasted at least 1 hr. Exclusions: obese, febrile, beta-blockers, alpha2 receptor antagonists, maois, chlorpromazine, tricyclic antidepressants, th yearsoid/neuromuscular disease, dysautomia, raynaud's syndrome age (range): mean 28 years (18-40 years); gender (m/f): 20: 10; comorbidities: not stated; No active warming; passive insulation restricted to 1 layer surgical draping; IV fluids not warmed; postoperatively covered by single blanket; postoperative erative ambient temperature 20.8°C	1) Meperidine (pethidine) (opioid); duration: 30 min before surgery to several hrafter; infusion with target conc. 0.15-0.6microgram/ml; n=15 2) Sufentanil (opioid); duration: not stated; infusion with target conc. 0.1-0.2nanogram/ml; n=15
Bilotta 2002 Trial held in Italy RCT	Inclusion and exclusion criteria: lower limb orthopaedic surgery Age (range): mean 46 years; gender (m/f): 44: 46; comorbidities: not stated; Theatre temperature 22°C and/-1 degree c	1) Nefopam (centrally activg analgesic); duration: immediately before anaesthesia; 0.15mg/kg; n=30 2) saline (placebo); duration: not stated; n=30 3) Tramadol 0.5mg/kg; n=30
Buggy Trial held in Ireland RCT	Inclusion and exclusion criteria: elective orthopaedic surgery on the limbs Age (range): not stated; gender (m/f): not stated; comorbidities: not stated; Cotton covering; nasopharyngeal temperature measured; abstract only	1) Clonidine (alpha adrenergic agonist); duration: at induction of anaesthesia; 150 microgram; n=not stated 2) Saline (placebo); duration: at induction of anaesthesia; n=not stated

Study	*Participants*	*Interventions*
Cheong 1998 Trial held in Singapore RCT	Inclusion and exclusion criteria: ent, dental, gynae, orthopaedic or general minor surgery. Excluded: fever, hypertension, ihd, blood transfusion within 24 hours Age (range): mean around 35 years; gender (m/f): 58: 102; comorbidities: not stated; Theatre temperature 22 degress c; no warming blanket; no blood proucts given; covered with standard gown and drapes	1) Thiopentone (barbiturate); duration: at induction; 4mg/kg; n=80 2) Propofol (anaesthetic); duration: at induction; 2.5mg/kg; n=80
Crozier 2004 Trial held in Germany, Sweden, Norway RCT	Inclusion and exclusion criteria: excl: alcohol abuse, renal, hepatic or emotional disorders, chronic medication with opioids, benzodiazepines or similar substances. Age (range): mean 42 years; gender (m/f): 58: 40; comorbidities: not stated; Active warming with Bair Hugger to prevent intra-operationheat loss; opioid infusion rate could be varied according to clinical need	1) Remifentanil (opioid); duration: not stated; 1 microg/kg loading dose, then 0.1microg/ kg/min; n=49 2) Alfentanil (opioid); duration: not stated; 30microg/kg loading dose then0.16microg/ kg/min; n=49
De witte 1995 Trial held in Belgium RCT	Inclusion and exclusion criteria: gynae laparoscopic surgery of around 1 hr duration. Exclusion: obese, febrile, taking vasoactive, antidepressant or analgesic drugs; history of cv, respiratory, end°C rine or neurological disease Age (range): mean around 35 years; gender (m/f): all female; comorbidities: not stated; Abstract only	3) Tramadol and glycop yearsronium (centrally activg analgesic); duration: premedication 1 hr before surgery; 1.5mg/kg tramadol and glycop yearsronium 5microg/kg; n=10 4) Glycop yearsronium (anticholinergic); duration: premedication 1 hr before surgery; 5microg/kg; n=11 5) Saline; n=11

Study	*Participants*	*Interventions*
De witte 1998 Trial held in Belgium RCT	Inclusion and exclusion criteria: laparoscopic surgery. Exclusion: obese, febrile, taking vasoactive, antidepressant or analgesic drugs; history of cv, respiratory, end°C rine or neurological disease, pregnant. Age (range): 47 years and/- 13 years (18-65 years); gender (m/f): 30: 10; comorbidities: not stated; No active warming; theatre temperature 21.8°C	6) Tramadol (centrally activg analgesic); duration: at beginning of wound closure; 3mg/kg; n=20 7) Saline (placebo); duration: not stated; n=20
Delauney 1991 Trial held in France RCT	Inclusion and exclusion criteria: thyroid surgery; hyper or hypothyroid patients excluded; also excluded if beta-bl°C kers, psychotropic drugs, alpha-2 adrenergic agonists. Age (range): mean 37 years (range 20-52 years); gender (m/f): 2: 18; comorbidities: not stated;	3) Clonidine (alpha 2 antagonist); duration: over 20 minutes at end of surgery; 2 microgram/kg; n=10 4) Isotonic saline solution (placebo); duration: over 20 minutes at end of surgery; n=10
Goto 1999 Trial held in Japan RCT	Inclusion and exclusion criteria: excl; history of thyroid dis; dysautonomia; raynaud's syndrome; malignant hyperthermia; cerebrovascular or other cns disease Age (range): 32-65 years, mean around 56 years; gender (m/f): 27: 11; comorbidities: not stated; Patients covered with 1 layer surgical draping; ambient temperature near 22-23°C	5) Xenon and isoflurane (general anaesthetic); duration: anaesthesia; n=15 6) Isoflurane only (general anaesthetic); duration: anaesthesia; n=15 7) Nitrous oxide and isoflurane; n=15

Study	*Participants*	*Interventions*
Grover 2002 Trial held in India RCT	Inclusion and exclusion criteria: bracytherapy for cervical cancer Age (range): mean 42 years; gender (m/f): all female; comorbidities: not stated;	1) Midazolam (benzodiazepine); duration: at end of pr°C edure; 0.04mg/kg; n=20 2) Saline (placebo); duration: at end of pr°C edure; n=20
Holdcroft 1978 Trial held in UK RCT	Inclusion and exclusion criteria: microscopic surgery of the fallopian tubes Age (range): mean around 29 years; gender (m/f): all women; comorbidities: not stated; Theatre temperature 24°C; no warming blanket	1) Halothane 0.5% (anaesthetic); duration: at induction of anaesthesia; not stated; n=8 2) Fentanyl (opioid); duration: at induction of anaesthesia; 0.8-1.5mg; n=8 3) Halothane 1%; n=7
Hong 2005 Trial held in South Korea RCT	Inclusion and exclusion criteria: casearean delivery under combined spinal-epidural anaesthesia. Excluded if contra-indications to regional anaesthesia, allergy to study medication, severe obesity, pre-eclampsia, placenta paevia, diabetes Age (range): mean around 30 years; gender (m/f): all female; comorbidities: not stated; Theatre 23-25°C	1) Morphine and 0.5% bupivacaine (opioid); duration: unclear; 0.1mg morphine and 8-10mg bupivacaine; n=29 2) 0.5% bupivacaine alone (usual treatment); duration: unclear; 8-10mg bupivacaine; n=30 3) 0.2mg morphine and bupivacaine; n=30; 4) 10mg pethidine and bupivacaine; n=30
Horn 1997 Trial held in Germany RCT	Inclusion and exclusion criteria: excluded: vas°C onstrictive drugs required during surgery Age (range): mean around 41 years; gender (m/f): 32: 28; comorbidities: not stated; Patients covered with warmed sheets	1) Clonidine and isoflurane (alpha 2 antagonist); duration: 5 mins before extubation; 3 microgram/kg; n=15 2) Saline and isoflurane (placebo); duration: 5 mins before extubation; n=15

Study	*Participants*	*Interventions*
Horn 1998 Trial held in Germany RCT	Inclusion and exclusion criteria: excl: vasoconstrictors required for surgery; long term alpha-2 agonist treatment; parkinson's disease-type sympatientsoms or signs Age (range): mean around 41 years; gender (m/f): 35: 25; comorbidities: not stated; Covered with warmed sheets during anaesthesia; ambient temperature 23°C .	1) Physostigmine (cholisnesterase inhibitor); duration: at end of surgery; 0.04mg/kg; n=15 2) Saline control (placebo); duration: at end of surgery; n=15 3) Meperidine 0.5mg/kg; n=15 4) clonidine 1.5microgram/kg; n=15
Ikeda 2001 Trial held in Japan RCT	Inclusion and exclusion criteria: elective oral and superficial surgery; excl: obese, taking medication, history of thyroid disease, dysautonomia, raynaud's syndrome, diabetes mellitus, hypertension Age (range): mean around 35 years; gender (m/f): 11: 9; comorbidities: not stated; IV fluids warmed to 37°C; ambient temperature 25-26°C; patients covered with single cotton blanket and surgical drapes during surgery	1) Ketamine (general anaesthetic); duration: anaesthetic; 1.5mg/kg; n=10 2) Propofol (general anaesthetic); duration: anaesthetic; 2.5mg/kg; n=10
Kelsaka 2006 Trial held in Turkey RCT	Inclusion and exclusion criteria: 20-60 years; elective orthopaedic surgery with leg tourniquet under spinal anaesthesia. Exclusion: obese, fever, hypo-/hyperth yearsoid, parkinson's disease, dysautonomia, raynaud's syndrome, blood transfusion, vasodilators, drugs likel age (range): mean around 36 years; gender (m/f): 56:19; comorbidities: not stated; Lactated Ringer’s solution warmed to 37°C infused 10ml/kg/hr for 30 min before surgery; ambient temperature 21-22°C; patients covered with 1 layer surgical drape during operationand 1 cotton blanket postoperative	1) Ondansteron (serotonin recepatientsor antagonist); duration: immediately before spinal anaesthesia; 8mg IV; n=25 2) Saline 0.9% (placebo); duration: not stated; n=25 3) Meperidine 0.4mg/kg IV; n=25

Study	*Participants*	*Interventions*
Kimberger 2007 Trial held in Austria RCT	Inclusion and exclusion criteria: german-speaking patients aged 18-75 years; excluded if psychiatric history; chronic sedative drugs, alcohol addiction, drug abuse, prior neurosurgery Age (range): mean age around 49 years; gender (m/f): 44: 36; comorbidities: not stated; Pre-operationthermal comfort/anxiety/temperature measured; no info on anaesthetic or operation itself. Ambient temperature at start and end around 19.25°C. Core temperature start 36.55 degress c.	1) Midazolam and passive insulation (benzodiazepine); duration: 34 (3.0)min; 30microgram/kg and passive insulation; n=20 2) Passive insulation alone (single blanket) and placebo (Ringer's lactate) (passive warming device); duration: 34.5 (3.5)min; n=20 3) Wrm air and placebo; n=20 4) warm air and midazolam; n=20
Kinoshita 2004 Trial held in Japan RCT	Inclusion and exclusion criteria: excl: morbid obesity, febrile tendencey, cardiopulmonary disease, end°C rine disease; pre-menopausal if female. Age (range): 20-72 mean 54 years; gender (m/f): 14: 6; comorbidities: not stated;; ambient temperature 25°C; no active warming	1) Ketamine and propofol (general anaesthetic); duration: anaesthesia; ketamine 0.3mg/kg/hr; n=10 2) Placebo and propofol (placebo); duration: anaesthesia; n=10
Mao 1998 Trial held in Taiwan RCT	Inclusion and exclusion criteria: aged above 40 years; elective urological surgery under spinal anaesthesia. Exclusion: bradycardia, hypotension, av conduction bl°C k, left bundle branch bl°C k, sepsis, chronic clonidine exposure, allergy Age (range): mean around 69 years; gender (m/f): all male; comorbidities: not stated; Ambient temperature 22-23°C	1) Clonidine (alpha adrenergic agonist); duration: 90 min before spinal anaesthesia; 150microgram (oral); n=48 2) Starch placebo (oral) (placebo); duration: 90 min before spinal anaesthesia; 2 tablets; n=52

Study	*Participants*	*Interventions*
Mathews 2002 Trial held in Kuwait RCT	Inclusion and exclusion criteria: elective general surgical or laparoscopic pr°C edures with expected duration >1 hour. Excl if required blood or blood prodicts or urological endoscopic pr°C edure; BMI>30; history of convulsions or multiple allergies; vasoact age (range): mean around 38 years; gender (m/f): 84: 66; comorbidities: not stated; IV fluid not warmed; temperature probe in nasopharynx; ambient temperature 21.2-24.9°C	1) Tramadol (centrally acting analgesic); duration: at wound closure; 2mg/kg; n=50 2) Saline (placebo); duration: at wound closure; n=50 3) Rramadol 1mg/kg; n=50
MatsUK awa 2001 Trial held in Japan RCT	Inclusion and exclusion criteria: aged over 60 years; scheduled for surgery lasting at least 3 hours. Excluded if obese, coronary artery disease, on medication, thyroid disease, dysautonomia, raynaud's syndrome Age (range): mean 73 years (sd 8 years); gender (m/f): 14: 26; comorbidities: not stated; Patients minimally clothed and covered with single layer cotton blanket; ambient temperature 23-24°C; outcome temperature before start of operation	1) Midazolam (benzodiazepine); duration: 30 minutes before anaesthesia; 0.05mg/kg; n=10 2) Saline control (placebo); duration: not stated; n=10 3) Atropine 0.01mg/kg; n=10 4) Atropine 0.01mg/kg plus midazolam 0.05mg/kg; n=10
Mizobe 2005 Trial held in Japan RCT	Inclusion and exclusion criteria: excl: obese, febrile, vasodilators, medication altering thermoregulation, history of thyroid disease or autonomic dysfunction Age (range): 20-60 years; gender (m/f): 9: 13; comorbidities: not stated; Patients covered with one cotton sheet; ambient temperature 24°C	1) Clonidine (alpha adrenergic agonist); duration: not stated; 150microg; n=8 2) Placebo (placebo); duration: not stated; n=8 3) Clonidine 300 micrograms

Study	*Participants*	*Interventions*
Piper 2002 Trial held in Germany RCT	Inclusion and exclusion criteria: abdominal or urological surgery. Exclusion: my°C ardial insufficiency, arrhythmias, muscle disease, parkinson's disease, fever, vasoconstrictors peri-operatively, long-term alhpa-2 agonist Age (range): mean around 53 years; gender (m/f): 45: 45; comorbidities: not stated; Not actively warmed	1) Dolasetron (serotonin recepatientsor antagonist); duration: after induction of anaesthesia; 12.5mg; n=30 2) Saline (placebo); duration: after induction of anaesthesia; n=30 3) Clonidine 3microg/kg; n=30
Piper 2004 Trial held in Germany/Switzerland RCT	Inclusion and exclusion criteria: elective abdominal or orthopaedic surgery; excluded if needed vas°C onstrictors; cardiac arrhythmias/heart failure; allergy to study drug; fever; muscle disease; parkinson's disease; alcohol abuse Age (range): mean around 55 years; gender (m/f): 191: 180; comorbidities: not stated; Patients not actively warmed; drug administered i.v. At end of surgery.	1) Nefopam (centrally activg analgesic); duration: at end surgery; 0.2mg/kg; n=73 2) Placebo (saline 0.9%) (placebo); duration: not stated; n=74 3) Nefopam 0.1mg/kg; n=75 4) Nefopam 0.05mg/kg; n=75 5) Clonidine 1.5microgram/kg; n=73
Powell 2000 Trial held in UK RCT	Inclusion and exclusion criteria: minor orthopaedic, general or urological surgery. Exclusion: fever, allergy to ondansetron, surgery anticipated to be >90min or require ventilation; use of vasoconstrictors or vasodilators Age (range): mean 46 years (18-60 years); gender (m/f): 61: 21; comorbidities: not stated;	1) Ondansetron (serotonin recepatientsor antagonist); duration: at induction; 4mg; n=27 2) Saline (placebo); duration: not stated; 4ml; n=28 3) Ondansetron 8mg; n=27

Study	*Participants*	*Interventions*
Rohm 2005 Trial held in Germany RCT	Inclusion and exclusion criteria: abdominal or urological surgery. Exclusion: alpha2agonist treatment; cardiac arrhythmias; my°C ardial insufficiency; vas°C onstrictors; muscle disease, parkinson's disease; other neurological or psychiatric disorder; fever Age (range): mean around 60 years; gender (m/f): 63: 26; comorbidities: not stated; Covered with sheets during anaesthesia	1) Physostigmine (cholisnesterase inhibitor); duration: over 15 minutes at start of skin closure; 2mg; n=31 2) Saline (placebo); duration: over 15 minutes at start of skin closure; n=28 3) Nefopam 10mg; n=30
Sagir 2007 Trial held in Turkey RCT	Inclusion and exclusion criteria: excl: hyperth yearsoidism, cardiopulmonary disease, psychological disorder, temperature >38 or <36.5 Age (range): mean around 43 years (18-65 years); gender (m/f): 112: 48; comorbidities: not stated; Theatre temperature 24°C; irrigation and i.v. Fluids pre-heated to 37°C; covered with 1 layer cotton blanket.	1) Ketamine (nmda recepatientsor antagonist); duration: just after induction of anaesthesia; 0.5mg; n=40 2) Saline (placebo); duration: just after induction of anaesthesia; n=40 3) Granisetron 3mg; n=40; ketamine 0.25mg and granisetron 1.5mg; n=40
Stapelfeldt 2005 Trial held in USA RCT	Inclusion and exclusion criteria: supratentorial pr°C edures. Exclusion: raised intracranial pressure, emergency surgery, on clonidine Age (range): mean 49 years; gender (m/f): 14: 20; comorbidities: not stated;	1) Clonidine (alpha 2 antagonist); duration: at beginning of dural closure; 3microg/kg; n=17 2) Saline (placebo); duration: at beginning of dural closure; n=17

Study	*Participants*	*Interventions*
Toyota 2004 Trial held in Japan RCT	Inclusion and exclusion criteria: arthroscopic knee ligament reconstruction lasting >2 hours. Exclusion: obese, thyroid disease, dysautonomia, raynaud's syndrome, vasodilators. Age (range): range 13-52 years; gender (m/f): 19: 26; comorbidities: not stated; Room temperature 24-25°C; covered with single surgical drape	1) Midazolam as premedication (benzodiazepine); duration: 30 min prior to anaesthesia; 0.04mg/kg im; n=15 2) No premedication usual care;duration: not stated; n=15 3) Midazolam 0.08mg/kg; n=15
Weinbroum 2001 Trial held in Israel RCT	Inclusion and exclusion criteria: inguinal hernioplasty, breast biopsy or diagnostic arthroscopy. Exclusion: benzodiazepine within last 2 weeks; chronic benzodiazepine use; significant cardiovascular/respiratory disease; pregnancy; age<18 years; previous administrat age (range): mean around 51 years; gender (m/f): 71: 31; comorbidities: not stated;	1) Flumenazil (benzodiazepine antagonist); duration: when patient began to awaken; 1mg; n=46 2) Saline (placebo); duration: when patient began to awaken; n=50 3) a) With halothane 0.75%; b) with enflurane 1.7%; c) with isoflurane 1.2%

C2: RISK FACTORS NON-PHARMACOLOGICAL

Study details	*Patient details*	*Factors adjusted for*	*Anaesthesia/surgery*	*Further details*
Abelha 2005; prospective cohort study; country Portugal; total number of patients: 185	Age: 66.0 y (sd 12.6), range 25 to 94; ASA grade ASA i 3%, ASA ii 39%, ASA III 49%, ASA IV 10%; temperature measured at tympanic membrane; some had warming mechanisms	Magnitude of surgery, IV crystalloids, preop patient temp, saps ii + adjusted for: anaesthesia type, anaesthesia duration, temperature monitoring, FAW, packed erythrocytes. Univariate: age, gender, body weight, BMI, ASA , emergency, IV colloids, plasma	Type of anaesthesia: mixed general/regional/combined; type of surgery: non-cardiac; theatre temperature 20-22°C(not adjusted for)	Multivariate analysis only contained those with p<0.1 in univariate analysis. 29/185 patients died. Preop ward temperature 36.37 (sd 0.49); range 35.00 to 38.60°C. 22/185 (12%) had temperature monitoring; 81/185 (44%) had FAW.
Baker 1995; prospective cohort study; country Canada; total number of patients: 56	Age: 59.9 (sd 11.9); ASA gradenot stated; temperature measured at pulmonary artery; no FAW, but warmed blankets and blood warmed	Age, gender, weight, height, history of previous cardiac surgery, pre-bypass temperature, time on cpb, fluid balance on cpb, type of surgery, nitroglycerin in theatre, airway humidifier, alpha agonists, volume warmed IV fluids, volume of unwarmed fluids	Type of anaesthesia: general; type of surgery: cardiac normothermia cpb; theatre temperature not stated	Patients having elective/urgent cardiac surgery under normothermic bypass. No FAW, but warmed blankets used at nurse's discretion; blood kept at 37°C, but IV fluids not warmed. Premed morphine/perphenazine. 15 had iph.
Closs 1986; prospective cohort study; country UK; total number of patients: 31	Age: 53.6 y (cholecystectomy) and 72 y (fnf); ASA gradenot stated; temperature measured at aural; no warming mechanisms stated	Multivariate analysis only recorded r and r2 not coefficients or p-values. Adjusted for age, theatre temperature, time spent in recovery, triceps skinfold thickness or body density	Type of anaesthesia: not stated; type of surgery: abdominal and orthopaedic; theatre temperature not stated (even though in regression analysis)	Temperature not measured during surgery or in immediate postoperative period because of problems of access. Cholecystectomy; n=17) and fractured femur; n=14)

Study details	*Patient details*	*Factors adjusted for*	*Anaesthesia/surgery*	*Further details*
Danelli 2002; RCT study; country Italy; total number of patients: 44	Age: mean 64 and 62 y (sd 8); range 18 minm to 75 max); ASA gradeI-II; temperature measured at bladder; no wd but fluids warmed	RCT, comparable at baseline for age, gender, weight, height, blood loss, crystalloid infusion. Duration of surgery was significantlty longer in the laparoscopic group (mean difference 1.1 h)	Type of anaesthesia: combined general/regional; type of surgery: abdominal; theatre temperature 21-23°C, laminar flow, rel humidity 40-45%	Colorectal resection, duration 255 and 180 min (medians). Obese patients excluded. Premed with midazolam. Ga induction thiopental/fentanyl/atracurium; maintained isoflurane. Epidural block up to t4 with ropivacaine. Infused solns warmed to 37°C.
El-gamal 2000; prospective cohort study; country Egypt; total number of patients: 40	Age: 2 groups: 33 y (sem 2); 20-40 & 67 (sem 2); 60-75y; ASA gradeI-II; temperature measured at tympanic membrane; no warming mechanisms stated	2 selected cohorts, 20 aged 20-40y, 20 aged 60-75. Following held constant: ASA I-II , type of surgery (lower extremity orthopaedic), type of anaesthetic (ga). Comparable at baseline for BMI, duration of surgery, IV fluid volume; preop core temperature	Type of anaesthesia: general; type of surgery: orthopaedic; theatre temperature 25.6 or 25.9°C(sem 0.3); range 24.2 to 28.5	Exclusions cardiac/pulmonary disease, thyroid disorders, raynaud's disease, dysautonomia, preoperative fever. Duration of surgery 1.7-1.8 h (sem 0.08). IV crystalloids given at room temperature
Flores-maldonado 1997; prospective cohort study; country México; total number of patients: 130	Age: 5 to 90 y (mean 42 sd20); ASA gradeasa i 50%; ASA ii 40%; ASA iii/iv 10%; temperature measured at tympanic membrane; no warming mechanisms stated	Age, gender, theatre temperature, duration of surgery, magnitude of surgery, blood transfusion, type of anaesthesia x3	Type of anaesthesia: mixed general/regional groups; type of surgery: mixed; theatre temperature mean 22.9 (sd 1.2)°C	Patients with fever, head or neck surgery and ear or upper respiratory tract infection not admitted into follow up. Emergency (35%) and elective. 53 patients had iph. 19% had 'miscellaneous' anaesthesia. Initial temp not stated.

Study details	*Patient details*	*Factors adjusted for*	*Anaesthesia/surgery*	*Further details*
Frank 1992; RCT study; country USA; total number of patients: 97	Age: 35 to 94y; mean 64.5, sd 1.1; ASA gradenot stated or considered; temperature measured at sublingual reliable; no wd but fluids warmed	Anova/multiple regression adjusted for (i) age (ii) type of anaesthesia (iii) theatre temperature, duration in operating room, volume of IV crystalloid, blood transfusion units. Also included were 3 interaction terms: (i) x (ii), (i) x (iii), (ii) x (iii)	Type of anaesthesia: RCT general/epidural; type of surgery: vascular; theatre temperature mean 20.9 (sd 0.13); range 18.7 to 22.9°C	Assignment to theatres based on scheduling rules/availability. Different analgesia for general (morphine pca) and epidural (fentanyl) anaesthesia. All had im midazolam premed. Lower extremity vascular bypass grafting. Preop temp not stated. Althought this was an rctfor type of anaesthesia, we assessed it as a cohort study because the other variables were assigned in non-random way.
Frank 1994; RCT study; country USA; total number of patients: 30	Age: median 62 y (48-70); ASA gradeI-II; temperature measured at tympanic membrane; no wd but fluids warmed	Stratified RCT (on surgeon); also analysed as subgroups by age. Baseline comparable for age, body weight, duration surgery, theatre temp, PACU temp, blood transfusion. Not comparable: crystalloid admin (significantly higher in ga)	Type of anaesthesia: randomised to epidural/general; type of surgery: urology; theatre temperature 21.7 (sem 0.4) ea and 22.0 (sem 0.4) ga	Radical prostatectomy for prostate cancer, all had midazolam on arrival in or. Pre-induction IV Ringers at room temp, then fluids warmed to 37°C. Gases warmed to 38°C& humidified. No warming devices. All patients had epidural catheter. PACU temp 23.3. (sem 0.3) ea; 23.0 (sem 0.3) ga. No patient had raynauds disease, preop fever, thyroid disorder.

Study details	*Patient details*	*Factors adjusted for*	*Anaesthesia/surgery*	*Further details*
Frank 2000; prospective cohort study; country USA; total number of patients: 44	Age: 57y (sd 7) range 47-67; ASA gradenot stated or considered; temperature measured at tympanic membrane; no wd but fluids warmed	Age, duration of surgery, theatre temperature, body mass, %body fat, height of spinal block (+ univariate BMI)	Type of anaesthesia: spinal; type of surgery: urology; theatre temperature mean 20.9°C(sd 0.13) range 18.7 to 22.9.	All patients male undergoing radical prostatectomy under spinal anaesthesia (midazolam + 18-20mg bupivacaine/20 mcg fentanyl). Regression with backward elimination. Preop temperature 37°C.
Hendolin 1982; RCT study; country Finland; total number of patients: 38	Age: ga 66.6y (sd 6.6); ea 70.9 (sd 8.9); ASA grademean 2.3 or 2.6 (sd 0.6); temperature measured at aural and nasopharyngeal; wd not stated but blood warmed	RCT. Baseline comparability age, weight, height, BMI, ASA . Factors kept constant: type of surgery, duration of surgery	Type of anaesthesia: randomised to epidural/general; type of surgery: urology; theatre temperature 24°C; rel humidity 40-55%	Retropubic prostatectomy, all had diazepam premedication 45 min preop. Ga: induction thiopentone; 70% n20/o2 + pethidine. Ventilator 10 ml/kg. EA at 3rd lumbar vertebra (up to t5); butanilicaine. Blood warmed. Half had polygeline. Sig diff in periop blood loss. Preoperative temperature 36.2°C(sem 0.1). Note that nasopharyngeal temperature measurement is not thought to be very accurate.

Study details	*Patient details*	*Factors adjusted for*	*Anaesthesia/surgery*	*Further details*
Hind 1994a; prospective cohort study; country UK; total number of patients: 30	Age: 51.43 y (sd 12.01); range 37 to 76; ASA gradenot stated; temperature measured at oesophageal; no warming mechanisms stated	1st of 2 multivariate analyses that fitted the data. Factors included: age, theatre temperature, body fat index, IV fluids, total blood loss (from univariate correlations). Excluded: surgery duration, theatre humidity. Constant: type of anaesthesia.	Type of anaesthesia: general; type of surgery: abdominal; theatre temperature 21.3°C(sd 1.2); 19.6-23.3. Rh: 56% (4); 50-65	All patients female and surgery was in afternoon. Elective gynaecological surgery. GA: induction: omnopon/scopolamine; maintenance: thiopentone/suxamethonium/vecuronium/isoflurane/augmentin. Skin prep prewarmed (38-40°C), abdominal packs (40°C) duration of surgery 1-2h. Significant correlations found between age and theatre temperature, body fat, IV fluids, blood loss. Body fat correlated with theatre temperature.
Hind 1994b; prospective cohort study; country UK; total number of patients: 30	Age: 51.43 y (sd 12.01); range 37 to 76; ASA gradenot stated; temperature measured at oesophageal; no warming mechanisms stated	2nd of 2 multivariate analyses that fitted the data. Factors included: theatre temperature, body fat index, IV fluids, total blood loss (from univariate correlations). Excluded: surgery duration, theatre humidity. Constant: type of anaesthesia.	Type of anaesthesia: general; type of surgery: abdominal; theatre temperature 21.3°C(sd 1.2); 19.6-23.3. Rh: 56% (4); 50-65	All patients female and surgery was in afternoon. Elective gynaecological surgery. Ga: induction: omnopon/scopolamine; maintenance: thiopentone/ suxamethonium/ vecuronium/ isoflurane/augmentin. Skin prep prewarmed (38-40°C), abdominal packs (40°C) duration of surgery 1-2h. Significant correlations found between age and theatre temperature (high correlation), body fat, IV fluids, blood loss. Body fat correlated with theatre temperature.

Study details	*Patient details*	*Factors adjusted for*	*Anaesthesia/surgery*	*Further details*
Kasai 2002; case control study; country Japan; total number of patients: 400	Age: 63 (sd 11); ASA gradeI-II; temperature measured at tympanic membrane; circulating water mattress 38 °C + warmed fluids	Age, height, weight, gender, preop systolic bp, preop core temperature, preop heart rate	Type of anaesthesia: combined general/regional; type of surgery: abdominal; theatre temperature 22 to 24°C	Cases >36.0°C; controls <35.0°C. Patients excluded if had blood transfusion or cv drugs for hypotension. Preop temp 36.7 (sd 0.6)°C.
Kitamura 2000; prospective cohort study; country Japan; total number of patients: 27	Age: 59 and 62 y (sd 12) (data given by sugroup); ASA gradenot stated; temperature measured at tympanic membrane; no warming devices	2 cohorts, diabetic & controls, divided into young and old controls, & diabetic neuropathy positive or not. All groups comparable for age, BMI, IV fluid rate, surgery duration, ambient temp. Constant: type of anaesthesia. Sig diff for diastolic bp in tilt	Type of anaesthesia: general; type of surgery: abdominal; theatre temperature 23°C	Unclear how cohorts selected. Patients with BMI > 28% excluded. No premeds. Induction fentanyl/propofol; maintenance 70% n2o/isoflurane; IV fluids not warmed (10-15 ml/kg/h). Patients had FAW after study. 70-90% operations were >2h. No blood transfusion.

Study details	*Patient details*	*Factors adjusted for*	*Anaesthesia/surgery*	*Further details*
Kongsa yearseepong 2003; prospective cohort study; country Thailand; total number of patients: 184	Age: 15-93; ASA grade19% ASA i; 55% ASA ii; 26% ASA >ii; temperature measured at tympanic membrane; some had active warming	Age, body weight, preop body temp, ASA , diabetic neuropathy, emergency surgery, magnitude of surgery, temp monitoring used, type of anaesthesia, IV fluid, duration of surgery, ambient temp (+ univariate: gender, FAW, duration of anaesthesia)	Type of anaesthesia: mixed general/regional/combined; type of surgery: non-cardiac; theatre temperature mean 19.5 to 20.6°C(sd 1.9)	Patients <15y/hyperthermic excluded. 21% <41y; 47% 41-70y; 32% >70y. Multivariate analysis only contained those with p<0.2 in univariate analysis. 11/184 patients died. Preop temperature 37.0 (sd 0.7) range 34.5 to 39.3°C. 53/184 (29%) had temperature monitoring; 90/184 (49%) had FAW.
Kurz 1995; prospective cohort study; country Austria; total number of patients: 40	Age: mean 59 y (sd 14), range 26-79 y; ASA gradeI-II i; temperature measured at oesophageal; no wd but fluids warmed	Multivariate included gender, height, weight, % body fat, surface area and weight/surface area ratio. Type of surgery comparable for different size patients. Type of anaesthesia constant. N°Consideration taken of age or ASA grade.	Type of anaesthesia: general; type of surgery: abdominal; theatre temperature maintained at 21.0°C(sd 0.4)	Elective colon surgery; mean duration of surgery 3.8 h (sd 1.3). Irrigation fluids warmed to body temperature, but no warming devices or fluid warmers. Ga: induction thiopental/fentanyl/vercuronium; maintenance isoflurane/60%n2o/o2
Lau 2001; prospective cohort study; country China (Hong Kong); total number of patients: 18759	Age: 13% <15y; 62% 15-64; 24% >65; ASA gradeasa i 52%; ASA ii 33%; ASA III 8%; ASA IV 2%; ASA v 0.3%; not identified 4%; temperature measured at not stated; warming mechanism not stated	Age, ASA grade, type of anaesthesia, hospital. All of these were categorical variables.	Type of anaesthesia: mixed general/regional/combined; type of surgery: mixed; theatre temperature not stated	Only for patients having surgery greater than 2 h duration. All 23 public hospitals in HK in june/july 1998. 13.4% patients were <15y. 69% elective. 45% major surgery; 29% intermediate. Theatre temperature, warming devices not mentioned.

Study details	*Patient details*	*Factors adjusted for*	*Anaesthesia/surgery*	*Further details*
Mizobe 2005; RCT study; country Japan; total number of patients: 16	Age: 20 to 60 y; ASA gradeI-II; temperature measured at oesophageal; no warming mechanisms stated	RCT. Comparable at baseline for age, gender, weight, height, arterial pressure, heart rate, core temperature	Type of anaesthesia: combined general/regional; type of surgery: abdominal; theatre temperature 24°C; rel humidity 40%	Positive end expiratory pressure (peep) 10cm H2O vs zero end expiratory pressure (ZEEP). Lower abdominal surgery. Induction: propofol/vecuronium bromide; maintained: isoflurane/66%n2o/o2.
Morris 1971; prospective cohort study; country USA; total number of patients: 22	Age: mean 53 y (23 to 85); ASA grade; temperature measured at oesophageal; no warming mechanisms stated	Sub group analysis for age, theatre temperature, operative site and fluids infused. No significant difference in age or volume of fluids infused or site of op between lower and higher temperature theatres. Type of anaesthesia constant; surgery >2h.	Type of anaesthesia: general; type of surgery: abdominal; theatre temperature cool theatre 18-21°C; warm theatre 21-24°C	All operations lasted >2h and evaluated during 0-2h. Intra-abdominal. Premed varied. Ga: induction thiamylal/succinylcholine. Maintenance IV narcotic/n2o (2-4l/m)/o2(2l/m). Mean preop temperatures 36.9°C(sd 0.2)
Nakajima 2002; RCT study; country Japan; total number of patients: 16	Age: mean 47 to 52 y (range 20-60); ASA gradeI-II; temperature measured at tympanic membrane; no warming mechanisms stated	RCT, comparable at baseline for age, gender, height, weight, heart rate, arterial pressure, theatre temperature, fluids, sensory block, pre-induction temperature	Type of anaesthesia: combined general/regional; type of surgery: abdominal; theatre temperature mean 23.9 to 24.2 (sd 0.4); rel humidity 40%	Open lower abdominal surgery (colorectal or gynae). None obese. All fasted for 8h, am operations; positioned after 10min. In theatre 30 min before induction. Ga: propofol induction, isoflurane/ 66%n2o/o2; epidural: bupivacaine, median t9 or t10 (t7-t12)

Study details	*Patient details*	*Factors adjusted for*	*Anaesthesia/surgery*	*Further details*
Nguyen 2001; RCT study; country USA; total number of patients: 101	Age: mean 43 to 48 y (sd 8); ASA gradenot stated; temperature measured at tympanic membrane; all had FAW but fluids not warmed	Type of anaesthesia: general; type of surgery: abdominal; theatre temperature 20 to 22°C	Gastric bypass. Stratified into two BMI groups: 40-49 kg/^{m2} and 50-60 kg/m^2. All patients obese and <60y. All patients had compression sleeves and thigh high anti-embolic stockings. Midazolam premed; induction: pentothal+succinylcholine; fentanyl/isoflurane oral temperatures preoperatively; oesophageal intraoperatively and tympanic membrane postoperatively.	
Roberts 1994; retrospective cohort study; country USA; total number of patients: 77	Age: mean 51 years; ASA grade; temperature measured at oesophageal; no warming devices	Univariate analysis	Type of anaesthesia: general; type of surgery: urology; theatre temperature not stated	Percutaneous nephrolithotomy. Passive warming (hat, including plastic seal), room temperature fluids. Mean core temperature at induction 36.7°C.
Steinbrook 1997; RCT study; country USA; total number of patients: 13	Age: ga: 47 (sd 5); combined: 38 (sd 13) y; ASA gradeI-III (iv and above excluded); temperature measured at oesophageal; no warming devices	RCT. Comparable at baseline for height, blood loss, opioids, preop temperature. Not comparable for age, weight, intraoperative fluids (may not be significant difference).	Type of anaesthesia: mixed; type of surgery: abdominal; theatre temperature 20 to 22°C	All had premedication midazolam/fentanyl. Major intra-abdominal surgery. Fluids not warmed. FAW or fluid warming given if temperature <35°C. May be confounded by this process.

Study details	*Patient details*	*Factors adjusted for*	*Anaesthesia/surgery*	*Further details*
Stewart 1998; prospective cohort study; country Australia; total number of patients: 107	Age:; ASA grade; temperature measured at bladder; all had active warming	Anova	Type of anaesthesia: mixed; type of surgery: abdominal; theatre temperature 22°C	This study was not considered further because it was confounded: all having open surgery had combined gen/epidural & all receiving laparoscopic surgery had general anaesthesia. All patients were warmed with a FAW set at 40°Cand IV fluids were warmd
Vorrakitpokatorn 2006; prospective cohort study; country Thailand; total number of patients: 128	Age: 48.9 y (sd 13.54); 12.5% >65y; ASA gradeasa i 59%; ASA ii 31%; ASA III 9%; temperature measured at tympanic membrane; no warming mechanisms stated	Age, duration of surgery, volume of irrigation fluid, blood transfusion units. Constant: type of anaesthesia.	Type of anaesthesia: general; type of surgery: urology; theatre temperature not stated	Age >18y; all patients had first time surgery for percutaneous nephrolithotomy. All patients had antibiotics. 56% had iph in PACU. Some patients appeared to have FAW.
Yamakage 2000; prospective cohort study; country Japan; total number of patients: 60	Age: 58 (sd 10) y; ASA gradeI-II; temperature measured at rectal; no wd but fluids warmed	Type of anaesthesia held constant at baseline: duration of anaesthesia effectively constant because considered at particular times less than duration of operation. Age partly adjusted in body fat calculator.	Type of anaesthesia: general; type of surgery: orthopaedic; theatre temperature 23.2°C(sd 0.7); rel humidity 31% (sd 8%)	Surgery on lumbar vertebrae (e.g. Disk herniation, spondylolisthesis); prone position. Premed pentobarbital. Ga: induction thiamylal/vercuronium; maintenance isoflurane/n2o/o2; fluids warmed to 37°C. Initial temperature 37.1°C(sd 0.4).

C3: CONSEQUENCES OF INADVERTENT PERIOPERATIVE HYPOTHERMIA ‡

Author(s), year	*Study type, location*	*Thermal management in study arms*	*Age of participants (years)**	*Surgery type and duration*	*Other study design features*	*Temperature (˚C)*
Kurz 1996	RCT, Austria	TgA; n=104): forced air warming plus fluid warmer TgB; n=96): no extra warming	TgA: 61(sd=15) TgB: 59(sd=14), P=0.33	Colorectal surgery; TgA: 3.1hr(sd=1.0) TgB: 3.1hr(sd=0.9), P=1.0	Prospective, sample size calculation	TgA: 36.6 (sd=0.5) TgB: 34.7 (sd=0.6), P<0.001 intra-operative
Flores-Maldonado 2001	Cohort study, Mexico	TgA; n=105) TgB; n=156)	TgA: 40(range 12) TgB: 40(range 11)	Cholecystectomy TgA: 47(range 17) minutes TgB: 59(range 15) minutes	Prospective,no sample size calculation	TgA: 36.2(sd=0.2) TgB: 35.5(sd=0.4) postoperative
Walz 2006	Cohort study, USA	Did not categorize patients; n=1446)	Median age: 57 (range: 18 -96) year	Bowel surgery, did not report surgery duration	Retrospective, no sample size calculation	Did not categorize patients
Frank 1997	RCT, USA	TgA; n=142): routine thermal care plus forced air warming,TgB; n=158): routine thermal care	TgA: 71(SEM 1),TgB: 71(SEM 1), p=0.98	Abdominal, thoracic or peripheral vascular surgery, TgA: 3.6(SEM 0.9) hours,TgB: 3.4(SEM 1.1) hours, p=0.79	Prospective, sample size calculation	TgA: 36.7(SEM=0.1),TgB: 35.4(SEM=0.1), p<0.001,postoperative

Author(s), year	*Study type, location*	*Thermal management in study arms*	*Age of participants (years)**	*Surgery type and duration*	*Other study design features*	*Temperature (˚C)*
Frank 1993	Cohort study, USA	TgA; n=67), TgB; n=33)	TgA: 62(sd=1),TgB: 70(sd=2) p=0.001	Lower extremity vascular reconstruction, TgA:5.7(sd=0.3) hours, TgB:5.0(sd=0.4) hours, p=0.13	Prospective, no sample size calculation	TgA (postoperative normothermia):≥35, TgB (postoperative hypothermia):<35
Frank 1995	RCT, USA	TgA; n=37): routine thermal care plus forced air warming TgB; n=37): routine thermal care	TgA: 71(SEM 1) TgB: 70(SEM 1), p=0.64	Abdominal, thoracic or lower extremity vascular surgery	Prospective, no sample size calculation	TgA: 36.7(SEM=0.1) TgB: 35.3(SEM=0.1), p=0.0001 postoperative
Widman 2002	RCT, Sweden	TgA; n=22): amino acid infusion ,TgB(24): acetated Ringer's solution	TgA: 67(sd=7),TgB: 67(sd=6)	Hip arthroplasty, TgA:78(sd=15)min, TgB:80(sd=20)min	Prospective, sample size calculation	TgA: 36.2˚C, TgB:36.0˚C, postoperative
Zhao 2005	RCT, China	TgA:FAW+FW; n=20), TgB:Cotton blanket; n=20)	TgA:52(sd=13), TgB:44(sd=15)	Abdominal surgery, TgA:204(sd=76)min, TgB:230(sd=88)	Prospective, no sample size calculation	TgA:36.4(sd=0.4), TgB:35.3(sd=0.5), p<0.001 intra-op
Bennet 1994	RCT, UK	TgA-a:FAW; n=15),TgA-b:TI; n=15), TgB:UC; n=15)	TgA-a:73(range63-89),TgA-b:71(range59-88), TgB:74(range54-84)	Hip arthroplasty, TgA-a:2.3(sd=0.3)hour,TgA-b:2.0(sd=0.3), TgB:2.5(sd=0.6)	Prospective, no sample size calculation	TgA-a:36.47(sd=0.35),TgA-b:35.76(sd=0.53), TgB:35.06(sd=0.53)

Author(s), year	*Study type, location*	*Thermal management in study arms*	*Age of participants (years)**	*Surgery type and duration*	*Other study design features*	*Temperature (˚C)*
Vorrakitpokatorn 2006	Cohort, Thailand			Percutaneous nephrolithotomy, 120 (sd=49)	Prospective, descriptive, multivariate analysis, no sample size calculation	TgA (intra-op normothermia):>35, TgB (intra-op hypothermia):≤35
Johansson 1999	RCT, Sweden	TgA; n=25): forced-air warming,TgB; n=25): standard operation procedure	TgA: 69(sd=7),TgB: 67(sd=7),	Hip arthroplasy,TgA: 102 (sd=20) minutes,TgB: 100 (sd=23) minutes	Prospective, power calculation was based on data from one group and was not for outcome of interest	TgA: 36.9(sd =0.5),TgB: 36.0(sd =0.7), postoperative
Lenhardt 1997	RCT, Austria	TgA; n=74): extra warming,TgB; n=76): routine thermal care	TgA: 56(sd=17),TgB: 55(sd=16),P=0.71	Abdominal surgery,TgA: 3.4 (sd=1.2) hours,TgB: 3.2 (sd=1.1) hours,P=0.29	Prospective, sample size calculation	TgA: 36.7 (sd=0.6),TgB: 34.8 (sd=0.6),P<0.001,intra-operative
Schmied 1996	RCT, Austria	TgA; n=30): forced air warming plus warmed intravenous fluid,TgB; n=30): Extra active skin and fluid warming were avoided	TgA: 63(sd=10),TgB: 63(sd=10)	Hip arthroplasy, TgA: 85 (sd=31) minutes,TgB: 87 (sd=24) minutes	Prospective, sample size calculation	TgA: 36.6 (sd=0.4),TgB: 35.0 (sd=0.5),P<0.05,intra-operative, TgA: 36.9 (sd=0.3),TgB: 35.9 (sd=0.6), P<0.05,postoperative

Author(s), year	*Study type, location*	*Thermal management in study arms*	*Age of participants (years)**	*Surgery type and duration*	*Other study design features*	*Temperature (˚C)*
Scott 2001	RCT, England	TgA; n=161): forced-air warming, IV fluid warming, and standard care TgB; n=163): standard care, fluid warming (according to need)	TgA: 68.4(sd=9.1) TgB: 68.2(sd=9.2), P=0.82	Orthopedic, colorectal, gastrointestinal, urology, and vascular surgery TgA: 111.0 (sd=47.4) minutes TgB: 115.5 (sd=46.8) minutes, p<0.53	Prospective, sample size calculation	TgA: 36.09 TgB: 35.70, p<0.001, intraoperative
Casati 1999	RCT, Italy	TgA; n=25):forced-air active warming, TgB; n=25): passive thermal insulation	TgA: 68(sd=11), TgB: 66(sd=7)	Hip arthroplasty, TgA: 100 (sd=37) minutes, TgB: 105 (sd=18) minutes	Prospective, sample size calculation	TgA: 36.6 (sd=0.3), TgB: 35.7 (sd=0.3), P<0.0005, postoperative
Mason 1998	RCT, USA	TgA; n=32): forced-air warming, TgB; n=32): warmed cotton blankets	TgA: 38.5 (sd=6.1) TgB: 40.7(sd=9.6)	Gastric bypass TgA: 156.1 (sd=27.4) mins TgB: 156.9 (sd=31.6) mins	Prospective, no sample size calculation	TgA: 36.6 (sd=0.5) TgB: 35.7 (sd=0.6), P<0.001 postoperative
Smith 1994	RCT, USA	TgA; n=69): forced-air warming, TgB; n=58): warmed cotton blankets	TgA: 35(SEM 1.5) TgB: 34(SEM 1.9)	Knee arthroscopy TgA: 56 (SEM=1.9) mins TgB: 53 (SEM=2.6) mins	Prospective, no sample size calculation	TgA: 36.0(SEM=0.135) TgB: 35.4(SEM=0.25)

Author(s), year	*Study type, location*	*Thermal management in study arms*	*Age of participants (years)**	*Surgery type and duration*	*Other study design features*	*Temperature (˚C)*
Smith 1998	RCT, USA	TgA; n=18): warmed IV fluids, TgB; n=20): room temperature fluids	TgA: 33(SEM 2), TgB: 33(SEM 2)	Gynaecological surgery, TgA: 67 (SEM=16) minutes, TgB: 75 (SEM=15) minutes	Prospective, no sample size calculation	TgA: 36.5(SEM=0.1), TgB: 35.6(SEM=0.1)
Fleisher 1998	RCT, USA	TgA; n=48): forced-air warming, TgB; n=47): routine thermal care	TgA: 43(SEM 2), TgB: 47(SEM 2), NS	Gynecologic, plastic, orthopaedic, or general surgery, TgA: 250.6 (SEM=15.1) minutes, TgB: 222.0 (SEM=13.7) minutes, NS	Prospective, no sample size calculation	TgA: 36.5(SEM=0.1), TgB: 35.4(SEM=0.1), NS
Selldén 1999	Quasi-RCT, Sweden	TgA; n=45): Received IV amino acid,TgB; n=30): Received nutrient free acetated Ringer's solution	TgA: 49(SEM 1),TgB: 50(SEM 2), NS	Abdominal surgery, TgA: 88 (SEM=3) minutes,TgB: 95 (SEM=7) minutes NS	Prospective, non-random, no sample size calculation	TgA: 36.5(SEM=0.1),TgB: 35.7(SEM=0.1), p<0.001,postoperative
Bush 1995	Cohort study USA	TgA; n=196), TgB; n=66)	TgA: 70.3(sd?? 1.3),TgB: 73.1 (sd?? 1.0)	Abdominal aortic aneurysm, TgA: 248 (sd?? =8) minutes,TgB: 296 (sd?? =18) minutes, p<0.05	Prospective, non random, no sample size calculation	TgA: 36.1(sd?? =0.1),TgB: 34.0(sd?? =0.1), p<0.0002,postoperative

Author(s), year	*Study type, location*	*Thermal management in study arms*	*Age of participants (years)**	*Surgery type and duration*	*Other study design features*	*Temperature (˚C)*
Conahan 1987	RCT, USA	TgA:heated and hydrated inspired gas; n=10), TgB:standard insufflation gas; n=9)	TgA:32.1(SEM=1.0), TgB:33.8(SEM=0.8)	Laparoscopy and ovum harvesting (in vitro fertilization), ambulatory surgery	Prospective, no sample size calculation	TgA:35.9(SEM=0.1), TgB:35.4(SEM=0.1), p<0.03, on admit to rec rm, however, 45 after the sart of anesthesia, TgA:36.2(SEM=0.1), TgB:35.8(SEM=0.1), p<0.01,
Smith 2007	RCT, USA	TgA:FAW+iv FW; n=156), TgB:RTC; n=180)	TgA:40(sd=13), TgB:40(13)	Ambulatory gynecologic, orthopaedic, urologic and general surgery. TgA:56(sd=33), TgB:56(sd=35)	Prospective, no sample size calculation	TgA:36.4(sd=0.5), TgB:35.8(sd=0.6), p<0.0001, intraoperative
Wills 1999	RCT, Australia	TgA:heated insufflation gas; n=19), TgB:standard insufflation gas; n=21)	TgA:47.5(range 21-71), TgB:52.2(range 28-74)	Laparoscopic fundoplication, most procedures required nearly 60 minutes	Prospective, sample size calculation was not based on HLoS	TgA:36.1(sd=0.5), TgB:35.8(sd=0.6), 1h into surgery

Author(s), year	*Study type, location*	*Thermal management in study arms*	*Age of participants (years)**	*Surgery type and duration*	*Other study design features*	*Temperature (˚C)*
Savel 2005	RCT, USA	TgA:heated and hydrated insufflation gas; n=15), TgB:standard insufflation gas; n=15)	TgA:41(sd=11), TgB:39(sd=8)	Laparoscopic-Roux-en-Y gastric bypass surgery, TgA:76(sd=16)min, TgB:101(sd=34)	Prospective, sample size calculation was not based on HLoS	TgA:36.2(sd=0.5), TgB:35.7(sd=0.6), p=0.02, postoperative
Stapelfeldt 1996	Cohort study, USA	100 patients	not given	Liver transplantation	Retrospective, no sample size calculation, multivariate analysis	TgA(intra-op normothermia):≥35; TgB(intra-op hypothermia):<35
Vorrakitpokatorn 2006	Cohort, Thailand	128 patients	48.9 (sd 13.54)	Percutaneous nephrolithotomy, 120 (sd=49)	Prospective, descriptive, multivariate analysis, no sample size calculation	TgA (intra-op normothermia):>35, TgB (intra-op hypothermia):≤35
Janczyk 2004	Cohort study, USA	not given (100 patients)	74 (sd8.6)	Abdominal aortic aneurysms, 213 (sd=86) minutes	Retrospective, no sample size calculation, multivariate analysis	not given, only gave values for survivors and nonsurvivors

Author(s), year	*Study type, location*	*Thermal management in study arms*	*Age of participants (years)**	*Surgery type and duration*	*Other study design features*	*Temperature (˚C)*
Abelha 2005	Cohort study, USA	not given (185 patients)	not given	Noncardiac surgery	Prospective, no sample size calculation	TgA(Normothermia) and TgB(hypothermia) were defined as core temperature of ≥ 35 and 35 respectively on admission toICU
Leung 2007	RCT, China	TgA; n=30): forced air warming TgB; n=30): Electric heating pad	TgA: 66.1(sd=10) TgB: 64.1(sd=12),	Pancreatic and gastric surgery, hepatobilliary, colectomy, cystectomy, abdominal aortic aneurysm; TgA: 271 min (sd=113) TgB: 258 min (sd=148)	Prospective, sample size calculation	TgA: 36.2 (sd=0.4) TgB: 35.2 (sd=1.0), Post-operative

*Mean age unless otherwise stated
‡TgA and TgB define the normothermic and hypothermic groups respectively

C4: PREOPERATIVE WARMING DEVICES

Study	*Participants*	*Interventions*
Camus 1995 Trial held in France Funding: mallinckrodt products donated thermocouples	Perioperative phase: preoperative; surgery type: elective; surgical speciality: abdominal; surgery duration: not stated Anaesthesia type: general; anaesthesia duration: more than 1h; premedication: oral hydroxyzine 100mg one hr prior to surgery All patients; ASA grade: I-II Age (range): 44; gender (m/f): 5:11; BMI: not stated comorbidities: not stated; preoperative ambient temperature was significantly higher in the prewarmed group than control group; intraoperative temperature was not significantly different between the groups; IV fluid: infused at ambient temperature and same volume used for both groups; gas flow: 2 l/min	1) Forced air warming (Bair Hugger model 500) and a cotton sheet placed over the forced-air warming cover (active + passive); duration: 60 min (1); temperature setting at 41°C; intervention body area covered: covered up to the shoulders; proportion covered ≥ 50% treated; n=8 2) Wool blanket (usual treatment); duration: not stated; control body area covered: not stated; proportion covered not stated; n=8
Fossum 2001 Trial held in USA Funding: Augustine Medical-equipment & financial support	Perioperative phase: preoperative; surgery type: not stated; surgical speciality: mixed; surgery duration: not stated Anaesthesia type: general; anaesthesia duration: more than 1h; premedication: not stated ASA grade: mixed Age (range): 45.23 years; gender (m/f): 57:43; BMI: not stated comorbidities: not stated; patients with hypoth yearsoidism	1) Forced warm air(Bair Hugger model # 505) and warmed single layer cotton blanket (active warming device); duration: 45 min; temperature at 38 (3)°C; intervention body area covered: not stated; proportion covered not stated; n=50 2) Single cotton sheet warmed in a continental metal products blanket warmer(model#sw1ae-24) (active warming device); duration: 45 min; warmed at 66°Control body area covered: not stated; proportion covered not stated; n=50

Study	*Participants*	*Interventions*
Just 1993 Trial held in USA Funding: not stated	Perioperative phase: preoperative; surgery type: elective; surgical speciality: orthopaedics; surgery duration: over 3 h Anaesthesia type: general; anaesthesia duration: not stated; premedication: flunitrazepam (1 mg) orally 1 hr prior ASA grade: I-II Age (range): 64 (60-68 years); gender (m/f): 8:8; BMI: not stated comorbidities: not stated; Ambient temperature: 21-23°C; or temperature: 21-22°C; gas flow of 2 l/min	1) Electric blanket (cm-an220, chromex) + sheet (warmed) (active warming device); duration: 90 min; 42-43°C; intervention body area covered: during surgery shoulders and thorax covered; proportion covered not stated; n=8 2) Paper shirt covered with cotton sheet (passive warming device); duration: until during surgery; not stated control body area covered: during surgery-covered shoulders and thorax; proportion covered not stated; n= 8
Melling 2001 Trial held in UK Funding: smith & nephew foundation; Augustine Medical inc	Perioperative phase: preoperative; surgery type: elective; surgical speciality: mixed; surgery duration: 1 to 3 h Anaesthesia type: not stated/unclear; anaesthesia duration: not stated; premedication: not stated ASA grade: not stated Age (range): not stated; gender (m/f): 119:158; BMI: comorbidities: not stated; mean duration of surgery: 48 to 49.5 min	1) Forced air warming blanket-systemic warming (active warming device); duration: 30 min (left on until just before surgery) (average: 44.94min); not stated; intervention body area covered: whole body; proportion covered; n=139 2) Non contact radiant heat dressing- local warming; usual care; duration: 30 min (average: 38.73min); not stated control body area covered:; proportion covered wound treated only; n=138

Study	*Participants*	*Interventions*
Sheng 2003 (1) Trial held in USA Funding: not stated	Perioperative phase: preoperative; surgery type: not stated; surgical speciality; surgery duration: not stated Anaesthesia type: not stated/unclear; anaesthesia duration; premedication: not stated; ASA grade: mixed Age (range): 37.5 years; gender (m/f): 23:30; BMI: not stated comorbidities: not stated; outpatient setting surgery; holding room temperature: not stated; or temperature: 21°C ;iv fluid: room temperature	1) Reflective hat and jackets (thermo-lite) (passive warming device); duration: on arrival to outpatients clinic and just prior to transfer to or; intervention body area covered: not stated; proportion covered: not stated; n=26 2) No hats or jackets; usual care; duration: not stated; control body area covered; proportion covered: not stated; n=26
Sheng 2003 (2) Trial held in USA Funding: not stated	Perioperative phase: preoperative; surgery type: not stated; surgical speciality; surgery duration: not stated; Anaesthesia type: not stated/unclear; anaesthesia duration; premedication: not stated ASA grade: mixed Age (range): 37.5 years; gender (m/f): 23:28; BMI: not stated comorbidities: not stated; outpatient setting surgery; holding room temperature: not stated; or temperature: 21°C; IV fluid: room temperature	1) Reflective hat (thermolite) (passive warming device); duration: upon arrival into clinic and removed prior to transfer to or; intervention body area covered: head; proportion covered not stated; n=30 2) No warming; usual care; duration: not stated; control body area covered:; proportion covered; n=23

C5: INTRAOPERATIVE WARMING DEVICES

Study	*Participants*	*Interventions*
Baxendale 2007 Trial held in UK	Inclusion: major abdominal or orthopaedic surgery Age (range):not stated; gender (m/f): not stated comorbidities: not stated; all patients received IV fluids warmed via a Bair Hugger hose thought surgery. Numbers randomised to each group not stated; assuming equal randomisation	1) Bair Hugger (active warming device); duration: after induction for the duration of surgery; 43°C; n=not stated 2) Inditherm mattress (active warming device); duration: from induction until transfer to recovery unit; 37°C; n=not stated
Bennett 1994 Trial held in UK	Exclusion: patients who were grossly obese or malnourished or who had endocrine abnormalities or p yearsexia Age (range):72.6; gender (m/f): 30:15 comorbidities: not stated; ambient temperature: 19-21°C; IV at ambient temperature at rate of 6ml/kg/h. Blood warmed to 37°C before infusion. Relative humidity maintained at 40-50%; ambient temperature (recovery)-23-25°C	1) Metallized plastic garment (thermolite, techstyles (thermal insulation; duration: after induction until end of surgery; n=15 2) usual care; duration: not stated; n=15 3) Convective warm air blanket (Bair Hugger); 43°C; n=15
Berti 1997 Trial held in Italy	Type of surgery: total knee or hip arthroplasty. None of the subjects were obese, taking medications, or history of thyroid disease, dyautonomia or raynaud's syndrome Age (range):68 years; gender (m/f): not stated comorbidities: not stated; room temperature: 21-23°C; IV fluid: room temperature; skin disinfected with standard room temperature disinfected laminar air flow humidity maintained 40-45%	1) FAW (Bair Hugger, Augustine Medical + low flow anaesthesia (active warming device; duration: not stated; 38°C; n=10 2) Low flow anaesthesia (heat retentive therapy); duration: not stated; n/r; n=10 3) Insulated blanket (thermadrape) + low drape anaesthesia system; covering head, trunk, upper limbs and unoperated lower limb

Study	*Participants*	*Interventions*
Borms 1994 Trial held in Belgium	Inclusion: total hip arthroplasty Exclusion: no patients had infections, fever, metabolic disease including diabetes and thyroid dysfunction Age (range):68.5(55-75); gender (m/f): 5:15 Comorbidities: not stated; IV fluid warmed to 37°C; inspiratory gases humidified by hme; or temperature -19°C; ventilation: maint Pet CO_2 35mmhg; gas flow: 4l/min; in both groups, the dependent leg. Was covered with single layer of cotton shirt and disposable surgical drape	1) FAW, lower body cover (model 525, Augustine Medical inc + single blanket + warmed IV fluid (active warming device; duration: applied immediately after patients positioned laterally; 'high'-40°C; n=10 2) Reflective thermoplastic aluminium composite (thermo-lite) + warmed IV fluid (thermal insulation); duration: not stated; n=10
Bourke 1984(study 1) Trial held in USA	Type of surgery: carotid endarterectomy Age (range):not stated; gender (m/f): not stated comorbidities: not stated; or temperature: 19.5°C; humidity: 47%	1) Aluminized blanket + surgical drape (thermal insulation; duration: not stated; n=30 2) Surgical draping usual care; duration: not stated; n=30
Bourke 1984(study 2) Trial held in USA	Age (range):not stated; gender (m/f): not stated Comorbidities: not stated; all patients rested on active warming blankets, equilibrated to room temperature .device turned on between 3-4hrin the control group. Or temperature: 19.7°C; humidity: 49%shivering not assessed as some patients remained intubated and paralysed	1) Aluminized blanket (thermal insulation; duration: not stated; n=15 2) Usual care (active warming device); duration: not stated; n=15 All patients rested on an active heating pad equilibrated to the room temperature; this was turned on after 3 hr for the patients in the control group

Study	*Participants*	*Interventions*
Camus 1993a Trial held in France	Inclusion: surgery lasting 2h; none were obese, febrile, or had a history of endocrine disease Age (range):48.5 years; gender (m/f): 10:12 comorbidities: not stated; IV: ambient temperature; irrigation fluids: 37°C; or temperature: 20°C; lungs ventilated via a semi closed circle system, 2l/min of fresh gas flow to maintain end-tidal pCO_2 at 30-35mmhg.inspiritaory gases not warmed; opioids not administered during recovery from anaesthesia	1) Elecontrol group warming blanket (cm-an 220, chromex; 120 cm wide (active warming device; duration: positioned as soon as patients lay on or table; 42-43°C; n=11 2) usual care; duration: not stated; n=11
Camus 1993b Trial held in France	Inclusion: surgery lasting 2 hr; none were obese, febrile, or had a history of endocrine disease Age (range):48.5 years; gender (m/f): not stated comorbidities: not stated; IV: ambient temperature; irrigation fluids: 37°C; or temperature: 21.5°C; lungs ventilated via a semi closed circle system, 2l/min of fresh gas flow to maintain end-tidal pCO_2 at 30-35mmhg.inspiritaory gases not warmed; opioids not administered during recovery from anaesthesia	1) 1 insulated lower body forced-air blower cover (Bair Hugger model 200, Augustine Medical + 2 cotton sheets (active warming device; duration: not stated; 43°C; n=11 2) usual care; duration: not stated; n=11) 3) Lower body forced air blower (Bair Hugger model 200, Augustine Medical); 43°C
Camus 1993b2 Trial held in France	Inclusion: surgery lasting 2 hr; none were obese, febrile, or had a history of endocrine disease Age (range):48.5 years; gender (m/f): not stated comorbidities: not stated; IV ambient temperature; irrigation fluids: 37°C; or temperature: 21.5°C; lungs ventilated via a semi closed circle system, 2l/min of fresh gas flow to maintain end-tidal pCO_2 at 30-35mmhg.Inspiratory gases not warmed; opioids not administered during recovery from anaesthesia	1) 1 lower body forced-air blower cover (Bair Hugger model 200, Augustine Medical + 2 cotton sheets (active warming device; duration: not stated; 43°C; n=11 2) usual care; duration: not stated; n=11 3) Lower body forced air blower (Bair Hugger model 200, Augustine Medical); 43°C

Study	*Participants*	*Interventions*
Camus 1997 Trial held in France	Inclusion: non-haemorrhagic abdominal surgery in the supine position; at least 2hrs Age (range):50 (24-65) years; gender (m/f): not stated comorbidities: not stated; or temperature: 20.5(sd0.1)°C; lower body FAW(Bair Hugger model 500e)set high(43°C) applied to control group; n=3/8) when temperature decreased < 35°C; IV fluids: rt; mean IV fluids: 1.7(0.lno postoperative thermal skin lesions were detected	1) 2 electric group blankets (Electr°Concept); model cb2 (covered leg. To pubis); model cb3 (over head, trunk and arms) + single cotton sheeting between skin and blanket (active warming device); duration: blanket 1: once on or table; blanket2: after tracheal intubation; 40°C; n=10 2) Usual care; duration: not stated; n=8
Casati 1999 Trial held in Italy	Inclusion: patients undergoing total hip asthroplasty Exclusion: patients with severe cv and respiratory disease, obese, thyroid disease, dysautonomi or raynaud's syndrome Age (range):67; gender (m/f): not stated comorbidities: not stated; 3 ml of Ringer's solution infused every 1ml of blood loss; all patients were in supine position; autologus blood warmed to 37°C before infusion	1) Forced air warming (Bair Hugger) + IV Ringer's solution (37°C) (active warming device); duration: after loss of sensation at t10 until end of surgery; not stated; n=25 2) Reflective blankets (thermal insulation); duration: after loss of sensation at t10 until end of surgery; n=25

Study	*Participants*	*Interventions*
Dyer 1986 Trial held in Australia	Inclusion: transurethral resection of prostate under spinal anaesthesia Age (range):69 years; gender (m/f): 100:0 comorbidities: not stated; theatre temperature: 20.7-21.3; resection time: w: 25.4min(sd10.8)vs c: 32.4(sd15.4)	1) Reflective blanket (thermal insulation); duration: not stated; n=24 2) usual care; duration: not stated; n=25
Erickson 1991 Trial held in USA	Inclusion: at least 21y age major nonvascular abdominal Exclusion: preoperative fever (oral temperature > 37.8°C); personal or family history of malignant hyperthermia, limb amputation, or pregnancy; unable to give informed consent; spinal or epidural anaesthesia; lithotomy position Age (range):51.6 (25-80); gender (m/f): 11:49 comorbidities: not stated; in this part of the study: 6:24 (m:f); type of surgery: upper abdominal gastrointestinal surgery (cholecystectomy, colon resection, gastrectomy, exploratory laparotomy=33); lower abdominal gynaecologic procedures (abdominal hysterectomy, ophorectomy; n=27	1) Thermadrape head and body cover + warmed blankets; n=15) (thermal insulation); duration: not stated; n=15 2) Thermadrape body cover + warmed blankets; n=3/15) usual care; duration: not stated; n=15 3) Head and body covers 4 body covers only

Study	*Participants*	*Interventions*
Frank 1995 Trial held in USA	Inclusion: patients age > 60 yearss; scheduled for lower vascular, abdominal or thoracic procedures; presence of 2 or more risk factors of cad Exclusion: patients with ecg abnormalities, preoperative temperature < 36°C or > 38°C; history raynaud or thyroid disease Age (range):71; gender (m/f): 85:82 comorbidities: not stated; room temperature: 21°C; endotracheal tube removed at end of surgery unless standard extubation criteria not met; in PACU for the control group: warmed blankets placed over patients at nurse's discretion; FAW group: intervention continued for 2 hr and similar to control group	1) Forced-air warming cover (mallinckrodt medical) + IV fluid and blood warmed (model bw-5) + HME (thermovent) (active patients + active fl); duration: not stated; set at height and adjusted to maintain core temp at 37°C; n=37 2) Warmed IV fluids (usual care+ active fl); duration: not stated; n=37
Frank 1997 Trial held in USA	Inclusion: patients age > 60 yearss; schedule for peripheral vascular, abdominal or thoracic procedures; scheduled for postoperative admission to theICU; documented or at high risk of cad Exclusion: patients with ecg abnormalities, preoperative temperature < 36°C or > 38°C; patients with raynaud or thyroid disease Age (range):71; gender (m/f): 85:82 comorbidities: not stated; room temperature: 21°C; endotracheal tube removed at end of surgery unless standard extubation criteria not met; criteria for inclusion: augmented cad or at high risk for cad; age criterion to preselect patients at risk for both perioperative cv complications and inadvertent hypothermia	1) Forced-air warming cover (mallinckrodt medical) + IV fluid and blood warmed (model bw-5) + HME (thermovent) (active patients + active fl); duration: not stated; set to maintain core temp at 37°C; n=142 2) 1 layer of paper of surgical field+ IV fluid and blood warmed + heat moisture exchanger (usual care+ active fl); duration: not stated; n=158

Study	*Participants*	*Interventions*
Harper 2007 Trial held in UK	Inclusion: non-emergency vascular, general, breast and gynaecological surgery Age (range):58 years; gender (m/f): not stated comorbidities: not stated; temperature also measured at the temperature oral artery; all patients received warmed IV fluids	1) Bair Hugger (actamed) (active warming device); duration: not stated; set at maximum; n=19 2) Full length electric warming mattress (Inditherm) (active warming device); duration: not stated; 37°C; n=21
Hindsholm 1992 Trial held in Denmark	Surgery: total hip arthroplasty for osteoarthritis Age (range):43-82; gender (m/f): 17:13 comorbidities: not stated; ambient or temperature: 21°C with air renewal 20x/hr; blood and IV fluid infusions heated to 37°C; assuming 15 patients in each group	1) Reflective blanket (sunflex aluminised plastic sheetings) + cotton gown + standard or draping (thermal insulation); duration: from the anaesthetic room; n=15 2) Cotton gown+ standard or draping (3 weave cotton blankets) usual care; duration: not stated; n=15
Hoyt 1993 Trial held in USA	Inclusion: at least 18 years old, intubated and mechanically ventilated, anaesthesia gas flow maintained at no greater than 3l after induction and having a blanket warmer, fluid warmer and humid vent Exclusion: preoperative temperature > 38°C and those receiving progesterone or testosterone Age (range):47.5 years; gender (m/f): not stated comorbidities: not stated; temperature of IV fluids and blanket warmers not stated	1) Insulated head cover (thermadrape) (thermal insulation); duration: applied upon arrival into the or; n=13 2) Paper head cover (kimberly-clark) usual care; duration: not stated; n=17

Study	*Participants*	*Interventions*
Hynson 1992 Trial held in USA	Included: kidney transplant patients with history of insulin-dependent diabetes, cv disease, hypertension or medication history Exclusion: obesity (150% of ideal body wt), peripheral vascular disease, limb amputation or preoperative infection or fever Age (range):not stated; gender (m/f): 4:6 comorbidities: not stated; IV fluids: warmed to 37°C; ambient room temperature: 20°C; gas flow maintained at 5l/min; ventilation was controlled to maintain end tidal $PetCO_2$ near 35mmhg	1) Full length circulating water blanket (blanketrol 200hl) covered by single layer cotton sheet (active warming device); duration: 180 min; 40°C; n=5 2) Standard surgical draping usual care; duration: not stated; n=5 3) Forced air warming (Bair Hugger) set at 43°C; lower-body warming blanket placed over the legs to the mid-thigh. 4) Inspired gas set at 40°C
Janicki 2001 Trial held in USA	Exclusion: pregnant, current fever (core temperature > 38°C), septic condition within 3 days before the study, burn or multiple traumatic injuries, abdominal procedures involving rectal manipulation and surgery in lithotomy position Age (range):54.5(37.9-67.9); gender (m/f): 29:24 comorbidities: not stated; ASA: ii-IV; ambient or temperature: 20.4°C; water garment group: lower and upper extremities, upper anterior, lateral portions of the chest and entire back of the patients whose temperature < 34.5°C room warmed to 24°C to assist with patient rewarming; ambient temperature in PACU not controlled	1) Water-garment warmer (Allon, MTRE, advanced technologies) (active warming device); duration: before induction; 36.8°C; n=25 2) Bair Hugger warming (model 505) and bair-hugger upper body warming blanket (model 52(active warming device); duration: not stated; 43°C; reduced to 'medium': 36°C if patient core temperature > 37°C; n=28

Study	*Participants*	*Interventions*
Janicki 2002 Trial held in USA	Exclusion: pregnant, current fever (core temperature > 38°C), septic condition within 3 days before the study, burn or multiple traumatic injuries, abdominal procedures involving rectal manipulation and surgery in lithotomy position Age (range): 50(18-65); gender (m/f): 12:12 comorbidities: not stated; ASA: ii-IV; ambient or temperature: 20.4°C; water garment group: lower and upper extremities, upper anterior, lateral portions of the chest and entire back of the patients whose temperature < 34.5°C room warmed to 24°C to assist with patient rewarming; ambient temperature in PACU not controlled	1) Water-garment warmer (Allon, MTRE, advanced technologies) (active warming device); duration: before induction; 36.8°C; n=12 2) Bair Hugger warming (model 505) and bair-hugger upper body warming blanket (model 52(active warming device); duration: not stated; 43°C; reduced to 'medium': 36°C if patient core temperature > 37°C; n=12
Joachimsson 1987 Trial held in Sweden	Inclusion: patients undergoing gastric, small and larger intestine or gall bladder operations Exclusion: criteria not stated Age (range):56; gender (m/f): 37:31 comorbidities: not stated; infused blood and colloids passed through blood warmers at 37-38°C; relative humidity: 40-50%; or temperature: 22°C	1) Hot-water mattress (heto, bikerod) (active warming device); duration: not stated; 39°C; n=21 2) usual care; duration: not stated; n=24 3) Heated-humidifier; 38°C
Johansson 1999 Trial held in Sweden	Inclusion: elective total unilateral primary hip arthroplasty, no pathologic fracture, no anamnestic evidence of coagulopathy, and prothrombin and activated partial thrombin time within normal limits Age (range):68; gender (m/f): 21:29; comorbidities: not stated; premedication continued: nsaids/aspirin discontinued 1 wk before operation in 8 patients in each group; diazepam, 5 mg by mouth used for sedation; ephedrine (5(7.6) v 4.3(6) mg); midazolam IV (2(1.8) v 1.3(1.5)mg); fl and blood warmed; or temperature: 20.9°C	1) Bair Hugger (Augustine Medical) + pre-warmed gel-filled mattress + warmed fluids (active patients + active pt); duration: not stated; n=25 2) Usual care + pre-warmed gel-filled mattress + warmed fluids (active warming device); duration: not stated; n=25

Study	*Participants*	*Interventions*
Kabbara 2002 Trial held in USA	Inclusion: gynaecologic, orthopaedic, otolaryngologic, plastic or general lasting 20 min or more Exclusion: emergency surgery, pregnant, heat injury, preoperative sublingual temperature < 35.5 or > 38°C, plannedICU administrated postoperative, use of calcium channel blocker, and history of malignant hyperthermia Age (range):43.5; gender (m/f): 26:57 Comorbidities: not stated; ward temperature. Exclusion: 21°C; fluids at rt where clinically indicated; fresh gas flow of 2l/min	1) Bair Hugger (Augustine Medical inc) (active warming device); duration: intraoperative period; 43°C; n=45 2) Standard hospital blankets usual care; duration: not stated; n=42
Kamitini 1999 Trial held in Japan	Inclusion: ASA I-III elective abdominal sugary Exclusion: preoperative fever or who received a vasodilator on day surgery Age (range):66; gender (m/f): not stated	1) Reflective sheets (thermal insulation); duration: not stated; n=22 2) Reflective sheets (thermal insulation); duration: not stated; only the extremities and trunk; n=22
Kurz 1995 Trial held in USA	Inclusion: ASA I-III patients undergoing colon surgery; none of the patients had a history of thyroid disease, dysautonomia, raynaud's syndrome or malignant hyperthermia Age (range):58(18-80 years); gender (m/f): 108:92 comorbidities: not stated; room temperature: 21-22°C intraoperative; 23-25°C postoperative; if patient core temperature approached 34°C, FAW was instituted to prevent further hypothermia	1) Forced air cover (Augustine Medical) + warmed IV fluids (active warming device); duration: not stated; 40°C; n=39 2) IV fluids - not warmed usual care; duration: not stated; not stated; n=35

Study	*Participants*	*Interventions*
Kurz 1996 Trial held in USA	Inclusion: colorectal resection for cancer or ibd Exclusion: patients scheduled for minor colon surgery, use of corticosteroids or other immunosuppressive drugs including cancer chemo 4weeks before surgery; recent history of fever, infection or both; serious malnutrition or bowel obstruction Age (range):60(18-80); gender (m/f): 108:92 comorbidities: not stated; inflammatory bowel disease; mechanical bowel prep night before surgery	1) Forced air cover (Augustine Medical) + warmed IV fluids (fluid warmer)-activated (active warming device); duration: not stated; 40°C; n=104 2) Forced air cover (Augustine Medical) + warmed IV fluids (fluid warmer)- not activated (active + passive); duration: not stated; 'ambient temperature'; n=56
Kurz 1993a Trial held in Austria	Inclusion: patients undergoing maxillofacial surgery, including node resection and flap reconstruction; none of the patients had history of fever, thyroid disease, dysautonomia, raynaud's syndrome or malignant hyperthermia. Age (range):58; gender (m/f): not stated comorbidities: not stated; or temperature: 21°C; anaesthetic gases: via circle system using fresh gas flow of 6l/min; fluids administered intravenously warmed to 37°C; type of surgery: maxillofacial; reports no significantly different in m:f but numbers not given	1) Convective warming (Bair Hugger, model 500; Augustine Medical) (active warming device); duration: after induction of anaesthesia; 40°C (high); n=8 2) Full-length circulating water mattress (aquamatic module, hamilton inc) (active warming device); duration: after induction of anaesthesia until ?; 40°C; n=8
Kurz 1993b Trial held in Austria	Inclusion: patients undergoing total hip arthroplasty or femoral resection for tumour in supine position; none of the patients had history of fever, thyroid disease, dysautonomia, raynaud's syndrome or malignant hyperthermia. Age (range):58; gender (m/f): not stated; comorbidities: not stated; or temperature: 21°C; anaesthetic gases: via circle system using fresh gas flow of 6l/min; fluids administered intravenously warmed to 37°C	1) Convective warming (Bair Hugger, model 500; Augustine Medical) (active warming device); duration: after induction of anaesthesia; 40°C (high); n=8 2) Full-length circulating water mattress (aquamatic module, hamilton inc) (active warming device); duration: after induction of anaesthesia until not stated; 40°C; n=8

Study	*Participants*	*Interventions*
Lenhardt 1997 Trial held in USA	Inclusion: patients aged 18-80 years undergoing abdominal surgery (colon resection with or without abdominal peritoneal pull stable, systemic disease); ASA I-III; exclusion: patients scheduled for minor abdominal surgery Age (range):55.5 years; gender (m/f): 74:76 Comorbidities: not stated; 100 of the patients participated in kurz 1996	1) Extra warming (active warming device); duration: not stated; core temperature maintained near 36.5°C; n=74 2) usual care; duration: not stated; n=76
Leung 2007 Trial held in Hong Kong, PRC (People's Republic of China)	Inclusion: age 18-80, ASA I-III and elective laparotomy Exclusion: pregnancy, core temp ≥ 37.5°C Age (range):65; gender (m/f): 39:21 comorbidities: not stated;	1) Upper body forced-air warming (Bair Hugger, Augustine Medical) (active warming device); duration: after induction until end of surgery; 43°C; n=30 2) Elecontrol group heating pad (operatherm 20+ prewarmed gel pad (active warming device); duration: not stated; 39°C; n=30
Lindwall 1998 Trial held in Sweden	Inclusion: ASA 1-iv patients for extensive operations for oesophageal, rectal or bladder carcinomia with duration of surgery and anaesthesia > 3hrs; exclusion criteria not stated Age (range):65.5 years; gender (m/f): not stated comorbidities: not stated; active fluid warming in both groups (38-39°C); low flow anaesthesia with fresh gas flow of 0.7-1.2 l/min	1) Upper or lower Bair Hugger (model 500) (Augustine Medical) (active patients + active fl); duration: started before induction of anaesthesia and stopped at end of operation; 43 (2.3)°C; n=12 2) Double layers of terry cloth + operation drapes usual care; duration: not stated; n=13

Study	*Participants*	*Interventions*
Mason 1998 Trial held in USA	Inclusion: roux-en-y gastric bypass surgery for morbid obesity Exclusion criteria not stated Age (range):40 (7.9) (17-59 years); gender (m/f): 9:55 comorbidities: not stated; or temperature: 20.9°C; PACU temperature: 24.75°C *significantly different between the groups length of incisim (cm). Length of incision longer in warmed blanket group	1) Bair Hugger (model 500 Augustine Medical) (active warming device); duration: not stated; 'medium'= 38°C (sd3); n=32 2) Warmed cotton blankets (active warming device); duration: not stated; n=32
MatsUK awa 1994 Trial held in Japan	Inclusion: abdominal surgery (subtotal gastrectomy, total gastrectomy, or cholecystectomy) scheduled to last at least 2h Exclusion criteria not stated Age (range):61.5; gender (m/f): 27:13 comorbidities: not stated; or temperature: 24-26°C; Ringer's lactate solution administered to all patients	1) Bair Hugger + circulating blanket warming (kr-thermia rk600) (active patients + active pt); duration: unclear; 38°C (bh) + 37°C (circulating blanket); n=20 2) Circulating blanket warming (kr-thermia rk600) (active warming device); duration: unclear; 37°C; n=20
Matsuzaki 2003 Trial held in Japan	Exclusion: patients with preoperative fever, evidence of current infection, thyroid disease or disturbance of autonomic function Age (range):55 (20-80) years; gender (m/f): 15:9 comorbidities: not stated; concurrent treatments, ward temperature, irrigation fluid, IV fluid, humidity, air flow	1) Upper body forced air over (warm touch; tyco-mallinckrodt) (active warming device); duration: just after induction of ga and maintained thru surgery; set to medium; n=8 2) Full length circulating water mattress (active warming device); duration: just after induction of ga and maintained thru surge; set to medium (38°C); n=8

Study	*Participants*	*Interventions*
Mogera 1997 Trial held in India	Inclusion: intracranial surgery lasting at least 4 hours Exclusion: obese, febrile, or had a history of endocrine diseases Age (range):47 years; gender (m/f): 18:12 comorbidities: not stated; IV fluids- ambient temperature	1) Convective warm air blanket (Bair Hugger, augustine) (active warming device); duration: not stated; n=15 2) Cotton sheet usual care; duration: not stated; n=12
Motamed 2000 Trial held in France	Inclusion: long-lasting abdominal surgery Exclusion: history of renal, hepatic or neuromuscular disease and taking medications known to interfere with neuromuscular fx, e.g. Patients with elecontrol group olyte abnormality, diabetes and those with an anticipated difficult airway; patients with drawn if surgery < 2hr Age (range):53; gender (m/f): 17:9 comorbidities: not stated; room temperature: at 21°C	1) Upper FAW (warmtouch, mallinkrodt) (active warming device); duration: not clearly stated; 43°C; n=13 2) Lower FAW (warmtouch, mallinkrodt) (active warming device); duration: not clearly stated; 43°C; n=13
Muller 1995 Trial held in Austria	Inclusion: orthotropic liver transplant Exclusion criteria not stated Age (range):52.5 years; gender (m/f): 15:5 Comorbidities: not stated; IV fluids warmed to 37°C	1) Forced air warming + circulating water mattress(full length) (american pharmaseal company) (active warming device); duration: not stated; 42°C; n=10 2) Circulating water mattress(full length) (american pharmaseal company) (active warming device); duration: not stated; n=10

Study	*Participants*	*Interventions*
Negishi 2003 Trial held in USA	Inclusion: open abdominal surgery Exclusion: preoperative fever, evidence of current infection, thyroid disease or dysautonomia Age (range):62 (20-80 years); gender (m/f): 15:9 comorbidities: not stated; ambient temperature: near 22°C; all fluids warmed to 37°C	1) Full-length circulating-water mattress (meditherm; gaymar industries inc)with 5mmpad placed between mattress and patients (thermal insulation); duration: not stated; 42°C; n=8 2) Forced-air cover (Bair Hugger) (active warming device); duration: not stated; set to high n=8 3) Restive heating blanket (smartcare operationsystem; thermamed gmbh) set at 42°C overed one arm, the chest and both legs
Ng 2006 Trial held in Hong Kong, PRC (People's Republic of China)	Inclusion: age 18-80 years, ASA I-III and elective total knee replacement Exclusion: pregnancy, core temp ≥ 37.5°C; history of heat injury; contraindication to neuraxial blockade Age (range):67; gender (m/f): 17:43	1) Upper body forced-air warming (Bair Hugger, Augustine Medical) (active warming device); duration: after induction until end of surgery; 43°C; n=30 2) Elecontrol group ic heating pad (operatherm 20+ prewarmed gel pad (active warming device); duration: not stated; 39°C; n=30
Ouellette 1993 Trial held in USA	Inclusion: patients undergoing cervical or lumbar laminectomy with duration of at least 90 min Exclusion criteria not stated Age (range):44 years; gender (m/f): not stated Comorbidities: not stated; IV fluids administered at room temperature; room temperature: 20-21°C	1) Bair Hugger forced air warming (active warming device); duration: not stated; set on 'low'; n=12 2) usual care; duration: not stated; n=not stated 3) Reflective blanket over upper and lower extremities; n=12; inspire, heated, humidified air (maquest sct 2000) at 39°C; n=12

Study	*Participants*	*Interventions*
Radel 1986 Trial held in USA	Inclusion: orthopaedic surgery on lower extremities of 1 hr duration or greater. Patients selected had no skin lesions or burns of chest, back or scalp; no pre-existing medical conditions precluding use of rectal and oesophageal probes; oral temperature < 38°C or less 1h prior to induction Age (range):23-92 years; gender (m/f): 30:0 Comorbidities: not stated	1) Circulating water vest and cap (gaymar meditherm) + IV fluids (active warming device); duration: not stated; water fluid at a temperature of 38°C; IV fluids: 37°C; n=10 2) 2 cotton sheets and patient gown+ IV fluids usual care; duration: not stated; warmed IV fluids: 37°C; n=10 3) Insulated usual care; 2 cotton blankets and shirts and a cotton skull cap; n=10
Radford 1979 Trial held in UK	Inclusion: patients undergoing craniotomy for intracranial tumours or aneurysms in supine position Exclusion: patients < 14 years and those with p yearsexia before operation Age (range):48.5; gender (m/f): 22:20 comorbidities: not stated; significantly different in baseline core temperature. Anaesthetic gases not warmed or humidified; infused blood (rarely given)not warmed; or other infusions not warmed; theatre temperature (start of operation): 22.2°C; end of operation: 23.7°C	1) Metallized plastic sheet (thermal insulation); duration: not stated; n=20 2) Cotton gown and 1 cotton blanket usual care; duration: not stated; n=22

Study	*Participants*	*Interventions*
Rasmussen 1998 Trial held in Denmark	Inclusion: colonic resections or rectal amputations lasting at least 2 h Exclusion: fever, metabolic disorder, BMI > 30 kg/m^2, ongoing treatment with b-blocking agents or neuromuscular disease Age (range):67(49-80 years); gender (m/f): 10:14 comorbidities: not stated; fresh gas flow: 1.5-3.0 l/min into a semi closed circle system with CO_2 absorption IV fluid: rt; blood humidity, blood transfusion: 37°C thru heating device; room temperature: 21	1) Bair Hugger (Augustine Medical) + prewarmed gel mattress (active patients + active pt); duration: from the or; unclear when warming ceased; bh: 43°C; gel mattress: 40°C; n=8 2) Prewarmed gel mattress (active warming device); duration: from the or rm; unclear when warming ceased; 40°C; n=8 3) 8 patients randomised to oesophageal heat exchanger. Gdg agreed this is not common practise within the UK
Russell 1995 Trial held in UK	Exclusion: patients with fulminant liver disease; history of previous upper abdominal surgery Age (range):45.8 years; gender (m/f): 29:31 comorbidities: not stated; ward temperature: not stated; irrigation and IV fluid: warmed to 37°C; anaesthetic gases: admin via a circle breathing system with fresh gas flow of 3l/min	1) FAW under mattress (howarth) + warmed IV and irrig fluid (37°C) (active warming device); duration: not stated; 40°C; n=20 2) Electric under blankets (jmw medical) + warmed IV and irrig fluid (37°C) (active warming device); duration: not stated; 39°C; 41°C; n=20 3) FAW over blanket (mallinkrodt); set to high (42-48°C) resets to medium (36-41.5°C) after 45 min

Study	*Participants*	*Interventions*
Scott 2001 Trial held in UK	Inclusion: > 40 years; ASA i-IV; undergoing major surgery with an expected hospital stay of 5 days; no existing sacral pressure ulcers and provided informed consent Exclusion: patients undergoing procedures in which intraoperative warming standard practice; lateral or prone position Age (range):68 (41-89); gender (m/f): 149:175 comorbidities: not stated; ASA i-IV; 27 protocol violations; 17 patients allocated to warming treated as standard and 10 patients assigned to std given warming because of clinical need; some control patients may have recd warmed iv	1) Forced air warming + warmed IV fluids (active warming device); duration: not stated; n=161 2) Usual care + warmed IV infusions, as determined by clinical need.usual care; duration: not stated; n=163
Sheng 2003 Trial held in USA	Exclusion: use of corticosteroids or immunosuppressive drugs (including cancer chemotherapy) 4 weeks prior to surgery, recent history of fever, infection or both; serious malnutrition (low serum albumin, a low wbc or loss of more than 20 % of body weight) Age (range):37.5; gender (m/f): 23:30 comorbidities: not stated; outpatient setting surgery; holding room temperature: not stated; or temperature: 21°C; IV fluid: room temperature; ASA: I-II i	1) Reflective blanket (thermal insulation); duration: on arrival into outpatient clinic till prior to transfer to or; n=30 2) Usual care;duration: not stated; n=23

Study	*Participants*	*Interventions*
Sheng 2003 (1b) Trial held in USA	Inclusion: ASA I-III Exclusion: use of corticosteroids or immunosuppressive drugs (including cancer chemotherapy) 4 weeks prior to surgery, recent history of fever, infection or both; serious malnutrition (low serum albumin, a low wbc or loss of more than 20 % of body weight) Age (range):37.5 years; gender (m/f): 23:30 comorbidities: not stated; outpatient setting surgery; holding room temperature: not stated; or temperature: 21°C; IV fluid: room temperature	1) Reflective blanket(thermo-lite) (thermal insulation); duration: on arrival to or; n=26 2) Cloth blanket usual care;duration: not stated; n=26 3) Patients randomised to hat/jackets in the preoperative phase
Smith 1994 Trial held in USA	Inclusion: outpatients scheduled for arthroscopic knee surgery Exclusion criteria not stated Age (range):34.5 years; gender (m/f): 79:48 comorbidities: not stated; not sated	1) Forced air cover (Bair Hugger, model 500; Augustine Medical) + warmed cotton blankets (active warming device); duration: not stated; n=31 2) Warmed cotton blankets usual care; duration: not stated; 60°C; n=21; warming continued in PACU; smith 1994a: patients not warmed in PACU
Smith 1994a Trial held in USA	Inclusion: outpatients scheduled for arthroscopic knee surgery Exclusion criteria not stated Age (range):34.5 years; gender (m/f): 79:48 comorbidities: not stated;	1) Forced air cover (Bair Hugger, model 500; Augustine Medical) + warmed cotton blankets (active warming device); duration: not stated; n=38 2) Warmed cotton blankets usual care; duration: not stated; 60°C; n=37; warming continued in PACU; smith 1994a: patients not warmed in PACU

Study	*Participants*	*Interventions*
Tølløfsrud 1984a Trial held in Norway	Inclusion: 40 patients scheduled for surgery on the abdominal aorta (straight or bifurcated prosthesis) Exclusion: patients with body temperature of over 37.5°C o under 36.5°C on the morning of surgery Age (range):64; gender (m/f): 8:2 comorbidities: not stated; blood and plasma warmed to 37°C	1) Warming blanket(gorman rupp); 45x60cm (active warming device); duration: not stated; 38-40°C; n=10 2) Usual care usual care; duration: not stated; n=10 3) Warming blanket + heated humidifier; n=10 4) Heated-humidifier(bennett cascade humidifier) 37-40°C; n=10
Tølløfsrud 1984b Trial held in Norway	Inclusion: 40 patients scheduled for extra-abdominal vascular surgery(femoropopliteal bypass and profunda plasty) Exclusion: patients with body temperature of over 37.5°C o under 36.5°C on the morning of surgery Age (range):70; gender (m/f): 8:2 Comorbidities: not stated; blood and plasma warmed to 37°C	1) Warming blanket(gorman rupp); 45x60cm (active warming device); duration: not stated; 38-40°C; n=10 2) Usual care usual care; duration: not stated; n=10 3) Warming blanket + heated humidifier; n=10 4) Heated-humidifier (bennett cascade humidifier) 37-40°C; n=10
Torrie 2005 Trial held in New Zealand	Inclusion: males ASA I-III scheduled for turp Exclusion: age < 55 or > 90years; thyroid dysfunction; weight < 50kg or > 120kg; ASA > iii; indwelling urinary catheter or urinary tract infection; core temperature ≥ 37.5°C Age (range):72.5 years; gender (m/f): 60:0 Comorbidities: not stated;	1) Forced air warming (Bair Hugger, Augustine Medical) + warmed iv(hotline)+warmed irrigation fluid(warming cabinet) (active warming device); duration: not stated; FAW: 43°C; IV: 41°C; irrigation: 42°C; n=32 2) Radiant warming (sun touch) + warmed IV fluids(hotline) + warmed irrigation fluids (warming cabinet) (active warming device); duration: not stated; radiant: 41°C; IV: 41°C; irrigation: 42°C; n=28

Study	*Participants*	*Interventions*
Whitney 1990 Trial held in USA	Inclusion: intra abdominal gynaecological surgery of at least 1.5hrs Exclusion criteria not stated Age (range):40.5; gender (m/f): 0:40 comorbidities: not stated; concurrent treatments: not stated; theatre temperature:, irrigation fluid: not stated; humidity: not stated;, air flow: not stated; HME utilised	1) Warmed cotton thermal blanket (active warming device); duration: prior to induction; not stated; when removed; not stated; n=20 2) Thermadrape (or concepts); reflective blanket is an aluminium impregnated plastic material (thermal insulation); duration: prior to induction; not stated; when removed; n=20
Winkler 2000 Trial held in Austria	Inclusion: patients scheduled to undergo primary, unilateral, cement-free total hip arthroplasty. None performed for treatment of tumour Exclusion: preoperative coagulation tests abnormal, aspirin products consumed within a week of surgery, history of bleeding disorders, dvt, pulmonary embolism Age (range):64.5 (40-80)years; gender (m/f): 65:85 comorbidities: not stated; concurrent treatments, ward temperature, irrigation fluid, IV fluid, humidity, air flow	1) Forced air covers attached to individual forced air heater (Bair Hugger, Augustine Medical) (active warming device); duration: not stated; temperature adjusted to maintain core temp at 36.5°C; n=75 2) Forced air covers attached to individual forced air heater(Bair Hugger, Augustine Medical) (active warming device); duration: not stated; temperature adjusted to maintain core temp at 36.0°C; n=75

Study	*Participants*	*Interventions*
Wong 2004 Trial held in New Zealand	Inclusion: 20-60 yearss; weight: 50-110 kg; laparoscopic cholecystectomy Exclusion: patients presenting with pre-existing hyperp yearsexia, history of malignant hyperthermia, or currently taking antip yearsetic medication Age (range):39.3 (26.5-50.3 years) gender (m/f): 0:42 comorbidities: not stated; mean theatre temperature: a: 21.6°C sd1.1; b: 22.2°C sd1.2 mean theatre humidity: a: 46% rh sd4; b: 45%rh sd5.iv fluid: for all patients prewarmed to 42°C .all patients covered in thin hospital blankets covering torso, arms and legs followed by drape	1) Sun touch (fisher and paykel healthcare, nz) (active+ thermal insulation); duration: after patients placed on operating table; temperature setting at 41°C; n=21 2) Bair Hugger (Augustine Medical, USA) (active + passive); duration: after patients placed on operating table; temperature setting at 43°C; n=21
Yamakage 1995 Trial held in Japan	Inclusion: spinal anaesthesia for surgery on the lower abdomen or a lower extremity Exclusion: patients with history of smoking or extreme obesity (BMI > 30) Age (range):56.2 (45-72 years); gender (m/f): 6:8 comorbidities: not stated; IV: 37°C; or: 23°C	1) Forced air warming (Bair Hugger) + warmed IV fluids (active warming device); duration: 90 min; set to 'medium'- 37°C; n=7 2) Cloth blanket + warmed IV fluids usual care; duration: not stated; n=7 3) Bair Hugger (lower body); below t10; n=7

C6: PRE AND INTRA OPERATIVE WARMING DEVICES

Study	*Participants*	*Interventions*
Bock 1998 Trial held in Germany ; Funding: not stated	Exclusion: patients undergoing surgery of biliary tract, liver, pancreatic, gasterctomy, or those who underwent preoperative radiotherapy or from recurrent rectal cancer; patients with temperature <36.5 or >37.5°C on arrival in preoperative holding area Perioperative phase: pre and intra; surgery type: not stated; surgical speciality: abdominal; surgery duration: over 3 h; anaesthesia type: General; anaesthesia duration more than 1h; premed: midazolam(7.5mg) 10min before arrival in holding area; all patients ASA grade: mixed; Age (range): 46(19-78 years); gender (m/f): 21: 19; BMI: Not stated comorbidities: not stated; fluids-warmed; gas flow at 3l/min;ambient room temperature: 22°C during preinduction and anaesthesia; included: ASA 1-iii undergoing major abdominal surgery for cancer or inflammatory bowel disease; no patients showed signs of bowel obstruction or acute onset of ibd	1) Warm touch (mallinckrodt medical gmbh) and (circulating water mattress and blankets and fluid warming devices (active patients and active fluids); duration: not stated; 40-42°C; water mattress: 39°C; intervention. Body area covered: arms and chest using forced air; abdomen and legs-blankets; proportion covered ≥ 50%; treated; n=20 2) Circulating water mattress and blankets and fluid warming devices (active patients and active fluids); duration: not stated; water mattress: 39°C ontrol body area covered: abdomen and legs/two blankets; arms and chest covered with blankets; proportion covered ≥ 50% treated; n=20

Study	*Participants*	*Interventions*
Buggy 1994 Trial held in Ireland; Funding: not stated	Inclusion: surgery: orthopaedic and plastic surgery on the limbs Exclusion: patients <14 years or >80 year, with p yearsexial illness, those who required mechanical ventilation or who required intraoperativeerative blood transfusions Perioperative phase: pre and intra; surgery type: elective; surgical speciality: mixed;: mixed; surgery duration: 30 to 60 min; anaesthesia type: general; anaesthesia duration 30 to 60 min; premed: all patients-oral temazepam or diazepam 10 mg; ASA grade: I-II Age (range): 35 (14-79 years); gender (m/f): 48: 20; BMI: not stated Comorbidities: not stated; theatre temperature 21-22°C; no patients received IV fluids;humidity-59-61%; air flow maintained constant; closed circle breathing system (drager, narkomed) fresh gas glow 1) 5 l/min; active humidification not used.	1) Space blanket (un320) placed next to the cotton gown and inside all surgical drapes. (thermal insulation); duration: from before induction to transfer to recovery room; amount; intervention body area covered: at least 60%; proportion covered ≥ 50% treated; n=34 2) Standard surgical draping (similar to intervention) usual care; control body area covered; proportion covered; n=34

Study	*Participants*	*Interventions*
Horn 2002 Trial held in USA; Funding: not stated	Inclusion: Cesarean delivery. Indication for caesarean including prior caesarean and breech; none were in labour Exclusion: <18 years, diagnosis of preeclampsia or eclampsia, history or clinical evidence of a clotting disorder. Patients taking any chronic medications (except patients perinatal vitamins) Perioperative phase: pre and intra; surgery type: elective; surgical speciality: gynaecology;: grade 2; surgery duration: 30 to 60 min; anaesthesia type: regional; anaesthesia duration: not stated; premed: oral ranitidine (150mg) 2h before surgery; ASA grade: not stated Age (range): 32; gender (m/f): 0: 30; BMI: not stated comorbidities: not stated; intraoperative ambient temperature maintained near 24°C; fluids warmed to 37°C ; patients fasted for at least 6 hours; surgery started 81min v 89 min after induction for the actively warmed and usual care group, respectively.	1) Bair Hugger forced-air cover (Augustine Medical) (active warming device); duration: 15 min; 43°C; intervention body area covered: 'upper body'; proportion covered not stated; n=15 2) Single cotton blanket usual care; control body area covered; proportion covered: not stated; n=15

Study	*Participants*	*Interventions*
Smith 2007 Trial held in USAFunding: metro-Health medical center, Smiths medical asd inc (formerly sims)	Inclusion: gynaecological, orthopaedic, urological, general surgery scheduled >30mins Exclusion: <18/>85 years; abnormal bleeding; malignant Hyperthermia (or fh); pre-operationtemperature >38/<35 c, chemo/major srugery last 3 mo; immuno-suppressed/steroids last 2 wk; cold agglutinins/vasospasm; pregnancy Perioperative phase: pre and intra; surgery type: elective; surgical speciality: mixed surgery Duration: 30 to 60 min; anaesthesia type: general; anaesthesia duration more than 1h; premed: midazolam; some patients ASA grade: mixed Age (range): 40 and/-13 years; gender (m/f): 98: 238; BMI: not stated comorbidities: not stated; 6 patients in each group had diabetes; 67 and 72 were smokers; ambient temperature 21°C; temperature measures; sublingually pre-operation and postoperatively and oesophageal or nasopharyngeal intra-operatively	1) Snuggle warm convective warming system, sims, irvine, ca and warmed IV fluids (active warming device); duration: aim for 30 mins; actually 42 and/-38 min pre- and intra-op; 40 and/-1 degree c; intervention body area covered: 40%; proportion covered; n=156 2) Convective air warming and/or warmed IV fluids at discretion of anaesthetist usual care; duration: not stated; control body area covered:; proportion covered: not stated; n=180

Study	*Participants*	*Interventions*
Wong 1997 Trial held in UKFunding: not stated	Inclusion: major open abdominal surgery requiring bowel resection, with or without anastomosis; 69% had abdominal surgery for colorectal surgery, 15% inflammatory bowel disease, diverticular disease (7%), gastric carcinoma (3%), benign colonic tumour (2%) and other (5%) Perioperative phase: pre and intra; surgery type: not stated; surgical speciality: abdominal;: unclear; surgery duration: over 3 h; anaesthesia type: general; anaesthesia duration not stated; premed: not stated; ASA grade: mixed Age (range): 61 years; gender (m/f): 53: 50; BMI: not stated Comorbidities: not stated; inc contd: with a similar proportion of benign and malignant diseases between the 2 groups Exclusion: laparoscopic procedures, use of corticosteroids or other immunosuppressive drugs (including cancer chemotherapy) 4weeks before surgery, recent history of fever, infection or both	1) Warming mattress (inditherm) (pre and intra) and forced air warming (Bair Hugger) and warmed fluids[intra only (active patients and active patients); duration: 2 hr(pre and intra); warming mattress: 40°C; forced air warming: 40°C; Intervention body area covered: patients placed on mattress; length not stated; proportion covered not atated; n=47 2) Usual care (pre and intra) and forced air warming (Bair Hugger) and warmed fluids [intra only] (active patients and active fluids); duration: n/r; FAW: 40°C ontrol body area covered: patients placed on warming mattress but not turned; proportion covered not stated; n=56

Study	*Participants*	*Interventions*
Wongorasartsuk 1998 Trial held in Australia; Funding: not stated	Exclusion: patients of ASA ≥ IV; <18 or >75 years; inter-current febrile illness, temperature >38°C on arrival in or, active thyroid disease, allergy to anaesthetic agents to be used or documented history of family history of malignant Hyperthermia and emergency surgery Perioperative phase: pre and intra; surgery type: elective; surgical speciality: orthopaedics;: grade 2; Surgery duration: 1 to 3 h; anaesthesia type: general; anaesthesia duration not stated; premed: not stated; all patients ASA grade: mixed Age (range): 50; gender (m/f): 14: 12; BMI: not stated; comorbidities: not stated; in both groups, after upper body blanket prep, rest of the body covered by 2 layers of cotton blankets prior to surgery; all IV fluids warmed via a warming coil; or temperature: 18-19°C; at end of surgery, no additional warming	1) Forced air warming (Bair Hugger) (active warming device); duration: 30 min; not stated; intervention body area covered: upper body and limbs; proportion covered <50% treated; n=14 2) Two cotton blankets usual care; duration: 30 min; control body area covered: upper body and limbs; proportion covered <50% treated; n=12

C7: ADVERSE EFFECTS OF WARMING DEVICES

a) -1- Observational retrospective insurance study

Study	*Population definition*	*Adverse effect & source*	*N (source)*	*Material*	*N (%)*	*Affected areas*	*Results*
Cheney 1994, USA	Patients with closed claims from the ASA closed claims project of adverse anaesthetic outcomes collected from a database of files of professional liability insurance carriers for which 89% of the adverse events°C curred between 1977 and 1987. Excluded patients with dental damage						
	Group I	Burns from heated materials: in a warming oven, used for generalised or local warming	20 (of 3,000 claims)	IV bags or bottles hot packs and compresses	18 (64) 2 (7)	Axilla or extremities	The major source of claims of burns were due to warming devices such as IV bags & plastic bottles warmed in a operating room warming oven recommended the prevention and treatment of hypothermia or application of localised heat should be conducted with devices of proven efficacy with specific design for the safe transfer of heat
	Group II	Burns from warming equipment: electrically powered equipment to treat hypothermia or localised heat	*8 (of 3,000 claims)	Circulating water blanket *warming light heated humidifier heating pad	5 (18) *1 (4) 1 (4) 1 (4)	Axilla or extremities	

*Includes a 2-day old infant; ASA: american society of anaesthesiologists; IV: intravenous

a) -2- Observational retrospective insurance study –update–

Study	*Population definition*	*Adverse effect & source*	*N (source)*	*Material*	*N*	*Affected areas*	*Results*
Kressin 2004, USA	Group I	Burns from heated materials	33 (of 3,449 claims)	IV bags or bottles	33	Axilla or trunk in 15 subjects	9 of the 145 burns caused permanent or disabling injuries; 82% of the burns by warming devices and 80% of the burns by heated materials (iv bags or bottles) were paid; cautery burns had the largest payments and burns due to non warming devices were the least paid
	Group II	Burns from warming devices: electrically powered equipment	31 (of 3,449 claims)	Heating blankets heating pads warming lights heated humidifier hot compresses	16 10 3 4	Buttocks, thighs, legs and feet in 16 subjects	

b) RCT studies

Study	*Groups*	*Population definition*	*Anaesthesia*	*Body areas & warming time*	*Adverse effect*	*Results*
Ng 2006, China	Group i; n=30: forced-air warming blanket with Bair Hugger (Augustine Medical model 500/or) - set at 43°C - group ii; n=30: electric heating pad blanket with operatherm 2002 - set at 39°C -	Adult ASA I-III patients for elective total knee replacement; mean age: 67.3 (9.1sd). Excluded pregnancy, head injury, core temperature ≥37.5°C & contra-indication of neuraxial blockade.	Combined spinal-epidural	Anterior chest, Both arms intraoperatively; pad on operating table	None	Only one slight difference in the mean rectal temperature between the two groups. The forced-air warming group temperature dropped from 36.8 (0.4sd)°Cto 36.6°C and the heating pad group temperature dropped from 36.9(0.4sd)°Cto 36.8°C. Speculations on potential sources of bacterial contamination with single & after re-use of FAW device on other patient(s). Recommended active warming with electric heating pad should be considered as alternative to forced-air warming intra-operatively.
Camus 1997, France	Group i: electric over blanket (electroconcept models cb2 & cb3) with single layer of cotton sheeting interposed between skin & blankets to prevent staining - set at 40°C - group ii: FAW usual case control group with no precaution for hypothermia prevention; unless tc <35°C, forced-air lower body blanket Bair Hugger (model 500e) used to prevent profound hypothermia - set to 43°C -	Adult ASA I-III patients undergoing non-haemorrhagic abdominal surgery	General	All available skin surface; over legs up to pubis (cb2) over head, trunk and arms (cb3) intraoperatively	None	In the electric blanket group, tc decreased only by 0.3 (0.2sd)°Cwhile tc decreased by 1.5 (0.1 sd)°Cin the control group. Conclusion: cutaneous warming with electric blankets is efficient in preventing intraoperative hypothermia during prolonged surgery. Electric blankets rather than forced-air warming may reduce the cost of intraoperative warming. Cost of disposable air blankets is higher than the labour cost of cleaning electric blankets.

Tc: core temperature; FAW: forced-air warming; ASA: american society of anaesthesiologists

c) Case reports and case series using FAW

Study	*Population definition*	*Anaesthesia*	*Adverse effect*	*Warming system*	*Results*
Zuokumor 2004, USA	79 years old male patient undergoing right total hip replacement	General	Mixed partial & full thickness burn (2% surface) needing debridement & skin grafting	Preoperative FAW (Bair Hugger) blanket for upper body, under the dependent axilla at 37°C; axillary roll with fluid warmer crystalloid bag wrapped with cotton towel from warming cabinet at 37°C	Burn possibly due to position of axillary roll & upper body forced air-warming blanket device exacerbating its temperature; patient's weight pressure on hypothermic & vasoconstricted skin over time may have contributed to heat skin's transfer. Presented severe pain posterior and inferior to left axilla to correct the situation, rolled cotton blankets with or without a litre bag of fluid at room temperature are employed now and operating room staff have been informed not to use warmed fluid bags from warming cabinet as bolsters

Study	*Population definition*	*Anaesthesia*	*Adverse effect*	*Warming system*	*Results*
Hemmerling 2002, Canada	10 consecutive male patients with age range from 51 to 73 & with epidural thoracic catheter inserted at t4 level upon arrival in the operating room & scheduled for ultra-track anaesthesia & had immediate extubation in the operating room	Regional	Risk of bis signal alteration & bis misinterpretation possibly due to concomitant use of FAW	Intraoperative FAW (Bair Hugger) blanket for head and lower body with active temperature control; room temp set to 24°C	With the concomitant use of upper-body Bair Hugger warming blankets there was no sign of artifact recognition and: -5 patients had a false increase in bis values (>70 & >90) while -5 other patients using the same FAW method showed adequately low bis values that did not change when air flow stopped Active temperature control continued with FAW therapy while monitoring bis indexes were checked intermittently by interrupting forced-air flow; bis values decreased immediately to 35-55 & increased again to >70 with forced-air flow back Recommended additional caution in interpretation of bis readings whenever the monitor sensor is in close proximity to a FAW therapy blanket. Temporary interruption of warm air flow may ascertain bis readings.

Study	*Population definition*	*Anaesthesia*	*Adverse effect*	*Warming system*	*Results*
Guignard 2000, France	58 years old female for left partial hepatectomy	General	Risk of bis signal alteration & misinterpretation in bis values: possible causes: air circulation due to vibration of head wires formed artifact not visible on the raw electroencephalographic trace. FAW blanket turned on simultaneously with the incision lay directly on the skin with warm air blowing on the forehead electrodes.	Intraoperative FAW (Bair Hugger) for upper body	When FAW was on, the bis increased; when FAW was on but disconnected from the blanket, bis returned to vales of <60; turning off heating unit decreased bis to ≈60 new medical devices may interfere with bis monitoring in the operating room; knowledge of potential interference from forced-air warming systems must be taken into account when interpreting bis

Study	*Population definition*	*Anaesthesia*	*Adverse effect*	*Warming system*	*Results*
Frolich 2001, USA	57 years old female patient undergoing open reduction and internal fixation of a right tibia stress fracture with remote history of asthma & reflex sympathetic dystrophy or right lower extremity	General	Increased systemic fentanyl levels & opioid overdose symptoms when transdermal fentanyl patch exposed to heat during treatment with warming blanket	Intraoperative FAW blanket for upper body	Patient's tc with lower skin temperature decreased due to increase in cutaneous perfusion resulting from systemic absorption of fentanyl from the intracutaneous fentanyl depot leading to fentanyl plasma concentration recommended close perioperative monitoring of patients medicated with fts
Ayala and Coe 1997, UK	61 years old male patient for left ilio-femoral arterial grafting and classified as ASA III due to peripheral vascular disease limiting his exercise tolerance	General	FAW set at 43°C gave a threat of tube obstruction & potential damage to the patient's lungs	Intra- and postoperative erative FAW (Bair Hugger) with unit (500e model) intubation of uncut polyvinyl chloride tube; torso attachment of Bair Hugger attached to patient	Increase of ventilator's peak inflation pressures leading to thermal softening of a tracheal uncut polyvinyl chloride tube resulting in distortion & movement of tracheal tube from its original vertical position problem correct by cutting tube to 22 cm leaving nothing outside mouth and temperature beside bent tube with warm air system working was 40°C recommended not to use uncut pvc when Bair Hugger patient warming system is used; if used, it must be supported adequately; high and low thresholds of pressure sensitive ventilator alarms must be set close to peak inflation pressure to give immediate warning of any obstruction

Study	*Population definition*	*Anaesthesia*	*Adverse effect*	*Warming system*	*Results*
No authors listed, 1990 Augustine medical service department	1 male postoperative patient in theICU 1 male patient with severe vascular disease	No information provided	Burns in legs and knees, caused by placing the wrong side, i.e. The top layer –plastic side- of the blanket in contact with the patient's skin. Large blistered area due to incorrect use of blanket; patient's left leg covered with a blanket for 1.5 hr with the device operating at its maximum temperature.	Intra and postoperative erative FAW Bair Hugger for lower extremities	Maximum temperature is not safe in all circumstances, even when the device is used correctly Direct contact of patient's skin with plastic heated to 120°f can cause thermal injury extent will depend on the length of time left in contact with patient's skin Use of FAW devices according to the manufacturer's directions and instructions
Marders 2002	1 hypothermic surgical patient; gender not reported 1 intraoperative surgical patient; gender not reported	No information provided	Second and third degree burns to lower extremities Severe muscle necrosis and further above-the-knee amputation	Intra-operative FAW Bair Hugger for legs and knees	Report of adverse events involving medical devices has been encouraged by the fda in order to accurately identify problems with the devices and desirable patient outcomes

d) Case reports using other warming systems

Study	*Population definition*	*Anaesthesia*	*Adverse effect*	*Warming system*	*Results*
Batistich 2006, UK	80 years old male patient undergoing right hephrectomy with a history of hypertension & hypercholesterolemia, treated with statin, atenolol & bendrofluazide. No history of skin conditions or previous photosintisation secondary to statin use	General	Partial thickness burn with blistering which required IV morphine postoperatively for analgesia	Intra- and postoperative erative radiant heat system (suntouch pw820) for right forearm at skin sensor as skin temperature approaches 41°C;used a padded arm gutter	Device inspected and observed that it was possible to place the arm close to heating grill without tripping the alarm; skin and oesophageal temperatures were normal but the arm was within the radiant field but not breaking the ultrasonic sensor beam leading to fast increase in of arm skin temperature recommended that suntouch warmer is used with caution in patients in the lateral position and skin sensor placed on the area of the body closest to warmer; safety of the device could improve by widening ultrasonic field to include the whole of radiant field less than 40 cm from heater element
Husser 2004, USA	42 years old male patient with chondrosarcoma of the left pelvis to undergo elective left internal hemipelvectomy	General	Risk of haemodynamic damage possibly due to overheating of the toroid heating element during massive rapid infusion/transfusion of crystalloid, packed erythrocytes and platelets.	Intraoperative fluid warming device (belmont fms 2000) for rapid inductive warming of intravenous fluids	A portion of the heat exchanger became very hot and a portion of the housing softened and distortion of toroid element potential physiological damage from thermally lysed or degranulated leUK°C ytes; transfused blood may have been exposed to non-physiological extreme temperatures (≥100°C) resulting in patient injury

Study	*Population definition*	*Anaesthesia*	*Adverse effect*	*Warming system*	*Results*
Gali 2003, USA	67 years old male patient with end-stage liver disease secondary to primary billiary cirrhosis to undergo liver transplantation with history of muscle wasting and poor nutritional status	General	Skin injury by second degree burns	Pre- and intra-operative water garment (thermowrap MTREadvance technologies ltd) for legs, thoracic & sacral areas until 36.3°C was reached by end of surgery; temperature regulated to measure oesophageal, rectal & skin temperatures	Difficult to discern the reasons for the burn but possibly due to pressure and heat or a combination of these and the patient's risk factors (age, poor nutritional status, low serum albumin level and prolonged surgery). Authors recommended that clinicians should consider circulating water garments to be a potential risk for prolonged surgeries.

Study	*population definition*	*Anaesthesia*	*Adverse effect*	*Warming system*	*Results*
Zukowski 1998, USA	54 years old female african-american patient who underwent a right modified radical mastectomy with immediate pedicled tram flat reconstruction for an infiltrating ductal carcinoma of the breast	Na	Second degree skin blisters on the superior mastectomy flap & part of the tram skin flap	Postoperative radiant heat (emerson warming light) device placed at a distance >71 cm from patient's bed & on first postoperative day; during patient care warming light against the bed rail at 32 cm from patient	Local burn care over the postoperative course, partial flap loss to the burn region & patient subsequently managed conservatively with local wound care and granulation of defect a biological model created to simulate a sympathectomised flap and temperature curves generated by the device it was determined that nursing staff had inadvertently pushed the light against the bed during patient care manoeuvres since the only access to patient was from the side lamp of the bed recommended education of clinicians on the importance of proper patient positioning in the postoperative period, both on the ward and in the recovery room when this therapy is used

e) Experimental studies - risk of infection

Study	*Case population*	*Method*	*Control*	*Results*
Avidan 1997, UK	FAW Bair Huggers Augustine Medical and one warm touch mallinckrodt medical - operating theatre temp between 21-23°C - humidity between 61-67 %	Vascular operating theatre daily cleaned chosen for the site of experiments investigators wore full operating theatre clothes, sterile gloves & remained at 1m from equipment for experiments' duration agar plates placed on sterile towels on operating tables	As specified in each group	Potential source of nosocomial infection; filters may not prevent colonisation in the machines distal to the filters; microbial pathogens detectable in 50% or warming devices & no longer detected with the use of recommended blankets; with the use of blankets, n°Contamination of sampled air was detected; organisms detected are potentially pathogenic in immunocompromised patients & in presence of prosthetic devices recommended that forced air warmers should only be used when attached to perforated blankets; microbial filters should be changed as the manufacturer specifies; detachable hoses are sterilised regularly; hoses get incorporated into the design of the warmer to reduce contamination
	Experiment 1: microbes present in the air stream of warmers - 9 intraoperative Bair Huggers Augustine Medical - 1 intraoperative warm touch mallinckrodt medical	Placed sequentially on standard place on floor & nozzle of the hose suspended from infusion stand 40 cm above two agar plates; turned on to blow air at 43°C over the plates for 5 min with a break of 5 min between each machine	2 control plates placed at beginning and end of experiments with no warmer blowing	Growth of aspergillums fumigatus on both control plates growth of organisms on plates from 40% of warmers cultured organisms include staphylococcus xylosus, s. Epidermidis, corynebacterium spp and cryptococcus albidus; a. Fumigatus from two of test plates

Study	Case population	Method	Control	Results
Avidan 1997, UK … continuation				
	Experiment 2: perforated blankets to reduce contamination - 2 intraoperative warmers with early growth on agar plates	Attached to infusion stands set to blow air at 43°C through perforated blankets elevated over agar plates for 30 min warmed air blown directly onto agar plates as done in experiment 1	1 control plate placed under a blanket for 30 min without air blowing	No growth of organisms on control plates growth of organisms (s. Epidermidis and corynebacterium spp) in agar plates directly placed in the stream of warmers no growth of organisms in agar plates with warm air blown on them through perforated blankets
	Experiment 3: localised colonisation - 3 intraoperative warmers with growth of organisms on agar plates	Swabbed from both sides of the internal microbial filter and from inside of hose at its proximal (warmer) and distal (patient) ends	___	Growth of organisms (staphylococcus aureus, s. Epidermidis, a. Fumigatus, aspergillums niger, bacillus spp) at the outer surfaces of the filters from the three warmers no growth of organisms on the swabs from inner surfaces growth of corynebacterium spp, bacillus spp and a fumigatus at the proximal hose swabs growth of s. Epidermidis, corynebacterium spp and a fumigatus at distal hose swab
	Experiment 4: reduction of the contamination from the air stream - same 3 intraoperative warmers with growth of organisms on agar plates -	Set to blow onto agar plates for 5 min with and without microbial filters fitted to the distal ends (nozzles) of their hoses. Filters used dar hygrabac filters for breathing systems serving as bacterial and viral filters	___	Growth of acinetobacter lwoffi and s. Epidermidis no growth of organisms when microbial filters were fitted to nozzles of same warmers

Study	*Case population*	*Method*	*Control*	*Results*
Baker 2002, UK	Warmair warming unit model 133a (cincinnati sub-zero) -	Surgical procedures in ultra clean orthopaedic theatre chosen as site of experiments & disposable porous blanket placed over patient swabs from both interior & exterior of machine & from distal end of hose	___	Heavy growth of bacteria detected in all samples both from direct plates & enrichment broths: coagulase-negative staphylococci, micrococcus spp., bacillus spp., streptococcus oralis growth of colonies of organisms in air sampled from stream blown through the hose of the warmer: coagulasae-negative staphylococci, bacillus spp., and micrococcus spp. Recommended the intraoperative use of machines based on thorough risk-benefit assessments, sealed and fitted with appropriate microbial filters -changed according to manufactures instructions- and use of blankets recommended by manufacturers; to ensure that blankets are properly sealed to patient's skin to prevent air contamination of the operative field and that machines on loan under blanket purchase contracts should be serviced & upgraded as improved models become available

Study	*Case population*	*Method*	*Control*	*Results*
Sigg 1999, USA	18 intraoperative Bair Huggers coverlets Augustine Medical inc.: - 8 full body from post-anaesthetic abdominal surgery; 1 full body from intensive coronary artery bypass grafting surgery - 7 upper body from intraoperative orthopaedic, abdominal & gynaecological surgeries; 2 lower body from intraoperative kidney surgery	Experiments performed in operating rooms, post anaesthetic care unit & intensive care unit. Coverlets removed after use samples of 1x2cm pieces from the underside of coverlets removed from: sternum, abdomen & right of foot sample of full body coverlets; centre top, middle & right of foot sample of lower body coverlets; & sternum, right and left arm of upper body coverlets all coverlet samples inserted in a sterile container & analysed for bacterial contamination; cultured plates incubated at 35°C under aerobic conditions for 48 h	Samples from 10 new full body coverlets, removed immediately from manufacturer's non-sterile packaging and processed in same way as patient group samples	The presence of a single bacterial colony in any of the cultures was considered a positive reaction -contamination identified in control samples prior to clinical use in 30% of coverlets & 3 out of 10 sites; no. Of colonies did not exceed two & manufacturer's packaging are sold as non-sterile -contamination identified in 61% of the coverlets from cases samples & 17 out of 54 sites; 33% of the 18 coverlets exceeded 2 colonies -statistically significant difference (p=0.05) between contaminated sites in the control (10%) compared to patient (31.5%) group -bacteria found: coagulasae-negative staphylococci, alpha haemolytic streptococci, bacillus spp., micrococcus spp., gram-negative bacilli, corynebacterium spp., neisseria spp., enterococcus group d -average time of coverlets on patients: 170 min (range:35-405 min) but n°Correlation between contamination and length of application -no significant difference of contamination per site comparing intraoperative versus postoperative patient coverlets reuse of convective air coverlets not recommended

Study	*Case population*	*Method*	*Control*	*Results*
Tumia 2002, UK	Samples for four tests performed during surgery: 3 hip replacement, 1 shoulder surgery: -pre-warmer on: patients/table in operating airflow system zone with forced-air convection warmer applied but switched-off & patients draped for operation -warmer on: 15 min after the warmer was switched on -direct: from air blower by connecting hose to air-sampling device	Ultra-clean cone of air ventilation systems howarth ex flow 90; perforated blanket applied to patients as manufacturer's recommendations experiments performed in two orthopaedic theatres with ultra-clean cone of air ventilation systems; quality of air tested routinely; patients for orthopaedic, elective or emergency operation tests where patients were present theatre staff entered as part of routine operation list blood agar plates incubated at 37°C for 48hr; samples taken after airflow running for at least 1 hr; bacterial counts calculated for each sample (cfu/m3)	Samples for the two tests in empty theatre before surgery start; with no preceding surgery or theatre staff present perforated blanket applied to operative table	Direct sampling from air blower grew 0.53cfu/$m^{3;}$ using the warming switched off, there was no rise of colony forming units patient tests showed a non significant (p=0.88) rise in the number of colony forming units between the empty theatre & warmer off & a further rise in the number of colonies between warmer off and warmer on (p=0.48); there was a difference between control samples and warmer on in the empty theatre and patient tests but numbers were too small to enable significance statistical assessment concerns that normal air flow could be disrupted and organisms shed from patient's skin due to warm airglow over it; differences between control values of in-use theatre and empty theatre groups are likely to be due to the movement of theatre staff; the greatest effect on the number of colony forming units appeared to be the movement and presence of patient and theatre staff in the theatre

Study	*Case population*	*Method*	*Control*	*Results*
Zink 1993, USA	Two groups of randomly divided subjects were created: - control-therapy: convective cover in place but not inflated for the first 2 hr period with blowers operational setting for the latter 2 hr period - therapy-control: convective cover in place initially on for the first 2 hr period with blowers operational setting off the latter 2 hr period Operational on the medium =airglow of 10.7 m3/min at a temperature of 383°C	8 healthy male volunteers aged 20-25 years, free of any cutaneous or systemic disease and not taking antibiotics within a month before the study; lower body and legs covered with an operating room convection warming system and skin was not surgically prepared or disinfected in any way wearing briefs and surgical masks throughout the study 3 different types of bacterial culture plates fastened to abdomen with double sided tape at the start of each trial period; making 6 for each subject including the control plates plates cultured at 35°C for 48 hr	Each subject served as his own control with control bacterial plates placed as explained in previous column	No significant difference in total no. Of bacterial colonies isolated on culture plates between the tow study periods Coagulase (-) staphylococcus was the most common bacteria detected which is commonly associated with aerolised contamination and leading cause of postoperative wound infections: the control group had more colonies than the study group No signs of the staphylococcus aureus, the worst pathogens for serious wound contamination and infection Temperature of the exposed skin of the abdomen in the region of culture dish placement was not significantly different between groups Thigh skin temperatures were higher during warming; average tympanic membrane temperatures in the control therapy group increased initially and then rose slightly during warming and temperature for the other group decreased slightly during warming and control

f) Prospective study - risk of infection –

Study	*Groups*	*Warming system, sample & method*	*Sites*	*Colonies M (range)*		*Results*
				Operation start	*Operation end*	
Huang 2003, UK	12 male and 4 female; mean age 72.5 (60 to 86); mean duration of warming blanket use: 234 min (range 180 to 270 min); patients undergoing aortic surgery with prosthetic graft insertion were prospectively studied and vascular surgery was performed in standard positive pressure theatre	Intraoperative FAW Bair Hugger for upper body Air samples: taken from theatre atmosphere (3), around the axillae (2), where the exhaust air emerged Swab specimens: taken from warming unit and hose and from the wound edges from abdomen site Two readings: one taken at the start of operation when the warming blanket was first applied and second taken at the end of the operation. Nine staff circulating in the operating theatre. All patients had three doses of intravenous antibiotics perioperatively. Bacterial colonies were compared from each site, at start and end of operation	Operating room air: theatre atmosphere -3- Exhaust -2- Hose filter -1- Wound -1-	112.9 (82 to 296) 31.6 (22 to 90) 0 0	71.7 (62 to 162) 28.6 (15 to 86) 0 0	Operating theatre specimens decreased in colony counts at the end of surgery, mean reduction: 36.4%. Exhaust air colony counts decreased at the end of surgery and reduction size was 9.5% (mean) Specimens from air samples from the theatre atmosphere and from the axillae had a negative rank difference which indicates a significant decrease in colony counts at end of surgery None of the patients developed postoperative wound or prosthetic infections during a 6 month follow-up period

C8: INTRAOPERATIVE PHASE: FLUID WARMING

Study	*Participants*	*Interventions*
Camus 1996 Trial held in France Funding: not stated	Inclusion & exclusion criteria: i: major abdominal surgery lasting at least 3 hours; none of the pateients were obese, ebrile or had a history o fendocrine disease. perioperative phase: intrafluids Surgery type: elective; surgical speciality: abdominal; surgery duration: 1 to 3 h Anaesthesia type: general; anaesthesia duration more than 1h; premed: hydroxyzine 100 mg orally 1 h prior to surgery; no. Of intubated/ventilated patients postoperative eratively: not stated - ASA grade: I-II; age (range): 45; gender (m/f): 9:9; BMI: not stated comorbidities: not stated; inspired gases not warmed;IV fluids infused at a rate of 8-10 ml/kglh thru an 18g cannula; all pts warmed with electric blanket in PACU until temp reached preinduction values; intubation of trachea pancuronium(0.1mg/kg); most pts in lithotomy position;	1) fluid tube-warming (hotline; level 1) + electric blanket (40°C) (electroconcept) (active pt + active fl); duration:; 37°C; n=9 2) room temp IV fluids + electric blanket (electroconcept) (40oc)s (active pt + active fl); duration:; amount; n=9

Study	*Participants*	*Interventions*
Cooper 1994 Trial held in Australia Funding: not stated	Inclusion & exclusion criteria: incl: routine hysteroscopic surgery for menorrhagia; Perioperative phase: intrafluids Surgery type: not stated; surgical speciality: gynaecology; surgery duration: not stated Anaesthesia type: not stated/unclear; anaesthesia duration not stated; premed: majority received danazol 200mg 3x daily for 6 weeks as an endometrial prep agent; no. Of intubated/ventilated patients postoperative eratively: not stated - ASA grade: not stated; age (range): 40 years(31-49); gender (m/f): 0:14; BMI: not stated comorbidities: not stated; uterine cavity length: 6v9cm; 9 pts:total transcervical resection of the endometrium, of whom 3 had simultaneous hysteroscopic polypectomy; 4 pts underwent rollerball ablation of the endometrium; 1 pt had extensive myoma resected;	1) Sterile 1.5% glycine (althin ift 220, althin medical ab) (active fl); duration:; 37.5°C; n=not stated 2) Usual care; duration:; 20 °C; n=not stated
Dyer 1986 Trial held in Australia Funding: not stated	Inclusion & exclusion criteria: i: transurethral resection of prostate under spinal anaesthesia perioperative phase: intrafluids Surgery type: not stated; surgical speciality: urology; surgery duration: over 3 h Anaesthesia type: regional; anaesthesia duration not stated; premed: not stated; no. Of intubated/ventilated patients postoperative eratively: not stated - ASA grade: not stated; age (range): 69 years; gender (m/f): 100:0; BMI: not stated comorbidities: not stated; theatre temp:20.7-21.3; resection time: w:29.2min(sd15.7)vs c:32.4(sd15.4);	1) 1.5% glycine warmed in contherm 150 incubator set (passive fl); duration:; 37oc (temperature fell rapidly; mean: 33°C); n=22 2) Usual care; n=25 3) Reflective blanket 4) Reflective blanket + warmed irrigation fluid

Study	*Participants*	*Interventions*
Ellis-stoll 1996 Trial held in USA Funding: not stated	Inclusion & exclusion criteria: i:women scheduled for laparoscopic cholecystectomy perioperative phase: all phases Surgery type: not stated; surgical speciality: abdominal; surgery duration: mixed Anaesthesia type: not stated/unclear; anaesthesia duration not stated; premed: not stated; no. Of intubated/ventilated patients postoperative eratively: not stated - ASA grade: not stated; age (range): 43years(26 to 64); gender (m/f): 0:50; BMI: not stated comorbidities: not stated; study did not state how many patients randomised to each group- assuming equal randomisation;all patients upper chest and arms covered with prewarmed blanket; none of the prewarmed IV fluid bag's initial temp exceed 44°C	1) Actively warmed IV fluids (active fl); duration:; 37°C; n=25 2) (room temp IV fl); duration:; temperature dropped to rt during surgery; n=25

Study	*Participants*	*Interventions*
Hasankhani 2005 Trial held in Iran Funding: not stated	Inclusion & exclusion criteria: excl: age: <18 or >55 preoperative use of ca channel blockers, preoperative sublingual temp >38.°C or <35.5°C; history of endocrine disease, obesity, pregnancy,or anaemia. perioperative phase: intrafluids Surgery type: elective; surgical speciality: orthopaedics; surgery duration: 1 to 3 h Anaesthesia type: general; anaesthesia duration more than 1h; premed: atropine (0.2-0.4mg); no. Of intubated/ventilated patients postoperative eratively: not stated - ASA grade: I-II; age (range): 36 years(18-55); gender (m/f): 39:21; BMI: not stated comorbidities: not stated; during surgery all pts covered by cotton blankets &surgical drapes & covered w/cotton blanket before transport to PACU;or temp:24°Cinspired gases not warmed.;p.9-set pt temp of fluid warmer to warming IV fluids: 39.5°C at 800cc/h;asa i only;	1) Warmed IV fluids via a dry fluid warmer (biegler) (active fl); duration: not stated; tbag:24;tprox:36-38°C;tdistal:32-38°C; n=30 2) Room temp IV fluids usual care; duration: not stated; 24.4°C n=30
Heathcote 1986 Trial held in Australia Funding: not stated	Inclusion & exclusion criteria: perioperative phase: intraoperative Surgery type: not stated; surgical speciality: not stated; surgery duration: not stated Anaesthesia type: regional; anaesthesia duration: not stated; premed:; no. Of intubated/ventilated patients postoperative eratively: not stated ASA grade: not stated; age (range):; gender (m/f):; BMI: comorbidities: not stated; Concurrent treatments, ward temperature, irrigation fluid, IV fluid,humidity, air flow	1) 1.5% glycine warmed in contherm 150 incubator set (passive fl); duration:; 37°C(mean 33°C); n=19 2) Usual care; duration:; amount; n=21

Study	*Participants*	*Interventions*
Jaffe 2001 Trial held in USA Funding: not stated	Inclusion & exclusion criteria: incl and excl criteria not stated perioperative phase: intrafluids Surgery type: not stated; surgical speciality: urology; surgery duration: 30 to 60 min Anaesthesia type: not stated/unclear; anaesthesia duration not stated; premed: not stated; no. Of intubated/ventilated patients postoperative eratively: not stated - ASA grade: not stated; age (range): 71.2 (52-89); gender (m/f): 56:0; BMI: not stated comorbidities: not stated; Pts from both groups were coverd with a gown and warmed blanket (45°C from neck to level of umbilicus; at end of procedure pt covered with a new warm blanket; in PACU all pts had continuous bladder irrigation with rt irrig fl; rt:21°C; none shiver	1) Warmed irrigation fluid (33°C); unclear actively or passively warmed (active fl); duration: not stated; 33°C; n=29 2) Room temp irrig fluid usual care; duration:; 21°C; n=27

Study	*Participants*	*Interventions*
Kelly 2000 Trial held in Phillipines/Cuba/USA Funding: not stated	Inclusion & exclusion criteria: i: pts undergoing knee arthroscopy; e:<18or>65years;presence of co-existing disease afecting ptsability to maintain normal core temp (i.e. Th yearsoiddisease);contraindication or unwillingess to undergo spinal anaesthesia;useantip yearset perioperative phase: intrafluids Surgery type: not stated; surgical speciality: orthopaedics; surgery duration: mixed Anaesthesia type: regional; anaesthesia duration not stated; premed: midazolam (iv) administered to all patients just before departing the preoperative holding area; no. Of intubated/ventilated patients postoperative eratively: not stated - ASA grade: I-II; age (range): 36(20-56); gender (m/f): not stated; BMI: not stated comorbidities: not stated; Mean duration of surgery:44min (18-92);all IV fluids administered at room temperature; if external warming devices were required during surgery or recovery, patient withdrawn from study; all pt covered w/single cloth sheet before application of sterile drape	1) Prewarmed salien irrigation solution in a warming cabinet (passive fl); 40°C n= 12 2) Usual care; n=12

Study	*Participants*	*Interventions*
Kurz 1996 Trial held in USA Funding: mallinckrodt anesthesiology products(equip donatio	Inclusion & exclusion criteria: icolorectal resection for cancer or ibd. Exclusion: pts scheduled for minor colon surgery,use of corticosteroids or other immunosuppressive drugs incl. Cancer chemo 4weeks before surgery;recent history of fever,infection or both; serious m perioperative phase: intrafluids Surgery type: elective; surgical speciality: not stated; surgery duration: 1 to 3 h Anaesthesia type: general; anaesthesia duration: not stated; premed: check piritramide; no. Of intubated/ventilated patients postoperative eratively: not stated - ASA grade: not stated; age (range): 60(18-80); gender (m/f): 108:92; BMI: not stated comorbidities: not stated; ibd=inflammatory bowel disease; mechanical bowel prep night before surgery;	1) Forced air cover (Augustine Medical) + warmed IV fluids (fluid warmer)-activated (active warming device); duration:; 40°C; n=104 2) Forced air cover (Augustine Medical) + warmed IV fluids (fluid warmer)- not activated (active + passive); duration:; 'ambient temp'; n=56

Study	*Participants*	*Interventions*
Monga 1996 Trial held in USA Funding: not stated	Inclusion & exclusion criteria: i:pts undergoing turp for tx of bladder outlet obstruction secondary to benign prostatic hypertrophy perioperative phase: intrafluids Surgery type: elective; surgical speciality: urology; surgery duration: not stated Anaesthesia type: general and regional; anaesthesia duration not stated; premed: not stated; no. Of intubated/ventilated patients postoperative eratively: not stated - ASA grade: not stated; age (range): 69.2; gender (m/f): 28:0; BMI: not stated comorbidities: not stated; study did not indicate how many patients randomised to each group. Assumed equal numbers randomised to the warmed (active and passive) and control group.	1) Warmed irrigation fluid (abbott level-one fluid warmer) (active fl); duration:; amount; n=not stated 2) Unwarmed fluid (rt irrigation fluid); duration:; 17°c n=not stated 3) Passively warmed fluids; 35°c n=not stated

Study	*Participants*	*Interventions*
Moore 1996 Trial held in USA Funding: not stated	Inclusion & exclusion criteria: incl: women undergoing elective operative laparoscopic procedures ranging from diagnostioc laparascopy to extensive lysis of adhesions& removal of adnexal structures; excl: pts weighing <40 or >100 kg, pregnant or undergoing perioperative phase: intrafluids Surgery type: elective; surgical speciality: gynaecology; surgery duration: 1 to 3 h Anaesthesia type: general; anaesthesia duration more than 1h; premed: midazolam (1-2mg) IV & lidocaine 40mg IV; no. Of intubated/ventilated patients postoperative eratively: not stated - ASA grade: not stated; age (range): 32; gender (m/f): 0:35; BMI: 26 kg/m^2 comorbidities: not stated; Room temp:20°Cin 6 pts surgery time was sig shorter and did not require irrig fluid; if pt's oesophageal temp dropped below 34°C, pt was rewarmed by increasing the temp setting of heating blanket & using warmed blankets & warmed IV fluids	1) lactated Ringer's solution through a pressurized fluid warming system (level 1) (active fl); duration:; 39 c; n= 13 2) ambient temp lactated Ringer's solution usual care; duration:; 20-22°C; n=16 3) Pts in both groups laid on a heating blanket (37.8°C before induction until throught the procedure;pt covered w/blankets before induction of anaesthesia on upper

Study	*Participants*	*Interventions*
Motamed 1998 Trial held in Canada Funding: not stated	Inclusion & exclusion criteria: incl:pts diagnosed w/benign or malignant tumor of colon; colonic resection. None of the pts suffered from inflammatory bowel, malnutrition, recent sigweight loss, anaemia, morbid obesity, endocrine disorders or pyrexia. perioperative phase: intrafluids Surgery type: not stated; surgical speciality: urology; surgery duration: 1 to 3 h Anaesthesia type: general and regional; anaesthesia duration not stated; premed: none administered; no. Of intubated/ventilated patients postoperative eratively: not stated - ASA grade: I-II; age (range): 62; gender (m/f): 15:15; BMI: not stated comorbidities: not stated; Humidity:between 35-42%; stated op and recovery room temperature measured and similar for both groups; in the unwarmed group, temp was allowed to decrease during surgery & recovery and no rescue measure instituted if core temp<33.5 °C; no patients had core temp<33.5 °C;	1) convective warm air blanket (mallinckrodt) + IV fluids (active pt + active pt); duration: from induction, during and after surgery; blanket: 42°C; blood warmer: 37°C; n=15 2) usual care usual care; duration:; amount; n=15

Study	*Participants*	*Interventions*
Muth 1996 Trial held in Germany Funding: not stated	Inclusion & exclusion criteria: i:asa III of either sex undergoing abdominal aortic aneurysm; perioperative phase: intrafluids Surgery type: elective; surgical speciality: abdominal; surgery duration: 1 to 3 h Anaesthesia type: general; anaesthesia duration more than 1h; premed: flunitrazepam(1-2 mg p.o); no. Of intubated/ventilated patients postoperative eratively: not stated ASA grade: III+; age (range): 64.5 years; gender (m/f): not stated; BMI: not stated comorbidities: not stated; Fresh gas flow:4l/min;all blood products prewarmed in a water bath(unitherm) at 37°C prior to transfusion; no othe rwarming devices-blankets,forced-air blowers or inspired gas heaters were used for either group.	1) IV fluids and blood products (hotline level 1) (active fl); duration:; 37°C n=25 2) IV fluids + prewarmed blood products usual care; duration:; amount; n=25

Study	*Participants*	*Interventions*
Patel 1996 Trial held in USA Funding: loan of hotline by level 1technologies	Inclusion & exclusion criteria: incl: elective ASA I-III orthopaedic or gynaecologic surg >2 hrs; excl: emergency surg, ca channel blocker therapy, preoperative hypothermia (<35.5°C), hyperthermia (temp >38°C), head injury, otitis, presence of nasogastric tub perioperative phase: intrafluids Surgery type: elective; surgical speciality: mixed; surgery duration: over 3 h Anaesthesia type: general; anaesthesia duration not stated; premed: not stated; no. Of intubated/ventilated patients postoperative eratively: not stated - ASA grade: mixed; age (range): 41; gender (m/f): 14:25; BMI: not stated comorbidities: not stated; Room temperature:20 - 21°C; fresh gas flow: 1 and 4 l/min; ventilation controlled to maintain p(et) CO_2 30 to 35 mmhg;	1) hotline fluid warmer (concurrent water heat exchange,level 1 technologies) (active fl); duration:; 35-36 °C; n= 24 2) flotem iie (dry heat exhange technology, datachem inc) (active fl); duration:; 28-38°C; n=25

Study	*Participants*	*Interventions*
Patel 1997 Trial held in USA Funding: loan of hotline by level 1technologies	Inclusion & exclusion criteria: incl: elective ASA I-III orthopaedic; n=19), gynaecological; n=15)&general (surg >2 hrs; excl: emergency surg, ca channel blocker therapy, preoperative temp(<35.5ocor >38oc), head injury, otitis, presence of nasogastric tube, perioperative phase: intrafluids Surgery type: elective; surgical speciality: mixed; surgery duration: over 3 h Anaesthesia type: general; anaesthesia duration not stated; premed: not stated; no. Of intubated/ventilated patients postoperative eratively: not stated - ASA grade: mixed; age (range): 41; gender (m/f): 14:25; BMI: not stated comorbidities: not stated; Room temperature:20 - 21°C; fresh gas flow: 1 and 4 l/min; ventilation controlled to maintain p(et) CO_2 30 to 35 mmhg; Intra: thermal insl+warmed IV fluids vs FAW Post: thermal insl vs usual care	1) Reflective blankets,head covers & leggings (thermadrape)+iv fluids[hotline fluid warmer (concurrent water heat exchange,level 1 technologies)] (active fl); duration: applied in the hold area through op and recovery. Unclear how long before induction 2) upper body convective warming (Bair Hugger, Augustine Medical)+ IV fluids (active fl); duration: after induction until end of surgery;cotton sheet; bh:43°C iv:21°C n=19

Study	*Participants*	*Interventions*
Pit 1996 Trial held in Netherlands Funding: not stated	Inclusion & exclusion criteria: incl: pts willigness to undergo spinal anaesthesia; excl criteria not stated. perioperative phase: intrafluids Surgery type: not stated; surgical speciality: urology; surgery duration: 30 to 60 min Anaesthesia type: regional; anaesthesia duration not stated; premed: not stated; no. Of intubated/ventilated patients postoperative eratively: not stated - ASA grade: not stated; age (range): 72 (59-86); gender (m/f): 59:0; BMI: not stated comorbidities: not stated; Resection time not sig diff; volume of irrig fluid not stated; IV fluid-rt during and after turp; after turp, continuous flow of irrig fluid at rt;	1) intermittent irrigation with 5% sorbitol containing chlorhexidine (fluid heater, level 1) (active fl); duration:; set at 37.5°C; never <36.8°C; n=28 2) room temperature irrigation fluid usual care; duration:; 20.6°C; n=31

Study	*Participants*	*Interventions*
Schmeid 1996 Trial held in Austria Funding: Augustine Medical; mallinckrodt donated thermocoup	Inclusion & exclusion criteria: i: pts undergoing initial, unilateral tha; none of the arthroplasties was for tx of tumour. E: pts with history of excessive bleeding, brusing, having ptt >35s, pt< 70% clot formation, fibrinogen <200 mg/dl, platelet count < 100, perioperative phase: intrafluids Surgery type: elective; surgical speciality: orthopaedics; surgery duration: 1 to 3 h Anaesthesia type: general; anaesthesia duration not stated; premed: 10 mg oral diazepam 1-2 hr before surgery; no. Of intubated/ventilated patients postoperatively all patients ASA grade: mixed; age (range): 63 (40-80); gender (m/f): 23:37; BMI: not stated comorbidities: not stated; Room temp: 21°C;blood loss replaced w/colloid, haemodilution blood, scavenged red cells & allogeneic transfusions; intraop colloid(haemodilution): 870 v 880 ml; intraop colloid (additional):217(303) v 80 (173); intraop blood(haemodilution):470vs450	1) Forced air warming (upper))+ warmed intravenous fluids (37°C (active pt + active fl); duration:; pts temp maintained near 36.5°C; FAW:high; iv-37; n= 30 2) Not stated usual care;duration:; pts temp allowed to decrease to 35°C; n=30

Study	*Participants*	*Interventions*
Smith 1998 Trial held in USA Funding: not stated	Inclusion & exclusion criteria: inc:type of surgery: laparasocpy (74%), hysterectomy(21%),cone biopsy (14%);excl: head injury, otitis, and preoperative temp >or eq 38°C or <oreq 35.5°C and pts taking ca2+ channel blockers. perioperative phase: intrafluids Surgery type: elective; surgical speciality: gynaecology; surgery duration: 30 to 60 min Anaesthesia type: general; anaesthesia duration more than 1h; premed: not stated; no. Of intubated/ventilated patients postoperative eratively: not stated - ASA grade: mixed; age (range): 33; gender (m/f): 0:38; BMI: not stated comorbidities: not stated; gas flow: 2l/min;room temp:@ 21°C;	1) Hotline (level 1) (active fl); duration: until end of surgery; then rt fluids; set point: 42°C (delivers at 38-39 °C); n=18 2) Rt fluids usual care; duration:; 21°C; n=20

Study	*Participants*	*Interventions*
Smith 1998b Trial held in USA Funding: not stated	Inclusion & exclusion criteria: inc:type of surgery: major gynaecologic, orthopaedic & general surery scheduled to last at least 90 min;excl: emergency surgery, preoperative use of ca2+ channel blockers,head injury, otitis, and preoperative sublingual temp ≥ 38°C o perioperative phase: intrafluids Surgery type: elective; surgical speciality: gynaecology; surgery duration: 30 to 60 min Anaesthesia type: general; anaesthesia duration more than 1h; premed: not stated; no. Of intubated/ventilated patients postoperative eratively: not stated - ASA grade: mixed; age (range): 44; gender (m/f): 15:41; BMI: not stated comorbidities: not stated; gas flow: 2l/min;room temp:@ 21°C;sublingual temp measured preoperative and postoperative; cessation of FAW after 131 min and 165 min fo the intervention and control goups, respectively. Will not consider end of surgery and incidence of hypothermia.	1) Hotline (level 1) (active fl); duration: until end of surgery; then rt fluids; set point: 42°C (delivers at 38-39 °C); n=31 2) Rt fluids (room temp IV fl); duration:; 21°C; n=30

Study	*Participants*	*Interventions*
Steinbrook 1997 Trial held in USA Funding: not stated	Inclusion & exclusion criteria: i: pts undergoing major intraabdominal surgery w/n°Contraindication to epidural anaesthesi. Ex: if ASA status IV or greater, evidence of malnutrition, anaemia, fever or an endocrine disorder. perioperative phase: intrafluids Surgery type: not stated; surgical speciality: abdominal; surgery duration: not stated Anaesthesia type: general and regional; anaesthesia duration not stated; premed: IV midazolam (1to4mg) and fentayl (100 to 250mcg); no. Of intubated/ventilated patients postoperative eratively: not stated - ASA grade: mixed; age (range): 45; gender (m/f): not stated; BMI: not stated comorbidities: not stated; Ambient temp: 20-22°C in or and PACU; inspired gases not heated or actively humidified but passive humidificantion provided with HME filter for all pts; postoperativeerative analgesia:pt controlled epidural infusion bupivacaine 0.125% with hydromorphone 0.02mg/ml.	1) Bair Hugger (Augustine Medical) + IV fluids (fenwal model) (active pt + active fl); duration: FAW: maintained pt oesophageal temp clsoe to 37°C; IV fluids: 37°C; n=5 2) Not stated usual care; duration:; FAW or active IV not used unless pt temp <35°C; n= 4

Study	*Participants*	*Interventions*
Zhao 2005 Trial held in China Funding: not stated	Inclusion & exclusion criteria: inc: pts scheduled for abdominal surgery lasting at least 2 hours; ex: pts w/coagulation disorder, severe malnutirition (total plasma albumin <3.0 g/l, wbc <2.5x10^9/l), recent history of fever or infection, history of endocrine dise perioperative phase: intrafluids Surgery type: not stated; surgical speciality: not stated; surgery duration: not stated Anaesthesia type: general; anaesthesia duration more than 1h; premed:; no. Of intubated/ventilated patients postoperatively --- ASA grade: I-II; age (range): 18-70; gender (m/f): 23:17; BMI: not stated comorbidities: not stated; Concurrent treatments, ward temperature, irrigation fluid, IV fluid,humidity, air flow *FAW lowered to medium 41-42 if core temp> 37.8 Colloid infusion: 800 (474) v 945 (394) ml; Ex contd: pts w/recent use of immunosuppresants	1) Forced air warming + actively warmed intravenous solutions including blood (39°C (active pt + active fl); duration:; FAW: high (42-43deg)*fluid: warmflo:39°C; n=20 2) Single layer of cotton sheet usual care; duration:; amount; n=20

C9: INTRAOPERATIVE PHASE: GASES

Study	*Participants*	*Interventions*
Backlund 1998 Trial held in Finland Funding: not stated	Inclusion & exclusion criteria: i; ASA I-III scheduled for laparoscopic surgery (fundoplication; henioplasty; resection of sigmoid colon; rectopexia); e: BMI>30; abnormal renal fx; duration of surgery<90min; conversion to laparotomy Perioperative phase: Surgery type: elective; surgical speciality: mixed;: ----; surgery duration: 1 to 3 h Anaesthesia type: not stated/unclear; anaesthesia duration not stated; premed:; no. Of intubated/ventilated patients postoperatively --- ASA grade: mixed; age (range): 51; gender (m/f): 15:11; BMI: 25 kg/m^2 comorbidities: not stated; Fluids: Ringer's acetated soln:8ml/kg during induction; 10ml/kg/hRinger's solution & hydroxyethyl startch; all fluidsprewarmed;	1) Warmed insufflated CO_2 + waterbath mattress (39°C (active pt + active gas); duration:; 37°C (prewarmed); vol:110 l(sd 53); n=13 2) Usual care gas; duration:; room temperature-21°C; vol 171l(sd76); n=13

Study	*Participants*	*Interventions*
Champion 2006 Trial held in USA Funding: not stated	Inclusion & exclusion criteria: i: morbidly obese pts to undergo laparoscopic antecolic proximal roux-en-y gastric bypass using the linear stapler technique; exclusion criteria not stated perioperative phase: intragases Surgery type: not stated; surgical speciality: abdominal; surgery duration: 1 to 3 h Anaesthesia type: general; anaesthesia duration not stated; premed: not stated; no. Of intubated/ventilated patients postoperatively --- ASA grade: not stated; age (range): 42 (23-59) years; gender (m/f): 7:43; BMI: 36-66 kg/m^2 comorbidities: not stated; Room temp: 16°C; no warming blankets or other external heat sources were used; hydromorphone hcl 1.0 mg intramuscularly every 3 hrs as requested was used in the PACU and postop for pain mgmt	1) Warmed CO_2 (insuflow device, lexion medical) (active warming device); duration: nto stated; 35°C; 95% relative humidity; n= 25 2) Cold dry CO_2 usual care; n=25

Study	*Participants*	*Interventions*
Conahan 1987 Trial held in USA Funding: fisher & paykell supplied the heater/humidifier units; filac corp electronic thermometers	Inclusion & exclusion criteria: i: women participating in an in vitro fertilization programme, patients scheduled to undergo laparoscopy a dovum harvesting in an ambulatory surgery unit. Exclusion criteria is not stated perioperative phase: intragases Surgery type: elective; surgical speciality: gynaecology; surgery duration: 1 to 3 h Anaesthesia type: general; anaesthesia duration more than 1h; premed: not stated; no. Of intubated/ventilated patients postoperatively ASA grade: not stated; age (range): 33 years; gender (m/f): 0:19; BMI: not stated comorbidities: not stated; Cotton blankets provided to all patients in the recovery room; or temp: 22.5°C; recovery room temp: 23°C	1) Heated humidified inspired gas (fisher & paykell) (warmed gas); duration: activated immediately after induction of anaesthesia; 38-39°C; n=10 2) Usual care inspired gas usual care gas; duration:; amount; n=9

Study	*Participants*	*Interventions*
Eckerrbom 1990 Trial held in Sweden Funding: supported by an university grant	Inclusion & exclusion criteria: i: dental & oral surgery, transsphenoidal hypophysectomy, middle ear surgery, surgery of the pharynx, nose & neck. Ecxclusion criteria not stated. Perioperative phase: intragases Surgery type: not stated; surgical speciality: mixed;: ----; surgery duration: mixed Anaesthesia type: not stated/unclear; anaesthesia duration more than 1h; premed: not stated; no. Of intubated/ventilated patients postoperatively --- ASA grade: not stated; age (range): 44 years; gender (m/f): 10:10; BMI: comorbidities: not stated; Patients in both arms received IV fluids (room temp) and 1 aluminum blanket (astronaut blanket)+ 2cotton sheets	1) Warmed inspired gas (hme) (active gas); n=10 2) Usual care inspired gas usual care gas; n=10
Farley 2004 Trial held in USA Funding: not stated	Inclusion & exclusion criteria: incl: pts 18-100 yearss undergoing laparascopic cholecystectomy; e:16 pts excl [11 converted to open cholecystectomy, 3 underwent addl op, 2 had insuflow device removed] perioperative phase: intragases Surgery type: not stated; surgical speciality: abdominal; surgery duration: 1 to 3 h Anaesthesia type: not stated/unclear; anaesthesia duration not stated; premed: orally: codeine, meperdine, oxycodone, propoxyphene; IV: meperdine, fentanyl, morphine; no. Of intubated/ventilated patients postoperatively; ASA grade: not stated; age (range): 52 (19-86) years; gender (m/f): 32:69; BMI: 29.6 kg/m^2 comorbidities: not stated; Bair Hugger (Augustine Medical) used on 32/49 and 34/52 pts by anaesthetist blinded to tx.	1) Warmed humidified CO_2 (insuflow device) (active warming device); duration: not stated; n=49 2) Standard CO_2 insufflation usual care; duration: not tated; n=52

Study	*Participants*	*Interventions*
Goldberg 1992a Trial held in USA Funding: not stated	Inclusion & exclusion criteria: i: ASA I-III pts scheduled for lower abdominal procedures lasting 1-4 hours. Excluision criteria not stated. perioperative phase: intragases Surgery type: elective; surgical speciality: abdominal; surgery duration: mixed Anaesthesia type: general; anaesthesia duration more than 1h; premed: not stated; no. Of intubated/ventilated patients postoperatively --- ASA grade: mixed; age (range): 43(16-69); gender (m/f): not stated; BMI: not stated comorbidities: not stated; Sublingual measurements also provided.sds not provided for oesophageal so sublingual used in the results; or temp: 21-21.5°C PACU temp: 21.6 to 23.1°C duration 1-4 hrmean: 1h-3.5.	1) Heated-humidifier (fisher & paykel) (active warming device); duration:; 37°C n=14 2) Usual care; n=16 3) Hme (pall ultipore filter); n=21

Study	*Participants*	*Interventions*
Hamza 2005 Trial held in USA Funding: not stated	Inclusion & exclusion criteria: i: morbidly obese pts undergoing laparoscopic roux-en-y gastric bypass surgery; e: pregnant or lactating or had clinically significant heart, liver or renal disease; if core temp≤34oc during op, pt excl. perioperative phase: int Surgery type: elective; surgical speciality: abdominal; surgery duration: 1 to 3 h Anaesthesia type: general; anaesthesia duration more than 1h; premed: 2-3mg IV midazolam; no. Of intubated/ventilated patients postoperatively --- ASA grade: not stated; age (range): 44.5; gender (m/f): 3:41; BMI: not stated comorbidities: not stated; Oesophagel core temp- baseline & intraop; tympanic- end of surgery & postop; or temp: 20°Cor humidity: 43.5%; PACU temp: 22°C PACU humidity: 44%; irrig volu: 694(480)l v 594(435); total IV fluids: 4.217ml(1.09) v 4.840.990); all irr	1) Warmed CO_2 insufflation gas (insuflow device) (active warming device); duration: 108 (21) min; 37°C 95% relative humidity; n=23 2) Standard CO_2 insufflation gas (passed through ianactive insuflow device) usual care; duration: 120 (43) min; amount; n=21
Hynson 1992 Trial held in USA Funding: mon-a-therm;datex medical instrumentation inc	Inclusion & exclusion criteria: included: kidney transplant pts w/history of insulin-dependent diabetes, cv disease, hypertension or medication hx. Excluded: obestiy (150% of ideal body wt), peripheral vascular disease,limb amputation or preop infection or fev Surgery type: not stated; surgical speciality: ----;: ----; surgery duration: not stated Anaesthesia type: ---; anaesthesia duration more than 1h; premed: midazolam 1-3 mg; no. Of intubated/ventilated patients postoperatively --- ASA grade: not stated; age (range):; gender (m/f): 5:5; BMI: not stated comorbidities: not stated; or temp: 20oc	1) Heated-humidifier (active warming device); duration: 180 min; 40°C; n=5 2) Usual care usual care; duration:; amount; n=5

Study	*Participants*	*Interventions*
Johansson 2003 Trial held in Sweden Funding: gibeck respiration ab for supply of the humidity sensory system	Inclusion & exclusion criteria: i: ASA i&ii general or urology surgery with an anticipated anaesthesia duration of 2h or longer. E: patients with signs and symptoms of pulmonray or cv disease perioperative phase: intragases Surgery type: elective; surgical speciality: mixed;: ----; surgery duration: 1 to 3 h Anaesthesia type: general; anaesthesia duration more than 1h; premed: midazolam(7.5mg) rectally 30 min prior to arriving in the or; no. Of intubated/ventilated patients postoperatively --- ASA grade: I-II; age (range): 74 years; gender (m/f): 63:27; BMI: not stated comorbidities: not stated; After 120 min of anaesthesia hmes (1,3,6 flow rates)32, 32, 29 mg H2O/l; usual care group: 26, 22,13 mg H2O/l	1) Fresh gas flow (hme) (warmed gas); duration:; 1.01 ;/min flow rate; n=16 2) Usual care usual care gas; duration:; amount; n=15 3) Flow rate: 3.01 l/min 4) Flow rate: 6.01 l/min
Mouton 1999 Trial held in Australia Funding: not stated	Inclusion & exclusion criteria: i: laparoscopic cholecystectomy perioperative phase: intragases Surgery type: not stated; surgical speciality: abdominal; surgery duration: not stated Anaesthesia type: general; anaesthesia duration not stated; premed: none administered; no. Of intubated/ventilated patients postoperatively --- ASA grade: not stated; age (range): 23-89; gender (m/f): not stated; BMI: not stated comorbidities: not stated; Mean or temp: 21.1oc	1) Humidified CO_2 flowed from modified lins-10000 insufflator (active gas); duration:; 34 to 37°C humidity 8-90%; n=20 2) Standard dry insufflation gas usual care gas; duration:; 21.2 to 25.2°C humidity 0 to 5%; n=20

Study	*Participants*	*Interventions*
Muth 1996 Trial held in Germany Funding: not stated	Inclusion & exclusion criteria: i:asa III of either sex undergoing abdominal aortic aneurysm; perioperative phase: intrafluids Surgery type: elective; surgical speciality: abdominal; surgery duration: 1 to 3 h Anaesthesia type: general; anaesthesia duration more than 1h; premed: flunitrazepam(1-2 mg p.o); no. Of intubated/ventilated patients postoperatively --- ASA grade: iii+; age (range): 64.5 years; gender (m/f): not stated; BMI: not stated comorbidities: not stated; Fresh gas flow:4l/min;all blood products prewarmed in a water bath(unitherm) at 37oc prior to transfusion; no othe rwarming devices-blankets,forced-air blowers or inspired gas heaters were used for either group.	1) IV fluids and blood products (hotline level 1) (active fl); duration:; 37°C n=25 2) IV fluids + prewarmed blood products usual care; duration:; amount; n=25
Nelskyla 1999 Trial held in Finland Funding: not stated	Inclusion & exclusion criteria: i:40 ASA 1or2 women scheduled for laparoscopic hysterctomy for benign diseases; e: <18 age >55 yearss, BMI>26 kg/m^2, known allergy to ketoprofen, ASA status ≥iii & any meds affecting cv or cns. perioperative phase: intragases Surgery type: elective; surgical speciality: gynaecology;: ---; surgery duration: 30 to 60 min Anaesthesia type: general; anaesthesia duration more than 1h; premed: 10 mg/os diazepam 60 min before preop data collection; no. Of intubated/ventilated patients postoperatively --- ASA grade: I-II; age (range): 46.5 (34-55); gender (m/f): 0:37; BMI: not stated comorbidities: not stated; Warmed IV and irrigation fluid (38oc); or temp: 20.5-22.0°Calso nasopharyngeal temp provided	1) Heated CO_2 insufflator (thermoflator, karl storz) (active warming device); duration:; 37°C 12-14 mm hg; ? Humidity?; n=not stated 2) Unheated CO_2 insufflation gas (electronic CO_2 endoflator, kasrl storz) usual care; duration:; amount; n=not stated

Study	*Participants*	*Interventions*
Nguyen 2002 Trial held in USA Funding: not stated	Inclusion & exclusion criteria: i: pts evaluated for nissen fundoplication;eligible if workups confimed gastroesophageal reflux & <60years; e: previous gastric surgery or history of chrnoic narcotic USAge perioperative phase: intragases Surgery type: not stated; surgical speciality: ----;: ----; surgery duration: 1 to 3 h Anaesthesia type: not stated/unclear; anaesthesia duration not stated; premed: not stated; no. Of intubated/ventilated patients postoperatively --- ASA grade: not stated; age (range): 44; gender (m/f): 11:9; BMI: not stated comorbidities: not stated; Or temp: 20-22°C	1) Heated and humidified insufflation gas CO_2 using insuflow device (georgia biomedical1) + uppder body warming blanket (Bair Hugger) (active pt + active gas); duration:; 37°C humidity 95%; n= 10 2) Standard CO_2 (active pt + usual care gas); duration:; room temperature; <5% humidity; n=10
Ott 1998 Trial held in USA Funding: not stated	Inclusion & exclusion criteria: e:pregnant or cancer patients perioperative phase: intragases Surgery type: not stated; surgical speciality: gynaecology;: ----; surgery duration: mixed Anaesthesia type: not stated/unclear; anaesthesia duration not stated; premed: not stated; no. Of intubated/ventilated patients postoperatively --- ASA grade: not stated; age (range): 18-48 years; gender (m/f): 0:72; BMI: not stated comorbidities: not stated; Duration of surgery: 38-262 min;at 4 hours: 30 pts in warmed CO_2 and 31 in standard CO_2 group; or temp: 19.5-21.5°C humidity 42-59%; CO_2 volume: 82-680l; irrigation vol: 0.3-12l at 26°C core temp measured w/endotrachael temperature proble; dur	1) Warmed CO_2 (insuflow) (active gas); duration:; amount; n=not stated 2) Standard CO_2 + underpad rewarmer (active pt + usual care gas); duration:; amount; n=not stated

Study	*Participants*	*Interventions*
Saad 2000 Trial held in Germany Funding: not stated	Inclusion & exclusion criteria: i: pts with symptomatic cholecystolithiasis undergoing laparoscopic cholecystectomy perioperative phase: intragases Surgery type: not stated; surgical speciality: abdominal; surgery duration: 1 to 3 h Anaesthesia type: general; anaesthesia duration not stated; premed: not stated; no. Of intubated/ventilated patients postoperatively --- ASA grade: I-II; age (range): 56.5; gender (m/f): 8:12; BMI: not stated comorbidities: not stated;	1) Warmed CO_2 gas for abdominal insufflation (flow therme, wisap) (active pt + active gas); duration:; 37°C n=10 2) Cold CO_2 insufflation (electronic laparoflater) usual care gas; duration:; 21°C n=10
Savel 2005 Trial held in USA Funding: lexicon medical provided insuflow device	Inclusion & exclusion criteria: i: pts undergoing laparoscopic roux-en-y gastric bypass [BMI>40 or BMI>35 w/medical problems] perioperative phase: intragases Surgery type: not stated; surgical speciality: abdominal; surgery duration: 1 to 3 h Anaesthesia type: general; anaesthesia duration ----; premed: not stated; no. Of intubated/ventilated patients postoperatively --- ASA grade: not stated; age (range): 40; gender (m/f): 5:25; BMI: 51.5 comorbidities: not stated; Forced air warming (Bair Hugger) applied at discretion of the attending anesthesiologist, blinded to the study.	1) Wam an dhumidified CO_2 using insuflow filter heater hydrator (lexion medical) (active gas); 35°C 95% humidity; n=15 2) Room temperature non-humidified CO_2 usual care gas; duration:; amount; n=15

Study	*Participants*	*Interventions*
Slim 1999 Trial held in France Funding: not stated	Inclusion & exclusion criteria: i:pts undergoing laparoscopic upper abdominal surgery incl cholecystectomy for symptomatic,uncomplicated gallstone disease, posterior fundoplication for gastroesophageal reflux disease, & heller's myotomy for achalasia.e: e Surgery type: elective; surgical speciality: abdominal; surgery duration: 1 to 3 h Anaesthesia type: general; anaesthesia duration not stated; premed: not stated; no. Of intubated/ventilated patients postoperatively --- ASA grade: I-II; age (range): 52.5; gender (m/f): 1:1.4 in each group; BMI: 26.3 kg/m^2 comorbidities: not stated; Subdiaphragmatic temp	1) Warmed CO_2 (thermoflator) (active gas); duration:; 36.2°C intra-abdominal pressure mantained at 14mm; n=49 2) Cold CO_2 (thermoflator) usual care gas; duration:; amount; n=51
Stone 1981 Trial held in USA Funding: not stated	Inclusion & exclusion criteria: i: 42 men expected to have surgical prcedures lasting 3 or more hours; exclusion criteria not stated perioperative phase: intragases Surgery type: ----; surgical speciality: mixed;: ----; surgery duration: over 3 h Anaesthesia type: general; anaesthesia duration more than 1h; premed: type of premedication not stated; premeds given 30-45 min prior to induction; no. Of intubated/ventilated patients postoperatively --- ASA grade: not stated; age (range): not stated; gender (m/f): 42:0; BMI: not stated comorbidities: not stated; Patients received circulating water blankets (38oc).	1) Inspired heated and humidified gases (active warming device); duration:; amount; n=10 2) usual care gas; duration:; amount; n=10

Study	*Participants*	*Interventions*
Tollofsrud 1984a Trial held in Norway Funding: not stated	Inclusion & exclusion criteria: i:40 patients scheduled for surgery on the abdominal aorta(straight or bifurcated prosthesis); e: patients with body temperature of over 37.5oc o under 36.5oc on the morning of surgery perioperative phase: intragases Surgery type: elective; surgical speciality: abdominal; surgery duration: 1 to 3 h Anaesthesia type: general; anaesthesia duration more than 1h; premed: <75years: morphine (5-15mg)i.m. Combined w/scopolamine (0.2-0.6mg)30-60min b4arrival into or; >75years:pethidine 30mg im; no. Of intubated/ventilated patients postoperatively --- ASA grade: not stated; age (range): 64; gender (m/f): 8:2; BMI: not stated comorbidities: not stated; Blood and plasma warmed to 37oc	1) Warming blanket(gorman rupp); 45x60cm (active warming device); duration:; 38-40°C n=10 2) Usual care usual care; duration:; amount; n=10 3) Warming blanket + heated humidifier; n=10 4) Heated-humidifier(bennett cascade humidifier) 37-40°C n=10
Tollofsrud 1984b Trial held in Norway Funding: not stated	Inclusion & exclusion criteria: i:40 patients scheduled for surgery on the abdominal aorta(straight or bifurcated prosthesis); e: patients with body temperature of over 37.5oc o under 36.5oc on the morning of surgery perioperative phase: intragases Surgery type: elective; surgical speciality: abdominal; surgery duration: 1 to 3 h Anaesthesia type: general; anaesthesia duration more than 1h; premed: <75years: morphine (5-15mg)i.m. Combined w/scopolamine (0.2-0.6mg)30-60min b4arrival into or; >75years:pethidine 30mg im; no. Of intubated/ventilated patients postoperatively; ASA grade: not stated; age (range): 64; gender (m/f): 8:2; BMI: not stated comorbidities: not stated; Blood and plasma warmed to 37oc	1) Warming blanket(gorman rupp); 45x60cm (active warming device); duration:; 38-40°C n=10 2) Usual care usual care; duration:; amount; n=10 3) Warming blanket + heated humidifier; n=10 4) Heated-humidifier(bennett cascade humidifier) 37-40°C n=10

Study	*Participants*	*Interventions*
Wills 2001 Trial held in Australia Funding: cook medical loaned equipment	Inclusion & exclusion criteria: i:laparoscopic fundoplication; e:if pt allergic to morphine, lafter hiatal hernia (>6cm), previous oesophageal surgery, requiring concomitant procedure such as cholecystectomy, postop intubation, conversion to an open proced Surgery type: elective; surgical speciality: ----;: ----; surgery duration: 30 to 60 min Anaesthesia type: general; anaesthesia duration not stated; premed: midazolam (0.1mg/kg) i.m; no. Of intubated/ventilated patients postoperatively --- ASA grade: not stated; age (range): 59 (21-74); gender (m/f): 22:18; BMI: 28 kg/m^2 comorbidities: not stated; Warming device placed over the upper torso and head (Bair Hugger); or temp:20 to 22oc.	1) Heated CO_2 (lins-2000, cook Australia) (active pt + active gas); duration:; 22 to 30.5oc(at 1 to 6 l/min); n= 19 2) Standard CO_2 (active pt + usual care gas); duration:; amount; n=21
Youngberg 1985 Trial held in USA Funding: not stated	Inclusion & exclusion criteria: perioperative phase: intragases Surgery type: not stated; surgical speciality: not stated;: ----; surgery duration: 1 to 3 h Anaesthesia type: not stated/unclear; anaesthesia duration ----; premed: not stated; no. Of intubated/ventilated patients postoperatively --- ASA grade: not stated; age (range): not stated; gender (m/f): not stated; BMI: not stated comorbidities: not stated; Concurrent treatments, ward temperature, irrigation fluid, IV fluid,humidity, air flow	1) Heated-humidified (conchatherm iii) inspired gas (active gas); duration:; 35 aand 37°C n=20 2) Usucal care usual care gas; duration:; amount; n=20

C10: PHARMACOLOGICAL AGENTS -PREVENTION

Study	*Participants*	*Interventions*
Ikeda 1999 Trial held in Japan RCT	Inclusion and exclusion criteria: minor oral surgery. Excluded if obese, taking medication, history of thyroid disease, dysautonomia or raynaud's syndrome. Age (range): mean 32 years (14 years); gender (m/f): 8:10 comorbidities: not stated; IV fluids warmed to 37°C; ambient temperature 25-26°C; patients covered with single cotton blanket and surgical drape	1) Phenylephrine (alpha adrenergic agonist); duration: not stated; 0.5microgram/ kg/min; n=9 2) No treatment control usual care;duration: not stated; n=9
Mizobe 2006 Trial held in Japan RCT	Inclusion and exclusion criteria: excl: obese, febrile, receiving vasodilators or drugs altering thermoregulation; thyroid disease; dysautonomia. Age (range): 29-61 years, mean around 48 years; gender (m/f): not stated Ambient temperature 24°C; covered with cotton sheet pre-operatively and drapes during surgery	1) Fructose infusion (sugars); duration: 4 hr starting 3 hr before induction; 0.5g/kg/hr; n=20 2) Saline infusion (placebo); duration: 4 hr starting 3 hr before induction; n=20
Mohamed 2005 Trial held in Egypt RCT	Inclusion and exclusion criteria: patients scheduled for abdominal operations of expected duration 3-5 hours. Exclusion: core temperature >37.2; patients not expected to withstand volume expansion; thyroid dysfunction, end stage renal failure, hepatic failure, major respiratory and cardiovascular disease not stated Concurrent treatments (incl. Warming devices), ward temperature, irrigation fluid, IV fluid, humidity, air flow	1) IV amino acid infusion and saline (amino acid); duration: 1 hr preoperative to end 1st hr of op; 125ml/hr; n=20 2) Saline only (placebo); duration: 1 hr preoperative to end 1st hr of operation; n=20

Study	*Participants*	*Interventions*
Piper 2000 Trial held in Germany RCT	Inclusion and exclusion criteria: abdominal or orthopaedic surgery. Exclusion: vasoconstrictors during surgery, alpha 2 agonist for long-term treatment, fever, muscle disease, parkinson's disease Age (range): mean around 50 years; gender (m/f): 58: 62not stated covered with sheet	1) Urapidil IV (alpha 1 antagonist); duration: at end of surgery; 0.2mg/kg; n=30 2) Saline (placebo); duration: at end of surgery; n=30 3) Clonidine 3microg/kg; n=30; meperidine 0.4mg/kg; n=30
Piper 2001 Trial held in Germany RCT	Inclusion and exclusion criteria: abdominal, urological or orthopaedic surgery. Exclusion: cardiac failure, muscle disease, parkinson's disease, required vasoconstrictors perioperatively, long-term alpha2 agonists, fever. Age (range): mean around 53 years; gender: not stated; No active warming	1) Urapidil (alpha 1 antagonist); duration: at end of surgery; 0.2mg/kg; n=30 2) Saline (placebo); duration: at end of surgery; n=30 3) Urapidil 0.3mg/kg; n=30); urapidil 0.4mg/kg; n=30 4) Clonidine 3microg/kg; n=30
Sahin 2002 Trial held in Turkey RCT	Inclusion and exclusion criteria: craniotomy for supratentorial tumour excision. Exclusion: tumours larger than 3cm diameter, invasion into midbrain/hypothalamus, hydr°C ephalus, infratentorial tumour. Age (range): mean around 48 years; gender (m/f): 21: 19not stated All patients received dextrose-free crystalloids and colloids at room temperature; ambient temperature 21 and/-1°C; at end of surgery, patients with temperature < 35°C warmed by Bair Hugger in PACU before extubation	1) Amino acid solution and anaesthetic regimen of isoflurane (amino acid); duration: not stated; 100kj/hr; n=10 2) Only the anaesthetic regimen of isoflurane usual care;duration: not stated; n=10 3) Amino acid 100kj/hr plus propofol; n=10 4) Propofol only; n=10

Study	*Participants*	*Interventions*
Sellden 1994 Trial held in Sweden RCT	Inclusion and exclusion criteria: all but 1 minor surgery Age (range): mean 52 years; gender (m/f): all male, Theatre temperature 21-23°C; no warming except patients 1 patient with partial gastrectomy in amino acid group (major surgery) had 4 units warmed blood; temperature measured using mixed venous blood from pulmonary artery	1) Amino acid (amino acid); duration: started immediately before and throughout anaesthesia; 126ml/hr in addition to saline; n=10 2) Saline (placebo); duration: not stated; 500ml/hour; n=11
Sellden 1996 Trial held in Sweden RCT	Inclusion and exclusion criteria: hysterectomy for menorrhagia. Age (range): mean 48 years; gender (m/f): all female; theatre temperature 21-23°C; no warming except patients 1 patient in control group had 1 unit warmed blood	1) Amino acid (amino acid); duration: 1 hr before and 1 hr during anaesthesia; 126ml/hr in addition to saline; n=8 2) Saline (placebo); duration: not stated; 500ml/hour; n=8 3) Amino acids 126ml/hr 2 hrbefore anaesthesia; n=8
Sellden 1999 Trial held in Sweden RCT	Inclusion and exclusion criteria: unclear Age (range): mean 50 years; gender (m/f): 27: 48not stated Theatre temperature 20-23°C; no warming exceptatients 5 patients had warmed blood. This report includes the patients in sellden 1994 and sellden 1996	1) Amino acid (amino acid); duration: 0-2 hr before and 0-5 hrduring anaesthesia; 126ml/hr in addition to saline; n=45 2) Saline (placebo); duration: not stated; n=30

Study	*Participants*	*Interventions*
Umenai 2006 Trial held in Japan RCT	Inclusion and exclusion criteria: off-pump cabg (elective/urgent); ASA grade ii or **III;** 40-85 years. Exclusion: minimally invasive direct cabg; concomitant major surgery; previous cabg/valvular heart operation; intra-aortic balloon pump support; severe hepatic disease, renal information not stated Ambient temperature near 23°C; covered with 1 layer sheet during surgery; circulating-water warming mattress under patients set to 37°C	1) Amino acid infusion (18 amino acids) (amino acid); duration: starting 2 hr before surgery, for 6 hr; 4kj/kg/hr; n=94 2) Saline infusion (placebo); duration: starting 2 hr before surgery, for 6 hr; n=86
Widman 2002 Trial held in Sweden RCT	Inclusion and exclusion criteria: age (range): 67 years; gender (m/f): 23: 23; comorbidities: not stated; ambient temperature 21°C	1) Amino acid (amino acid); duration: 1 he before surgery and during; n=22 2) Acetated Ringer's solution (placebo); duration: not stated; n=24

C11: TREATMENT: WARMING DEVICES

Study	*Participants*	*Interventions*
Alfonsi 2003 Trial held in France Funding: nih, joseph drown foundation & kentucky trust fund	Final intraoperative temperature 35.1 (sd 0.4) °C. All recovering from knee (6 and 7 patients in warmed and control groups) or shoulder arthroscopy (3 and 2 patients). None febrile. Pain treated with paracetamol when necessary (2g) exclusions: not stated Perioperative phase: postoperative; surgery type: not stated; surgical speciality: orthopaedics;: grade 2; surgery duration: 1 to 3 h Anaes type: general and regional; anaes duration: more than 1h; premedication: none No. Of intub/vent patients postoperative erative: no patients Severity of hypothermia: mild (35.0-35.9); ASA grade: I-II; age (range): 31 (18-40) years; gender (m/f): 18:0; BMI: none obese; height 178cm, weight 71 kg Comorbidities: not stated; none stated. None taking beta-blockers, or beta2 receptor antagonists. No history of thyroid or neuromuscular disease, dysautonomia, raynauds Not warmed intraoperative unless <35°C; IV fluids not warmed. Ambient PACU t=20.8°C; surgery 87(sd 37) min; ~2/3rds smokers. No paracetamol allergies. Core temp	1) Forced air warmer (Bair Hugger forced air cover) (active warming); duration: unclear,started on arrival in PACU; high (43°Csetting); intervention body area covered: full body; proportion covered ≥ 50% treated; n=9 2) Single cotton blanket (unwarmed) (usual treatment); duration: unclear; control body area covered: unclear; positioned over body; proportion covered not stated; n=9

Study	*Participants*	*Interventions*
Bräuer 2004 (indirect) Trial held in Germany Funding: not stated	Inclusion: preoperativeleft ventricle ejection fraction>40%; uncomplicated surgical course; postop oesophageal temperature <35.5°C; bodyweight within -10% and +30% of normal; no pre-existing endocrine disease; only low dose inotropic support on arrival inICU Perioperative phase: postoperative; surgery type: elective; surgical speciality: cardiothoracic;: unclear; surgery duration: not stated Anaes type: general; anaes duration: more than 1h; premedication: flunitrazepam 2 mg given night before surgery and 1 h before anaes No. Of intub/vent patients postoperative erative: all patients Severity of hypothermia: not stated; ASA grade: III +; age (range): median 64 (50-75) years; gender (m/f): 50:0; BMI: not stated; height 154(160-192)cm;weight 78(51-120)kg comorbidities: not stated;but see exclusions Additional drugs inICU: low dose catecholamines prn & nitroglycerin 0.4-0.6mcg/ kg/min. IV meperidine for shivering.infusions at room temp; blood: 37°C; room temp 22.8 °C. Heat and moisture exchangers used.	1) Forced air warmer (warm touch 5700) (active warming); duration: until reached 37.5°C; maximal flow and temperature; intervention body area covered: whole body; proportion covered ≥ 50% treated; n=10 2) Forced air warmer (Bair Hugger) 500 (active warming); duration: until reached 37.5°C; maximal flow and temperaturecontrol body area covered: whole body; proportion covered ≥ 50% treated; n=10 3) Radiant heater (aragona thermal ceilings ctc x) 100 °C; 1kw, 7000-8000nm; parabolic surface (80 x 200cm); max heating mode; 75cm from chest; n=10 4) Radiant heater (self assembled): 4 hydrosun 500 halogen lamps (4x160w); 2600°C; 600-1300nm; 60cm from chest.

Study	*Participants*	*Interventions*
Bredahl 1995 Trial held in Denmark Funding: grants from aalborg stifts julelotteri and althin medi plast gra	Age over 50 years; elective major thoracic, abdominal, orthopaedic surgery (mainly abdominal surgery (22/30)); ASA I-II; rectal temperature less than 35.5°C, measured within 5 min of arrival in PACU; stable haemodynamics. Exclusions not stated. Perioperative phase: postoperative; surgery type: elective; surgical speciality: mixed;: mixed; surgery duration: 1 to 3 h Anaes type: general and regional; anaes duration: more than 1h; premedication: diazepam by mouth (abdominal, othopaedic) or pethidine midazolami i.m. (thoracic surgery) No. Of intub/vent patients postoperative erative: not stated Severity of hypothermia: not stated; ASA grade: I-II; age (range): 66 (50-89) years; gender (m/f): 16:14; BMI: not stated; weight 67 (45-100) kg comorbidities: not stated; none stated Pacu temp 23.5; IV fluid:37°C; dry o2. Heat & moisture exchangers for gases; surgery duration 165 (120-320) min. Blockade reversals: atropine/neostigmine 1.0/2.5mg/h. PACU analgesia epidural morphine 0.2mg/h + bupivacaine 10mg/h (28 pts). Sup	1) Radiant heater (aragona mobile thermal ceiling) mounted ~65cm above patient's body surface + warmed (37°C) IV fluids (active warming + warmed fluids); duration: 2 h; max (500w); decreased if skin temp >37 °C; intervention body area covered: majo 2) Aluminised reflective blanket (space blanket) + 3 cotton blankets+ warmed (37°C) IV fluids (thermal insulation+warmed fluids); duration: 2 h; control body area covered: body covered; proportion covered ≥ 50% treated; n=15

Study	*Participants*	*Interventions*
Giuffre 1991 Trial held in USA Funding: not stated	Pacu admission temperature 35°Cor less (axilla or oral). Exclusions: planned admission to critical care, preoperativefever or sepsis; open undressed burn; neurological problem with thermal instability; inability to co-operate with warming interventions. Perioperative phase: postoperative; surgery type: not stated; surgical speciality: not stated;: unclear; surgery duration: not stated Anaes type: not stated/unclear; anaes duration: more than 1h; premedication: not stated No. Of intub/vent patients postoperative erative: not stated Severity of hypothermia: moderate (34.0-34.9); ASA grade: not stated; age (range): 51.5 (sd 16.7) years; gender (m/f): 30:60; BMI: not stated comorbidities: not stated; Anaesthesia duration 211 (sd 95) min; 714 (sd 394) ml intraoperative fluid per hour; warming of fluids not stated. Mainly oral temperatures measured. Temperature measured at axilla or mouth	1) Forced air warmer (Bair Hugger) + head wrapped in warmed cotton cloth (replaced every 20min) (active warming + active warming); duration: until reached 36°C; medium setting 57°C(sd 2.8); intervention body area covered: whole body; proportion covered ≥ 50% treated; n=29 2) Warmed, double thickness cotton blanket placed near skin every 20 min + additional blanket + head wrap (as above) (active warming + active warming); duration: until reached 36°C; blankets stored at 66-77°Ccontrol body area covered: whole body; proportion covered ≥ 50% treated; n=31 3) Radiant heater (2 radiant lights 71cm from skin) + warmed thermal blanket + head wrapped in warmed cotton cloth (replaced every 20min); warmed until reached 36°C; n=30

Study	*Participants*	*Interventions*
Hershey 1997 Trial held in USA Funding: none stated	Diagnostic laparotomy procedures for suspected cancer; general anaesthesia, in stable condition; PACU admission sublingual temperature <36°C. Exclusions: elderly patients (>60); previous radical oral procedures; need controlled ventilation (warm o2) Perioperative phase: postoperative; surgery type: not stated; surgical speciality: gynaecology;: grade 2; surgery duration: over 3 h Anaes type: general; anaes duration: more than 1h; premedication: not stated No. Of intub/vent patients postoperative erative: some patients Severity of hypothermia: mixed; ASA grade: not stated; age (range): 20 to 60 years; gender (m/f): mainly female; BMI: not stated comorbidities: not stated; IV fluid not reported; 29-31% patients had endotracheal tube when admitted to PACU. Mean time in or 184-233 min. Oral temperature measured Temperature measured at mouth	1) Reflective (aluminised) blanket + reflective head covering + two warmed thermal blankets (not stated to be changed; temperature not stated) (active warming + thermal insulation); duration: until temperature reached 36°C; not applicable; intervention covered area body and head; proportion covered ≥ 50% treated; n=48 2) Reflective (aluminised) blanket + two warmed thermal blankets (not stated to be changed; temperature not stated) (active warming + thermal insulation); duration: until temperature reached 36°C; not applicablecontrol body area covered: whole body; proportion covered ≥ 50% treated; n=48 3) 3.two warmed thermal blankets (not stated to be changed; temperature not stated); intervention time: until temperature reached 36°C; n=48

Study	*Participants*	*Interventions*
Jackson 1997 Trial held in South Africa Funding: none stated; hospital/university research study	Patients had a rectal temperature of 35.9°C or less on admission toICU. Patients did not receive any intraoperative warming. Exclusions: not stated Perioperative phase: postoperative; surgery type: not stated; surgical speciality: not stated;: unclear; surgery duration: not stated Anaes type: general; anaes duration: not stated; premedication: not stated No. Of intub/vent patients postoperative erative: not stated Severity of hypothermia: not stated; ASA grade: not stated; age (range): 62 (18-85) years; gender (m/f): 13:7; BMI: not stated comorbidities: not stated; none stated Icu temperature controlled between 22 and 24°C. All patients inICU; fluid warming not stated. Temperature measured at rectum	1) Forced air warmer (warm touch) (active warming); duration: 3 hours; 42-46°C; intervention body area covered: from neck down; proportion covered ≥ 50% treated; n=10 2) 2 standard cotton blankets (usual treatment); duration: 3 hours; control body area covered: from neck down; proportion covered ≥ 50% treated; n=10

Study	*Participants*	*Interventions*
Karayan 1996 Trial held in France Funding: not stated	Type of surgery: abdominal aortic surgery (aortic aneurysm repair or aortobifemoral bypass); none of the pts were obese,febrile, or history of endocrine disease. Perioperative phase: intraoperative; surgery type: elective; surgical speciality: cardiothoracic;: grade 2; surgery duration: over 3 h Anaes type: general; anaes duration: more than 1h; premedication: cardiovascualr tx orally & morphine .1mg/kgi.m. 2 hrb4 No. Of intub/vent patients postoperative erative: all patients Severity of hypothermia: mild (35.0-35.9); ASA grade: mixed; age (range): 59(42-79); gender (m/f): not stated; BMI: not stated comorbidities: not stated; Ambient or temp:20-21°C;all infused IV fluids warmed(fenwal); treatment initiated when t<36°C Temperature measured at pulmonary artery	1) Upper body fablower cover (model 520) attached to Bair Hugger model (Augustine Medical) + 2cotton sheets (active warming+warmed fluids); duration:; intervention body area covered: upper chest and arms; proportion covered <50% treated; n=9 2) Warm cotton sheet (usual treatment + warmed fluids); duration:; control body area covered: upper chest and arms; proportion covered <50% treated; n=9

Study	*Participants*	*Interventions*
Lennon 1990 Trial held in USA Funding: none stated; from may°Clinic	Patients admitted to PACU with oral temp ≤ 35.0°C. Exclusions: patients who were febrile, haemodynamically unstable, mechanically ventilated, having blood products infused, or required vasoactive drugs. Those with muscle, cns, autonomic disorders. Perioperative phase: postoperative; surgery type: not stated; surgical speciality: not stated;: unclear; surgery duration: not stated Anaes type: general; anaes duration: not stated; premedication: not stated No. Of intub/vent patients postoperative erative: no patients Severity of hypothermia: not stated; ASA grade: not stated; age (range): 59 (18-70) years; gender (m/f): ns; BMI: ns; height 162cm; weight 63.0kg comorbidities: not stated; none stated (see also exclusions) Oral temperature ≤ 35°C; IV fluids not reported. Temperature measured at mouth	1) Forced air warmer (Bair Hugger); 400 w heating element; max setting limited to 43°C(active warming); duration: 90 min; ns; intervention body area covered: whole body; proportion covered ≥ 50% treated; n=15 2) Warmed cotton blankets; not stated if changed systematically (active warming); duration: 90 min; warmed to 37°Ccontrol body area covered: neck to feet; proportion covered ≥ 50% treated; n=15

Study	*Participants*	*Interventions*
Stevens 2000 Trial held in Australia Funding: not stated	General, orthopaedic, urological, vascular or gynaecological surgery; procedure greater than 20 min; general, regional or epidural/spinal anaesthesia. PACU implied t< 36.0°C. Exclusions: severely hypothermic patients excluded (t<34.5°C). Perioperative phase: postoperative; surgery type: not stated; surgical speciality: mixed;: unclear; surgery duration: not stated Anaes type: mixed general and/or regional; anaes duration: not stated; premedication: not stated No. Of intub/vent patients postoperative erative: not stated Severity of hypothermia: mixed; ASA grade: not stated; age (range): 51 (sd 19) years; gender (m/f): results reported for 113 pts (m:f 56:64); BMI: not stated comorbidities: not stated; Pacu temperature 19.9 to 21.1°C, 9 to 17% had warmed fluids. Study carried out post-hoc subgroup analysis without orthopaedic patients - not repeated here. Temperature measured at tympanic membrane	1) Forced air warmer (Bair Hugger) + head covering (blanket wrapped like a turban; not said to be warmed) (active warming + thermal insulation); duration: until 36°Creached; high setting; intervention body area covered: whole body; proportion covered ≥ 50% treated; n=60 2) Warmed blanket, changed every 15 min. Temperature not stated + head covering as above (active warming + thermal insulation); duration: until 36°Creached; up to 7 blankets maximumcontrol body area covered: whole body; proportion covered ≥ 50% treated; n=60

Study	*Participants*	*Interventions*
Summers 1990 Trial held in USA Funding: part funded by grant from Augustine Medical (Bair Hugger manufacturer)	Inclusion: PACU tympanic temperature < 36.0°C. Exclusions: not stated Perioperative phase: postoperative; surgery type: not stated; surgical speciality: not stated;: unclear; surgery duration: 1 to 3 h Anaes type: not stated/unclear; anaes duration: more than 1h; premedication: not stated No. Of intub/vent patients postoperative erative: not stated Severity of hypothermia: not stated; ASA grade: not stated; age (range): 50 (16-86) years; gender (m/f): 45:46; BMI: not stated comorbidities: not stated; Theatre temperature 20.5 (control) and 21.6°C (intervention). Total time in or 138-173 min. IV fluids not reported. Temperature measured at tympanic membrane	1) Forced air warmer (Bair Hugger) no details (active warming); duration: 1 hr (probably); not stated; intervention body area covered: not stated; proportion covered ≥ 50% treated; n=45 2) Warmed blankets changed as needed (temperature not stated); mean: 6 blankets (active warming); duration: 1 hr (probably); control body area covered: not stated; proportion covered ≥ 50% treated; n=46
Vanni 2003 Trial held in Brazil Funding: not stated	Exclusion: none of the pts were obese,ferbile,taking voative drugs or history of endocrine diseases Perioperative phase: preoperative; surgery type: elective; surgical speciality: abdominal; surgery duration: 1 to 3 h Anaes type: general; anaes duration: not stated; premedication: midazolam (7.5mg by intramuscluar injection) 30 min before admission to or No. Of intub/vent patients postoperative erative: some patients Severity of hypothermia:; ASA grade: I-II; age (range): 39(22-56); gender (m/f): 0:20; BMI: 26(20-30) comorbidities: not stated; IV fluid: kept at or temp before infusion; Temperature measured at	1) Forced air warming blanket (warmtouch model 5200) over a cotton sheet with an additional cotton sheet over the warmtouch blanket (active warming); duration: 60; set at 42 to 46°C; intervention body area covered: covered up to the shoulders; proportion covered ≥ 50% treated; n=10 2) 2 cotton sheets (usual treatment); duration: 60 minutes; control body area covered: not stated; proportion covered not stated; n=10

Study	*Participants*	*Interventions*
Weyland 1994 Trial held in Germany Funding: none stated; university study	Postop oesophageal temperature <35°C; postop mechanical ventilation inICU (given until temperature reached 37°C); body weight= normal (-10% to +30%); no postop irrigation. Exclusions: not stated Perioperative phase: postoperative; surgery type: elective; surgical speciality: mixed; surgery duration: not stated Anaes type: general; anaes duration: not stated; premedication: flunitrazepam 2mg night before surgery and 1h before anaesthesia No. Of intub/vent patients postoperative erative: all patients Severity of hypothermia: not stated; ASA grade: I-II i; age (range): median 58 (18-76) years; gender (m/f): 17:18; BMI: not stated; height med 168 cm; weight med 67 kg comorbidities: not stated; none stated Infusions - room temp; blood - 37°C. Ambient temp 22-24°C; heat & moisture exchangers for gas. Pethidine for shivering. Unclear temperature: inclusion <35 °C; results ≥ 35. Major surgery (ortho, gynae, urology). All pts dopamine 2-3mcg/kg/min. Temperature measured at oesophagus	1) Overhead radiant heater (aragona thermal ceilings ctc x); 7000-8000 nm; parabolic radiation; 75cm from patient's chest; 80-210cm long; + sheet (active warming); duration: until 37°C; 1000 w; intervention body area covered: whole body; proportion covered ≥ 50% treated; n=12 2) Standard hospital blanket (usual treatment); duration: until 37°C; control body area covered: whole body; proportion covered ≥ 50% treated; n=11 3) Electric heating blanket (beurer bettwarmer bw2) 50w, 150-80cm, placed between two standard hospital blankets on top of patient

APPENDIX D: QUALITY ASSESSMENT OF STUDIES

D1: RISK FACTORS PHARMACOLOGICAL AGENTS

Study	*Sequence Generation*	*Allocation Concealment*	*Outcome Assessor blinded*	*Patient Blinding*	*Attrition*	*Itt?*	*Power calculation*	*Baseline comparable*
Alfonsi 1998	Unclear; not stated	Unclear; not stated	Yes double blind	Yes double blind	Yes	Yes	Not stated	Yes
Bilotta 2002	Adequate; computer-generated	Unclear; not stated	Yes double blind	Yes double blind	Yes	Yes	Yes	Yes
Buggy	Unclear; not stated	Unclear; not stated	Yes double blind	Yes double blind	Yes	Yes	Not stated	Yes
Cheong 1998	Adequate; table of random numbers	Inadequate; table of random numbers	Yes double blind	Yes double blind	Yes	Yes	Not stated	Yes
Crozier 2004	Unclear; not stated	Adequate; sealed envelopes	Yes double blind	Yes double blind	Yes	Yes	Not stated	Yes
De Witte 1995	Unclear; not stated	Unclear; not stated	Yes double blind	Yes double blind	No (≤ 20% dropouts)	Yes	Not stated	Yes
De Witte 1998	Adequate; computer generated	Unclear; not stated	Yes double blind	Yes double blind	Yes	Yes	Not stated	Yes
Delauney 1991	Unclear; not stated	Unclear; not stated	Yes double blind	Yes double blind	Yes	Yes	Not stated	Yes

Study	*Sequence Generation*	*Allocation Concealment*	*Outcome Assessor blinded*	*Patient Blinding*	*Attrition*	*Itt?*	*Power calculation*	*Baseline comparable*
Goto 1999	Unclear; not stated	Unclear; not stated	Not stated	Not stated	No (≤ 20% dropouts)	Yes	Not stated	Yes
Grover 2002	Partial; not stated	Unclear; not stated	Yes double blind	Yes double blind	Yes	Yes	Not stated	Yes
Holdcroft 1978	Unclear; random numbers	Unclear; not stated	Not stated	Not stated	Yes	Yes	Not stated	Yes
Hong 2005	Unclear; not stated	Partial; sealed envelopes	Yes double blind	Yes double blind	Yes	Yes	Yes	Yes
Horn 1997	Unclear; not stated	Unclear; not stated	Yes double blind	Yes double blind	Yes	Yes	Not stated	Yes
Horn 1998	Unclear; not stated	Unclear; not stated	Yes double blind	Yes double blind	Yes	Yes	Not stated	Yes
Ikeda 2001	Unclear; not stated	Unclear; not stated	Not stated	Not stated	Yes	Yes	Not stated	Yes
Kelsaka 2006	Unclear; not stated	Unclear; not stated	Yes double blind	Yes double blind	Yes	Yes	Yes	Yes
Kimberger 2007	Adequate; computer-generated random numbers	Partial; sealed opaque sequentially numbered envelopes	Yes double blind; impossible to blind to warm air treatment but midazolam/placebo blinded	Yes double blind	Yes	Yes	Yes	Yes

Study	*Sequence Generation*	*Allocation Concealment*	*Outcome Assessor blinded*	*Patient Blinding*	*Attrition*	*Itt?*	*Power calculation*	*Baseline comparable*
Kinoshita 2004	Unclear; not stated	Unclear; not stated	Yes double blind	Yes double blind	Yes	Yes	Not stated	Yes
Mao 1998	Unclear; not stated	Unclear; not stated	Yes double blind	Yes double blind	Yes	Yes	Not stated	Yes
Mathews 2002	Unclear; not stated	Adequate; sealed envelope	Yes double blind	Yes double blind	Yes	Yes	Not stated	Yes
Matsukawa 2001	Adequate; computer generated randomisation table	Unclear; not stated	Yes double blind	Yes double blind	Yes	Yes	Not stated	Yes
Mizobe 2005	Adequate; computer generated code	Adequate; sealed envelopes	Yes double blind	Yes double blind	Yes	Yes	Not stated	Yes
Piper 2002	Unclear; not stated	Adequate; closed envelopes	Yes double blind	Yes double blind	Yes	Yes	Yes	Yes
Piper 2004	Unclear; not stated	Partial; closed opaque envelopes	Yes double blind	Yes double blind	Yes	Unclear	Yes	Yes
Powell 2000	Unclear; not stated	Adequate; sealed envelope	Yes double blind	Yes double blind	Yes	Yes	Not stated	Not stated
Rohm 2005	Unclear; not stated	Partial; closed envelopes	Yes double blind	Yes double blind	Yes	Yes	Yes	Yes

Study	*Sequence Generation*	*Allocation Concealment*	*Outcome Assessor blinded*	*Patient Blinding*	*Attrition*	*Itt?*	*Power calculation*	*Baseline comparable*
Sagir 2007	Unclear; not stated	Adequate; sealed envelopes	Yes double blind	Yes double blind	Yes	Yes	Yes	Yes
Stapelfeldt 2005	Unclear; not stated	Adequate; sealed envelopes	Yes double blind	Yes double blind	Yes	Yes	Yes	Yes
Toyota 2004	Unclear; not stated	Unclear; not stated	Yes double blind	Yes double blind	Yes	Yes	Yes	Yes
Weinbroum 2001	Unclear; not stated	Unclear; not stated	Yes double blind	Yes double blind	Yes	Yes	Not stated	Yes

D2: RISK FACTORS: NON-PHARMACOLOGICAL

a) RCTs

Study	*Sequence Generation*	*Allocation Concealment*	*Outcome Assessor blinded*	*Attrition Itt?*	*Power calculation*	*Baseline comparable*
Danelli 2002	Adequate; random number sequence	Unclear	Unclear; stated that nurse blinded to aim of study	No	Yes	Yes mainly; comparable for age, gender, weight, height, blood loss, and crystalloid infusion. Duration of surgery was significantly longer in the laparoscopic group (mean difference 64 min)
Frank 1992	Unclear	Unclear	Unclear	No	Not stated	Yes mainly; comparable for age, body weight, and duration of surgery, theatre temperature, and surgeon. Crystalloid administration significantly greater in GA (p=0.01); blood transfusion also greater for GA but borderline significance (p=0.06). Allowed for in anova
Frank 1994	Unclear	Unclear	Unclear; epidural catheter used regardless of group	No	Not stated	Yes mainly; comparable for age, body weight, duration of surgery, OR and PACU ambient temp. Significantly different for crystalloid admin (p=0.01; more for GA)
Hendolin 1982	Unclear	Unclear	Unclear	No	Not stated	Yes; comparable for age, weight, height, BMI, ASA, cardiovascular state and medication (not significant differences); duration of surgery, IV fluid volume, urine output.

Study	*Sequence Generation*	*Allocation Concealment*	*Outcome Assessor blinded*	*Attrition Itt?*	*Power calculation*	*Baseline comparable*
Nakajima 2002	Unclear	Unclear	Unclear	No	Not stated	Yes; comparable for age, gender, height, weight, heart rate, arterial pressure, theatre temperature, fluids, sensory block, pre-induction temperature
Nguyen 2001	Unclear	Partial; sealed envelopes	No; not likely because assessors would know which operation	No (patients reassigned to new groups); 2 patients converted to laparotomy from laparoscopy; analysed as itt	Yes	Yes; comparable for age, gender, BMI, baseline temperature, and intraoperative fluid. Not comparable for duration of surgery (but related to intervention).
Steinbrook 1997	Adequate; coin toss	Unclear	Unclear	some (≤ 20% dropouts); overall 3/27 (11%) deviation from protocol	Not stated	Some comparable; comparable: height, blood loss, opioids, preoperative temperature. Not comparable for age, weight, intraoperative fluids (may not be significant difference).

b) Cohort studies

Study	*Temperature measurement*	*Representativeness*	*Cohort comparability*	*Patients per covariate*	*Source of population*	*Initial exposure*	*Loss to follow up*	*Sample size calculation*	*Overall comments*	*Evidence quality*
Abelha 2005; prospective study	Adequate (tympanic membrane)	Somewhat representative of the community	Acceptable: confounders taken into account in analysis (multivariate)	107 / 9 (=12)	Exposed / non-exposed from same cohort	Some patients had iph at start of study	Adequate: all patients followed up	Not stated / unclear	Forward conditional elimination in regression. Non-cardiac patients in ICU. Preoperative temperature: 36.37^{0}c (SD 0.49); range 35.0 to 38.6 (i.e. Some patients hypothermic by our definition but not by authors). 3 or 4 / 4 vital risk factors included; age and ASA partly included in saps ii. Warming 44% but in analysis	Low / moderate
Baker 1995; prospective study	Adequate (pulmonary artery)	Selected group eg specific operations	Confounding possible: not enough patients for multivariate analysis	56 / 13 (=4)	Exposed / non-exposed from same cohort	Unclear	Adequate: all patients followed up;	Not stated / unclear	Patient group specialised - normothermic cardiopulmonary bypass and blood temperature was kept at 37^{0}c. Too many variables.	Biased

Study	*Temperature measurement*	*Representativeness*	*Cohort comparability*	*Patients per covariate*	*Source of population*	*Initial exposure*	*Loss to follow up*	*Sample size calculation*	*Overall comments*	*Evidence quality*
Closs 1986; prospective study	Partially adequate (aural)	Somewhat representative of the community	Confounding possible : not enough factors included	31 / 3 (=10)	Exposed / non-exposed from same cohort	Unclear	Not stated;	Not stated / unclear	Restricted operations, but temperature monitoring at wrong time. Unclear what factors included but, of important ones, only age present.	Low
El-gamal 2000; prospective study	Adequate (tympanic membrane)	Somewhat representative of the community	Comparable at baseline apart from study risk factor	40 / 1 (=40)	Exposed / non-exposed from same cohort	No patients had iph at start of study	Adequate: all patients followed up;	Yes (and number met)	Comparable for ASA, height, weight, BMI, preoperative core temperature, duration of surgery, ambient OR temperature, ambient PACU temperature too few events for dichotomous (4); 40 patients for continuous, so ok. Orthopaedic operations only. Unlikely to have IPH at start (37.3 sem 0.1). Power calc required 15 per group	Moderate

Study	*Temperature measurement*	*Representativeness*	*Cohort comparability*	*Patients per covariate*	*Source of population*	*Initial exposure*	*Loss to follow up*	*Sample size calculation*	*Overall comments*	*Evidence quality*
Flores-maldonado 1997; prospective study	Adequate (tympanic membrane)	Somewhat representative of the community	Fairly acceptable: multivariate analysis with nearly enough patients (8-10 per covariate)	53 / 7 (=8)	Exposed / non-exposed from same cohort	Unclear	Adequate: all patients followed up;	Not stated / unclear	Study included children: mean 42 years, SD 20, range 5-90, i.e. May not be representative population.	Low / moderate
Frank 1992; prospective study	Partly adequate (sublingual well done)	Somewhat representative of the community	Confounding possible: some factors not comparable at baseline	97 / 9 (=11)	Exposed / non-exposed from same cohort	No patients had iph at start of study	Adequate: all patients followed up;	Not stated / unclear	Spinal anaesthesia for prostate surgery; 3 / 46 patients transferred to general anaesthesia because of failed epidural block - analysed as received. Possible confounding by type of analgesia	Low
Frank 2000; prospective study	Adequate (tympanic membrane)	Somewhat representative of the community	Confounding possible: not enough patients for multivariate analysis	44 / 6 (=7)	Exposed / non-exposed from same cohort	Unclear	Adequate: all patients followed up;	Not stated / unclear	Men undergoing spinal anaesthesia for prostate surgery.	Low / moderate

Study	*Temperature measurement*	*Representativeness*	*Cohort comparability*	*Patients per covariate*	*Source of population*	*Initial exposure*	*Loss to follow up*	*Sample size calculation*	*Overall comments*	*Evidence quality*
Hind 1994a; prospective study	Adequate (oesophageal)	Somewhat representative of the community	Confounding possible: not enough patients for multivariate analysis	30 / 5 (=6)	Exposed / non-exposed from same cohort	Unclear	Adequate: all patients followed up;	Not stated / unclear	1 of 2 regressions that fitted data; many correlations between 'independent' variables, i.e. some confounding (e.g. older patients first on list when theatre colder). 2 / 4 vital risk factors incl or constant (not ASA or duration)	Low
Hind 1994b; prospective study	Adequate (oesophageal)	Somewhat representative of the community	Confounding possible : not enough factors included	30 / 4 (=8)	Exposed / non-exposed from same cohort	Unclear	Adequate: all patients followed up;	Not stated / unclear	1 of 2 regressions that fitted data; many correlations between 'independent' variables, i.e. some confounding (e.g. older patients first on list when theatre colder). 1 / 4 vital risk factors including or constant (not age, ASA or duration)	Low

Study	*Temperature measurement*	*Representativeness*	*Cohort comparability*	*Patients per covariate*	*Source of population*	*Initial exposure*	*Loss to follow up*	*Sample size calculation*	*Overall comments*	*Evidence quality*
Kitamura 2000; prospective study	Adequate (tympanic membrane)	Somewhat representative of the community	Comparable at baseline apart from study risk factor	27 / 1 (=27)	Exposed / non-exposed from same cohort	Unclear	Adequate: all patients followed up;	Yes (and number not met)	Diabetes subgroup. Power calculation was for 15 patients per group. All groups comparable for age, BMI, IV fluid rate, duration of surgery, ambient temperature. Constant: type of anaesthesia. Sig diff for diastolic BP in tilt	Low / moderate
Kongsayreepong 2003; prospective study	Adequate (tympanic membrane)	Somewhat representative of the community	Fairly acceptable: multivariate analysis with nearly enough patients (8-10 per covariate)	105 / 12 (=9)	Exposed / non-exposed from same cohort	Some patients had iph at start of study	Acceptable: ≤20% loss to follow up; 10 / 194 (5%) patients deliberately excluded from analysis because they were children or hyperthermic	No	Regression method not stated. Non-cardiac surgery; patients in ICU. Preoperative core temp 37.0 (SD 0.7); range 34.5 to 39.3^{0}c (symmetrical non normal distribution. Age 15-93 years (ie some children). Risk factors not primary purpose of study so no sample size calculation. FAW 49%.	Low / moderate

Study	*Temperature measurement*	*Representativeness*	*Cohort comparability*	*Patients per covariate*	*Source of population*	*Initial exposure*	*Loss to follow up*	*Sample size calculation*	*Overall comments*	*Evidence quality*
Kurz 1995; prospective study	Adequate (oesophageal)	Somewhat representative of the community	Confounding possible : not enough factors included	40 / 5 (=8)	Exposed / non-exposed from same cohort	Unclear	Adequate: all patients followed up;	No	Colorectal surgery. 2 / 4 risk factors considered in multivariate analysis or held constant (duration of anaesthesia, type of anaesthesia). Age and ASA grade not considered.	Low
Lau 2001; prospective study	Not stated	Somewhat representative of the community	Acceptable: confounders taken into account in analysis (multivariate)	111 / 4 (=28)	Exposed / non-exposed from same cohort	Unclear	Acceptable: ≤20% loss to follow up; 2159 / 20918 (10%) had missing data	Yes (and number not met)	Very few covariates. Selected patients with operations lasting more than 2 hours. Limited to 2 months of operations. 13% patients under 15 years. 3 / 4 vital risk factors included (not duration of surgery, but all had >2h).	Moderate

Study	*Temperature measurement*	*Representativeness*	*Cohort comparability*	*Patients per covariate*	*Source of population*	*Initial exposure*	*Loss to follow up*	*Sample size calculation*	*Overall comments*	*Evidence quality*
Morris 1971; prospective study	Adequate (oesophageal)	Somewhat representative of the community	Comparable at baseline apart from study risk factor	20 / 1 (=20)	Exposed / non-exposed from same cohort	No patients had iph at start of study	Adequate: all patients followed up;	No	3 / 4 risk factors held constant: age and type of anaesthesia. Duration of surgery at least 2h and comparable for different theatre temperatures. Very small study and confounding is possible.	Low / moderate
Roberts 1994; retrospective study	Adequate (oesophageal)	Somewhat representative of the community	Confounded: other factors not comparable at baseline	not stated	Exposed / non-exposed from same cohort	No patients had iph at start of study	Adequate: all patients followed up;	Not stated / unclear	Nephrolithotomy. Retrospective. Univariate analysis, not allowed for confounders. Not comparable for duration of surgery and not allowed for in analysis.	Biased

Study	*Temperature measurement*	*Representativeness*	*Cohort comparability*	*Patients per covariate*	*Source of population*	*Initial exposure*	*Loss to follow up*	*Sample size calculation*	*Overall comments*	*Evidence quality*
Stewart 1998; prospective study	Adequate (intravesical)	Somewhat representative of the community	Confounded: two variables changed at once without allowance	107 / 2 (=54)	Exposed / non-exposed from same cohort	Unclear	Adequate: all patients followed up;	Yes (and number met)	Colorectal surgery. Anaesthesia and surgical method changed at same time - confounded. Significantly more IV fluids infused and blood loss for open group.	Biased
Vorrakitpokatorn 2006; prospective study	Adequate (pulmonary artery)	Somewhat representative of the community	Acceptable: confounders taken into account in analysis (multivariate)	72 / 4 (=18)	Exposed / non-exposed from same cohort	Unclear	Adequate: all patients followed up;	Not stated / unclear	Not many factors used in multivariate analysis, but 3 / 4 vital risk factors included or held constant (not ASA).	Moderate
Yamakage 2000; prospective study	Adequate (rectal)	Somewhat representative of the community	Confounding possible : not enough factors included	60 / 1 (=60)	Exposed / non-exposed from same cohort	No patients had iph at start of study	Adequate: all patients followed up;	Not stated / unclear	Selected operations (lumbar vertebrae). 2 / 4 risk factors included (age may have been taken into consideration in body fat calc and duration of anaesthesia effectively constant for this measurement)	Low

D3: PREOPERATIVE WARMING DEVICES

Study	*Sequence Generation*	*Allocation Concealment*	*Outcome Assessor blinded*	*Patient Blinding*	*Attrition*	*Itt?*	*Power calculation*	*Baseline comparable*
Camus 1995	Adequate; random numbers table	Unclear	Not stated; shivering was the only outcome that was blinded	Not stated	Unclear	Unclear	Not stated	Yes mainly; age, weight, height, initial core temperature. Preoperative ambient temperature higher in pre-warmed group.
Fossum 2001	Adequate; sealed packets with red or blue dots shuffled	Partial; sealed packets	Not stated	Not stated	Yes	Unclear	Not stated	Yes mainly; age, gender, type of surgery, ASA, initial temperature. Not stated: weight or BMI
Horn 2002	Adequate; computer generated	Partial; sequentially numbered opaque enveloped (not stated if sealed)	Not stated	Not stated	Yes	Unclear	Yes	Yes; comparable on age, weight, height, duration of surgery
Just 1993	Unclear	Unclear	Not stated; only shivering evaluated by a blinded observer	Not stated	Unclear	Unclear	Not stated	Yes; comparable on age, weight, height, or temperature, duration of surgery, volume of IV fluids, basal core temperature and administered opioids

Study	*Sequence Generation*	*Allocation Concealment*	*Outcome Assessor blinded*	*Patient Blinding*	*Attrition*	*Itt?*	*Power calculation*	*Baseline comparable*
Melling 2001	Partial; randomised in bl°c ks of 90	Partial; opaque envelopes	Not stated; blinding of outcome assessor at 2 to 6 weeks for wounds; but unclear re: measuring core temperature	Not stated	No (20% dropouts)	Yes	Yes	Yes; comparable on age, gender, BMI, type of surgery, prior surgery, initial core temperature, length of surgery, prophylactic abs, preoperative fasting, preoperative shaving, cancer diagnosis, seniority of surgeon
Sheng 2003 (1)	Unclear	Unclear	Not stated	Not stated	Unclear	Unclear	Not stated	Yes; groups comparable on height, weight and age.
Sheng 2003 (2)	Unclear	Unclear	Not stated	Not stated	Unclear	Unclear	Not stated	Yes mainly; groups matched in height, weight, age. But more women than men in treatment group

D4: INTRAOPERATIVE WARMING DEVICES

Study	*Sequence Generation*	*Allocation Concealment*	*Outcome Assessor blinded*	*Patient Blinding*	*Attrition*	*Itt?*	*Power calculation*	*Baseline comparable*
Baxendale 2007	Unclear	Unclear	Not stated	Not stated	Unclear	Unclear	No	Yes, but limited data; the authors reported groups were comparable in respect of age, BMI, intraoperative fluid requirements and duration of surgery
Bennett 1994	Unclear	Unclear	Not stated	Not stated	Unclear	Unclear	Not stated	Yes mainly; comparable in age, gender, body weight, height, OR temperature
Berti 1997	Partial; randomisation table	Unclear	Not stated	Not stated	Unclear	Unclear	Not stated	Yes; comparable on age, weight, height, duration of surgery, fluid infused
Borms 1994	Unclear	Unclear	Not stated	Not stated	Yes	Unclear	Not stated	Yes; comparable on age, gender, weight, kg, end-tidal isoflurane concentration, ambient temperature

Study	*Sequence Generation*	*Allocation Concealment*	*Outcome Assessor blinded*	*Patient Blinding*	*Attrition*	*Itt?*	*Power calculation*	*Baseline comparable*
Bourke 1984(study 1)	Unclear	Unclear	Not stated; nurse blinded to treatment assessed shivering in recovery room	Not stated	Unclear	Unclear	Not stated	Yes, but limited data; authors stated that patients comparable on age, weight, body surface area, ASA class, preoperative erative meds, anaesthetic technique, or room temperature , humidity. Numbers not provided.
Bourke 1984(study 2)	Unclear	Unclear	Not stated	Not stated	Unclear	Unclear	Not stated	Yes, but limited data; authors reported that there were no differences with respect to patient population, or environment or anaesthetic technique. Numbers not provided.
Camus 1993a	Unclear	Unclear	Not stated; shivering evaluated by an independent observer blinded to the treatment	Not stated	Yes	Unclear	Not stated	Yes; comparable on age, gender, weight, height, basal core temperature, or temperature, duration of anaesthesia, total dose of fentanyl, and infused fluids

Study	*Sequence Generation*	*Allocation Concealment*	*Outcome Assessor blinded*	*Patient Blinding*	*Attrition*	*Itt?*	*Power calculation*	*Baseline comparable*
Camus 1993b	Unclear	Unclear	Not stated; shivering evaluated by an independent observer blinded to the treatment	Not stated	Yes	Unclear	Not stated	Yes; comparable on age, gender, weight, height, basal core temperature, or temperature, duration of anaesthesia, total dose of fentanyl, and infused fluids
Camus 1997	Unclear	Unclear	Not stated; observer blinded to treatment assessed shivering	Not stated	Yes	Unclear	Not stated	Yes; comparable in age, weight, initial core temperature, duration of anaesthesia, OR temperature , IV fluids volume
Casati 1999	Unclear	Partial; sealed envelopes	Not stated; observer blinded to treatment assessed shivering, ponv and other undesirable side effects	Not stated	Yes	Unclear	Yes	Yes; age, weight, height, ASA, duration of surgery, blood loss, fluid infused and urine output
Dyer 1986	Unclear	Unclear	Not stated	Not stated	No (≤ 20% dropouts)	No	Not stated	Yes; comparable on age, weight, resection time, theatre temperature, spinal height, volume of infused fluids

Study	*Sequence Generation*	*Allocation Concealment*	*Outcome Assessor blinded*	*Patient Blinding*	*Attrition*	*Itt?*	*Power calculation*	*Baseline comparable*
Erickson 1991	Adequate; random number tables	Unclear	Not stated	Not stated	Yes	Unclear	Not stated	Yes; comparable on age, gender, BMI, duration of surgery, volume of infused fluids
Frank 1995	Unclear; stratified on type of surgery	Unclear	Not stated	Not stated	Yes	Unclear	Not stated	Yes; comparable on age, gender, height, weight, history of hypertension, diabetes, surgical procedures, anaesthetic types, preoperative beta-blocker
Frank 1997	Adequate; computer generated randomization sequence	Partial; opaque sealed envelope	Not stated	Not stated	Yes	Unclear	Not stated	Yes; comparable on age, gender, weight, height, ASA status, type of surgical procedure, history of MI and related cardiac, BP, diabetes, renal failure, preoperative erative medications
Harper 2007	Unclear	Inadequate; sealed envelopes	No single blind	No single blind	Yes	Yes	Not stated	Yes, but limited data; comparable on age, ASA status, volume of infused fluids.

Study	*Sequence Generation*	*Allocation Concealment*	*Outcome Assessor blinded*	*Patient Blinding*	*Attrition*	*Itt?*	*Power calculation*	*Baseline comparable*
Hinds holm 1992	Unclear	Unclear	Not stated	Not stated	Unclear	Unclear	Yes	Yes; comparable in age, weight, height, same anaesthetic technique, blood loss, infusion requirements, blood transfusions.
Hoyt 1993	Adequate; coin toss	Unclear	Not stated	Not stated	Unclear	Unclear	Not stated	Yes, but limited data; comparable on age, weight and height.
Hynson 1992	Unclear	Unclear	Not stated	Not stated	Unclear	Unclear	Not stated	Yes; groups comparable on age, weight, height, BSA, IV fluid
Joachimsson 1987	Unclear	Unclear	Not stated	Not stated	Yes	Unclear	Not stated	Yes; comparable on age, gender, weight, duration of surgery, room temperature , humidity, pre-induction temperature
Johansson 1999	Unclear	Adequate; sequentially numbered opaque sealed envelopes	No not blinded	No not blinded	No (≤ 20% dropouts)	Unclear	Yes	Yes; comparable on age, gender, weight, height, preoperative haemoglobin, pre-medication, fluids

Study	*Sequence Generation*	*Allocation Concealment*	*Outcome Assessor blinded*	*Patient Blinding*	*Attrition*	*Itt?*	*Power calculation*	*Baseline comparable*
Kabbara 2002	Adequate; computer generated random numbers table	Unclear; states 'sealed envelopes not used'	Not stated	Not stated	No (≤ 20% dropouts)	No	Yes	Yes mainly; comparable on age, weight, ASA status, anaesthesia time, surgery time, fluid balance. Significantly different in gender distribution. More women in usual care group. Significantly different in height.
Kamitini 1999	Unclear	Unclear	Not stated	Not stated	Yes	Unclear	Not stated	Yes; comparable on age, height, weight, ASA status, duration of surgery, dose of ephedrine, volume of infused fluids
Krenzischek 1995	Unclear	Partial; sealed opaque	Not stated	Not stated	Yes	Unclear	Not stated	Yes; comparable on age, gender, preoperative core temperature, weight, height, anaesthetic technique
Kurz 1995	Adequate; computer generated random numbers table	Unclear	Not stated; qualitative assessment made by an observer blinded to the patient(s)' group assignment and ct;	Not stated	Unclear	Unclear	Not stated	Yes; comparable on age, weight, height, gender, duration of surgery, IV fluids, administered fentanyl, end-tidal isoflurane

Study	*Sequence Generation*	*Allocation Concealment*	*Outcome Assessor blinded*	*Patient Blinding*	*Attrition*	*Itt?*	*Power calculation*	*Baseline comparable*
Kurz 1996	Adequate; computer generated	Partial; numbered sealed opaque envelopes (does not state if sequentially numbered)	Yes double blind; surgeons, or personnel and patient(s) not aware of FAW and fluid heater settings	Yes double blind	Yes	Yes	Yes	Yes; comparable on age, weight, height, gender, duration of surgery, IV fluids, administered fentanyl, end-tidal isoflurane
Kurz 1993a	Unclear	Unclear	Not stated	Not stated	Unclear	Unclear	Not stated	Yes; comparable in age, weight, height, infused volume, gender
Kurz 1993b	Unclear	Unclear	No not blinded	No not blinded	Unclear	Unclear	Not stated	Yes, but limited data; comparable on age, weight, height
Lee 2004	Adequate; random numbers table	Partial; opaque envelopes	Not stated	Not stated	No (≤ 20% dropouts)	Unclear	Yes	Yes; comparable on age, gender, BMI, duration of surgery
Lenhardt 1997	Adequate; computer generated random codes	Partial; sealed and numbered opaque envelopes	Yes double blind	Yes double blind	Yes	Yes	Yes	Yes; comparable on age, weight, height, gender, preoperative core temperature, duration of surgery

Study	*Sequence Generation*	*Allocation Concealment*	*Outcome Assessor blinded*	*Patient Blinding*	*Attrition*	*Itt?*	*Power calculation*	*Baseline comparable*
Leung 2007	Adequate; drawing lots	Unclear	Not stated	Not stated	Unclear	Unclear	Yes	Yes; comparable on age, BMI, preoperative temperature, duration of anaesthesia, surgery
Lindwall 1998	Unclear	Unclear	Not stated	Not stated	Yes	Unclear	Not stated	Yes, but limited data; comparable on age, ASA, weight, duration of operation, baseline core temperature
Mason 1998	Adequate; computer generated	Partial; numbered, sealed, opaque envelopes	Not stated; blinding for pacu observations (criteria for discharge, shivering) unaware of group assignment	Not stated	Unclear	Unclear	Not stated	Yes; matched on age, gender, weight, height, or temperature , PACU temperature , duration of surgery volume of IV fluid, duration of anaesthesia
Matsukawa 1994	Unclear	Unclear	Not stated	Not stated	Unclear	Unclear	Not stated	Yes; comparable: age, gender, height, weight, duration of surgery, room temperature
Matsuzaki 2003	Partial; computer-generated codes	Partial; sequentially numbered opaque envelopes	No not blinded	No not blinded	Yes	Yes	Not stated	Yes; comparable on age, gender, weight, BMI, preoperative core temperature

Study	*Sequence Generation*	*Allocation Concealment*	*Outcome Assessor blinded*	*Patient Blinding*	*Attrition*	*Itt?*	*Power calculation*	*Baseline comparable*
Mogera 1997	Inadequate; patients randomised after establishment of balanced anaesthesia	Unclear	Not stated	Not stated	Unclear	Unclear	Not stated	Yes; comparable on age, gender, weight, height, duration of anaesthesia, volume of infused fluids
Motamed 2000	Partial; computer-generated list of random numbers	Unclear	Not stated	Not stated	No (≤ 20% dropouts)	Unclear	Yes	Yes; comparable in age, sex, weight, height, duration of surgery and anaesthesia, room temperature
Muller 1995	Unclear	Unclear	Not stated	Not stated	Unclear	Unclear	Not stated	Yes, but limited data; comparable on age, weight, height
Negishi 2003	Adequate; computer generated codes	Adequate; sequentially numbered opaque envelopes	Not stated	Not stated	Unclear	Unclear	Not stated	Yes; age, sex, weight, BMI, surgical duration, ambient temperature, SpO_2, mean arterial pressure
Ng 2006	Adequate; drawing lots	Unclear	Not stated	Not stated	Yes	Unclear	Yes	Yes; comparable on age, gender, BMI, preoperative core temperature, duration of surgery, duration of tourniquet, duration of anaesthesia, volume of infused fluids

Study	*Sequence Generation*	*Allocation Concealment*	*Outcome Assessor blinded*	*Patient Blinding*	*Attrition*	*Itt?*	*Power calculation*	*Baseline comparable*
Ouellette 1993	Unclear	Unclear	Not stated	Not stated	Unclear	Unclear	Not stated	Yes; comparable on age, weight, fluids, anaesthesia time
Radel 1986	Unclear	Unclear	Not stated	Not stated	Yes	Unclear	Not stated	Yes, but limited data; authors reported patients had similar demographics.
Radford 1979	Unclear	Unclear	Not stated	Not stated	Unclear	No	No	Yes, but limited data; sex, age, theatre temperature, intracranial pathology, use of halothane and tirmtaphan.
Rasmussen 1998	Unclear	Unclear	Not stated	Not stated	Unclear	Unclear	Not stated	Yes; comparable on age, weight, height, BMI, gender, IV fluids used, fluid balance, RT or cvp.
Russell 1995	Unclear	Partial; sealed envelopes	Not stated	Not stated	Unclear	Unclear	Not stated	Yes; comparable on age, sex, height, weight, blood transfused and duration of surgery

Study	*Sequence Generation*	*Allocation Concealment*	*Outcome Assessor blinded*	*Patient Blinding*	*Attrition*	*Itt?*	*Power calculation*	*Baseline comparable*
Scott 2001	Partial; bl°c k randomisation system	Partial; opaque envelopes	Not stated; outcome assessors assessing pressure ulcers blinded to treatment	Not stated	Yes	Yes	Yes	Yes; comparable on age, gender, BMI, preoperative temperature, type of anaesthetic, ASA status, surgical category, oral steroids, peripheral vascular disease, heart disease, diabetes, tobacco use.
Sheng 2003 (1)	Unclear	Unclear	Not stated	Not stated	Unclear	Unclear	Not stated	Yes; groups comparable on height, weight and age.
Smith 1994	Adequate; computer generated random number sequence	Unclear	Not stated; presence or absence of shivering	Not stated	Yes	Unclear	Not stated	Yes; comparable on age, gender, weight, height, ASA, duration of surgery, body surface area
Smith 1994a	Adequate; computer generated random number sequence	Unclear	Not stated; presence or absence of shivering	Not stated	Yes	Unclear	Not stated	Yes; comparable on age, gender, weight, height, ASA, duration of surgery, body surface area

Study	*Sequence Generation*	*Allocation Concealment*	*Outcome Assessor blinded*	*Patient Blinding*	*Attrition*	*Itt?*	*Power calculation*	*Baseline comparable*
Tøllofsrud 1984a	Unclear	Unclear	Not stated	Not stated	Unclear	Unclear	Not stated	Yes, but limited data; comparable on age, weight
Tøllofsrud 1984b	Unclear	Unclear	Not stated	Not stated	Unclear	Unclear	Not stated	Yes, but limited data; comparable on age, weight
Torrie 2005	Adequate; random number table	Partial; opaque envelopes	Not stated	Not stated	No (≤ 20% dropouts)	No	Yes	Yes; comparable on age, BMI, initial oral temperature, block height, sedation, volume of irrigation fluid, duration of surgery
Whitney 1990	Adequate; random numbers table	Unclear	Not stated	Not stated	Unclear	Unclear	Not stated	Yes; age, weight, height, baseline core temperature, mean volume of IV fluid infused during 1st hour, mean time from induction to skin incision, mean time from skin incision to peritoneal incision

Study	*Sequence Generation*	*Allocation Concealment*	*Outcome Assessor blinded*	*Patient Blinding*	*Attrition*	*Itt?*	*Power calculation*	*Baseline comparable*
Winkler 2000	Adequate; computer generated random numbers table	Partial; sealed envelopes	Not stated; observations weighing gauze sponges and calculating blood recovered by rbc scavenging system blinded to group assignment	Not stated	Yes	Yes	Yes	Yes; comparable on age, gender, weight, height, ASA physical status, duration of surgery, patients with or without CV disease under or over 65 years of age.
Wong 1997	Adequate; computer generated random numbers	Partial; sealed opaque envelopes	Not stated; blinded for assessment of surgical wounds and complications daily during hospitalization and 6-8wks post	Not stated	Yes	Yes	Yes	Yes mainly; comparable on age, gender, BMI, ASA, duration of surgery, IV fluids
Yamakage 1995	Unclear	Unclear	Not stated	Not stated	Unclear	Unclear	Not stated	Yes, but limited data; comparable in age, gender, weight, height

D5: PRE AND INTRA OPERATIVE WARMING DEVICES

Study	*Sequence Generation*	*Allocation Concealment*	*Outcome Assessor blinded*	*Patient Blinding*	*Attrition*	*Itt?*	*Power calculation*	*Baseline comparable*
Bock 1998	Unclear	Unclear	Not stated; independent anaesthetist assessed blood loss; anaesthetist blinded to treatment assessed shivering in pacu	Not stated	Yes	No	Not stated	Yes; comparable on age, gender, height, weight, length of operation, intraoperative fluid volume, fentanyl dose
Buggy 1994	Unclear	Unclear	Nursing staff blinded to intervention; assessed shivering		Yes	Unclear	Not stated	Yes, but limited data; age, gender, duration of surgery - comparable
Horn 2002	Adequate; computer generated	Partial; sequentially numbered opaque enveloped (not stated if sealed)	Not stated	Not stated	Yes	Unclear	Yes	Yes; comparable on age, weight, height, duration of surgery
Janiciki 2001	Unclear	Unclear	Not stated	Not stated	Yes	Unclear	Yes	Yes; comparable on age, weight, height

Study	*Sequence Generation*	*Allocation Concealment*	*Outcome Assessor blinded*	*Patient Blinding*	*Attrition*	*Itt?*	*Power calculation*	*Baseline comparable*
Janiciki 2002	Adequate; computer generated	Unclear	Not stated	Not stated	Yes	Unclear	Yes	Yes; comparable on age, weight, height
Wong 1997	Adequate; computer generated random numbers	Partial; sealed opaque envelopes	Not stated; blinded for assessment of surgical wounds and complications daily during hospitalization and 6-8 weeks post	Not stated	Yes	Yes	Yes	Yes mainly; comparable on age, gender, BMI, ASA, duration of surgery, IV fluids
Wongorasarts uk 1998	Unclear	Unclear	Not stated	Not stated	No (20% dropouts)	No	Yes	Yes; comparable in age, weight, height, duration of surgery, baseline temperature

D6: INTRAOPERATIVE PHASE: FLUID WARMING

Study	*Sequence Generation*	*Allocation Concealment*	*Outcome Assessor blinded*	*Patient Blinding*	*Attrition*	*Itt?*	*Power calculation*	*Baseline comparable*
Camus 1996	Unclear	Unclear	Not stated; shivering evaluated at 5-min interval by an independent observer blindd to the treatment.	Not stated	Unclear	Unclear	Not stated	Yes; comparable on age, sex, weight, height, OR temperature,duration of anaesthesia, volume of infused fluids, infusion rate & dose of anaesthesia
Cooper 1994	Unclear	Unclear	Not stated	Not stated	Unclear	Unclear	Not stated	Not stated
Dyer 1986	Unclear	Unclear	Not stated	Not stated	Unclear	Unclear	Not stated	Yes; comparable on age, weight, theatre temp, and volume of infused fluids, spinal height and resection time.
Ellis-stoll 1996	Unclear	Unclear	Not stated	Not stated	No (≤ 20% dropouts)	No	No	Not stated; study reported the groups did not differ signifcantly in any demographic factors and comparable surgical time

Study	*Sequence Generation*	*Allocation Concealment*	*Outcome Assessor blinded*	*Patient Blinding*	*Attrition*	*Itt?*	*Power calculation*	*Baseline comparable*
Hasankhani 2005	Partial; coin toss	Unclear	Not stated; post-operative data assessed by nurse unaware of treatement group	Not stated	No (≤ 20% dropouts)	Unclear	Not stated	Yes; comparable on age, sex, weight, height, duration of surgery, infused fluids, or temperature
Jaffe 2001	Unclear	Unclear	Yes double blind	Yes double blind	Unclear	Unclear	Not stated	Yes, but limited data; comparable on age, time in or, baseline core temperature, volume of infused fluids
Kelly 2000	Adequate; random numbers table	Unclear	Not stated	Not stated	No (≤ 20% dropouts)	No	Not stated	Yes, but limited data; comparable on age, weight, gender surgical time, volume of IV fluids, volume of irrigation fluids
Kurz 1996	Adequate; computer generated	Partial; numbered sealed opaque envelopes (does not state if sequentially numbered)	Yes double blind; surgeons, or personnel and pts not aware of FAW and fluid heater settings	Yes double blind	Yes	Yes	Yes	Not stated

Study	*Sequence Generation*	*Allocation Concealment*	*Outcome Assessor blinded*	*Patient Blinding*	*Attrition*	*Itt?*	*Power calculation*	*Baseline comparable*
Monga 1996	Unclear	Unclear	Not stated	Not stated	Yes	Unclear	Not stated	Not stated; study did report that patients receiving warmed irrigation fluids were older than those receiving cold fluids (73.4 vs 67.5years; p=0.004)
Moore 1996	Partial; table of random numbers	Unclear	Not stated	Not stated	No (≤ 20% dropouts)	No	Not stated	Yes mainly; comparable on age, BMI,OR temp, total IV, CO_2 used to maintain pneumoperitoneum, length of anaesthesia & surgery sig diff in volume of irrigation fluids.
Motamed 1998	Unclear	Unclear	Yes double blind; does not provide any additional expect those assigned to 'measure outcome were not aware of group	Yes double blind	Unclear	Unclear	Not stated	Yes; comparable of age, gender, height, duration of surgery, blood loss, IV fluids, intraoperative anaesthesia; weight greater in control; post-operative bupivacaine more in control group

Study	*Sequence Generation*	*Allocation Concealment*	*Outcome Assessor blinded*	*Patient Blinding*	*Attrition*	*Itt?*	*Power calculation*	*Baseline comparable*
Muth 1996	Inadequate; patients' day of surgery; i.e. Odd or even number	Unclear; likely to be inadequate	Not stated	Not stated	Unclear	Unclear	Not stated	Yes; comparable on age, weight, height, duration of surgery, total fluid replacement
Patel 1996	Partial; random numbers table	Unclear	No not blinded; assessed by nurse blinded to treatment group.	No not blinded	No (≤ 20% dropouts)	Unclear	Not stated	Yes mainly; comparable on height, weight, ASA, gender; but flotem patients younger than hotline group
Patel 1997	Unclear	Unclear	Not stated	Not stated	Unclear	Unclear	Not stated	Yes mainly
Pit 1996	Unclear	Unclear	Yes single blind; pt unaware of treatment until post-operative	Yes single blind	Yes	Unclear	Not stated	Yes, but limited data; age
Schmeid 1996	Partial; computer generated code	Partial; sequentially numbered opaque envelopes	Not stated	Not stated	Unclear	Yes	Yes	Yes; comparable on age, weight, gender, height, duration of surgery, isoflurane, mean arterial BP, heart rate, end tidal PCO_2.

Study	*Sequence Generation*	*Allocation Concealment*	*Outcome Assessor blinded*	*Patient Blinding*	*Attrition*	*Itt?*	*Power calculation*	*Baseline comparable*
Smith 1998	Unclear	Unclear	Not stated; post-operative erative data recorded by pacu nurse blinded to treatment	Not stated	Yes	Unclear	Not stated	Yes; age, weight, height, anaesthesia time, blood loss, room temperature, surgery time
Smith 1998b	Adequate; random numbes table	Unclear	Not stated	Not stated	No (≤ 20% dropouts)	Yes	No	Yes; age, gender, height, weight, duration of anaesthesia & surgery longer in the FAW+warmed fl;
Steinbrook 1997	Partial; coin toss	Unclear	Not stated	Not stated	No (≤ 20% dropouts)	No	Not stated	Yes; comparable on age, weight, total-body O_2 consumption, opiods;
Zhao 2005	Unclear	Unclear	Not stated; shivering evaluated by an independent observer blinded to treatment	Not stated	Yes	Unclear	Not stated	Yes; comparable on age, body weight, duration of surgery and volume of IV

D7: INTRAOPERATIVE PHASE: GASES

Study	*Sequence Generation*	*Allocation Concealment*	*Outcome Assessor blinded*	*Patient Blinding*	*Attrition*	*Itt?*	*Power calculation*	*Baseline comparable*
Bäcklund 1998	Unclear	Unclear	Not stated; blinded to pneuoperitoneum temp assessed post-operative pain	Not stated	Unclear	Unclear	Not stated	Yes; comparable on age, weight, BMI, gender, duration of operation, volume of infused fluids; significanlty higher volume of insufflated CO_2 in control group; & lower number of patients given mannitol
Champion 2006	Unclear	Unclear	Yes double blind; nurses blined to allcoation recorded the subjective pain score	Yes double blind	Yes	Unclear	Not stated	Yes, but limited data; age, sex, BMI,
Conahan 1987	Unclear	Unclear	Not stated; nuse unaware of treatment a patient had received; assesed shivering and patient's perception of cold	Not stated	Unclear	Unclear	Not stated	Yes, but limited data; comparable mainly on age, weight, anaesthesia time, or temperature, recovery room temperature

Study	*Sequence Generation*	*Allocation Concealment*	*Outcome Assessor blinded*	*Patient Blinding*	*Attrition*	*Itt?*	*Power calculation*	*Baseline comparable*
Eckerrbom 1990	Unclear	Unclear	No not blinded	No not blinded	Unclear	Unclear	Not stated	Yes, but limited data; comparable on age, body weight, ventilation(l/min)
Farley 2004	Partial; computer model	Unclear	Yes double blind; all personnel blinded to treatment.	Yes double blind	No (≤ 20% dropouts)	No	Yes	Yes, but limited data; age, gender, BMI, pts w/LAD,COPD, MI
Goldberg 1992	Adequate; computer generated random table	Unclear	Not stated; assessing sublingual temp, shivering, perception of cold	Not stated	Yes	Unclear	Not stated	Yes; comparable on age, ASA, weight, duration of surgery, fluids, amount of IV anesthetics administered, OR and PACU temp
Hamza 2005	Adequate; computer generated random numbers	Unclear	Yes double blind; 2 pts in control grp excl from analysis as FAW applied	Yes double blind	No (≤ 20% dropouts)	No	Yes	Yes; comparable on age, weight, gender, anaesthesia, time, surgery time, insufflation time, IV and irrigation fluids, urine output, OR and PACU temp and humidity

Study	*Sequence Generation*	*Allocation Concealment*	*Outcome Assessor blinded*	*Patient Blinding*	*Attrition*	*Itt?*	*Power calculation*	*Baseline comparable*
Hynson 1992	Unclear	Unclear	Not stated	Not stated	Yes	Yes	Not stated	Yes; comparable on age, weight, height, bsa, gender, volume of IV fluids, ambient temperature
Johansson 2003	Unclear	Unclear	No not blinded	No not blinded	Yes	Unclear	Not stated	Yes, but limited data; comparable on age, weight and gender
Mouton 1999	Unclear	Unclear	Not stated	Not stated	Yes	Unclear	Not stated	Not stated; paper reported that there was no difference in terms of age, gender, previous abdominal surgery, intraoperative analgesics& narcotics.
Nelskylä 1999	Unclear	Unclear	Yes double blind	Yes double blind	No (≤ 20% dropouts)	No	Not stated	Yes; comparable on age, weight, duration of surgery & anaesthesia, volume of insufflation & irrigation gas, time from induction of anaesthesia to start of surgery

Study	*Sequence Generation*	*Allocation Concealment*	*Outcome Assessor blinded*	*Patient Blinding*	*Attrition*	*Itt?*	*Power calculation*	*Baseline comparable*
Nguyen 2002	Unclear	Partial; sealed envelopes	Not stated	Not stated	Unclear	Unclear	Yes	Yes; comparable on age, gender, volume of gas, duration of surgery, baseline core temperature
Ott 1998	Unclear	Unclear	Yes double blind	Yes double blind	Unclear	Unclear	Not stated	Not stated; stated no statistically significant diff between groups in demographic info.
Saad 2000	Unclear	Unclear	Not stated	Not stated	Unclear	Unclear	Yes	Yes; comparable on age, gender, weight, height, duration of surgery, volume of gas, baseline core temperature, volume of rinse solution

Study	*Sequence Generation*	*Allocation Concealment*	*Outcome Assessor blinded*	*Patient Blinding*	*Attrition*	*Itt?*	*Power calculation*	*Baseline comparable*
Savel 2005	Unclear	Unclear	Yes double blind; all clinicians blinded to group assignment.	Yes double blind	Unclear	Unclear	Yes	Yes mainly; comparable in age, gender, BMI, preoperative core temperature, medical co-morbities (incl diabetes, hypertension, known CAD, ostructive sleep apena); duration of surgery longer in usual care group
Slim 1999	Partial; random numbers	Partial; sealed envelopes	Yes double blind	Yes double blind	No (≤ 20% dropouts)	Unclear	Yes	Yes; comparable on age, gender, BMI, type of surgery, duration of procedure,volume of gas
Stone 1981	Unclear	Unclear	No not blinded	No not blinded	Yes	Unclear	Not stated	Yes, but limited data; group comparable age, weight, ASA, preoperative temperature,

Study	*Sequence Generation*	*Allocation Concealment*	*Outcome Assessor blinded*	*Patient Blinding*	*Attrition*	*Itt?*	*Power calculation*	*Baseline comparable*
Tølløfsrud 1984a	Unclear	Unclear	No not blinded	No not blinded	Yes	Unclear	Not stated	Not stated
Tølløfsrud 1984b	Unclear	Unclear	No not blinded	No not blinded	Yes	Yes	Not stated	Not stated
Wills 2001	Adequate; random number table	Adequate; sequentially numbered opaque sealed envelopes	Yes double blind; pain	Yes double blind	No (≤ 20% dropouts)	Unclear	Yes	Yes, but limited data; comparable on age, gender, BMI
Youngberg 1985	Unclear	Unclear	No not blinded	No not blinded	Unclear	Unclear	Not stated	Not stated

D8: PHARMACOLOGICAL AGENTS -PREVENTION

Study	*Sequence Generation*	*Allocation Concealment*	*Outcome Assessor blinded*	*Patient Blinding*	*Attrition*	*Itt?*	*Power calculation*	*Baseline comparable*
Ikeda 1999	Adequate; computer-generated codes	Unclear; not stated	Yes single blind	Yes single blind	Yes	Yes	Not stated	Yes
Mizobe 2006	Adequate; computer generated	Partial; sealed envelopes	Yes double blind	Yes double blind	Yes	Yes	Not stated	Yes
Mohamed 2005	Unclear; not stated	Unclear; not stated	Not stated	Not stated	Yes	Yes	Not stated	Yes
Piper 2000	Unclear; not stated	Unclear; not stated	Yes double blind	Yes double blind	Yes	Yes	Yes	Yes
Piper 2001	Unclear; not stated	Unclear; not stated	Yes double blind	Yes double blind	Yes	Yes	Not stated	Yes
Sahin 2002	Unclear; not stated	Unclear; not stated	Yes double blind	Yes double blind	Yes	Yes	Not stated	Yes

Study	*Sequence Generation*	*Allocation Concealment*	*Outcome Assessor blinded*	*Patient Blinding*	*Attrition*	*Itt?*	*Power calculation*	*Baseline comparable*
Sellden 1994	Quasi-randomised (alternate)	Inadequate	Yes double blind	Yes double blind	Yes	Yes	Not stated	Yes
Sellden 1996	Unclear; groups a and c apparently randomised; group b added later (not randomised)	Unclear; not stated	No not blinded	No not blinded	Yes	Yes	Not stated	Yes
Sellden 1999	Inadequate; alternate	Unclear; not stated	No not blinded	No not blinded	Yes	Yes	Not stated	Yes
Umenai 2006	Adequate; computer generated	Partial; sealed envelopes	Yes double blind	Yes double blind	No (>20% dropouts)	Yes	Yes	Yes
Widman 2002	Unclear; not stated	Adequate; sealed envelopes	Yes double blind	Yes double blind	Yes	Yes	Yes	Yes

D9: TREATMENT: WARMING DEVICES

Study	*Sequence Generation*	*Allocation Concealment*	*Outcome Assessor blinded*	*Patient Blinding*	*Attrition*	*Itt?*	*Power calculation*	*Baseline comparable*
Alfonsi 2003	Adequate; computer generated codes	Partial; sequentially numbered, opaque envelopes	No not blinded; outcome assessor blinded for shivering, not for pain and cold	No not blinded	Yes	Yes	Yes	Yes; comparable: age, height, weight, operation type, surgery duration, anaesthetic, intraoperative CV response, core temperature at end of surgery, ambient temperature
Bräuer 2004 (indirect)	Unclear	Unclear	Not stated; assessor probably not blinded. Patient may be blinded for some outcomes because sedated.	Not stated	Yes	Yes	Not stated	Yes; comparable for age, gender, weight, height, infusions, sedation and meperidine. Initial temperature not stated.
Bredahl 1995	Unclear	Unclear	No not blinded; probably not blinded. Measurements every 15 min	No not blinded	Yes	Yes	Yes	Yes; comparable for: age, gender, weight, anaesthetic type (general/regional); PACU temperature; operation site; duration of surgery, IV infusions, and initial temperature.

Study	*Sequence Generation*	*Allocation Concealment*	*Outcome Assessor blinded*	*Patient Blinding*	*Attrition*	*Itt?*	*Power calculation*	*Baseline comparable*
Giuffre 1991	Adequate; shuffled piles of envelopes; stratified by gender	Unclear	No not blinded; assessor probably not blinded	No not blinded	Yes	Yes	Not stated	Yes; comparable for age, gender, admitting temperature, duration of anaesthesia, volume intraoperative fluid.
Hershey 1997	Adequate; random number table	Unclear; investigator opened an envelope, but possible 3rd party randomised	No not blinded; outcome assessor also opened envelopes	No not blinded	No (≤ 20% dropouts)	Unclear	Yes	Yes, but limited data; comparable for age, presence of endotracheal tube, admission BP. Not comparable for time in or (group 3 mean 184min, group 2: 233min; group 1: 201min)
Jackson 1997	Unclear	Unclear	No not blinded; investigators stated not to be blinded	No not blinded	Yes	Yes	Not stated	Yes, but limited data; comparable for age, gender, admission core temperature
Karayan 1996	Unclear	Unclear	Not stated	Not stated	Unclear	Unclear	Not stated	Yes; comparable in age, duration of anaesthesia, duration of surgery, blood loss, infused volume of solutions, OR temperature

Study	*Sequence Generation*	*Allocation Concealment*	*Outcome Assessor blinded*	*Patient Blinding*	*Attrition*	*Itt?*	*Power calculation*	*Baseline comparable*
Lennon 1990	Unclear	Partial; sealed envelope	No not blinded	No not blinded	Yes	Yes	Not stated	Yes, but limited data; comparable for age, height, weight, oral temperature on admission to recovery room.
Stevens 2000	Inadequate; 1st patient by coin flip, then alternation	Inadequate; alternation	Not stated; assessor unlikely to be blinded	Not stated	No (≤ 20% dropouts)	Unclear	Not stated	Yes mainly; comparable for: age, gender, length of operation, use of muscle relaxants, use of warmed IV fluids. Not comparable for proportion of orthopaedic patients (more in control group: 3.6 vs 13.2%).
Summers 1990	Adequate; coin toss	Unclear	No not blinded; assessors unlikely to be blinded	No not blinded	Yes	Yes	Not stated	Yes mainly; similar for age, gender, OR temperature. Not comparable for length of time in OR (Bair Hugger longer by 35 min; significant difference in temperature on arrival in PACU (0.38^{O}c lower for intervention)

Study	*Sequence Generation*	*Allocation Concealment*	*Outcome Assessor blinded*	*Patient Blinding*	*Attrition*	*Itt?*	*Power calculation*	*Baseline comparable*
Vanni 2003	Unclear	Partial; sealed envelope	Not stated; blinding for shivering in post-operative period	Not stated	Unclear	Unclear	Not stated	Yes; comparable: age, weight, height, BMI, core body temperature, preinduction or temperature, final or temperature, duration of surgery and volume of IV fluids.
Weyland 1994	Unclear	Unclear	No not blinded; unlikely to be blinded	No not blinded	Yes	Yes	Not stated	Yes; comparable for: age, gender, weight, height, volume of infusions given post-operative, intraoperative amount of opioids and sedatives, post-operative total dose of propofol; initial temperature not stated

APPENDIX E: EXCLUDED STUDIES - TABLES AND REFERENCES

E1: RISK FACTORS

Study	Reason for exclusion
Abd El-Hakeem 2003	Indirect population: patients had undergone cardiopulmonary bypass under therapeutic hypothermia
Baxendale 1994	Shivering only outcome measure
Beaussier 1998	Not intervention under study
Bernard 1998	Not surgery
Bilotta 2001	Not IPH
Caverni 2005	Not measuring core temperature
Chen 1991	Shivering only outcome measure
de Witte 1996	Not intervention under study
Generali 2005	Review not primary data
Hartley 1989	Not measuring core temperature
Harwood 1995	Not intervention under study
Holm 1997	Not IPH

Study	Reason for exclusion
Horn 1999	Not IPH
Khosravi 2002	Not measuring core temperature
Kranke 2004	Review not primary data
Kudoh 2004	Not RCT
Kurz 1997	Healthy subjects
Launo 2004	Not measuring core temperature
Nicolaou 1997	Volunteers
Quintin 1991	Not intervention under study
Sevarino 1989	Indirect population: pregnant women undergoing Caesarean section
Vogelsang 1989	Not measuring core temperature

E2: CONSEQUENCES OF INADVERTENT PERIOPERATIVE HYPOTHERMIA

Study	Reason for exclusion
Agrawal 2003	Cohort study with no multivariate regression to adjust for confounding variables.
Barone 1999	Cohort study with no multivariate regression to adjust for confounding variables.
Bernabei 1992	Cohort study with multivariate regression but not for relevant outcomes.
Bush Jr 1995	Cohort study. Included for mortality and length of stay but no multivariate analysis for morbid cardiac events.
Conahan 1987	All patients were hypothermic at the point of entrance to PACU.
Cory 1998	Cohort study with no multivariate regression to account for confounding variables. Study sample included children.
Edwards 2003	Cohort study with no multivariate regression to adjust for confounding variables.
Gentilello 1997	Patients were hypothermic at baseline and not all had surgery.
Janczyk 2004	Cohort study. Included for mortality but there was no multivariate analysis for blood transfusion outcome.
Melling 2006	Did not provide one hypothermic and one normothermic group when applying our definition of hypothermia.
Nguyen 2002	All patients were hypothermic at baseline.

Study	Reason for exclusion
Panagiotis 2005	Cohort study with no multivariate regression to adjust for confounding variables.
Paterson 1999	It was a cohort study. Multivariate regression was for CMV infection and no other relevant outcomes. CMV infection only relevant in immuocompromised patients.
Schmied 1998	Neither intra-operative nor post-operative core temperature was reported.
Slotman 1985	Cohort study with no multivariate regression to adjust for confounding variables.
Wong 2007	Did not provide one hypothermic and one normothermic group when applying our definition of hypothermia.

E3: PREOPERATIVE WARMING DEVICES

Study	Reason for exclusion
Giesbrecht 1994	Volunteers; skin temperature outcome
Glosten 1993	Volunteers
Grief 2000	Resistive heating versus thermal insulation; Volunteers
Hynson 1993	Volunteers
Taguchi 2004	Volunteers actively cooled and subsequently warmed

E4: INTRAOPERATIVE WARMING DEVICES

Study	Reason for exclusion
Goll 1997	Fluid warming versus usual care; abstract only
Kulkarni 1995	GDG agreed that oesophageal exchange heater not common practise within the UK
Leben 1996	Warming in polytraumatic patients following hospital admission; but patients not undergoing surgery
Marker 1997	Forced air warming versus usual care; duration of postoperative recovery; abstract only
McGuire 1993	Abstract; volunteers
Schroeder 1999	Paper in foreign language(German); Forced air warming versus usual care; warmed IV fluids in both arms
Taguchi 2004	Forced air warming versus circulating water garment; volunteers
Tschernich 1996	Trial on wound infection and duration of hospitalisation following IPH; abstract only

E5: PRE AND INTRA OPERATIVE WARMING DEVICES

There were no excluded studies for this review

E6: ADVERSE EFFECTS OF WARMING DEVICES

There were no excluded studies for this review

E7: INTRAOPERATIVE PHASE: FLUID WARMING

Study	Reason for exclusion
Heathcote 1986	Non-randomised
McCarroll 1986	Indirect evidence on warming intravenous fluids
Smith 1999	Indirect evidence on warming intravenous fluids

E8: INTRAOPERATIVE PHASE: GASES

Study	Reason for exclusion
Bickler 1990	Comparing types of heat and moisture exchangers
Conahan 1987	Provided oral temperature results
Deriaz 1992	Paper in foreign language (French).
Huntington 1997	Measured heat loss
Jacobs 1999	Non-randomised study design
Linko 1984	Non-randomised study design
Ralley 1984	Cardipulmonary bypass patients

E9: PHARMACOLOGICAL AGENTS -PREVENTION

Study	Reason for exclusion
Abd El-Hakeem 2003	Indirect population: patients had undergone cardiopulmonary bypass under therapeutic hypothermia
Alfonsi 1995	Treatment of hypothermia not prevention
Baxendale 1994	Shivering only outcome measure
Beaussier 1998	Not intervention under study
Bilotta 2001	Not IPH
Chen 1991	Shivering only outcome measure
de Witte 1996	Not intervention under study
Generali 2005	Review not primary data
Harwood 1995	Not intervention under study
Hirose 1995	Drug not being used to prevent hypothermia
Holm 1997	Not IPH
Horn 1999	Not IPH
Kranke 2004	Review not primary data
Kudoh 2004	Not RCT
Nalda 1985	Drug not being used to prevent hypothermia

Study	Reason for exclusion
Quintin 1991	Not intervention under study
Sarma 1991	Drug not being used to prevent hypothermia
Sevarino 1989	Indirect population: pregnant women undergoing Caesarean section
Terasako 2000	Drug not being used to prevent hypothermia
Wrench 1997	Drug not being used to prevent hypothermia

E10: TREATMENT: WARMING DEVICES

Study	Reason for exclusion
Goll 1997	Fluid warming versus usual care; abstract only
Huang 2003	Non randomised
Kulkarni 1995	GDG agreed that oesophageal exchange heater not common practise within the UK
Leben 1996	Warming in polytraumatic patients following hospital admission; but patients not undergoing surgery
Marker 1997	Forced air warming versus usual care; duration of postoperative recovery; abstract only
McGuire 1993	Abstract; volunteers
Schroeder 1999	Paper in foreign language(German); Forced air warming versus usual care; warmed IV fluids in both arms
Taguchi 2004	Forced air warming versus circulating water garment; volunteers
Tschernich 1996	Trial on wound infection and duration of hospitalisation following IPH; abstract only

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APPENDIX F: MULTIVARIATE RISK FACTORS

Study name	Outcome	OR (95%CI)	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
incidence of IPH (<36) intraoperative (any time)						
age as continuous variable						
Flores-Maldonado 1997; prospective cohort study in 130 patients	multivariate adjusted odds ratio	no data	not significant	Age 42y (SD 20)	age: 5 to 90 y (mean 42 SD 20); theatre temperature: mean 22.9 (SD 1.2)°C; ASA: ASA I 50%; ASA II 40%; ASA III / IV 10%; no warming mechanisms stated; mixed general / regional groups anaesthesia; duration: Mean surgical time 1.1h (SD 0.9) and 1.8 (SD 1.0)	age, gender, theatre temperature, duration of surgery, magnitude of surgery, blood transfusion, type of anaesthesia x3. Number of events / number of covariates = 53 / 7 = 8
incidence of IPH (<36) in ICU						
age >70 vs age ≤40						
Kongsayreepong 2003; prospective cohort study in 184 patients	multivariate adjusted odds ratio	2.16 (0.58, 8.06)	not statistically significant, fairly wide confidence intervals	21% <40, 47% 41-70y, 32% >70y	age: 15-93; theatre temperature: mean 19.5 to 20.6°C (SD 1.9); ASA: 19% ASA I; 55% ASA II; 26% ASA > II; some had active warming; mixed general / regional / combined anaesthesia; duration: Anaesthesia: range 0.5 to 11.5h. 19% had ≤2h.	neuropathy, emergency surgery, magnitude of surgery, temperature monitoring used, type of anaesthesia, iv fluid, duration surgery, ambient temperature (+ univariate: gender, FAW, duration of anaesthesia)
age 41-70 vs age ≤40						
Kongsayreepong 2003; prospective cohort study in 184 patients	multivariate adjusted odds ratio	0.46 (0.15, 1.48)	not statistically significant	21% <40, 47% 41-70y, 32% >70y	age: 15-93; theatre temperature: mean 19.5 to 20.6°C (SD 1.9); ASA: 19% ASA I; 55% ASA II; 26% ASA > II; some had active warming; mixed general / regional / combined anaesthesia; duration: Anaesthesia: range 0.5 to 11.5h. 19% had ≤ 2h.	age, body weight, preoperative body temperature, ASA, diabetic neuropathy, emergency surgery, magnitude of surgery, temperature monitoring used, type of anaesthesia, iv fluid, duration of surgery, ambient temperature (+ univariate: gender, FAW, duration of anaesthesia). Number of events / number of covariates = 105 / 12 = 9

a) Patient risk factors: age

Study name	Outcome	OR (95%CI)	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis

incidence of IPH (<35) in PACU						
age > 65 vs age ≤65						
Vorrakitpokatorn 2006; prospective cohort study in 128 patients	multivariate adjusted odds ratio	0.48 (0.13, 1.85)	not significant	48.9 y (SD 13.54); 12.5% >65y	age: 48.9 y (SD 13.54); 12.5% >65y; theatre temperature: not stated; ASA: ASA I 59%; ASA II 31%; ASA III 9%; no warming mechanisms stated; general anaesthesia; duration: Duration of surgery 2h (SD 0.8); 44% had >2h	age, duration of surgery, volume of irrigation fluid, blood transfusion units. Constant: type of anaesthesia. Number of events / number of covariates = 72 / 4 = 18
age ≥ 65 vs age <15						
Lau 2001; prospective cohort study in 18759 patients	multivariate adjusted odds ratio	2.62 (1.01, 6.76)	Statistically significant; favours younger age	13% <15y; 62% 15-64; 24% >65	age: 13% <15y; 62% 15-64; 24% >65; theatre temperature: not stated; ASA: ASA I 52%; ASA II 33%; ASA III 8%; ASA IV 2%; ASA V 0.3%; not identified 4%; warming mechanism not stated; mixed general / regional / combined anaesthesia; duration: Surgery duration for all patients >2h, but no details	age, ASA grade, type of anaesthesia, hospital. All of these were categorical variables.
age 15-64 vs age <15						
Lau 2001; prospective cohort study in 18759 patients	multivariate adjusted odds ratio	1.67 (0.65, 4.27)	not statistically significant; comparator is children <15y	13% <15y; 62% 15-64; 24% >65	age: 13% <15y; 62% 15-64; 24% >65; theatre temperature: not stated; ASA: ASA I 52%; ASA II 33%; ASA III 8%; ASA IV 2%; ASA V 0.3%; not identified 4%; warming mechanism not stated; mixed general / regional / combined anaesthesia; duration: Surgery duration for all patients >2h, but no details	age, ASA grade, type of anaesthesia, hospital. All of these were categorical variables. Number of events / number of covariates = 111 / 4 = 28

Study name	Outcome	OR (95%CI)	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
incidence of IPH (<35) in PACU						
age 60-75 vs age 20--40						
El-Gamal 2000; prospective cohort study in 40 patients	baseline comparable OR	3.35 (0.32, 35.36)	very wide confidence interval; not significant	2 groups: 33 y (SEM 2); 20-40 & 67 (SEM 2); 60-75y	age: 2 groups: 33 y (SEM 2); 20-40 & 67 (SEM 2); 60-75y; theatre temperature: 25.6 or 25.9°C (SEM 0.3); range 24.2 to 28.5; ASA: I-II; no warming mechanisms stated; general anaesthesia; duration: Duration of surgery 1.7-1.8 h (SEM 0.08)	2 selected cohorts, 20 aged 20-40y, 20 aged 60-75. Following held constant: ASA I-II, type of surgery (lower extremity orthopaedic), type of anaesthetic (GA). Comparable at baseline for BMI, duration of surgery, iv fluid volume; preoperative core temperature. Number of events / number of covariates = 40 / 1 = 40
core temperature at 1h						
age 60-75 vs age 20-40						
El-Gamal 2000; prospective cohort study in 40 patients	baseline comparable mean difference	-0.19°C (-0.25, -0.13)	Statistically significant, younger patients warmer core temperature: patients 36.6°C (i.e. not hypothermic)	2 groups: 33 y (SEM 2); 20-40 & 67 (SEM 2); 60-75y	age: 2 groups: 33 y (SEM 2); 20-40 & 67 (SEM 2); 60-75y; theatre temperature: 25.6 or 25.9°C (SEM 0.3); range 24.2 to 28.5; ASA: I-II; no warming mechanisms stated; general anaesthesia; duration: Duration of surgery 1.7-1.8 h (SEM 0.08)	2 selected cohorts, 20 aged 20-40y, 20 aged 60-75. Following held constant: ASA I-II, type of surgery (lower extremity orthopaedic), type of anaesthetic (GA). Comparable at baseline for BMI, duration of surgery, iv fluid volume; preoperative core temperature. Number of events / number of covariates = 40 / 1 = 40
core temperature at 2h						
age 60-75 vs age 20-40						
El-Gamal 2000; prospective cohort study in 40 patients	baseline comparable mean difference	-0.31°C (-0.44, -0.18)	Statistically significant, younger patients warmer, core temperature younger patients 36.5°C (i.e. not hypothermic)	2 groups: 33 y (SEM 2); 20-40 & 67 (SEM 2); 60-75y	age: 2 groups: 33 y (SEM 2); 20-40 & 67 (SEM 2); 60-75y; theatre temperature: 25.6 or 25.9°C (SEM 0.3); range 24.2 to 28.5; ASA: I-II; no warming mechanisms stated; general anaesthesia; duration: Duration of surgery 1.7-1.8 h (SEM 0.08)	2 selected cohorts, 20 aged 20-40y, 20 aged 60-75. Following held constant: ASA I-II, type of surgery (lower extremity orthopaedic), type of anaesthetic (GA). Comparable at baseline for BMI, duration of surgery, iv fluid volume; preoperative core temperature. Number of events / number of covariates = 40 / 1 = 40

Study name	Outcome	OR (95%CI)	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
core temperature in PACU						
age as continuous variable						
Frank 2000; prospective cohort study in 44 patients	B from regression (non-standardised)	no data	statistically significant; p=0.01	Mean age 57y (SD 7) range 47 to 67	age: 57y (SD 7) range 47-67.; theatre temperature: mean 20.9°C (SD 0.13) range 18.7 to 22.9.; ASA: not stated or considered; no WD but fluids warmed; spinal anaesthesia; duration: Duration of surgery: mean 1.5 h (SD 0.9) range 1.1 to 2.6	age, duration of surgery, theatre temperature, body mass, % body fat, height of spinal block (+ univariate BMI). Number of events / number of covariates = 44 / 6 = 7
age 60-75 vs age 20-40						
El-Gamal 2000; prospective cohort study in 40 patients	baseline comparable mean difference	-0.3°C (-0.36, -0.24)	Statistically significant, younger patients warmer, core temperature younger patients 36.7°C (i.e. not hypothermic)	2 groups: 33 y (SEM 2); 20-40 & 67 (SEM 2); 60-75y	age: 2 groups: 33 y (SEM 2); 20-40 & 67 (SEM 2); 60-75y; theatre temperature: 25.6 or 25.9°C (SEM 0.3); range 24.2 to 28.5; ASA: I-II; no warming mechanisms stated; general anaesthesia; duration: Duration of surgery 1.7-1.8 h (SEM 0.08)	2 selected cohorts, 20 aged 20-40y, 20 aged 60-75. Following held constant: ASA I-II, type of surgery (lower extremity orthopaedic), type of anaesthetic (GA). Comparable at baseline for BMI, duration of surgery, iv fluid volume; preoperative core temperature. Number of events / number of covariates = 40 / 1 = 40
core temperature after 30 min in PACU						
age 60-75 vs age 20-40						
El-Gamal 2000; prospective cohort study in 40 patients	baseline comparable mean difference	-0.26°C (-0.34, -0.18)	Statistically significant, younger patients warmer, core temperature younger patients 37.1°C (i.e. not hypothermic)	2 groups: 33 y (SEM 2); 20-40 & 67 (SEM 2); 60-75y	age: 2 groups: 33 y (SEM 2); 20-40 & 67 (SEM 2); 60-75y; theatre temperature: 25.6 or 25.9°C (SEM 0.3); range 24.2 to 28.5; ASA: I-II; no warming mechanisms stated; general anaesthesia; duration: Duration of surgery 1.7-1.8 h (SEM 0.08)	2 selected cohorts, 20 aged 20-40y, 20 aged 60-75. Following held constant: ASA I-II, type of surgery (lower extremity orthopaedic), type of anaesthetic (GA). Comparable at baseline for BMI, duration of surgery, iv fluid volume; preoperative core temperature. Number of events / number of covariates = 40 / 1 = 40

Study name	Outcome	OR (95%CI)	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
core temperature after 45 min in PACU						
age 60-75 vs age 20-40						
El-Gamal 2000; prospective cohort study in 40 patients	baseline comparable mean difference	-0.26°C (-0.33, -0.19)	Statistically significant, younger patients warmer, core temperature younger patients 37.2°C (i.e. not hypothermic)	2 groups: 33 y (SEM 2); 20-40 & 67 (SEM 2); 60-75y	age: 2 groups: 33 y (SEM 2); 20-40 & 67 (SEM 2); 60-75y; theatre temperature: 25.6 or 25.9°C (SEM 0.3); range 24.2 to 28.5; ASA: I-II; no warming mechanisms stated; general anaesthesia; duration: Duration of surgery 1.7-1.8 h (SEM 0.08)	2 selected cohorts, 20 aged 20-40y, 20 aged 60-75. Following held constant: ASA I-II, type of surgery (lower extremity orthopaedic), type of anaesthetic (GA). Comparable at baseline for BMI, duration of surgery, iv fluid volume; preoperative core temperature. Number of events / number of covariates = 40 / 1 = 40
change in temperature						
age as continuous variable						
Hind 1994a; prospective cohort study in 30 patients	B from regression (non-standardised)	-0.06°C / year	'Drop in oesophageal temperature' =+ 0.06; probably maximum drop. statistically significant, favouring lower age (t=3.3; p<0.01)	51.43 y (SD 12.01); range 37 to 76. NB several correlations with age and other RFs.	age: 51.43 y (SD 12.01); range 37 to 76; theatre temperature: 21.3°C (SD 1.2); 19.6-23.3. RH: 56% (4); 50-65; ASA: not stated; no warming mechanisms stated; general anaesthesia; duration: Duration of surgery 1-2h	1st of 2 multivariate analyses that fitted the data. Factors included: age, theatre temperature, body fat index, iv fluids, and total blood loss (from univariate correlations). Excluded: surgery duration, theatre humidity. Constant: type of anaesthesia. Number of events / number of covariates = 30 / 5 = 6
Frank 1992; prospective cohort study in 97 patients	beta from regression (standardised)	-0.11°C / year	p=0.03; difference between 'first intraoperative temperature, and preoperative temperature, Favours lower ages. Probably standardised coefficients.	General warm 65.2 (SD 2.0) y; general cold 68.2 (2.1); epidural warm 62.9 (2.0); epidural cold 60.2 (3.2)	age: 35 to 94y; mean 64.5, SD 1.1; theatre temperature: mean 20.9 (SD 0.13); range 18.7 to 22.9°C; ASA: not stated or considered; no WD but fluids warmed; RCT general / epidural anaesthesia; duration: Duration in theatre: general warm 6.6h (SD 0.5); GA cold 4.4 (0.3); epidural warm 5.1 (0.3); EA cold 5.5 (0.4)	ANOVA / multiple regression adjusted for (i) age (ii) type of anaesthesia (iii) theatre temperature, duration in operating room, volume of iv crystalloid, blood transfusion units. Also included were 3 interaction terms: (i) x (ii), (i) x (iii), (ii) x (iii)
Hind 1994a; prospective cohort study in 30 patients	beta from regression (standardised)	0.4°C	'Drop in oesophageal temperature' - probably maximum drop. Beta reported to be statistically significant, favouring lower age (p<0.01)	51.43 y (SD 12.01); range 37 to 76. NB several correlations with age and other RFs.	age: 51.43 y (SD 12.01); range 37 to 76; theatre temperature: 21.3°C (SD 1.2); 19.6-23.3. RH: 56% (4); 50-65; ASA: not stated; no warming mechanisms stated; general anaesthesia; duration: Duration of surgery 1-2h	1st of 2 multivariate analyses that fitted the data. Factors included: age, theatre temperature, body fat index, iv fluids, and total blood loss (from univariate correlations). Excluded: surgery duration, theatre humidity. Constant: type of anaesthesia. Number of events / number of covariates = 30 / 5 = 6

Study name	Outcome	OR (95%CI)	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
rate of change of temperature intraoperative						
age ≥ 60 vs age <60						
Kitamura 2000; prospective cohort study in 36 patients	baseline comparable mean difference	0°C / h (-0.13, 0.13)	No significant difference; younger group change in intraoperative temperature rate 0.80°C / h	69 (SD 5) and 48 y (SD 28) (data given by subgroup)	age: 69 (SD 5) and 48 y (SD 28) (data given by subgroup); theatre temperature: 23°C; ASA: not stated; no warming devices; general anaesthesia; duration: duration of surgery 3.2 (SD 0.6) and 3.5 (SD 1.0) h	2 cohorts, diabetic and controls, divided into young and old controls, and diabetic neuropathy positive or not. All groups comparable for age, BMI, iv fluid rate, duration of surgery, ambient temperature. Constant: type of anaesthesia.
time to rewarm to 36°C						
age as continuous variable						
Frank 1992; prospective cohort study in 97 patients	beta from regression (standardised)	0.111 h / year	statistically significant in favour of lower ages (p ≤0.05). Probably standardised coefficients.	General warm 65.2 (SD2.0) y; general cold 68.2 (2.1); epidural warm 62.9 (2.0); epidural cold 60.2 (3.2)	age: 35 to 94y; mean 64.5, SD 1.1; theatre temperature: mean 20.9 (SD 0.13); range 18.7 to 22.9°C; ASA: not stated or considered; no WD but fluids warmed; RCT general / epidural anaesthesia; duration: Duration in theatre: general warm 6.6h (SD 0.5); GA cold 4.4 (0.3); epidural warm 5.1 (0.3); EA cold 5.5 (0.4)	ANOVA / multiple regression adjusted for (i) age (ii) type of anaesthesia (iii) theatre temperature, duration in operating room, volume of iv crystalloid, blood transfusion units. Also included were 3 interaction terms: (i) x (ii), (i) x (iii), (ii) x (iii)

b) Patient risk factors: gender

Study name	Outcome	OR (95%CI)	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
incidence of IPH (<36) intraoperative(any time)						
men vs women						
Flores-Maldonado 1997; prospective cohort study in 130 patients	multivariate adjusted odds ratio	no data	not significant	Men 53%	age: 5 to 90 y (mean 42 SD20); theatre temperature: mean 22.9 (SD 1.2)°C; ASA: ASA I 50%; ASA II 40%; ASA III / IV 10%; no warming mechanisms stated; mixed general / regional groups anaesthesia; duration: Mean surgical time 1.1h (SD 0.9) and 1.8 (SD 1.0)	age, gender, theatre temperature, duration of surgery, magnitude of surgery, blood transfusion, type of anaesthetic

c) Patient risk factors: ASA grade

Study name	Outcome	OR (95%CI)	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
incidence of IPH (<36) in ICU						
ASA >II vs ASA I						
Kongsayreepong 2003; prospective cohort study in 184 patients	multivariate adjusted odds ratio	8.35 (1.67, 41.88)	statistically significant, favours ASA I, wide confidence intervals	19% ASA I; 55% ASA II; 26% ASA >II.	age: 15-93; theatre temperature: mean 19.5 to 20.6°C (SD 1.9); ASA: 19% ASA I; 55% ASA II; 26% ASA > II; some had active warming; mixed general / regional / combined anaesthesia; duration: Anaesthesia: range 0.5 to 11.5h. 19% had ≤2h.	age, body weight, preoperative body temperature, ASA, diabetic neuropathy, emergency surgery, magnitude of surgery, temperature monitoring used, type of anaesthesia, iv fluid, duration surgery, ambient temperature (+ univariate: gender, FAW, duration of anaesthesia)
ASA II vs ASA I						
Kongsayreepong 2003; prospective cohort study in 184 patients	multivariate adjusted odds ratio	2.87 (0.82, 10.03)	not statistically significant, fairly wide confidence intervals	19% ASA I; 55% ASA II; 26% ASA >II.	age: 15-93; theatre temperature: mean 19.5 to 20.6°C (SD 1.9); ASA: 19% ASA I; 55% ASA II; 26% ASA >II; some had active warming; mixed general / regional / combined anaesthesia; duration: Anaesthesia: range 0.5 to 11.5h. 19% had ≤2h.	neuropathy, emergency surgery, magnitude of surgery, temperature monitoring used, type of anaesthesia, iv fluid, duration surgery, ambient temperature (+ univariate: gender, FAW, duration of anaesthesia)
incidence of IPH (<35) in PACU						
ASA II vs ASA I						
Lau 2001; prospective cohort study in 18759 patients	multivariate adjusted odds ratio	1.83 (1.04, 3.19)	Statistically significant; favours ASA I	ASA I 52%; ASA II 33%; ASA III 8%; ASA IV 2%; ASA V 0.3%; not identified 4%	age: 13% <15y; 62% 15-64; 24% >65; theatre temperature: not stated; ASA: ASA I 52%; ASA II 33%; ASA III 8%; ASA IV 2%; ASA V 0.3%; not identified 4%; warming mechanism not stated; mixed general / regional / combined anaesthesia; duration: Surgery duration for all patients >2h, but no details	age, ASA grade, type of anaesthesia, hospital. All of these were categorical variables.

Study name	Outcome	OR (95%CI)	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
incidence of IPH (<35) in PACU						
ASA III vs ASA I						
Lau 2001; prospective cohort study in 18759 patients	multivariate adjusted odds ratio	1.79 (0.94, 3.4)	not significant; favours ASA I	ASA I 52%; ASA II 33%; ASA III 8%; ASA IV 2%; ASA V 0.3%; not identified 4%	age: 13% <15y; 62% 15-64; 24% >65; theatre temperature: not stated; ASA: ASA I 52%; ASA II 33%; ASA III 8%; ASA IV 2%; ASA V 0.3%; not identified 4%; warming mechanism not stated; mixed general / regional / combined anaesthesia; duration: Surgery duration for all patients >2h, but no details	age, ASA grade, type of anaesthesia, hospital. All of these were categorical variables.
ASA IV vs ASA I						
Lau 2001; prospective cohort study in 18759 patients	multivariate adjusted odds ratio	3.22 (1.37, 7.54)	statistically significant; favours ASA I	ASA I 52%; ASA II 33%; ASA III 8%; ASA IV 2%; ASA V 0.3%; not identified 4%	age: 13% <15y; 62% 15-64; 24% >65; theatre temperature: not stated; ASA: ASA I 52%; ASA II 33%; ASA III 8%; ASA IV 2%; ASA V 0.3%; not identified 4%; warming mechanism not stated; mixed general / regional / combined anaesthesia; duration: Surgery duration for all patients >2h, but no details	age, ASA grade, type of anaesthesia, hospital. All of these were categorical variables.
incidence of IPH (<35) in PACU						
ASA V vs ASA I						
Lau 2001; prospective cohort study in 18759 patients	multivariate adjusted odds ratio	19.91 (4.77, 88.03)	fairly wide confidence interval; large effect; statistically significant; favours ASA I	ASA I 52%; ASA II 33%; ASA III 8%; ASA IV 2%; ASA V 0.3%; not identified 4%	age: 13% <15y; 62% 15-64; 24% >65; theatre temperature: not stated; ASA: ASA I 52%; ASA II 33%; ASA III 8%; ASA IV 2%; ASA V 0.3%; not identified 4%; warming mechanism not stated; mixed general / regional / combined anaesthesia; duration: Surgery duration for all patients >2h, but no details	age, ASA grade, type of anaesthesia, hospital. All of these were categorical variables.

d) Patient risk factors: Score of Acute physiologic system (SAPS II)

Study name	Outcome	OR (95%CI)	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
incidence of IPH (<35) in ICU						
SAPS II as continuous variable						
Abelha 2005; prospective cohort study in 185 patients	multivariate adjusted odds ratio	1 (1, 1.7)	p=0.014 -a bit skewed?	SAPS II Score 24.4 (SD 14.0) range 3 to 74 (max possible=162 poor).	age: 66.0 y (SD 12.6), range 25 to 94; theatre temperature: 20-22°C (not adjusted for); ASA: ASA I 3%, ASA II 39%, ASA III 49%, ASA IV 10%.; some had warming mechanisms; mixed general / regional / combined anaesthesia; duration: Anaesthesia duration: 3.6 h (SD 1.8) range 0.7 to 11h; 51% >3h	magnitude of surgery, iv crystalloids, preoperative patient temperature, SAPS II + adjusted for: anaesthesia type, anaesthesia duration, temperature monitoring, FAW, packed erythrocytes. Univariate: age, gender, body weight, BMI, ASA, emergency, iv colloids, plasma

e) Patient risk factors: body weight

Study name	Outcome	OR (95%CI)	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
incidence of IPH (<36) in ICU						
body weight as continuous variable						
Kongsayreepong 2003; prospective cohort study in 184 patients	multivariate adjusted odds ratio	0.94 (0.89, 0.98)	small statistically significant effect, favours higher body weight	Mean 57.2kg (SD 12) range 30-91.	age: 15-93; theatre temperature: mean 19.5 to 20.6°C (SD 1.9); ASA: 19% ASA I; 55% ASA II; 26% ASA >II; some had active warming; mixed general / regional / combined anaesthesia; duration: Anaesthesia: range 0.5 to 11.5h. 19% had ≤ 2h.	age, body weight, preoperative body temperature, ASA, diabetic neuropathy, emergency surgery, magnitude of surgery, temperature monitoring used, type of anaesthesia, iv fluid, duration surgery, ambient temperature (+ univariate: gender, FAW, duration of anaesthesia)
change in temperature at 1h						
body weight as continuous variable						
Kurz 1995; prospective cohort study in 40 patients	B from regression (non-standardised)	no data	not significant; change in core temperature over 1st hour	weight mean 73 kg (SD 20), range 40-110)	age: mean 59 y (SD 14), range 26-79 y; theatre temperature: maintained at 21.0°C (SD 0.4); ASA: I-III; no WD but fluids warmed; general anaesthesia; duration: mean duration of surgery 3.8 h (SD 1.3)	multivariate included gender, height, weight, % body fat, surface area and weight / surface area ratio. Type of surgery comparable for different size patients. Type of anaesthesia constant. No consideration taken of age or ASA grade.
core temperature in PACU						
body weight as continuous variable						
Frank 2000; prospective cohort study in 44 patients	B from regression (non-standardised)	no data	not statistically significant; p=0.14	Body weight mean 88kg (SD 20) range 70 to 120.	age: 57y (SD 7) range 47-67.; theatre temperature: mean 20.9°C (SD 0.13) range 18.7 to 22.9.; ASA: not stated or considered; no WD but fluids warmed; spinal anaesthesia; duration: Duration of surgery: mean 1.5 h (SD 0.9) range 1.1 to 2.6	age, duration of surgery, theatre temperature, body weight, % body fat, height of spinal blockage (+ univariate BMI)

f) Patient risk factors: body fat

Study name	Outcome	*B 95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
change in temperature at 1h						
body fat % as continuous variable						
Kurz 1995; prospective cohort study in 40 patients	B from regression (non-standardised)	0.016°C / %	Statistically significant, favours higher % body fat, but p values / SE not given (appears to be p<0.01), change in core temperature over 1st hour	% body fat ranged from 15 to 49%	age: mean 59 y (SD 14), range 26-79 y; theatre temperature: maintained at 21.0°C (SD 0.4); ASA: I-III; no WD but fluids warmed; general anaesthesia; duration: mean duration of surgery 3.8 h (SD 1.3)	multivariate included gender, height, weight, % body fat, surface area and weight / surface area ratio. Type of surgery comparable for different size patients. Type of anaesthesia constant. No consideration taken of age or ASA grade. Number of events / number of covariates = 40 / 5 = 8
Yamakage 2000; prospective cohort study in 60 patients	B from regression (non-standardised)	no data	stated to be not significant (p=0.054)	height 159 cm (SD 7); weight 63 kg (SD 8); skinfold measurements to right of patient; total body fat calculated from age and sex specific regression	age: 58 (SD 10) y; theatre temperature: 23.2°C (SD 0.7); humidity 31% (SD 8%); ASA: I-II; no WD but fluids warmed; general anaesthesia; duration: approx 3h	Type of anaesthesia held constant at baseline: duration of anaesthesia effectively constant because considered at particular times less than duration of operation. Age partly adjusted in body fat calculator. Number of events / number of covariates = 60 / 1 = 60
change in temperature at 2h						
body fat % as continuous variable						
Yamakage 2000; prospective cohort study in 60 patients	B from regression (non-standardised)	-0.03°C / %	change in temperature over 1-3 hours; statistically significant (p<0.0001), favours higher body fat	height 159 cm (SD 7); weight 63 kg (SD 8); skinfold measurements to right of patient; total body fat calculated from age and sex specific regression	age: 58 (SD 10) y; theatre temperature: 23.2°C (SD 0.7); humidity 31% (SD 8%); ASA: I-II; no WD but fluids warmed; general anaesthesia; duration: approx 3h	Type of anaesthesia held constant at baseline: duration of anaesthesia effectively constant because considered at particular times less than duration of operation. Age partly adjusted in body fat calculator. Number of events / number of covariates = 60 / 1 = 60

study name	outcome	*B (95%CI)*	comments	risk factor details	other details	factors adjusted for in multivariate analysis
core temperature in PACU						
body fat % as continuous variable						
Frank 2000; prospective cohort study in 44 patients	B from regression (non-standardised)	no data	not statistically significant; p=0.14	Body fat 27% (SD 7) range 13-39	age: 57y (SD 7) range 47-67.; theatre temperature: mean 20.9°C (SD 0.13) range 18.7 to 22.9.; ASA: not stated or considered; no WD but fluids warmed; spinal anaesthesia; duration: Duration of surgery: mean 1.5 h (SD 0.9) range 1.1 to 2.6	age, duration of surgery, theatre temperature, body weight, % body fat, height of spinal blockage (+ univariate BMI)
change in temperature						
body fat % as continuous variable						
Hind 1994a; prospective cohort study in 30 patients	beta from regression (standardised)	no data	'Drop in oesophageal temperature' - probably maximum drop. Not significant in analysis 1: correlations with age and theatre temperature.	23.7% (SD 1.2); 15-39.4%. Skinfold measurement. NB correlations with age and theatre temperature. Unexpected negative correlation with age.	age: 51.43 y (SD 12.01); range 37 to 76; theatre temperature: 21.3°C (SD 1.2); 19.6-23.3. RH: 56% (4); 50-65; ASA: not stated; no warming mechanisms stated; general anaesthesia; duration: Duration of surgery 1-2h	1 of 2 multivariate analyses that fitted the data. Factors included: age, theatre temperature, body fat index, iv fluids, and total blood loss (chosen from univariate correlations). Excluded: surgery duration, theatre humidity. Constant: type of anaesthesia.

g) Patient risk factors: body weight / surface area

Study name	Outcome	*B (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
change in temperature at 1h						
body weight / surface area as continuous variable						
Kurz 1995; prospective cohort study in 40 patients	B from regression (non-standardised)	0.033 °C m2 / kg	Statistically significant, favours higher weight / surface area, but p values / SE not given (appears to be p<0.01), change in core temperature over 1st hour	weight / surface area (calculated using formula)	age: mean 59 y (SD 14), range 26-79 y; theatre temperature: maintained at 21.0°C (SD 0.4); ASA: I-III; no WD but fluids warmed; general anaesthesia; duration: mean duration of surgery 3.8 h (SD 1.3)	multivariate included gender, height, weight, % body fat, surface area and weight / surface area ratio. Type of surgery comparable for different size patients. Type of anaesthesia constant. No consideration taken of age or ASA grade.

h) Patient risk factors: height

Study name	Outcome	*B (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
change in temperature at 1h						
height as continuous variable						
Kurz 1995; prospective cohort study in 40 patients	B from regression (non-standardised)	no data	not significant; change in core temperature over 1st hour	height mean 169 cm (SD 7), range 152-180)	age: mean 59 y (SD 14), range 26-79 y; theatre temperature: maintained at 21.0°C (SD 0.4); ASA: I-III; no WD but fluids warmed; general anaesthesia; duration: mean duration of surgery 3.8 h (SD 1.3)	

i) Patient risk factors: diabetes

Study name	Outcome	*OR (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
incidence of IPH (<36) in ICU						
history of diabetic neuropathy vs No history						
Kongsayreepong 2003; prospective cohort study in 184 patients	multivariate adjusted odds ratio	0.86 (0.24, 3.14)	not significant,	14% had history of diabetic neuropathy	age: 15-93; theatre temperature: mean 19.5 to 20.6°C (SD 1.9); ASA: 19% ASA I; 55% ASA II; 26% ASA > II; some had active warming; mixed general / regional / combined anaesthesia; duration: Anaesthesia: range 0.5 to 11.5h. 19% had ≤ 2h.	age, body weight, preoperative body temperature, ASA, diabetic neuropathy, emergency surgery, magnitude of surgery, temperature monitoring used, type of anaesthesia, iv fluid, duration surgery, ambient temperature (+ univariate: gender, FAW, duration of anaesthesia)
change in temperature						
diabetes + no neuropathy vs not diabetes						
Kitamura 2000; prospective cohort study in 50 patients	mean difference from RCT	-0.02°C (-0.15, 0.11)	No significant difference; control group change in intraoperative temperature rate 0.78°C / h	7 type I and 20 type II diabetic patients; 13 neuropathy positive, 14 neuropathy negative	age: 59 and 62 y (SD 12) (data given by subgroup); theatre temperature: 23°C; ASA: not stated; no warming devices; general anaesthesia; duration: duration of surgery 3.2 (SD 0.6) and 3.5 (SD 1.0) h	2 cohorts, diabetic and controls, divided into young and old controls, and diabetic neuropathy positive or not. All groups comparable for age, BMI, iv fluid rate, duration of surgery, ambient temperature. Constant: type of anaesthesia.
rate of change of temperature intraoperative						
diabetes + neuropathy vs diabetes no neuropathy						
Kitamura 2000; prospective cohort study in 27 patients	baseline comparable mean difference	0.08°C / h (-0.12, 0.28)	Not significantly different; non-neuropathy group intraoperative temperature change rate 0.76°C / h	7 type I and 20 type II diabetic patients; 13 neuropathy positive, 14 neuropathy negative	age: 59 and 62 y (SD 12) (data given by subgroup); theatre temperature: 23°C; ASA: not stated; no warming devices; general anaesthesia; duration: duration of surgery 3.2 (SD 0.6) and 3.5 (SD 1.0) h	2 cohorts, diabetic & controls, divided into young and old controls, & diabetic neuropathy positive or not. All groups comparable for age, BMI, iv fluid rate, surgery duration, ambient temperature, Constant: type of anaesthesia. Significantly different for diastolic blood pressure in tilt. Number of events / number of covariates = 27 / 1 = 27

j) Patient risk factors: Patient temperature in preoperative phase

Study name	Outcome	*OR (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
incidence of IPH (<35) in ICU						
core temperature before surgery as continuous variable						
Abelha 2005; prospective cohort study in 185 patients	multivariate adjusted odds ratio	0.3 (0.1, 0.7)	statistically significant, favours higher preoperative temperature	36.37°C (SD 0.49) range 35.00 to 38.60.	age: 66.0 y (SD 12.6), range 25 to 94; theatre temperature: 20-22°C (not adjusted for); ASA: ASA I 3%, ASA II 39%, ASA III 49%, ASA IV 10%.; some had warming mechanisms; mixed general / regional / combined anaesthesia; duration: Anaesthesia duration: 3.6 h (SD 1.8) range 0.7 to 11h; 51% >3h	magnitude of surgery, iv crystalloids, preoperative patient temperature, SAPS II + adjusted for: anaesthesia type, anaesthesia duration, temperature monitoring, FAW, packed erythrocytes. Univariate: age, gender, body weight, BMI, ASA, emergency, iv colloids, plasma

k) Patient risk factors: Patient temperature at start of intraoperative phase

Study name	Outcome	*OR (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
incidence of IPH (<36) in ICU						
core temperature before surgery as continuous variable						
Kongsayreepong 2003; prospective cohort study in 184 patients	multivariate adjusted odds ratio	0.31 (0.15, 0.65)	statistically significant, favours higher patient temperature	Mean 37.0 (SD 0.7) range 34.5 to 39.3°C.	age: 15-93; theatre temperature: mean 19.5 to 20.6°C (SD 1.9); ASA: 19% ASA I; 55% ASA II; 26% ASA > II; some had active warming; mixed general / regional / combined anaesthesia; duration: Anaesthesia: range 0.5 to 11.5h. 19% had ≤2h.	age, body weight, preoperative body temperature, ASA, diabetic neuropathy, emergency surgery, magnitude of surgery, temperature monitoring used, type of anaesthesia, iv fluid, duration surgery, ambient temperature (+ univariate: gender, FAW, duration of anaesthesia)

I) Anaesthesia risk factors: anaesthesia: type

Study name	Outcome	*OR (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
incidence of IPH (<36) intraoperative (any time)						
epidural anaesthesia vs spinal or general						
Flores-Maldonado 1997; prospective cohort study in 130 patients	multivariate adjusted odds ratio	no data	not significant	49% general, 17% spinal, 15% epidural, 24% miscellaneous	age: 5 to 90 y (mean 42 SD20); theatre temperature: mean 22.9 (SD 1.2)°C; ASA: ASA I 50%; ASA II 40%; ASA III / IV 10%; no warming mechanisms stated; mixed general / regional groups anaesthesia; duration: Mean surgical time 1.1h (SD 0.9) and 1.8 (SD 1.0)	age, gender, theatre temperature, duration of surgery, magnitude of surgery, blood transfusion, type of anaesthesia x3
epidural anaesthesia vs general anaesthesia						
Hendolin 1982; RCT study in 38 patients	OR from RCT	1.36 (0.35, 5.38)	Not significant but wide confidence intervals; half pts had nasopharyngeal temperature measurement	GA thiopentone / N_2O / O_2, pethidine with ventilator. EA T3 to T5	age: GA 66.6y (SD 6.6); EA 70.9 (SD 8.9); theatre temperature: 24°C; humidity 40-55%; ASA: mean 2.3 or 2.6 (SD 0.6); WD not stated but blood warmed; randomised to epidural / general anaesthesia; duration: Duration of anaesthesia around 24 h; duration of surgery about 14h	RCT. Baseline comparability age, weight, height, BMI, ASA. Factors kept constant: type of surgery, duration of surgery
incidence of IPH (<36) in ICU						
general anaesthesia vs epidural or spinal						
Flores-Maldonado 1997; prospective cohort study in 130 patients	multivariate adjusted odds ratio	no data	not significant	49% general, 17% spinal, 15% epidural, 24% miscellaneous	age: 5 to 90 y (mean 42 SD20); theatre temperature: mean 22.9 (SD 1.2)°C; ASA: ASA I 50%; ASA II 40%; ASA III / IV 10%; no warming mechanisms stated; mixed general / regional groups anaesthesia; duration: Mean surgical time 1.1h (SD 0.9) and 1.8 (SD 1.0)	age, gender, theatre temperature, duration of surgery, magnitude of surgery, blood transfusion, type of anaesthetic
spinal anaesthesia vs epidural or general						
Flores-Maldonado 1997; prospective cohort study in 130 patients	multivariate adjusted odds ratio	0.23 (0.06, 0.9)	statistically significant, favours spinal anaesthesia	49% general, 17% spinal, 15% epidural, 24% miscellaneous	age: 5 to 90 y (mean 42 SD20); theatre temperature: mean 22.9 (SD 1.2)°C; ASA: ASA I 50%; ASA II 40%; ASA III / IV 10%; no warming mechanisms stated; mixed general / regional groups anaesthesia; duration: Mean surgical time 1.1h (SD 0.9) and 1.8 (SD 1.0)	age, gender, theatre temperature, duration of surgery, magnitude of surgery, blood transfusion, type of anaesthetic

Study name	Outcome	*OR (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
incidence of IPH (<35) intraoperative (any time)						
epidural anaesthesia vs general anaesthesia						
Hendolin 1982; RCT study in 38 patients	OR from RCT	17.6 (1.96, 157.94)	Statistically significant, favours general; very wide confidence intervals; half pts had nasopharyngeal temperature measurement	GA thiopentone / N_2O / O_2, pethidine with ventilator. EA T3 to T5	age: GA 66.6y (SD 6.6); EA 70.9 (SD 8.9); theatre temperature: 24°C; humidity 40-55%; ASA: mean 2.3 or 2.6 (SD 0.6); WD not stated but blood warmed; randomised to epidural / general anaesthesia; duration: Duration of anaesthesia around 24 h; duration of surgery about 14h	RCT. Baseline comparability age, weight, height, BMI, ASA. Factors kept constant: type of surgery, duration of surgery
incidence of IPH (<36) in ICU						
Combined general / epidural anaesthesia vs general or regional						
Kongsayreepong 2003; prospective cohort study in 184 patients	multivariate adjusted odds ratio	3.39 (1.05, 10.88)	statistically significant, favours non-combined general or regional anaesthesia	25% combined anaesthesia, 66% general, 9% regional	age: 15-93; theatre temperature: mean 19.5 to 20.6°C (SD 1.9); ASA: 19% ASA I; 55% ASA II; 26% ASA > II; some had active warming; mixed general / regional / combined anaesthesia; duration: Anaesthesia: range 0.5 to 11.5h. 19% had ≤2h.	age, body weight, preoperative body temperature, ASA, diabetic neuropathy, emergency surgery, magnitude of surgery, temperature monitoring used, type of anaesthesia, iv fluid, duration surgery, ambient temperature (+ univariate: gender, FAW, duration of anaesthesia)
regional anaesthesia vs general or combined						
Kongsayreepong 2003; prospective cohort study in 184 patients	multivariate adjusted odds ratio	1.04 (0.18, 6.02)	not significant, fairly wide confidence intervals	66% general; 9% regional; 25% combined.	age: 15-93; theatre temperature: mean 19.5 to 20.6°C (SD 1.9); ASA: 19% ASA I; 55% ASA II; 26% ASA > II; some had active warming; mixed general / regional / combined anaesthesia; duration: Anaesthesia: range 0.5 to 11.5h. 19% had ≤2h.	age, body weight, preoperative body temperature, ASA, diabetic neuropathy, emergency surgery, magnitude of surgery, temperature monitoring used, type of anaesthesia, iv fluid, duration surgery, ambient temperature (+ univariate: gender, FAW, duration of anaesthesia)

Study name	Outcome	*OR (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
incidence of IPH (<35) in PACU						
Combined general / regional anaesthesia vs general anaesthesia						
Lau 2001; prospective cohort study in 18759 patients	multivariate adjusted odds ratio	2.77 (1.69, 4.55)	statistically significant; favours general	general 72%; major regional 19%; combined general / major regional 7%; others 1.7%	age: 13% <15y; 62% 15-64; 24% >65; theatre temperature: not stated; ASA: ASA I 52%; ASA II 33%; ASA III 8%; ASA IV 2%; ASA V 0.3%; not identified 4%; warming mechanism not stated; mixed general / regional / combined anaesthesia; duration: Surgery duration for all patients >2h, but no details	age, ASA grade, type of anaesthesia, hospital. All of these were categorical variables.
general anaesthesia vs regional anaesthesia						
Abelha 2005; prospective cohort study in 185 patients	multivariate adjusted odds ratio	no data	type of anaesthesia adjusted for in multivariate analysis but no results given	85% general, 10% regional, 4% combined.	age: 66.0 y (SD 12.6), range 25 to 94; theatre temperature: 20-22°C (not adjusted for); ASA: ASA I 3%, ASA II 39%, ASA III 49%, ASA IV 10%.; some had warming mechanisms; mixed general / regional / combined anaesthesia; duration: Anaesthesia duration: 3.6 h (SD 1.8) range 0.7 to 11h; 51% >3h	magnitude of surgery, iv crystalloids, preoperative patient temperature, SAPS II + adjusted for: anaesthesia type, anaesthesia duration, temperature monitoring, FAW, packed erythrocytes. Univariate: age, gender, body weight, BMI, ASA, emergency, iv colloids, plasma
regional anaesthesia vs general anaesthesia						
Lau 2001; prospective cohort study in 18759 patients	multivariate adjusted odds ratio	0.22 (0.07, 0.7)	statistically significant; favours regional, fairly wide confidence intervals	general 72%; major regional 19%; combined general / major regional 7%; others 1.7%	age: 13% <15y; 62% 15-64; 24% >65; theatre temperature: not stated; ASA: ASA I 52%; ASA II 33%; ASA III 8%; ASA IV 2%; ASA V 0.3%; not identified 4%; warming mechanism not stated; mixed general / regional / combined anaesthesia; duration: Surgery duration for all patients >2h, but no details	age, ASA grade, type of anaesthesia, hospital. All of these were categorical variables.

Study name	Outcome	*OR (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
core temperature at 15 min						
epidural anaesthesia vs general anaesthesia						
Frank1994; RCT subgroup (non stratified) study in 15 patients	mean difference from RCT	0°C (0, 0)		GA group: iv morphine, sodium thiopental, succinylcholine for induction then 70% N_2O/O_2 & isoflurane. EA group: bupivacaine	age: mean 57y; theatre temperature: 21.7 (SEM 0.4) EA and 22.0 (SEM 0.4) GA; ASA: I-II; no WD but fluids warmed; randomised to epidural / general anaesthesia; duration: Duration of surgery: GA 3.4 (SD 0.2) h; EA 3.5 (SD 0.2) h	Stratified RCT (on surgeon); younger age subgroup. Baseline comparability unclear for subgroup. Factors kept constant: type of surgery, ASA I-II
Frank 1994; RCT study in 30 patients	mean difference from RCT	0.27 (-0.01, 0.55)	From graph, not significant; fairly wide confidence intervals; GA group 36.13°C		age: median 62 y (48-70); theatre temperature: 21.7 (SEM 0.4) EA and 22.0 (SEM 0.4) GA; ASA: I-II; no WD but fluids warmed; randomised to epidural / general anaesthesia; duration: Duration of surgery: GA 3.4 (SD 0.2) h; EA 3.5 (SD 0.2) h	Stratified RCT (on surgeon); also analysed as subgroups by age. Baseline comparable for age, body weight, duration surgery, theatre temperature, PACU temperature, blood transfusion. Not comparable: crystalloid admin (significantly higher in GA)

Study name	Outcome	*OR (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
core temperature at 30 min						
epidural anaesthesia vs general anaesthesia						
Frank1994; RCT subgroup (non stratified) study in 15 patients	mean difference from RCT	0°C (0, 0)		GA group: iv morphine, sodium thiopental, succinylcholine for induction then 70% N_2O /O_2 & isoflurane. EA group: bupivacaine	age: mean 57y; theatre temperature: 21.7 (SEM 0.4) EA and 22.0 (SEM 0.4) GA; ASA: I-II; no WD but fluids warmed; randomised to epidural / general anaesthesia; duration: Duration of surgery: GA 3.4 (SD 0.2) h; EA 3.5 (SD 0.2) h	Stratified RCT (on surgeon); younger age subgroup. Baseline comparability unclear for subgroup. Factors kept constant: type of surgery, ASA I-II
Frank 1994; RCT study in 30 patients	mean difference from RCT	0.37°C (0.09, 0.65)	From graph, statistically significant; fairly wide confidence intervals; GA group 35.76°C		age: median 62 y (48-70); theatre temperature: 21.7 (SEM 0.4) EA and 22.0 (SEM 0.4) GA; ASA: I-II; no WD but fluids warmed; randomised to epidural / general anaesthesia; duration: Duration of surgery: GA 3.4 (SD 0.2) h; EA 3.5 (SD 0.2) h	Stratified RCT (on surgeon); also analysed as subgroups by age. Baseline comparable for age, body weight, duration surgery, theatre temperature, PACU temperature, blood transfusion. Not comparable: crystalloid admin (significantly higher in GA)

Study name	Outcome	*OR (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
core temperature at 1h						
epidural anaesthesia vs general anaesthesia						
Frank 1994; RCT study in 30 patients	mean difference from RCT	0.16°C (-0.12, 0.44)	From graph, not significant; fairly wide confidence intervals; GA group 35.53°C	GA group had iv morphine, sodium thiopental, succinylcholine for induction; then 70% N_2O / O_2 and isoflurane. EA group had bupivacaine	age: median 62 y (48-70); theatre temperature: 21.7 (SEM 0.4) EA and 22.0 (SEM 0.4) GA; ASA: I-II; no WD but fluids warmed; randomised to epidural / general anaesthesia; duration: Duration of surgery: GA 3.4 (SD 0.2) h; EA 3.5 (SD 0.2) h	Stratified RCT (on surgeon); also analysed as subgroups by age. Baseline comparable for age, body weight, duration surgery, theatre temperature, PACU temperature, blood transfusion. Not comparable: crystalloid admin (significantly higher in GA)
Frank1994; RCT subgroup (non stratified) study in 15 patients	mean difference from RCT	0°C (0, 0)			age: mean 57y; theatre temperature: 21.7 (SEM 0.4) EA and 22.0 (SEM 0.4) GA; ASA: I-II; no WD but fluids warmed; randomised to epidural / general anaesthesia; duration: Duration of surgery: GA 3.4 (SD 0.2) h; EA 3.5 (SD 0.2) h	Stratified RCT (on surgeon); younger age subgroup. Baseline comparability unclear for subgroup. Factors kept constant: type of surgery, ASA I-II
lowest intraoperative core temperature						
epidural anaesthesia vs general anaesthesia						
Frank 1994; RCT study in 30 patients	mean difference from RCT	-0.03°C (-0.48, 0.42)	From graph; not significant but fairly wide confidence intervals; GA group 35.53°C	GA group had iv morphine, sodium thiopental, succinylcholine for induction; then 70% N_2O / O_2 and isoflurane. EA group had bupivacaine	age: median 62 y (48-70); theatre temperature: 21.7 (SEM 0.4) EA and 22.0 (SEM 0.4) GA; ASA: I-II; no WD but fluids warmed; randomised to epidural / general anaesthesia; duration: Duration of surgery: GA 3.4 (SD 0.2) h; EA 3.5 (SD 0.2) h	Stratified RCT (on surgeon); also analysed as subgroups by age. Baseline comparable for age, body weight, duration surgery, theatre temperature, PACU temperature, blood transfusion. Not comparable: crystalloid admin (significantly higher in GA)

Study name	Outcome	*OR (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
core temperature at end of surgery						
epidural anaesthesia vs general anaesthesia						
Frank1994; RCT subgroup (non stratified) study in 15 patients	mean difference from RCT	0.01°C (-0.67, 0.69)	younger subgroup; from graph, not significant but wide confidence intervals	GA group had iv morphine, sodium thiopental, succinylcholine for induction; then 70% N_2O / O_2 and isoflurane. EA group had bupivacaine	age: mean 57y; theatre temperature: 21.7 (SEM 0.4) EA and 22.0 (SEM 0.4) GA; ASA: I-II; no WD but fluids warmed; randomised to epidural / general anaesthesia; duration: Duration of surgery: GA 3.4 (SD 0.2) h; EA 3.5 (SD 0.2) h	Stratified RCT (on surgeon); younger age subgroup. Baseline comparability unclear for subgroup. Factors kept constant: type of surgery, ASA I-II
Frank1994; RCT subgroup (non stratified) study in 15 patients	mean difference from RCT	-0.22°C (-0.64, 0.2)	older subgroup; from graph, not significant, fairly wide confidence intervals		age: mean 67y; theatre temperature: 21.7 (SEM 0.4) EA and 22.0 (SEM 0.4) GA; ASA: I-II; no WD but fluids warmed; randomised to epidural / general anaesthesia; duration: Duration of surgery: GA 3.4 (SD 0.2) h; EA 3.5 (SD 0.2) h	Stratified RCT (on surgeon); older age subgroup. Baseline comparability unclear for subgroup. Factors kept constant: type of surgery, ASA I-II
Frank 1994; RCT study in 30 patients	mean difference from RCT	-0.1°C (-0.65, 0.45)	from graph, not significant but wide confidence intervals; GA group 35.60°C		age: median 62 y (48-70); theatre temperature: 21.7 (SEM 0.4) EA and 22.0 (SEM 0.4) GA; ASA: I-II; no WD but fluids warmed; randomised to epidural / general anaesthesia; duration: Duration of surgery: GA 3.4 (SD 0.2) h; EA 3.5 (SD 0.2) h	Stratified RCT (on surgeon); also analysed as subgroups by age. Baseline comparable for age, body weight, duration surgery, theatre temperature, PACU temperature, blood transfusion. Not comparable: crystalloid admin (significantly higher in GA)

Study name	Outcome	*OR (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
core temperature in PACU						
Combined general / epidural anaesthesia vs general anaesthesia						
Steinbrook 1997; RCT study in 13 patients	mean difference from RCT	0.1°C (-1.15, 1.35)	No significant difference, fairly wide confidence intervals, general anaesthesia 35.00°C	GA: Ind: thiopental / pancuronium or vecuronium; O_2/ N_2O / isoflurane (0.5 to 1.5% end tidal).Combined: GA to 0.5% + bupivacaine/ T4 hydromorphone	age: GA: 47 (SD 5) ; combined: 38 (SD 13) y; theatre temperature: 20 to 22°C; ASA: I-III (IV and above excluded); no warming devices; mixed anaesthesia; duration: not stated	RCT. Comparable at baseline for height, blood loss, opioids, preoperative temperature. Not comparable for age, weight, intraoperative fluids (may not be significant difference).
epidural anaesthesia vs general anaesthesia						
Frank 1994; RCT study in 30 patients	mean difference from RCT	0°C (-0.39, 0.39)	From graph; not significant but wide confidence intervals; GA group 35.49°C	GA group: iv morphine, sodium thiopental, succinylcholine for induction then 70% N_2O / O_2 & isoflurane. EA group: bupivacaine	age: median 62 y (48-70); theatre temperature: 21.7 (SEM 0.4) EA and 22.0 (SEM 0.4) GA; ASA: I-II; no WD but fluids warmed; randomised to epidural / general anaesthesia; duration: Duration of surgery: GA 3.4 (SD 0.2) h; EA 3.5 (SD 0.2) h	Stratified RCT (on surgeon); also analysed as subgroups by age. Baseline comparable for age, body weight, duration surgery, theatre temperature, PACU temperature, blood transfusion. Not comparable: crystalloid admin (significantly higher in GA)
Frank1994; RCT subgroup (non stratified) study in 15 patients	mean difference from RCT	0.3°C (-0.2, 0.8)	younger subgroup; from graph, not significant but wide confidence intervals		age: mean 57y; theatre temperature: 21.7 (SEM 0.4) EA and 22.0 (SEM 0.4) GA; ASA: I-II; no WD but fluids warmed; randomised to epidural / general anaesthesia; duration: Duration of surgery: GA 3.4 (SD 0.2) h; EA 3.5 (SD 0.2) h	Stratified RCT (on surgeon); younger age subgroup. Baseline comparability unclear for subgroup. Factors kept constant: type of surgery, ASA I-II
Frank1994; RCT subgroup (non stratified) study in 15 patients	mean difference from RCT	-0.28°C (-0.8, 0.24)	older subgroup; from graph, not significant but wide confidence intervals		age: mean 67y; theatre temperature: 21.7 (SEM 0.4) EA and 22.0 (SEM 0.4) GA; ASA: I-II; no WD but fluids warmed; randomised to epidural / general anaesthesia; duration: Duration of surgery: GA 3.4 (SD 0.2) h; EA 3.5 (SD 0.2) h	Stratified RCT (on surgeon); older age subgroup. Baseline comparability unclear for subgroup. Factors kept constant: type of surgery, ASA I-II

Study name	Outcome	*OR (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
core temperature after 30 min in PACU						
epidural anaesthesia vs general anaesthesia						
Frank 1994; RCT study in 30 patients	mean difference from RCT	-0.29°C (-0.8, 0.22)	From graph; not significant but wide confidence intervals; GA group 35.82°C	GA group had iv morphine, sodium thiopental, succinylcholine for induction; then 70% N_2O / O_2 and isoflurane. EA group had bupivacaine	age: median 62 y (48-70); theatre temperature: 21.7 (SEM 0.4) EA and 22.0 (SEM 0.4) GA; ASA: I-II; no WD but fluids warmed; randomised to epidural / general anaesthesia; duration: Duration of surgery: GA 3.4 (SD 0.2) h; EA 3.5 (SD 0.2) h	Stratified RCT (on surgeon); also analysed as subgroups by age. Baseline comparable for age, body weight, duration surgery, theatre temperature, PACU temperature, blood transfusion. Not comparable: crystalloid admin (significantly higher in GA)
core temperature after 60 min in PACU						
epidural anaesthesia vs general anaesthesia						
Frank 1994; RCT study in 30 patients	mean difference from RCT	-0.09°C (-0.52, 0.34)	From graph; not significant but fairly wide confidence intervals; GA group 36.00°C	GA group had iv morphine, sodium thiopental, succinylcholine for induction; then 70% N_2O / O_2 and isoflurane. EA group had bupivacaine	age: median 62 y (48-70); theatre temperature: 21.7 (SEM 0.4) EA and 22.0 (SEM 0.4) GA; ASA: I-II; no WD but fluids warmed; randomised to epidural / general anaesthesia; duration: Duration of surgery: GA 3.4 (SD 0.2) h; EA 3.5 (SD 0.2) h	Stratified RCT (on surgeon); also analysed as subgroups by age. Baseline comparable for age, body weight, duration surgery, theatre temperature, PACU temperature, blood transfusion. Not comparable: crystalloid admin (significantly higher in GA)
change in temperature						
epidural anaesthesia vs general anaesthesia						
Frank 1992; RCT study in 97 patients	beta from regression (standardised)	-5.22°C	p=0.003; difference between 'first intraoperative temperature, and preoperative temperature, favours epidural. Probably standardised coefficients.	General: thiamylal / fentanyl / succinylcholine; enflurane / N_2O. Epidural: bupivacaine / epinephrine T6-T8 block.	age: 35 to 94y; mean 64.5, SD 1.1; theatre temperature: mean 20.9 (SD 0.13); range 18.7 to 22.9°C; ASA: not stated or considered; no WD but fluids warmed; RCT general / epidural anaesthesia; duration: Duration in theatre: general warm 6.6h (SD 0.5); GA cold 4.4 (0.3); epidural warm 5.1 (0.3); EA cold 5.5 (0.4)	ANOVA / multiple regression adjusted for (i) age (ii) type of anaesthesia (iii) theatre temperature, duration in operating room, volume of iv crystalloid, blood transfusion units. Also included were 3 interaction terms: (i) x (ii), (i) x (iii), (ii) x (iii). Number of events / number of covariates = 97 / 9 = 11

Study name	Outcome	*OR (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
time to rewarm to 36°C						
epidural anaesthesia vs general anaesthesia						
Frank 1992; RCT study in 97 patients	beta from regression (standardised)	no data	not significant	General: thiamylal / fentanyl / succinylcholine; enflurane / N_2O. Epidural: bupivacaine / epinephrine T6-T8 block.	age: 35 to 94y; mean 64.5, SD 1.1; theatre temperature: mean 20.9 (SD 0.13); range 18.7 to 22.9°C; ASA: not stated or considered; no WD but fluids warmed; RCT general / epidural anaesthesia; duration: Duration in theatre: general warm 6.6h (SD 0.5); GA cold 4.4 (0.3); epidural warm 5.1 (0.3); EA cold 5.5 (0.4)	ANOVA / multiple regression adjusted for (i) age (ii) type of anaesthesia (iii) theatre temperature, duration in operating room, volume of iv crystalloid, blood transfusion units. Also included were 3 interaction terms: (i) x (ii), (i) x (iii), (ii) x (iii). Number of events / number of covariates = 97 / 9 = 11
Frank 1994; RCT study in 30 patients	mean difference from RCT	6 min (-35.57, 47.57)	Not significant but wide confidence intervals; GA group 56 min	GA group had iv morphine, sodium thiopental, succinylcholine for induction; then 70% N_2O / O_2 and isoflurane. EA group had bupivacaine	age: median 62 y (48-70); theatre temperature: 21.7 (SEM 0.4) EA and 22.0 (SEM 0.4) GA; ASA: I-II; no WD but fluids warmed; randomised to epidural / general anaesthesia; duration: Duration of surgery: GA 3.4 (SD 0.2) h; EA 3.5 (SD 0.2) h	Stratified RCT (on surgeon); also analysed as subgroups by age. Baseline comparable for age, body weight, duration surgery, theatre temperature, PACU temperature, blood transfusion. Not comparable: crystalloid admin (significantly higher in GA)

m) Anaesthesia risk factors: anaesthesia type x age

Study name	Outcome	*Beta (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
change in temperature						
type anaesthesia x age as continuous variable						
Frank 1992; prospective cohort study in 97 patients	beta from regression (standardised)	0.036	not statistically significant interaction; p=0.06. Probably standardised coefficients.	General warm 65.2 (SD2.0) y; general cold 68.2 (2.1); epidural warm 62.9 (2.0); epidural cold 60.2 (3.2)	age: 35 to 94y; mean 64.5, SD 1.1; theatre temperature: mean 20.9 (SD 0.13); range 18.7 to 22.9°C; ASA: not stated or considered; no warming devices but fluids warmed; RCT general / epidural anaesthesia; duration: Duration in theatre: general warm 6.6h (SD 0.5); GA cold 4.4 (0.3); epidural warm 5.1 (0.3); EA cold 5.5 (0.4)	ANOVA / multiple regression adjusted for (i) age (ii) type of anaesthesia (iii) theatre temperature, duration in operating room, volume of iv crystalloid, blood transfusion units. Also included were 3 interaction terms: (i) x (ii), (i) x (iii), (ii) x (iii).

n) Anaesthesia risk factors: anaesthesia: height of spinal block

Study name	Outcome	*B (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
core temperature in PACU						
block level as continuous variable						
Frank 2000; prospective cohort study in 44 patients	B from regression (non-standardised)	no data	statistically significant; p=0.002	Block height (dermatome level) T5 (SD 3) range T3 to T8.	age: 57y (SD 7) range 47-67.; theatre temperature: mean 20.9°C (SD 0.13) range 18.7 to 22.9.; ASA: not stated or considered; no warming devices but fluids warmed; spinal anaesthesia; duration: Duration of surgery: mean 1.5 h (SD 0.9) range 1.1 to 2.6	age, duration of surgery, theatre temperature, body weight, % body fat, height of spinal blockage (+ univariate BMI)

o) Anaesthesia risk factors: anaesthesia: end expiratory pressure

Study name	Outcome	*MD (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
core temperature at 20 min						
PEEP 10 cm H2O vs zero end expiratory pressure (ZEEP)						
Mizobe 2005; RCT study in 16 patients	mean difference from RCT	0.13°C (-0.22, 0.48)	from graph, not statistically significant, fairly wide confidence intervals, ZEEP core temperature 36.36°C	PEEP 10 cm H2O initiated 10 min after induction, and maintained for 3h	age: 20 to 60 y; theatre temperature: 24°C; relative humidity 40%; ASA: I-II; no warming mechanisms stated; combined general / regional anaesthesia; duration: Anaesthesia maintained for 3h	RCT. Comparable at baseline for age, gender, weight, height, arterial pressure, heart rate, core temperature
core temperature at 40 min						
PEEP 10 cm H2O vs zero end expiratory pressure (ZEEP)						
Mizobe 2005; RCT study in 16 patients	mean difference from RCT	0.36°C (-0.02, 0.74)	from graph, not statistically significant, fairly wide confidence intervals, ZEEP core temperature 35.92°C	PEEP 10 cm H2O initiated 10 min after induction, and maintained for 3h	age: 20 to 60 y; theatre temperature: 24°C; relative humidity 40%; ASA: I-II; no warming mechanisms stated; combined general / regional anaesthesia; duration: Anaesthesia maintained for 3h	RCT. Comparable at baseline for age, gender, weight, height, arterial pressure, heart rate, core temperature
core temperature at 1h						
PEEP 10 cm H2O vs zero end expiratory pressure (ZEEP)						
Mizobe 2005; RCT study in 16 patients	mean difference from RCT	0.4°C (0.07, 0.73)	from graph, statistically significant, favours PEEP, fairly wide confidence intervals, ZEEP core temperature 35.64°C	PEEP 10 cm H2O initiated 10 min after induction, and maintained for 3h	age: 20 to 60 y; theatre temperature: 24°C; relative humidity 40%; ASA: I-II; no warming mechanisms stated; combined general / regional anaesthesia; duration: Anaesthesia maintained for 3h	RCT. Comparable at baseline for age, gender, weight, height, arterial pressure, heart rate, core temperature

Study name	Outcome	*MD (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
core temperature at 2h						
PEEP 10 cm H2O vs zero end expiratory pressure (ZEEP)						
Mizobe 2005; RCT study in 16 patients	mean difference from RCT	0.61°C (0.17, 1.05)	from graph, statistically significant, favours PEEP, fairly wide confidence intervals, ZEEP core temperature 35.19°C	PEEP 10 cm H2O initiated 10 min after induction, and maintained for 3h	age: 20 to 60 y; theatre temperature: 24°C; relative humidity 40%; ASA: I-II; no warming mechanisms stated; combined general / regional anaesthesia; duration: Anaesthesia maintained for 3h	RCT. Comparable at baseline for age, gender, weight, height, arterial pressure, heart rate, core temperature
core temperature at 3h						
PEEP 10 cm H2O vs zero end expiratory pressure (ZEEP)						
Mizobe 2005; RCT study in 16 patients	mean difference from RCT	0.7°C (0.26, 1.14)	from text, statistically significant, favours PEEP, fairly wide confidence intervals, ZEEP core temperature 35.10°C	PEEP 10 cm H2O initiated 10 min after induction, and maintained for 3h	age: 20 to 60 y; theatre temperature: 24°C; relative humidity 40%; ASA: I-II; no warming mechanisms stated; combined general / regional anaesthesia; duration: Anaesthesia maintained for 3h	RCT. Comparable at baseline for age, gender, weight, height, arterial pressure, heart rate, core temperature

p) Anaesthesia risk factors: duration of anaesthesia

Study name	Outcome	*OR (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
incidence of IPH (<35) in ICU						
anaesthesia >3h vs duration of anaesthesia ≤3h						
Abelha 2005; prospective cohort study in 185 patients	multivariate adjusted odds ratio	no data	duration of anaesthesia adjusted for in multivariate analysis but no results given (presumed NS)	218 min (SD 108) range 44 to 660 min; 51% >3h.	age: 66.0 y (SD 12.6), range 25 to 94; theatre temperature: 20-22°C (not adjusted for); ASA I 3%, ASA II 39%, ASA III 49%, ASA IV 10%.; some had warming mechanisms; mixed general / regional / combined anaesthesia; duration: Anaesthesia duration: 3.6 h (SD 1.8) range 0.7 to 11h; 51% >3h	magnitude of surgery, iv crystalloids, preoperative patient temperature, SAPS II + adjusted for: anaesthesia type, anaesthesia duration, temperature monitoring, FAW, packed erythrocytes. Univariate: age, gender, body weight, BMI, ASA, emergency, iv colloids, plasma
change in temperature						
time in theatre as continuous variable						
Frank 1992; prospective cohort study in 97 patients	beta from regression (standardised)	no data	not significant	Time spent in operating room: general warm 6.6h (SD 0.5); general cold 4.4 (0.3); epidural warm 5.1 (0.3); epidural cold 5.5 (0.4)	age: 35 to 94y; mean 64.5, SD 1.1; theatre temperature: mean 20.9 (SD 0.13); range 18.7 to 22.9°C; ASA: not stated or considered; no WARMING DEVICES but fluids warmed; RCT general / epidural anaesthesia; duration: Duration in theatre: general warm 6.6h (SD 0.5); GA cold 4.4 (0.3); epidural warm 5.1 (0.3); EA cold 5.5 (0.4)	ANOVA / multiple regression adjusted for (i) age (ii) type of anaesthesia (iii) theatre temperature, duration in operating room, volume of iv crystalloid, blood transfusion units. Also included were 3 interaction terms: (i) x (ii), (i) x (iii), (ii) x (iii)
time to rewarm to 36°C						
time in theatre as continuous variable						
Frank 1992; prospective cohort study in 97 patients	beta from regression (standardised)	no data	not significant	Time spent in operating room: general warm 6.6h (SD 0.5); general cold 4.4 (0.3); epidural warm 5.1 (0.3); epidural cold 5.5 (0.4)	age: 35 to 94y; mean 64.5, SD 1.1; theatre temperature: mean 20.9 (SD 0.13); range 18.7 to 22.9°C; ASA: not stated or considered; no WARMING DEVICES but fluids warmed; RCT general / epidural anaesthesia; duration: Duration in theatre: general warm 6.6h (SD 0.5); GA cold 4.4 (0.3); epidural warm 5.1 (0.3); EA cold 5.5 (0.4)	ANOVA / multiple regression adjusted for (i) age (ii) type of anaesthesia (iii) theatre temperature, duration in operating room, volume of iv crystalloid, blood transfusion units. Also included were 3 interaction terms: (i) x (ii), (i) x (iii), (ii) x (iii)

q) Surgery risk factors: duration of surgery

Study name	Outcome	*OR (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
incidence of IPH (<36) intraoperative (any time)						
duration of surgery as continuous variable						
Flores-Maldonado 1997; prospective cohort study in 130 patients	multivariate adjusted odds ratio	no data	not significant	Mean surgical time 83 min (SD 59)	age: 5 to 90 y (mean 42 SD20); theatre temperature: mean 22.9 (SD 1.2)°C; ASA I 50%; ASA II 40%; ASA III/IV 10%; no warming mechanisms stated; mixed general / regional groups anaesthesia; Mean surgical time 1.1h (SD 0.9) and 1.8 (SD 1.0)	age, gender, theatre temperature, duration of surgery, magnitude of surgery, blood transfusion, type of anaesthetic
incidence of IPH (<36) in ICU						
duration >2h vs duration of surgery ≤2h						
Kongsayreepong 2003; prospective cohort study in 184 patients	multivariate adjusted odds ratio	4.5 (1.48, 13.68)	statistically significant, favours less than 2 h	0.25 to 10.25h range; 27% had ≤2h.	age: 15-93; theatre temperature: mean 19.5 to 20.6°C (SD 1.9); 19% ASA I; 55% ASA II; 26% ASA > II; some had active warming; mixed general/regional /combined anaesthesia; duration: Anaesthesia: range 0.5 to 11.5h. 19% had ≤2h.	age, body weight, preoperative body temperature, ASA, diabetic neuropathy, emergency surgery, magnitude of surgery, temperature monitoring used, type of anaesthesia, iv fluid, duration surgery, ambient temperature (+ univariate: gender, FAW, duration of anaesthesia)
incidence of IPH (<35) in PACU						
duration >2h vs duration of surgery ≤2h						
Vorrakitpokatorn 2006; prospective cohort study in 128 patients	multivariate adjusted odds ratio	0.58 (0.19, 1.76)	not statistically significant	duration of surgery 120 min (SD 49); 44% had >2h.	age: 48.9 y (SD 13.54); 12.5% >65y; theatre temperature: not stated; ASA I 59%; ASA II 31%; ASA III 9%; no warming mechanisms stated; general anaesthesia; duration: Duration of surgery 2h (SD 0.8); 44% had >2h	age, duration of surgery, volume of irrigation fluid, blood transfusion units
core temperature in PACU						
duration of surgery as continuous variable						
Frank 2000; prospective cohort study in 44 patients	B from regression (non-standardised)	no data	not statistically significant; p=0.22	Duration of surgery: mean 92 min (SD 54) range 65 to 155	age: 57y (SD 7) range 47-67; theatre temperature: mean 20.9°C (SD 0.13) range 18.7 to 22.9.; ASA: not stated or considered; no warming devices but fluids warmed; spinal anaesthesia; duration: Duration of surgery: mean 1.5h (SD 0.9) range 1.1 to 2.6	age, duration of surgery, theatre temperature, body mass, % body fat, height of spinal blockage (+ univariate BMI)

r) Surgery risk factors: surgery type

Study name	Outcome	*OR (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
incidence of IPH (<35) intraoperative (any time)						
laparoscopic procedure vs open procedure						
Nguyen 2000; RCT study in 101 patients	OR from RCT	0.48 (0.04, 5.47)	very wide confidence intervals	open GBP through upper midline incision; laparoscopic GBP through 5 abdominal trocars.	age: mean 43 to 48 y (SD 8); theatre temperature: 20 to 22°C; ASA: not stated; all had FAW but fluids not warmed; general anaesthesia; duration: Duration surgery: laparoscopy 3.9h (SD 0.7); open 3.4h (SD 0.6)	
incidence of IPH (<35) in PACU						
laparoscopic procedure vs open procedure						
Nguyen 2000; RCT study in 101 patients	OR from RCT	0 (0, 0)	No severe IPH in PACU	open GBP through upper midline incision; laparoscopic GBP through 5 abdominal trocars.	age: mean 43 to 48 y (SD 8); theatre temperature: 20 to 22°C; ASA: not stated; all had FAW but fluids not warmed; general anaesthesia; duration: Duration surgery: laparoscopy 3.9h (SD 0.7); open 3.4h (SD 0.6)	
incidence of IPH (<36) in PACU						
laparoscopic procedure vs open procedure						
Nguyen 2000; RCT study in 101 patients	OR from RCT	1.33 (0.28, 6.29)	wide confidence interval	open GBP through upper midline incision; laparoscopic GBP through 5 abdominal trocars.	age: mean 43 to 48 y (SD 8); theatre temperature: 20 to 22°C; ASA: not stated; all had FAW but fluids not warmed; general anaesthesia; duration: Duration surgery: laparoscopy 3.9h (SD 0.7); open 3.4h (SD 0.6)	

Study name	Outcome	*OR (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
core temperature at 30 min						
laparoscopic procedure vs open procedure						
Nguyen 2000; RCT study in 101 patients	mean difference from RCT	0 (-0.19, 0.19)	No significant difference; open group 36.06°C	open GBP through upper midline incision; laparoscopic GBP through 5 abdominal trocars.	age: mean 43 to 48 y (SD 8); theatre temperature: 20 to 22°C; ASA: not stated; all had FAW but fluids not warmed; general anaesthesia; duration: Duration surgery: laparoscopy 3.9h (SD 0.7); open 3.4h (SD 0.6)	
Danelli 2002; RCT study in 44 patients	median from RCT	no data	Median and range given. Authors reported no significant differences between groups (and shown on graph)	laparoscopy with 30 °C Trendelenberg position; Open surgery (laparotomy) with midline incision	age: mean 64 and 62 y (SD 8); range 18 min to 75 max); theatre temperature: 21-23°C, laminar flow, relative humidity 40-45%; ASA: I-II; no warming devices but fluids warmed; combined general / regional anaesthesia; duration: duration of surgery median 4.1h (range 3-5h) and 3 h (2-6h)	RCT, comparable at baseline for age, gender, weight, height, blood loss, crystalloid infusion. Duration of surgery was significantly longer in the laparoscopic group (mean difference 1.1 h)
core temperature at 1h						
laparoscopic procedure vs open procedure						
Nguyen 2000; RCT study in 101 patients	mean difference from RCT	-0.03 (-0.23, 0.17)	No significant difference; open group 36.12°C	open GBP through upper midline incision; laparoscopic GBP through 5 abdominal trocars.	age: mean 43 to 48 y (SD 8); theatre temperature: 20 to 22°C; ASA: not stated; all had FAW but fluids not warmed; general anaesthesia; duration: Duration surgery: laparoscopy 3.9h (SD 0.7); open 3.4h (SD 0.6)	
Danelli 2002; RCT study in 44 patients	median from RCT	no data	Median and range given. Authors reported no significant differences between groups (and shown on graph)	laparoscopy with 30 °C Trendelenberg position; Open surgery (laparotomy) with midline incision	age: mean 64 and 62 y (SD 8); range 18 min to 75 max); theatre temperature: 21-23°C, laminar flow, relative humidity 40-45%; ASA: I-II; no warming devices but fluids warmed; combined general / regional anaesthesia; duration: duration of surgery median 4.1h (range 3-5h) and 3 h (2-6h)	RCT, comparable at baseline for age, gender, weight, height, blood loss, crystalloid infusion. Duration of surgery was significantly longer in the laparoscopic group (mean difference 1.1 h)

Study name	Outcome	*OR (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
core temperature at 2h						
laparoscopic procedure vs open procedure						
Nguyen 2000; RCT study in 101 patients	mean difference from RCT	-0.1 (-0.31, 0.11)	No significant difference; open group 36.35°C	open GBP through upper midline incision; laparoscopic GBP through 5 abdominal trocars.	age: mean 43 to 48 y (SD 8); theatre temperature: 20 to 22°C; ASA: not stated; all had FAW but fluids not warmed; general anaesthesia; duration: Duration surgery: laparoscopy 3.9h (SD 0.7); open 3.4h (SD 0.6)	
Danelli 2002; RCT study in 44 patients	median from RCT	no data	Median and range given. Authors reported no significant differences between groups (and shown on graph)	laparoscopy with 30 °C Trendelenberg position; Open surgery (laparotomy) with midline incision	age: mean 64 and 62 y (SD 8); range 18 min to 75 max); theatre temperature: 21-23°C, laminar flow, relative humidity 40-45%; ASA: I-II; no warming devices but fluids warmed; combined general / regional anaesthesia; duration: duration of surgery median 4.1h (range 3-5h) and 3 h (2-6h)	RCT, comparable at baseline for age, gender, weight, height, blood loss, crystalloid infusion. Duration of surgery was significantly longer in the laparoscopic group (mean difference 1.1 h)
core temperature at 3h						
laparoscopic procedure vs open procedure						
Danelli 2002; RCT study in 44 patients	median from RCT	no data	Median and range given. Authors reported no significant differences between groups (and shown on graph)	laparoscopy with 30 °C Trendelenberg position; Open surgery (laparotomy) with midline incision	age: mean 64 and 62 y (SD 8); range 18 min to 75 max); theatre temperature: 21-23°C, laminar flow, relative humidity 40-45%; ASA: I-II; no warming devices but fluids warmed; combined general / regional anaesthesia; duration: duration of surgery median 4.1h (range 3-5h) and 3 h (2-6h)	RCT, comparable at baseline for age, gender, weight, height, blood loss, crystalloid infusion. Duration of surgery was significantly longer in the laparoscopic group (mean difference 1.1 h)

Study name	Outcome	*OR (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
core temperature in PACU						
laparoscopic procedure vs open procedure						
Nguyen 2000; RCT study in 101 patients	mean difference from RCT	-0.29 (-0.48, -0.1)	p=0.002; statistically significant difference, favouring open procedure	open GBP through upper midline incision; laparoscopic GBP through 5 abdominal trocars.	age: mean 43 to 48 y (SD 8); theatre temperature: 20 to 22°C; ASA: not stated; all had FAW but fluids not warmed; general anaesthesia; duration: Duration surgery: laparoscopy 3.9h (SD 0.7); open 3.4h (SD 0.6)	
Danelli 2002; RCT study in 44 patients	median from RCT	no data	Median and range given. Authors reported no significant differences between groups (and shown on graph)	laparoscopy with 30 °C Trendelenberg position; Open surgery (laparotomy) with midline incision	age: mean 64 and 62 y (SD 8); range 18 min to 75 max); theatre temperature: 21-23°C, laminar flow, relative humidity 40-45%; ASA: I-II; no warming devices but fluids warmed; combined general / regional anaesthesia; duration: duration of surgery median 4.1h (range 3-5h) and 3 h (2-6h)	RCT, comparable at baseline for age, gender, weight, height, blood loss, crystalloid infusion. Duration of surgery was significantly longer in the laparoscopic group (mean difference 1.1 h)
core temperature after 30 min in PACU						
laparoscopic procedure vs open procedure						
Danelli 2002; RCT study in 44 patients	median from RCT	no data	Median and range given. Authors reported no significant differences between groups (and shown on graph)	laparoscopy with 30 °C Trendelenberg position; Open surgery (laparotomy) with midline incision	age: mean 64 and 62 y (SD 8); range 18 min to 75 max); theatre temperature: 21-23°C, laminar flow, relative humidity 40-45%; ASA: I-II; no warming devices but fluids warmed; combined general / regional anaesthesia; duration: duration of surgery median 4.1h (range 3-5h) and 3 h (2-6h)	RCT, comparable at baseline for age, gender, weight, height, blood loss, crystalloid infusion. Duration of surgery was significantly longer in the laparoscopic group (mean difference 1.1 h)
core temperature after 60 min in PACU						
laparoscopic procedure vs open procedure						
Danelli 2002; RCT study in 44 patients	median from RCT	no data	Median and range given. Authors reported no significant differences between groups (and shown on graph)	laparoscopy with 30 °C Trendelenberg position; Open surgery (laparotomy) with midline incision	age: mean 64 and 62 y (SD 8); range 18 min to 75 max); theatre temperature: 21-23°C, laminar flow, relative humidity 40-45%; ASA: I-II; no warming devices but fluids warmed; combined general / regional anaesthesia; duration: duration of surgery median 4.1h (range 3-5h) and 3 h (2-6h)	RCT, comparable at baseline for age, gender, weight, height, blood loss, crystalloid infusion. Duration of surgery was significantly longer in the laparoscopic group (mean difference 1.1 h)

s) Surgery risk factors: surgery: magnitude

Study name	Outcome	*OR (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
incidence of IPH (<36) intraoperative (any time)						
major surgery vs minor surgery						
Flores-Maldonado 1997; prospective cohort study in 130 patients	multivariate adjusted odds ratio	2.8 (1.2, 6.3)	statistically significant, favours minor surgery	52 / 150 (35%) had major surgery (=opening of abdominal or chest cavities)	age: 5 to 90 y (mean 42 SD20); theatre temperature: mean 22.9 (SD 1.2)°C; ASA I 50%; ASA II 40%; ASA III / IV 10%; no warming mechanisms stated; mixed general / regional groups anaesthesia; duration: Mean surgical time 1.1h (SD 0.9) and 1.8 (SD 1.0)	age, gender, theatre temperature, duration of surgery, magnitude of surgery, blood transfusion, type of anaesthetic
incidence of IPH (<36) in ICU						
intermediate magnitude of surgery vs minor surgery						
Kongsayreepong 2003; prospective cohort study in 184 patients	multivariate adjusted odds ratio	6.6 (1.66, 26.19)	statistically significant, favours minor surgery, fairly wide confidence intervals	medium: body cavities exposed less than major (e.g. appendectomy) minor: superficial. 18% minor; 30% medium; 52% major	age: 15-93; theatre temperature: mean 19.5 to 20.6°C (SD 1.9); 19% ASA I; 55% ASA II; 26% ASA > II; some had active warming; mixed general / regional / combined anaesthesia; duration: Anaesthesia: range 0.5 to 11.5h. 19% had ≤2h.	age, body weight, preoperative body temperature, ASA, diabetic neuropathy, emergency surgery, magnitude of surgery, temperature monitoring used, type of anaesthesia, iv fluid, duration surgery, ambient temperature (+ univariate: gender, FAW, duration of anaesthesia)
major surgery vs minor surgery						
Kongsayreepong 2003; prospective cohort study in 184 patients	multivariate adjusted odds ratio	22.23 (5.41, 91.36)	larger statistically significant effect, favours minor surgery, fairly wide confidence intervals	Major surgery: body cavities / major vessels exposed (e.g. major abdominal, thoracic, major vascular, hip arthroplasty; minor: superficial	age: 15-93; theatre temperature: mean 19.5 to 20.6°C (SD 1.9); 19% ASA I; 55% ASA II; 26% ASA > II; some had active warming; mixed general / regional / combined anaesthesia; duration: Anaesthesia: range 0.5 to 11.5h. 19% had ≤2h.	age, body weight, preoperative body temperature, ASA, diabetic neuropathy, emergency surgery, magnitude of surgery, temperature monitoring used, type of anaesthesia, iv fluid, duration surgery, ambient temperature (+ univariate: gender, FAW, duration of anaesthesia)

Study name	Outcome	*OR (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
incidence of IPH (<35) in ICU						
intermediate magnitude of surgery vs minor surgery						
Abelha 2005; prospective cohort study in 185 patients	multivariate adjusted odds ratio	3.6 (1.5, 9)	statistically significant, favours minor surgery	Medium: body cavities exposed less than major (e.g. appendectomy) minor: superficial. 20% minor; 24% medium; 56% major.	age: 66.0 y (SD 12.6), range 25 to 94; theatre temperature: 20-22°C (not adjusted for); ASA I 3%, ASA II 39%, ASA III 49%, ASA IV 10%.; some had warming mechanisms; mixed general / regional / combined anaesthesia; duration: Anaesthesia duration: 3.6 h (SD 1.8) range 0.7 to 11h; 51% >3h	magnitude of surgery, iv crystalloids, preoperative patient temperature, SAPS II + adjusted for: anaesthesia type, anaesthesia duration, temperature monitoring, FAW, packed erythrocytes. Univariate: age, gender, body weight, BMI, ASA, emergency, iv colloids, plasma
major surgery vs minor surgery						
Abelha 2005; prospective cohort study in 185 patients	multivariate adjusted odds ratio	3.9 (1.4, 10.6)	statistically significant, favours minor surgery	Major surgery: body cavities / major vessels exposed (e.g. major abdominal, thoracic, major vascular, hip arthroplasty.	age: 66.0 y (SD 12.6), range 25 to 94; theatre temperature: 20-22°C (not adjusted for); ASA I 3%, ASA II 39%, ASA III 49%, ASA IV 10%.; some had warming mechanisms; mixed general / regional / combined anaesthesia; duration: Anaesthesia duration: 3.6 h (SD 1.8) range 0.7 to 11h; 51% >3h	magnitude of surgery, iv crystalloids, preoperative patient temperature, SAPS II + adjusted for: anaesthesia type, anaesthesia duration, temperature monitoring, FAW, packed erythrocytes. Univariate: age, gender, body weight, BMI, ASA, emergency, iv colloids, plasma

t) Surgery risk factors: surgery: elective

Study name	Outcome	*OR (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
incidence of IPH (<36) in ICU						
emergency surgery vs elective surgery						
Kongsayreepong 2003; prospective cohort study in 184 patients	multivariate adjusted odds ratio	0.4 (0.09, 1.81)	not statistically significant	16% emergency surgery.	age: 15-93; theatre temperature: mean 19.5 to 20.6°C (SD 1.9); 19% ASA I; 55% ASA II; 26% ASA > II; some had active warming; mixed general / regional / combined anaesthesia; duration: Anaesthesia: range 0.5 to 11.5h. 19% had ≤2h.	age, body weight, preoperative body temperature, ASA, diabetic neuropathy, emergency surgery, magnitude of surgery, temperature monitoring used, type of anaesthesia, iv fluid, duration surgery, ambient temperature (+ univariate: gender, FAW, duration of anaesthesia)

u) Surgery risk factors: patient position intraoperatively

Study name	Outcome	*MD (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
core temperature at 30 min						
Head down tilt (Trendelenburg) vs supine						
Nakajima 2002; RCT study in 16 patients	mean difference from RCT	-0.05°C (-0.41, 0.31)	from graph, 30 min approx, not significant difference, fairly wide confidence intervals, supine temperature 36.03°C	15-20 °C head down tilt (Trendelenburg) vs supine; positions initiated after 10 min of GA	age: mean 47 to 52 y (range 20-60); theatre temperature: Mean 23.9 to 24.2 (SD 0.4); relative humidity 40%; ASA: I-II; no warming mechanisms stated; combined general / regional anaesthesia; duration: Duration of anaesthesia about 3h	RCT, comparable at baseline for age, gender, height, weight, heart rate, arterial pressure, theatre temperature, fluids, sensory block, pre-induction temperature
core temperature at 1h						
Head down tilt (Trendelenburg) vs supine						
Nakajima 2002; RCT study in 16 patients	mean difference from RCT	-0.15°C (-0.51, 0.21)	from graph, 1h approx, not significant difference, fairly wide confidence intervals, supine temperature 35.83°C	15-20 °C head down tilt (Trendelenburg) vs supine; positions initiated after 10 min of GA	age: mean 47 to 52 y (range 20-60); theatre temperature: Mean 23.9 to 24.2 (SD 0.4); relative humidity 40%; ASA: I-II; no warming mechanisms stated; combined general / regional anaesthesia; duration: Duration of anaesthesia about 3h	RCT, comparable at baseline for age, gender, height, weight, heart rate, arterial pressure, theatre temperature, fluids, sensory block, pre-induction temperature

Study name	Outcome	*MD (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
core temperature at 2h						
Head down tilt (Trendelenburg) vs supine						
Nakajima 2002; RCT study in 16 patients	mean difference from RCT	-0.42°C (-0.93, 0.21)	from graph, 2h approx, not significant difference, wide confidence intervals, supine temperature 35.59°C	15-20 °C head down tilt (Trendelenburg) vs supine; positions initiated after 10 min of GA	age: mean 47 to 52 y (range 20-60); theatre temperature: Mean 23.9 to 24.2 (SD 0.4); relative humidity 40%; ASA: I-II; no warming mechanisms stated; combined general / regional anaesthesia; duration: Duration of anaesthesia about 3h	RCT, comparable at baseline for age, gender, height, weight, heart rate, arterial pressure, theatre temperature, fluids, sensory block, pre-induction temperature
Leg up + head down position vs supine						
Nakajima 2002; RCT study in 16 patients	mean difference from RCT	-0.64°C (-1.09, -0.19)	from graph, 2h approx, statistically significant, favours supine position, fairly wide confidence intervals, supine temperature 35.59°C	leg up (lithotomy) + head down tilt position vs supine; positions initiated after 10 min of GA	age: mean 47 to 52 y (range 20-60); theatre temperature: Mean 23.9 to 24.2 (SD 0.4); relative humidity 40%; ASA: I-II; no warming mechanisms stated; combined general / regional anaesthesia; duration: Duration of anaesthesia about 3h	RCT, comparable at baseline for age, gender, height, weight, heart rate, arterial pressure, theatre temperature, fluids, sensory block, pre-induction temperature
Leg up position vs supine						
Nakajima 2002; RCT study in 16 patients	mean difference from RCT	-0.93°C (-1.52, -0.34)	from graph, 2h approx, statistically significant, favours supine position, wide confidence intervals, supine temperature 35.59°C	leg up (lithotomy) position vs supine; positions initiated after 10 min of GA	age: mean 47 to 52 y (range 20-60); theatre temperature: Mean 23.9 to 24.2 (SD 0.4); relative humidity 40%; ASA: I-II; no warming mechanisms stated; combined general/regional anaesthesia; duration: Duration of anaesthesia about 3h	RCT, comparable at baseline for age, gender, height, weight, heart rate, arterial pressure, theatre temperature, fluids, sensory block, pre-induction temperature

Study name	Outcome	*MD (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
core temperature at 3h						
Head down tilt (Trendelenburg) vs supine						
Nakajima 2002; RCT study in 16 patients	mean difference from RCT	-0.2°C (-0.76, 0.36)	from text;30 min approx, not significant difference, wide confidence intervals, supine temperature 35.20°C	15-20 °C head down tilt (Trendelenburg) vs supine; positions initiated after 10 min of GA	age: mean 47 to 52 y (range 20-60); theatre temperature: Mean 23.9 to 24.2 (SD 0.4); relative humidity 40%; ASA: I-II; no warming mechanisms stated; combined general/regional anaesthesia; duration: Duration of anaesthesia about 3h	RCT, comparable at baseline for age, gender, height, weight, heart rate, arterial pressure, theatre temperature, fluids, sensory block, pre-induction temperature
Leg up + head down position vs supine						
Nakajima 2002; RCT study in 16 patients	mean difference from RCT	-0.9°C (-1.46, -0.34)	statistically significant, favours supine position, wide confidence intervals, supine temperature 35.20°C	leg up (lithotomy) + head down tilt position vs supine; positions initiated after 10 min of GA	age: mean 47 to 52 y (range 20-60); theatre temperature: Mean 23.9 to 24.2 (SD 0.4); relative humidity 40%; ASA: I-II; no warming mechanisms stated; combined general/regional anaesthesia; duration: Duration of anaesthesia about 3h	RCT, comparable at baseline for age, gender, height, weight, heart rate, arterial pressure, theatre temperature, fluids, sensory block, pre-induction temperature
Leg up position vs supine						
Nakajima 2002; RCT study in 16 patients	mean difference from RCT	-1°C (-1.56, -0.44)	statistically significant, favours supine position, wide confidence intervals, supine temperature 35.20°C	leg up (lithotomy) position vs supine; positions initiated after 10 min of GA	age: mean 47 to 52 y (range 20-60); theatre temperature: Mean 23.9 to 24.2 (SD 0.4); relative humidity 40%; ASA: I-II; no warming mechanisms stated; combined general/regional anaesthesia; duration: Duration of anaesthesia about 3h	RCT, comparable at baseline for age, gender, height, weight, heart rate, arterial pressure, theatre temperature, fluids, sensory block, pre-induction temperature

v) Other risk factors: IV fluids volume

Study name	Outcome	*OR (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
incidence of IPH (<36) in ICU						
volume of IV fluid > 4000ml vs total IV fluid ≤4000ml						
Kongsayreepong 2003; prospective cohort study in 184 patients	multivariate adjusted odds ratio	1.24 (0.38, 4.02)	not significant	Fluids range 100 to 11,200ml. 72.5% had ≤ 4000ml; fluid temperature not stated.	age: 15-93; theatre temperature: mean 19.5 to 20.6°C (SD 1.9); 19% ASA I; 55% ASA II; 26% ASA > II; some had active warming; mixed general / regional / combined anaesthesia; duration: Anaesthesia: range 0.5 to 11.5h. 19% had ≤2h.	age, body weight, preoperative body temperature, ASA, diabetic neuropathy, emergency surgery, magnitude of surgery, temperature monitoring used, type of anaesthesia, iv fluid, duration surgery, ambient temperature (+ univariate: gender, FAW, duration of anaesthesia)
change in temperature						
IV fluid volume as continuous variable						
Hind 1994a; prospective cohort study in 30 patients	beta from regression (standardised)	no data	'Drop in oesophageal temperature' - probably maximum drop. Not significant in analysis 1: negative correlations with age.	730 ml (SD 223.8); 140-1250 ml. Fluids at room temperature. NB correlations with age	age: 51.43 y (SD 12.01); range 37 to 76; theatre temperature: 21.3°C (SD 1.2); 19.6-23.3. RH: 56% (4); 50-65; ASA: not stated; no warming mechanisms stated; general anaesthesia; duration: Duration of surgery 1-2h	1 of 2 multivariate analyses that fitted the data. Factors included: age, theatre temperature, body fat index, iv fluids, and total blood loss (chosen from univariate correlations). Excluded: surgery duration, theatre humidity. Constant: type of anaesthesia.

w) Patient risk factors: IV crystalloids volume

Study name	Outcome	*OR (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
incidence of IPH (<35) in ICU						
IV crystalloids volume as continuous variable						
Abelha 2005; prospective cohort study in 185 patients	multivariate adjusted odds ratio	1.4 (1.1, 1.7)	statistically significant, favours lower volumes	2.85 litre (SD 1.65) range 0.20 to 10.50; authors stated fluid warming was not known.	age: 66.0 y (SD 12.6), range 25 to 94; theatre temperature: 20-22°C (not adjusted for); ASA I 3%, ASA II 39%, ASA III 49%, ASA IV 10%.; some had warming mechanisms; mixed general / regional / combined anaesthesia; duration: Anaesthesia duration: 3.6 h (SD 1.8) range 0.7 to 11h; 51% >3h	magnitude of surgery, iv crystalloids, preoperative patient temperature, SAPS II + adjusted for: anaesthesia type, anaesthesia duration, temperature monitoring, FAW, packed erythrocytes. Univariate: age, gender, body weight, BMI, ASA, emergency, iv colloids, plasma

x) Other risk factors: irrigation fluid volume

Study name	Outcome	*OR (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
incidence of IPH (<35) in PACU						
irrigation fluids >20 litre vs irrigation fluid ≤20 litre						
Vorrakitpokatorn 2006; prospective cohort study in 128 patients	multivariate adjusted odds ratio	7.42 (2.13, 25.94)	large statistically significant effect, favours lower volume	Irrigation fluid 24.1 litre (SD 16.36), range 5 to 97; 42% had >20 liters. Room temperature irrigation fluid.	age: 48.9 y (SD 13.54); 12.5% >65y; theatre temperature: not stated; ASA I 59%; ASA II 31%; ASA III 9%; no warming mechanisms stated; general anaesthesia; duration: Duration of surgery 2h (SD 0.8); 44% had >2h	age, duration of surgery, volume of irrigation fluid, blood transfusion units

y) Other risk factors: packed erythrocytes

Study name	Outcome	*beta (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
incidence of IPH (<35) in ICU						
packed erythrocytes units as continuous variable						
Abelha 2005; prospective cohort study in 185 patients	multivariate adjusted odds ratio	no data	packed erythrocytes adjusted for in multivariate analysis but no results given	0.7 (SD 1.3) range 0 to 7; warming not stated.	age: 66.0 y (SD 12.6), range 25 to 94; theatre temperature: 20-22°C (not adjusted for); ASA I 3%, ASA II 39%, ASA III 49%, ASA IV 10%.; some had warming mechanisms; mixed general / regional / combined anaesthesia; duration: Anaesthesia duration: 3.6 h (SD 1.8) range 0.7 to 11h; 51% >3h	magnitude of surgery, iv crystalloids, preoperative patient temperature, SAPS II + adjusted for: anaesthesia type, anaesthesia duration, temperature monitoring, FAW, packed erythrocytes. Univariate: age, gender, body weight, BMI, ASA, emergency, iv colloids, plasma

z) Other risk factors: blood transfusion

Study name	Outcome	*OR (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
incidence of IPH (<36) intraoperative (any time)						
blood transfusion vs no transfusion						
Flores-Maldonado 1997; prospective cohort study in 130 patients	multivariate adjusted odds ratio	6.7 (1.5, 29)	statistically significant, favours no blood transfusion, fairly wide confidence intervals	13 / 130 (10%) had blood transfusion during surgery. Blood not warmed (4°C).	age: 5 to 90 y (mean 42 SD20); theatre temperature: mean 22.9 (SD 1.2)°C; ASA I 50%; ASA II 40%; ASA III & IV 10%; no warming mechanisms stated; mixed general / regional groups anaesthesia; duration: Mean surgical time 1.1h (SD 0.9) and 1.8 (SD 1.0)	age, gender, theatre temperature, duration of surgery, magnitude of surgery, blood transfusion, type of anaesthetic
incidence of IPH (<35) in PACU						
blood transfusion vs no transfusion						
Vorrakitpokatorn 2006; prospective cohort study in 128 patients	multivariate adjusted odds ratio	0.8 (0.21, 3.07)	not significant	Need for blood transfusion was 16% and max transfusion was 2 units in 7.6%. Temperature not stated.	age: 48.9 y (SD 13.54); 12.5% >65y; theatre temperature: not stated; ASA I 59%; ASA II 31%; ASA III 9%; no warming mechanisms stated; general anaesthesia; duration: Duration of surgery 2h (SD 0.8); 44% had >2h	age, duration of surgery, volume of irrigation fluid, blood transfusion units
change in temperature						
blood transfusion as continuous variable						
Frank 1992; prospective cohort study in 97 patients	beta from regression (standardised)	no data	not significant	0.7 to 1.2 units; blood warmed to infusion temperature of 30-33°C	age: 35 to 94y; mean 64.5, SD 1.1; theatre temperature: mean 20.9 (SD 0.13); range 18.7 to 22.9°C; ASA: not stated or considered; no warming devices but fluids warmed; RCT general / epidural anaesthesia; duration: Duration in OR: general warm 6.6h (SD 0.5); GA cold 4.4 (0.3); epidural warm 5.1 (0.3); EA cold 5.5 (0.4)	ANOVA / multiple regression adjusted for (i) age (ii) type of anaesthesia (iii) theatre temperature, duration in operating room, volume of iv crystalloid, blood transfusion units. Also included were 3 interaction terms: (i) x (ii), (i) x (iii), (ii) x (iii)

Study name	Outcome	*OR (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
time to rewarm to 36°C						
blood transfusion as continuous variable						
Frank 1992; prospective cohort study in 97 patients	beta from regression (standardised)	no data	not significant	0.7 to 1.2 units; blood warmed to infusion temperature of 30-33°C	age: 35 to 94y; mean 64.5, SD 1.1; theatre temperature: mean 20.9 (SD 0.13); range 18.7 to 22.9°C; ASA: not stated or considered; no warming devices but fluids warmed; RCT general / epidural anaesthesia; duration: Duration in OR: general warm 6.6h (SD 0.5); GA cold 4.4 (0.3); epidural warm 5.1 (0.3); EA cold 5.5 (0.4)	ANOVA / multiple regression adjusted for (i) age (ii) type of anaesthesia (iii) theatre temperature, duration in operating room, volume of iv crystalloid, blood transfusion units. Also included were 3 interaction terms: (i) x (ii), (i) x (iii), (ii) x (iii)

aa) Other risk factors: blood loss

Study name	Outcome	*beta (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
change in temperature						
blood loss as continuous variable						
Hind 1994a; prospective cohort study in 30 patients	beta from regression (standardised)	no data	'Drop in oesophageal temperature' - probably maximum drop. Not significant in analysis 1: negative correlations with age.	140.5 ml (SD 77.2); 60-325 ml. NB correlations with age	age: 51.43 y (SD 12.01); range 37 to 76; theatre temperature: 21.3°C (SD 1.2); 19.6-23.3. RH: 56% (4); 50-65; ASA: not stated; no warming mechanisms stated; general anaesthesia; duration: Duration of surgery 1-2h	1 of 2 multivariate analyses that fitted the data. Factors included: age, theatre temperature, body fat index, iv fluids, total blood loss (chosen from univariate correlations). Excluded: surgery duration, theatre humidity. Constant: type of anaesthesia.

bb) Other risk factors: warming mechanism

Study name	Outcome	*OR (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
incidence of IPH (<35) in ICU						
warming mechanism used vs no warming mechanism						
Abelha 2005; prospective cohort study in 185 patients	multivariate adjusted odds ratio	no data	warming technique adjusted for in multivariate analysis but no results given	44% had warming technique.	age: 66.0 y (SD 12.6), range 25 to 94; theatre temperature: 20-22°C (not adjusted for); ASA I 3%, ASA II 39%, ASA III 49%, ASA IV 10%.; some had warming mechanisms; mixed general / regional / combined anaesthesia; duration: Anaesthesia duration: 3.6 h (SD 1.8) range 0.7 to 11h; 51% >3h	magnitude of surgery, iv crystalloids, preoperative patient temperature, SAPS II + adjusted for: anaesthesia type, anaesthesia duration, temperature monitoring, FAW, packed erythrocytes. Univariate: age, gender, body weight, BMI, ASA, emergency, iv colloids, plasma

cc) Other risk factors: temperature monitoring

Study name	Outcome	*OR (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
incidence of IPH (<36) in ICU						
temperature monitoring not used vs temperature monitoring used						
Kongsayreepong 2003; prospective cohort study in 184 patients	multivariate adjusted odds ratio	3 (0.89, 10.12)	not significant	29% had monitoring, BUT disproportionate across surgical specialties: orthopaedic 29%, general 58%.	age: 15-93; theatre temperature: mean 19.5 to 20.6°C (SD 1.9); 19% ASA I; 55% ASA II; 26% ASA > II; some had active warming; mixed general / regional / combined anaesthesia; duration: Anaesthesia: range 0.5 to 11.5h. 19% had ≤ 2h.	age, body weight, preoperative body temperature, ASA, diabetic neuropathy, emergency surgery, magnitude of surgery, temperature monitoring used, type of anaesthesia, iv fluid, duration surgery, ambient temp

dd) Other risk factors: particular hospital

Study name	Outcome	*OR (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
incidence of IPH (<35) in PACU						
hospital Y vs hospitals other than Y						
Lau 2001; prospective cohort study in 18759 patients	multivariate adjusted odds ratio	2.46 (1.08, 5.61)	statistically significant; favours other hospitals	one of the 23 hospitals	age: 13% <15y; 62% 15-64; 24% >65; theatre temperature: not stated; ASA I 52%; ASA II 33%; ASA III 8%; ASA IV 2%; ASA V 0.3%; not identified 4%; warming mechanism not stated; mixed general / regional / combined anaesthesia; duration: Surgery duration for all patients >2h, but no details	age, ASA grade, type of anaesthesia, hospital. All of these were categorical variables.

ee) Environmental risk factors: theatre temperature

Study name	Outcome	*OR (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
incidence of IPH (<36) intraoperative (any time)						
average ambient temperature as continuous variable						
Flores-Maldonado 1997; prospective cohort study in 130 patients	multivariate adjusted odds ratio	0.61 (0.42, 0.89)	statistically significant, favours higher theatre temperatures	22.9 (SD 1.2) °C.	age: 5 to 90 y (mean 42 SD20); theatre temperature: mean 22.9 (SD 1.2)°C; ASA I 50%; ASA II 40%; ASA III / IV 10%; no warming mechanisms stated; mixed general / regional groups anaesthesia; duration: Mean surgical time 1.1h (SD 0.9) and 1.8 (SD 1.0)	age, gender, theatre temperature, duration of surgery, magnitude of surgery, blood transfusion, type of anaesthetic
incidence of IPH (<36) in ICU						
average ambient temperature as continuous variable						
Kongsayreepong 2003; prospective cohort study in 184 patients	multivariate adjusted odds ratio	0.67 (0.51, 0.88)	statistically significant, favours higher ambient temperature	Normothermic group 20.6°C (SD 1.8); hypothermic 19.5 (SD 1.9).	age: 15-93; theatre temperature: mean 19.5 to 20.6°C (SD 1.9); 19% ASA I; 55% ASA II; 26% ASA > II; some had active warming; mixed general / regional / combined anaesthesia; duration: Anaesthesia: range 0.5 to 11.5h. 19% had ≤2h.	age, body weight, preoperative body temperature, ASA, diabetic neuropathy, emergency surgery, magnitude of surgery, temperature monitoring used, type of anaesthesia, iv fluid, duration surgery, ambient temperature (+ univariate: gender, FAW, duration of anaesthesia)
core temperature at 30 min						
warm theatre 21-24°C vs cool theatre 18-21°C						
Morris 1971; prospective cohort study in 22 patients	baseline comparable mean difference	0.53°C (0.23, 0.83)	from graph, statistically significant, favours higher theatre temperature, cool theatre core temperature 36.0°C; fairly wide confidence intervals	Theatre temperature: cool theatre 18-21°C; warm theatre 21-24°C	age: mean 53 y (23 to 85); theatre temperature: cool theatre 18-21°C; warm theatre 21-24°C; ; no warming mechanisms stated; general anaesthesia; duration: duration of surgery at least 2 h	sub group analysis for age, theatre temperature, operative site and fluids infused. No significant difference in age or volume of fluids infused or site of op between lower and higher temperature theatres. Type of anaesthesia constant; surgery >2h. Number of events / number of covariates = 20 / 1 = 20

Study name	Outcome	*OR (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
core temperature at 1h						
warm theatre 21-24°C vs cool theatre 18-21°C						
Morris 1971; prospective cohort study in 22 patients	baseline comparable mean difference	0.6°C (0.3, 0.9)	from text, statistically significant, favours higher theatre temperature, cool theatre core temperature 35.6°C; fairly wide confidence intervals	Theatre temperature: cool theatre 18-21°C; warm theatre 21-24°C	age: mean 53 y (23 to 85); theatre temperature: cool theatre 18-21°C; warm theatre 21-24°C; ; no warming mechanisms stated; general anaesthesia; duration: duration of surgery at least 2 h	sub group analysis for age, theatre temperature, operative site and fluids infused. No significant difference in age or volume of fluids infused or site of op between lower and higher temperature theatres. Type of anaesthesia constant; surgery >2h. Number of events / number of covariates = 20 / 1 = 20
core temperature at 2h						
warm theatre 21-24°C vs cool theatre 18-21°C						
Morris 1971; prospective cohort study in 22 patients	baseline comparable mean difference	0.8°C (0.47, 1.13)	from text, statistically significant, favours higher theatre temperature, cool theatre core temperature 35.4°C; fairly wide confidence intervals	Theatre temperature: cool theatre 18-21°C; warm theatre 21-24°C	age: mean 53 y (23 to 85); theatre temperature: cool theatre 18-21°C; warm theatre 21-24°C; ; no warming mechanisms stated; general anaesthesia; duration: duration of surgery at least 2 h	sub group analysis for age, theatre temperature, operative site and fluids infused. No significant difference in age or volume of fluids infused or site of op between lower and higher temperature theatres. Type of anaesthesia constant; surgery >2h. Number of events / number of covariates = 20 / 1 = 20
core temperature in PACU						
theatre temperature as continuous variable						
Frank 2000; prospective cohort study in 44 patients	B from regression (non-standardised)	no data	not statistically significant; p=0.70	Ambient theatre temperature mean 20.9°C (SD 0.13) range 18.7 to 22.9.	age: 57y (SD 7) range 47-67.; theatre temperature: mean 20.9°C (SD 0.13) range 18.7 to 22.9.; ASA: not stated or considered; no warming devices but fluids warmed; spinal anaesthesia; duration: Duration of surgery: mean 1.5 h (SD 0.9) range 1.1 to 2.6	age, duration of surgery, theatre temperature, body mass, % body fat, height of spinal blockage (+ univariate BMI)

Study name	Outcome	*OR (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
change in temperature						
theatre temperature as continuous variable						
Hind 1994a; prospective cohort study in 30 patients	B from regression (non-standardised)	-0.26 °C / °C	'Drop in oesophageal temperature' - probably maximum drop. Slope reported to be statistically significant, favouring higher theatre temperature (p<0.001)	21.3°C (SD 1.2); 19.6-23.3. NB correlations with age (older patients in theatre 1st when coldest)	age: 51.43 y (SD 12.01); range 37 to 76; theatre temperature: 21.3°C (SD 1.2); 19.6-23.3. RH: 56% (4); 50-65; ASA: not stated; no warming mechanisms stated; general anaesthesia; duration: Duration of surgery 1-2h	1 of 2 multivariate analyses that fitted the data. Factors included: age, theatre temperature, body fat index, iv fluids, total blood loss (chosen from univariate correlations). Excluded: surgery duration, theatre humidity. Constant: type of anaesthesia.
Hind 1994a; prospective cohort study in 30 patients	beta from regression (standardised)	-0.6°C	'Drop in oesophageal temperature' - probably maximum drop. Slope reported to be statistically significant, favouring higher theatre temperature (p<0.001)	21.3°C (SD 1.2); 19.6-23.3. NB correlations with age (older patients in theatre 1st when coldest)	age: 51.43 y (SD 12.01); range 37 to 76; theatre temperature: 21.3°C (SD 1.2); 19.6-23.3. RH: 56% (4); 50-65; ASA: not stated; no warming mechanisms stated; general anaesthesia; duration: Duration of surgery 1-2h	1 of 2 multivariate analyses that fitted the data. Factors included: age, theatre temperature, body fat index, iv fluids, total blood loss (chosen from univariate correlations). Excluded: surgery duration, theatre humidity. Constant: type of anaesthesia.
warm theatre 24.5°C vs cool theatre 21°C						
Frank 1992; prospective cohort study in 97 patients	beta from regression (standardised)	-2.11	Not statistically significant (p=0.07); difference between 'first intraoperative temperature, and preoperative temperature, Probably standardised coefficients.	Warm: 24.5°C (SD 0.4); cold 21.3 (0.3)	age: 35 to 94y; mean 64.5, SD 1.1; theatre temperature: mean 20.9 (SD 0.13); range 18.7 to 22.9°C; ASA: not stated or considered; no warming devices but fluids warmed; RCT general / epidural anaesthesia; duration: Duration in theatre: general warm 6.6h (SD 0.5); GA cold 4.4 (0.3); epidural warm 5.1 (0.3); EA cold 5.5 (0.4)	ANOVA / multiple regression adjusted for (i) age (ii) type of anaesthesia (iii) theatre temperature, duration in operating room, volume of iv crystalloid, blood transfusion units. Also included were 3 interaction terms: (i) x (ii), (i) x (iii), (ii) x (iii)
time to rewarm to 36°C						
warm theatre 24.5°C vs cool theatre 21°C						
Frank 1992; prospective cohort study in 97 patients	beta from regression (standardised)	no data	not significant	Warm: 24.5°C (SD 0.4); cold 21.3 (0.3)	age: 35 to 94y; mean 64.5, SD 1.1; theatre temperature: mean 20.9 (SD 0.13); range 18.7 to 22.9°C; ASA: not stated or considered; no warming devices but fluids warmed; RCT general / epidural anaesthesia; duration: Duration in theatre: general warm 6.6h (SD 0.5); GA cold 4.4 (0.3); epidural warm 5.1 (0.3); EA cold 5.5 (0.4)	ANOVA / multiple regression adjusted for (i) age (ii) type of anaesthesia (iii) theatre temperature, duration in operating room, volume of iv crystalloid, blood transfusion units. Also included were 3 interaction terms: (i) x (ii), (i) x (iii), (ii) x (iii)

ff) Environmental risk factors: theatre temperature x age

Study name	Outcome	*Beta (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
change in temperature						
theatre temperature x age as continuous variable						
Frank 1992; prospective cohort study in 97 patients	beta from regression (standardised)	no data	not significant		age: 35 to 94y; mean 64.5, SD 1.1; theatre temperature: mean 20.9 (SD 0.13); range 18.7 to 22.9°C; ASA: not stated or considered; no warming devices but fluids warmed; RCT general / epidural anaesthesia; duration: Duration in theatre: general warm 6.6h (SD 0.5); GA cold 4.4 (0.3); epidural warm 5.1 (0.3); EA cold 5.5 (0.4)	ANOVA / multiple regression adjusted for (i) age (ii) type of anaesthesia (iii) theatre temperature, duration in operating room, volume of iv crystalloid, blood transfusion units. Also included were 3 interaction terms: (i) x (ii), (i) x (iii), (ii) x (iii)

gg) Environmental risk factors: theatre temperature x anaesthesia type

Study name	Outcome	*Beta (95%CI)*	Comments	Risk factor details	Other details	Factors adjusted for in multivariate analysis
change in temperature						
type anaesthesia x theatre temperature as continuous variable						
Frank 1992; prospective cohort study in 97 patients	beta from regression (standardised)	0.98	Statistically significant interaction between anaesthesia type and theatre temperature (p=0.03). Greater decrease in T for GA vs EA in a cold theatre.	General warm n=33; general cold n=21; epidural warm n=30; epidural cold n=13	age: 35 to 94y; mean 64.5, SD 1.1; theatre temperature: mean 20.9 (SD 0.13); range 18.7 to 22.9°C; ASA: not stated or considered; no warming devices but fluids warmed; RCT general / epidural anaesthesia; duration: Duration in theatre: general warm 6.6h (SD 0.5); GA cold 4.4 (0.3); epidural warm 5.1 (0.3); EA cold 5.5 (0.4)	ANOVA / multiple regression adjusted for (i) age (ii) type of anaesthesia (iii) theatre temperature, duration in operating room, volume of iv crystalloid, blood transfusion units. Also included were 3 interaction terms: (i) x (ii), (i) x (iii), (ii) x (iii)

APPENDIX G: American Society of Anaesthesiologists (ASA)

Physical Status Classification System

Class I	A normal healthy patient
Class II	A patient with mild systemic disease
Class III	A patient with severe systemic disease
Class IV	A patient with severe systemic disease that is a constant threat to life
Class V	A moribund patient who is not expected to survive without the operation
Class VI	A declared brain-dead patient whose organs are being removed for donor purposes

Source: http://www.asahq.org/clinical/physicalstatus.htm

APPENDIX H: HEALTH ECONOMICS

Table 1: Parameter distributions used in the probabilistic sensitivity analysis (*Italics* indicate values used in sensitivity analyses only)*

Model parameter description	Point estimate	Probability distribution	Distribution parameters	Source
RR SWI	4.58	Lognormal	Mean =1.52 SD = 0.40	Meta-analysis in the consequences review (section 8)
RR Blood transfusion	1.3	Lognormal	Mean = 0.26 SD = 0.14	
RR MCE	2.2	Lognormal	Mean = 0.79 SD = 0.37	
RR Mechanical ventilation	1.58	Lognormal	Mean = 0.46 SD = 0.26	
RR Pressure ulcer	1.87	Lognormal	Mean = 0.63 SD = 0.40	
Hospital length of stay	22.9%	Normal	Mean = 22.9% SD = 5.1%	
PACU LoS sensitivity analysis (zero in basecase)	*3.26 minutes*	*Normal*	*Mean = 3.26* *SD = 1.66*	
MCE baseline (age 50)	2.40%	Beta	α=24, β=991	Polanczyk 2003
MCE baseline (age 70)	4.47%	Beta	α=60, β=1281	
MCE higher risk	*4.47%*	*Beta*	*α=60, β=1281*	
Infection baseline	3.00%	Beta	α=7194, β=232758	Health Protection Agency 2006
Infection baseline (higher risk)	*9.21%*	*Beta*	*α=1317, β=12979*	
Blood transfusion rate (proportion surgical)	40.7%	beta	α=3982, β=5792	Wells 2002
Blood transfusion rate for higher risk	*28%*	*Beta*	*α=55, β=141*	Consequences review (section 8)
Blood transfusion (mean units per transfusion)	1.95	Normal	Mean = 1.95 SD = 0.49 SD fitted to give lower 95% CI at 1 unit	Consequences review (section 8)
Mechanical ventilation baseline	0.27%	Beta	α=41, β=15018	Rose 1996
Mechanical ventilation, higher risk	*11.7%*	*Beta*	*α=21, β=158*	Consequences review (section 8)
Pressure ulcer baseline	1.80%	Beta	α= 78, β= 4255	Clark 1994
Pressure ulcer, higher risk	*10.9%*	*Beta*	*α= 162, β= 1324,*	Consequences review (section 8)

MCE event mix in hypothermic patients	70% ischaemia, 20% cardiac arrest 10% Myocardial infarction	Dirichlet	(7,2,1)	Frank 1997
Population utility	Linear relationship with age	Multinormial	Intercept mean= 1.06, gradient mean= -0.004	HTA 2007
MCE utility decrease for MI and cardiac arrest	0.76	Beta	α= 427, β= 135	HTA 2007
SWI utility	0.07	Beta	α= 122, β= 1614, Fitted to mean and sd of U diff	Whitehouse, 2002 and Shmueli, 1999
Additional LoS due to infection (major/medium)	11.37	Lognormal	Mean = 2.43 SD = 0.09	Coello 2005
Additional LoS due to infection (minor)	2.8	Lognormal	Mean = 0.45 SD = 0.05	Coello 2005
Ventilation duration	16 hours	Normal	Mean = 16 SD = 6	Frank 1995
Mechanical ventilation cost per day	£1,716	Lognormal	Mean = 7.45, SD = 0.18	Department of Health, 2006 (National Schedule of Reference Costs)
MCE costs per day (cardiac arrest)	£253	Lognormal	Mean = 5.53 SD = 0.20	
MCE costs per day (Myocardial infarction)	£186	Lognormal	Mean = 5.23 SD = 0.37	
MCE costs per day (Ischeamia)	£285	Lognormal	Mean = 5.65 SD = 0.40	
PACU cost per day	£1066	Lognormal	Mean = 6.97 SD = 0.29	
HLoS cost per day	£275	Lognormal	Mean = 5.62 SD = 0.34	
Pressure ulcer cost	£1064	Normal	Mean = 1064 SD = 54.08	Bennett 2004
Cost per unit of blood	£106	Lognormal	Mean = 4.67 SD = 0.13	Varney 2003
ASA risk (odds ratio) (ASA II vs I)	1.97	Lognormal	Mean = 0.68 SD = 0.26	Kongsayreepong 2003 and Lau 2001
ASA risk (odds ratio) (ASA >II vs I)	2.68	Lognormal	Mean = 0.99 SD = 0.33	
Odds ratio for intermediate vs minor surgery	4.31	Lognormal	Mean = 1.46 SD = 0.47	Kongsayreepong 2003 and Abelha 2005
Odds ratio for major vs minor surgery	3.2	Lognormal	Mean = 1.16 SD = 0.42	Abelha 2005 and Flores-Maldonado 1997

Odds ratio for combined anaesthesia vs general or regional	2.86	Lognormal	Mean = 1.05 SD = 0.23	Kongsayreepong 2003 and Lau 2001
FAW cost, disposables	£15.02	Lognormal	Mean = 2.71 SD = 0.35	NHS Supply Chain
FAW cost, service / maintenance only	£0.61	Lognormal	Mean = -0.49 SD = 0.10 Fitted to range	Submitted data
FAW cost, service / maintenance and purchase	*£2.19*	*Lognormal*	*Mean = 0.79* *SD = 0.07* *Fitted to range*	Submitted data
Fluid warming cost	£9.38	Lognormal	Mean = 2.24 SD = 0.39	NHS Supply Chani
Fluid warming cost, service / maintenance only	£0.68	Lognormal	Mean = -0.39 SD = 0.16 Fitted to range	Submitted data
Fluid warming cost, service / maintenance and purchase	*£2.24*	*Lognormal*	*Mean = 0.80* *SD = 0.08* *Fitted to range*	Submitted data
Thermal insulation cost	£3.67	Lognormal	Mean = 1.30 SD = 0.20 Fitted to range	Submitted data and NHS Supply Chain
Hypothermia risk in cohort (before adjusting for risk factor prevalence)	40.7%	Regression coeff normally distributed to fit uncertainty due to sample size of cohort	Mean = -1.17 SD = 0.18 (33.5% - 49.3%)	Flores-Maldonado 1997
All RR for interventions	Various	Lognormal distribution	Fitted to 95%CI of meta-analysed RR	See Chapter 12, Table 5

*Abbreviations: RR, relative risk; SD, standard deviation; SWI, surgical wound infection; MCE, morbid cardiac events; PACU, post-anaesthetic care unit, LoS, length of stay; FAW, forced air warming

Manufacturer and suppliers invited to provide cost data

Arizant UK
Armstrong Medical Ltd
Central Medical Supplies Ltd
Electro Concept
Fisher and Paykel healthcare
Geratherm Medical AG
Inditherm Medical
JMW Medical Ltd
KCI Medical Ltd
Kimal Plc
Kimberly-Clarke Health Care
Mediwrap Ltd
Pennine Health Care
Sarstedt Ltd
Smiths Medical
The Surgical Company Int
Tyco Healthcare
Vital Signs Ltd

Table 2 Standardised data form sent to manufacturers and suppliers

Product name	Description	Purchase price and/or lease cost per annum	Life-expectancy*	List of associated disposables	Unit cost for each associated disposable item	Power consumption	Service/maintenance costs per annum

*please provide the life-expectancy of the device in terms of the number of expected uses before replacement