

IV fluids in children

Intravenous fluid therapy in children and young people in hospital

.

Appendices

May 2015

Draft

*Commissioned by the National Institute for
Health and Care Excellence*

Disclaimer

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

Copyright

National Clinical Guideline Centre, 2015

Funding

National Institute for Health and Care Excellence

Contents

Appendix F: Literature search strategies	5
--	---

Appendix F: Literature search strategies

Contents

Introduction	Search methodology
Section F.1	Standard population search strategy This population was used for all search questions unless stated
Section F.2	Study filter terms
F.2.1	Systematic reviews (SR)
F.2.2	Randomised controlled trials (RCT)
F.2.3	Observational studies (OBS)
F.2.4	Qualitative studies (QUAL)
F.2.5	Health economic studies (HE)
F.2.6	Quality of life studies (QoL)
F.2.7	Excluded study designs and publication types
Section F.3	Searches for specific questions with intervention (and population where different from F.1)
Error! Reference source not found.	Body surface area
F.3.1.2	Documentation
0	Point of care testing
Error! Reference source not found.	Dehydration
Error! Reference source not found.	Resuscitation – fluid type
Error! Reference source not found.	Resuscitation – rate
Error! Reference source not found.	Maintenance – fluid type
Error! Reference source not found.	Maintenance – rate
Error! Reference	Replacement and redistribution

Introduction	Search methodology
source not found.	
Error! Reference source not found.	Hypernatraemia
Error! Reference source not found.	Hyponatraemia
F.3.5.2	Training and education
Section F.4	Health economics searches
F.4.1	Health economic reviews
Section F.5	References

Search strategies used for the Intravenous fluids in children guideline are outlined below and were run in accordance with the methodology in the NICE guidelines manual 2012.¹ All searches were run up to **22 December 2014** unless otherwise stated. Any studies added to the databases after this date (even those published prior to this date) were not included unless specifically stated in the text. We do not routinely search for electronic, ahead of print or “online early” publications. Where possible searches were limited to retrieve material published in English.

Table 1: Database date parameters

Database	Dates searched
Medline	1946 – 22 December 2014
Embase	1974 – December 2014 (week 51)
The Cochrane Library	Cochrane Reviews to 2014 Issue 12 of 12 CENTRAL to 2014 Issue 11 of 12 DARE, HTA and NHSEED to 2014 Issue 4 of 4
CINAHL	1981 – 22 December 2014
PsycINFO	1987 to December Week 3 2014

Searches for the **clinical reviews** were run in Medline (OVID), Embase (OVID) and the Cochrane Library (Wiley). Additional searches were run in CINAHL and PsycINFO for the training and education question.

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

Searches for the **health economic reviews** were run in Medline (OVID), Embase (OVID), the NHS Economic Evaluations Database (NHS EED), the Health Technology Assessment (HTA) database and the Health Economic Evaluation Database (HEED). Searches in NHS EED and HEED were constructed using population terms only. For Medline and Embase an economic filter (instead of a study type filter) was added to the same clinical search strategy.

F.1 Population search strategies

F.1.1 Paediatric search terms

Medline search terms

1	exp child/
2	exp pediatrics/
3	child*.ti,ab.
4	exp infant/
5	infan*.ti,ab.
6	(baby or babies).ti,ab.
7	"adolescent"/ or adolescen*.ti,ab.
8	(pediatric*1 or paediatric*1).ti,ab.
9	(neonat* or newborn*).ti,ab.
10	or/1-9

Embase search terms

1	exp child/
2	exp pediatrics/
3	child*.ti,ab.
4	infan*.ti,ab.
5	(baby or babies).ti,ab.
6	exp adolescent/ or adolescen*.ti,ab.
7	(pediatric*1 or paediatric*1).ti,ab.
8	(neonat* or newborn*).ti,ab.
9	or/1-8

Cochrane search terms

#1	[mh child]
#2	[mh pediatrics]
#3	child*:ti,ab
#4	[mh infant]
#5	infan*:ti,ab
#6	(baby or babies):ti,ab
#7	[mh ^adolescent]
#8	adolescen*:ti,ab
#9	(pediatric* or paediatric*):ti,ab
#10	(neonat* or newborn*):ti,ab
#11	{or #1-#10}

CINAHL search terms

S1	(mh "child+") or (mh "adolescence+") or (mh "pediatrics+")
S2	child*
S3	infan* or baby or babies
S4	adolescen*
S5	pediatric* or paediatric*
S6	neonat* or newborn*

S7	S1 or S2 or S3 or S4 or S5 or S6
----	----------------------------------

PsycINFO search terms

1	pediatrics/
2	child*.ti,ab.
3	infan*.ti,ab.
4	(baby or babies).ti,ab.
5	adolescen*.ti,ab.
6	(pediatric*1 or paediatric*1).ti,ab.
7	(neonat* or newborn*).ti,ab.
8	or/1-7

F.2 Study filter search terms

F.2.1 Systematic review search terms

Medline search terms

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

Embase search terms

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

F.2.2 Randomised controlled trials (RCTs) search terms

Medline search terms

1	randomized controlled trial.pt.
2	controlled clinical trial.pt.

3	randomi#ed.ab.
4	placebo.ab.
5	randomly.ab.
6	clinical trials as topic.sh.
7	trial.ti.
8	or/1-7

Embase search terms

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

F.2.3 Observational studies search terms

Medline search terms

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

Embase search terms

1	clinical study/
2	exp case control study/
3	family study/
4	longitudinal study/
5	retrospective study/
6	prospective study/
7	cross-sectional study/
8	cohort analysis/
9	follow-up/
10	cohort*.ti,ab.
11	9 and 10
12	case control.ti,ab.

13	(cohort adj (study or studies or analys*)).ti,ab.
14	((follow up or observational or uncontrolled or non randomi#ed or nonrandomi#ed or epidemiologic*) adj (study or studies)).ti,ab.
15	((longitudinal or retrospective or prospective or cross sectional) and (study or studies or review or analys* or cohort*)).ti,ab.
16	or/1-8,11-15

F.2.4 Qualitative search terms

Medline search terms

1	qualitative research/ or narration/ or exp interviews as topic/ or exp questionnaires/ or health care surveys/
2	(qualitative or interview* or focus group* or theme* or questionnaire* or survey*).ti,ab.
3	(metasynthes* or meta-synthes* or metasummar* or meta-summar* or metastud* or meta-stud* or metathem* or meta-them* or ethno* or emic or etic or phenomenolog* or grounded theory or constant compar* or (thematic* adj3 analys*) or theoretical sampl* or purposive sampl* or hermeneutic* or heidegger* or husserl* or colaizzi* or van kaam* or van manen* or giorgi* or glaser* or strauss* or ricoeur* or spiegelberg* or merleau*).ti,ab.
4	or/1-3

Embase search terms

1	health survey/ or exp questionnaire/ or exp interview/ or qualitative research/ or narrative/
2	(qualitative or interview* or focus group* or theme* or questionnaire* or survey*).ti,ab.
3	(metasynthes* or meta-synthes* or metasummar* or meta-summar* or metastud* or meta-stud* or metathem* or meta-them* or ethno* or emic or etic or phenomenolog* or grounded theory or constant compar* or (thematic* adj3 analys*) or theoretical sampl* or purposive sampl* or hermeneutic* or heidegger* or husserl* or colaizzi* or van kaam* or van manen* or giorgi* or glaser* or strauss* or ricoeur* or spiegelberg* or merleau*).ti,ab.
4	or/1-3

CINAHL search terms

S1	(mh "qualitative studies+")
S2	(mh "qualitative validity+")
S3	(mh "interviews+") or (mh "focus groups") or (mh "surveys") or (mh "questionnaires+")
S4	(qualitative or interview* or focus group* or theme* or questionnaire* or survey*)
S5	(metasynthes* or meta-synthes* or metasummar* or meta-summar* or metastud* or meta-stud* or metathem* or meta-them* or ethno* or emic or etic or phenomenolog* or grounded theory or constant compar* or (thematic* n3 analys*) or theoretical sampl* or purposive sampl* or hermeneutic* or heidegger* or husserl* or colaizzi* or van kaam* or van manen* or giorgi* or glaser* or strauss* or ricoeur* or spiegelberg* or merleau*)
S6	S1 or S2 or S3 or S4 or S5

F.2.5 Health economics search terms

Medline search terms

1	economics/
2	value of life/
3	exp "costs and cost analysis"/
4	exp economics, hospital/
5	exp economics, medical/
6	economics, nursing/

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

Embase search terms

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

F.2.6 Quality of life search terms

Medline search terms

1	quality-adjusted life years/
2	sickness impact profile/
3	(quality adj2 (wellbeing or well-being)).ti,ab.
4	sickness impact profile.ti,ab.
5	disability adjusted life.ti,ab.
6	(qal* or qtime* or qwb* or daly*).ti,ab.
7	(euroqol* or eq5d* or eq 5d*).ti,ab.
8	(qol* or hql* or hqol* or h qol* or hrqol* or hr qol*).ti,ab.
9	(health utility* or utility score* or disutilit*).ti,ab.
10	(hui or hui1 or hui2 or hui3).ti,ab.
11	health* year* equivalent*.ti,ab.
12	(hye or hyes).ti,ab.
13	rosser.ti,ab.
14	(willingness to pay or time tradeoff or time trade off or tto or standard gamble*).ti,ab.
15	(sf36 or sf 36 or short form 36 or shortform 36 or shortform36).ti,ab.

16	(sf20 or sf 20 or short form 20 or shortform 20 or shortform20).ti,ab.
17	(sf12 or sf 12 or short form 12 or shortform 12 or shortform12).ti,ab.
18	(sf8 or sf 8 or short form 8 or shortform 8 or shortform8).ti,ab.
19	(sf6 or sf 6 or short form 6 or shortform 6 or shortform6).ti,ab.
20	or/1-19

Embase search terms

1	quality adjusted life year/
2	"quality of life index"/
3	short form 12/ or short form 20/ or short form 36/ or short form 8/
4	sickness impact profile/
5	(quality adj2 (wellbeing or well-being)).ti,ab.
6	sickness impact profile.ti,ab.
7	disability adjusted life.ti,ab.
8	(qal* or qtime* or qwb* or daly*).ti,ab.
9	(euroqol* or eq5d* or eq 5d*).ti,ab.
10	(qol* or hql* or hqol* or h qol* or hrqol* or hr qol*).ti,ab.
11	(health utility* or utility score* or disutilit*).ti,ab.
12	(hui or hui1 or hui2 or hui3).ti,ab.
13	health* year* equivalent*.ti,ab.
14	(hye or hyes).ti,ab.
15	rosser.ti,ab.
16	(willingness to pay or time tradeoff or time trade off or tto or standard gamble*).ti,ab.
17	(sf36 or sf 36 or short form 36 or shortform 36 or shortform36).ti,ab.
18	(sf20 or sf 20 or short form 20 or shortform 20 or shortform20).ti,ab.
19	(sf12 or sf 12 or short form 12 or shortform 12 or shortform12).ti,ab.
20	(sf8 or sf 8 or short form 8 or shortform 8 or shortform8).ti,ab.
21	(sf6 or sf 6 or short form 6 or shortform 6 or shortform6).ti,ab.
22	or/1-21

F.2.7 Excluded study designs and publication types

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

Medline search terms

1	letter/
2	editorial/
3	news/
4	exp historical article/
5	anecdotes as topic/
6	comment/
7	case report/
8	(letter or comment*).ti.
9	or/1-8
10	randomized controlled trial/ or random*.ti,ab.
11	9 not 10

12	animals/ not humans/
13	exp animals, laboratory/
14	exp animal experimentation/
15	exp models, animal/
16	exp rodentia/
17	(rat or rats or mouse or mice).ti.
18	or/11-17

Embase search terms

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

CINAHL search terms

S1	PT anecdote or PT audiovisual or PT bibliography or PT biography or PT book or PT book review or PT brief item or PT cartoon or PT commentary or PT computer program or PT editorial or PT games or PT glossary or PT historical material or PT interview or PT letter or PT listservs or PT masters thesis or PT obituary or PT pamphlet or PT pamphlet chapter or PT pictorial or PT poetry or PT proceedings or PT "questions and answers" or PT response or PT software or PT teaching materials or PT website
----	--

F.3 Searches for specific questions

F.3.1 Assessment and monitoring

F.3.1.1 Methods of assessing IV fluid requirements

F.3.1.1.1 *Body weight versus body surface area*

How effective is assessing body weight compared with body surface area for predicting IV fluid requirements in children?

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

Population	Intervention or exposure	Comparison	Study design filter	Date parameters and other limits
------------	--------------------------	------------	---------------------	----------------------------------

Population	Intervention or exposure	Comparison	Study design filter	Date parameters and other limits
Fluid therapy Paediatric population terms were not used for this search	Body weight	Body surface area	The following filters were used in Medline and Embase only: OBS, RCT, SR	See Table 1 English only Exclusion filter applied in Medline and Embase

Medline search terms

1	fluid therapy/
2	((fluid* or electrolye* or water) adj3 (requir* or need* or prescri* or intravenous or iv or maint* or volume* or therap* or resus* or replac* or administrat* or manag* or balance* or imbalance* or overload* or loss* or status or assess* or evaluat*)).ti,ab.
3	exp water-electrolyte balance/
4	or/1-3
5	body weight/ or exp body weight changes/
6	(body adj3 weigh*).ti,ab.
7	("ml/kg" or "mls/kg").ti,ab.
8	or/5-7
9	body surface area/
10	(body adj3 surface area).ti,ab.
11	("ml/m2" or "mls/m2" or ((metre* or meter*) adj1 square*)).ti,ab.
12	or/9-11
13	4 and 8 and 12

Embase search terms

1	fluid therapy/ or fluid resuscitation/
2	fluid balance/
3	((fluid* or electrolye* or water) adj3 (requir* or need* or prescri* or intravenous or iv or maint* or volume* or therap* or resus* or replac* or administrat* or manag* or balance* or imbalance* or overload* or loss* or status or assess* or evaluat*)).ti,ab.
4	or/1-3
5	body weight/ or lean body weight/ or weight change/ or weight fluctuation/ or weight gain/ or weight reduction/
6	(body adj3 weigh*).ti,ab.
7	("ml/kg" or "mls/kg").ti,ab.
8	or/5-7
9	body surface/
10	(body adj3 surface area).ti,ab.
11	("ml/m2" or "mls/m2" or ((metre* or meter*) adj1 square*)).ti,ab.
12	or/9-11
13	4 and 8 and 12

Cochrane search terms

#1	[mh ^"fluid therapy"]
#2	[mh "water-electrolyte balance"]
#3	((fluid* or electrolye* or water) near/3 (requir* or need* or prescri* or intravenous or iv or maint* or volume* or therap* or resus* or replac* or administrat* or manag* or balance* or

	imbalance* or overload* or loss* or status or assess* or evaluat*)):ti,ab
#4	{or #1-#3}
#5	[mh ^"body weight"]
#6	[mh "body weight changes"]
#7	(body near/3 weigh*):ti,ab
#8	("ml/kg" or "mls/kg"):ti,ab
#9	{or #5-#8}
#10	[mh "body surface area"]
#11	(body near/3 surface next area):ti,ab
#12	("ml/m2" or "mls/m2" or ((metre* or meter*) near square*)):ti,ab
#13	{or #10-#12}
#14	#4 and #9 and #13

F.3.1.2 Methods of calculating IV fluid requirements

F.3.1.2.1 Measurement and documentation

What are the key components to be measured and documented on an IV fluid balance and/or prescription chart to ensure appropriate prescribing of IV fluids?

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

Population	Intervention or exposure	Comparison	Study design filter	Date parameters and other limits
Fluid therapy Paediatric population terms were not used for this search	Documentation	n/a	None	See Table 1 English only Exclusion filter applied in Medline and Embase

Medline search terms

1	exp shock/
2	fluid therapy/
3	((fluid* or volum*) adj3 (restor* or resuscita* or replac* or deplet* or deficien* or replenish* or therap* or substitut* or rehydrat*)):ti,ab.
4	(fluid* adj3 (challenge or bolus)):ti,ab.
5	(volume adj2 (expand* or expansion* or substitut*)):ti,ab.
6	((perioperativ* or intraoperativ* or postoperativ*) adj3 fluid*):ti,ab.
7	exp water-electrolyte balance/
8	(euvo?emi* or normovo?emi*):ti,ab.
9	insensible loss*.ti,ab.
10	((fluid* or electrolye* or water) adj3 (requir* or need* or prescri* or intravenous or iv or infusion* or drip or drips or maint* or volume* or therap* or resus* or replac* or administrat* or manag* or balance* or imbalance* or overload* or loss* or status or monit* or assess* or evaluat* or re-evaluat* or reevaluat*)):ti,ab.
11	or/1-10
12	documentation/
13	"forms and records control"/
14	medical records/

15	((medical record* or patient* record* or medical note* or patient* note* or chart*) adj3 (design or layout or template*)).ti,ab.
16	health records, personal/ or medical record linkage/ or medical records, problem-oriented/ or exp medical records systems, computerized/
17	((record* or document* or chart* or measur* or tool* or form) adj3 (((fluid* or water) adj2 (requir* or need* or status or loss* or input or output or intake or balance or assess*)) or dehydrat* or hydrat*)).ti,ab.
18	or/12-17
19	11 and 18

Embase search terms

1	exp *shock/
2	exp *hypovolemia/
3	fluid resuscitation/
4	((fluid* or volum* or rehydrat*) adj3 (restor* or resuscita* or replac* or deplet* or deficien* or replenish* or therap* or substitut* or rehydrat*)).ti,ab.
5	(fluid* adj3 (challenge or bolus)).ti,ab.
6	(volume adj2 (expand* or expansion* or substitut*)).ti,ab.
7	((perioperativ* or intraoperativ* or postoperativ*) adj3 fluid*).ti,ab.
8	fluid therapy/
9	fluid balance/
10	exp *electrolyte balance/
11	((fluid* or electrolye* or water) adj3 (requir* or need* or prescri* or intravenous or iv or infusion* or drip or drips or maint* or volume* or therap* or resus* or replac* or administrat* or manag* or balance* or imbalance* or overload* or loss* or status or monit* or assess* or evaluat* or re-evaluat* or reevaluat*)).ti,ab.
12	(euvo?emi* or normovol?emi*).ti,ab.
13	insensible loss*.ti,ab.
14	or/1-13
15	exp *documentation/
16	((medical record* or patient* record* or medical note* or patient* note* or chart*) adj3 (design or layout or template*)).ti,ab.
17	((record* or document* or chart* or measur* or tool* or form) adj3 (((fluid* or water) adj2 (requir* or need* or status or loss* or input or output or intake or balance or assess*)) or dehydrat* or hydrat*)).ti,ab.
18	or/15-17
19	14 and 18

Cochrane search terms

#1	[mh shock]
#2	[mh ^"fluid therapy"]
#3	[mh "water-electrolyte balance"]
#4	((fluid* or volum* or rehydrat*) near/3 (restor* or resuscita* or replac* or deplet* or deficien* or replenish* or therap* or substitut* or rehydrat*) .ti,ab
#5	(fluid* near/3 (challenge or bolus)) .ti,ab
#6	(volume near/2 (expand* or expansion* or substitut*)):.ti,ab
#7	((perioperativ* or intraoperativ* or postoperativ*) near/3 fluid*):.ti,ab
#8	(euvolemi* or euvo?laemi* or normovolemi* or normovolaemi*):.ti,ab
#9	insensible loss*:ti,ab

#10	((fluid* or electrolye* or water) near/3 (requir* or need* or prescri* or intravenous or iv or infusion* or drip or drips or maint* or volume* or therap* or resus* or replac* or administrat* or manag* or balance* or imbalance* or overload* or loss* or status or monit* or assess* or evaluat* or re-evaluat* or reevaluat*)):ti,ab
#11	{or #1-#10}
#12	[mh ^documentation]
#13	[mh ^"forms and records control"]
#14	[mh ^"medical records"]
#15	((medical record* or patient* record* or medical note* or patient* note* or chart*) near/3 (design or layout or template*)):ti,ab
#16	[mh ^"health records, personal"]
#17	[mh ^"medical record linkage"]
#18	[mh ^"medical records, problem-oriented"]
#19	[mh "medical records systems, computerized"]
#20	((record* or document* or chart* or measur* or tool* or form) near/3 (((fluid* or water) near/2 (requir* or need* or status or loss* or input or output or intake or balance or assess*)) or dehydrat* or hydrat*)):ti,ab
#21	{or #12-#20}
#22	#11 and #21

F.3.1.2.2 Laboratory-based methods versus point-of-care testing

What is the clinical- and cost-effectiveness of laboratory-based methods versus point-of-care testing for assessing electrolyte estimations in children?

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

Population	Intervention or exposure	Comparison	Study design filter	Date parameters and other limits
Fluid therapy, dehydration Paediatric population terms were not used for this search	POC or laboratory tests	n/a	None	See Table 1 English only Exclusion filter applied in Medline and Embase

Medline search terms

1	exp shock/
2	fluid therapy/
3	((fluid* or volum*) adj3 (restor* or resuscita* or replac* or deplet* or deficien* or replenish* or therap* or substitut* or rehydrat*)):ti,ab.
4	(fluid* adj3 (challenge or bolus)).ti,ab.
5	(volume adj2 (expand* or expansion* or substitut*)):ti,ab.
6	((perioperativ* or intraoperativ* or postoperativ*) adj3 fluid*).ti,ab.
7	exp water-electrolyte balance/
8	(euvo?emi* or normovol?emi*).ti,ab.
9	insensible loss*.ti,ab.
10	((fluid* or electrolye* or water) adj3 (requir* or need* or prescri* or intravenous or iv or infusion* or drip or drips or maint* or volume* or therap* or resus* or replac* or administrat* or manag* or balance* or imbalance* or overload* or loss* or status or monit* or assess* or

	evaluat* or re-evaluat* or reevaluat*)).ti,ab.
11	dehydration/
12	dehydrat*.ti,ab.
13	or/1-12
14	point-of-care systems/
15	((point* adj3 (care or contact)) or poc or (near* adj3 patient*) or (bedside adj3 (test* or tech*))).ti,ab.
16	*laboratories, hospital/
17	clinical laboratory techniques/
18	(lab* adj2 (assess* or measur* or test*)).ti,ab.
19	or/14-18
20	13 and 19

Embase search terms

1	exp *shock/
2	exp *hypovolemia/
3	fluid resuscitation/
4	((fluid* or volum* or rehydrat*) adj3 (restor* or resuscita* or replac* or deplet* or deficien* or replenish* or therap* or substitut* or rehydrat*)).ti,ab.
5	(fluid* adj3 (challenge or bolus)).ti,ab.
6	(volume adj2 (expand* or expansion* or substitut*)).ti,ab.
7	((perioperativ* or intraoperativ* or postoperativ*) adj3 fluid*).ti,ab.
8	fluid therapy/
9	fluid balance/
10	exp *electrolyte balance/
11	((fluid* or electrolyte* or water) adj3 (requir* or need* or prescri* or intravenous or iv or infusion* or drip or drips or maint* or volume* or therap* or resus* or replac* or administrat* or manag* or balance* or imbalance* or overload* or loss* or status or monit* or assess* or evaluat* or re-evaluat* or reevaluat*)).ti,ab.
12	(euvo?emi* or normovol?emi*).ti,ab.
13	insensible loss*.ti,ab.
14	*dehydration/
15	dehydrat*.ti,ab.
16	or/1-15
17	"point of care testing"/
18	((point* adj3 (care or contact)) or poc or (near* adj3 patient*) or (bedside adj3 (test* or tech*))).ti,ab.
19	*laboratory test/
20	(lab* adj2 (assess* or measur* or test*)).ti,ab.
21	or/17-20
22	16 and 21

Cochrane search terms

#1	[mh shock]
#2	[mh ^"fluid therapy"]
#3	[mh "water-electrolyte balance"]
#4	((fluid* or volum* or rehydrat*) near/3 (restor* or resuscita* or replac* or deplet* or deficien* or replenish* or therap* or substitut* or rehydrat*)).ti,ab

#5	(fluid* near/3 (challenge or bolus)) .ti,ab
#6	(volume near/2 (expand* or expansion* or substitut*)):ti,ab
#7	((perioperativ* or intraoperativ* or postoperativ*) near/3 fluid*):ti,ab
#8	(euvolemi* or euvoelaemi* or normovolemi* or normovolaemi*):ti,ab
#9	insensible loss*:ti,ab
#10	((fluid* or electrolye* or water) near/3 (requir* or need* or prescri* or intravenous or iv or infusion* or drip or drips or maint* or volume* or therap* or resus* or replac* or administrat* or manag* or balance* or imbalance* or overload* or loss* or status or monit* or assess* or evaluat* or re-evaluat* or reevaluat*)):ti,ab
#11	[mh ^dehydration]
#12	dehydrat*:ti,ab
#13	{or #1-#12}
#14	[mh ^"point-of-care systems"]
#15	((point* near/3 (care or contact)) or poc or (near* near/3 patient*) or (bedside near/3 (test* or tech*)):ti,ab
#16	[mh ^"laboratories, hospital"]
#17	[mh ^"clinical laboratory techniques"]
#18	(lab* near/2 (assess* or measur* or test*)):ti,ab
#19	{or #14-#18}
#20	#13 and #19

F.3.1.2.3 Assessing dehydration and hypovolaemia

What are the most clinically- and cost-effective methods for assessing dehydration and hypovolaemia?

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

Population	Intervention or exposure	Comparison	Study design filter	Date parameters and other limits
Dehydration Paediatric population terms were not used for this search	Assessment measures	n/a	The following filters were used in Medline and Embase only: OBS	See Table 1 English only Exclusion filter applied in Medline and Embase

Medline search terms

1	dehydration/
2	hypovolemia/
3	dehydrat*.ti,ab.
4	hypovol?emi*.ti,ab.
5	or/1-4
6	weight loss/
7	(weight adj2 (loss* or reduc*)):ti,ab.
8	exp water-electrolyte balance/
9	((fluid or electrolyte*) adj2 (balance* or imbalance*)):ti,ab.
10	((water or fluid) adj2 (intake* or output* or loss*)):ti,ab.
11	medical history taking/

12	physical examination/
13	((clinical or medical of physical) adj2 (histor* or assess* or exam*)).ti,ab.
14	pulse/
15	pulse.ti,ab.
16	exp vital signs/
17	(blood pressure or heart rate).ti,ab.
18	(capillary refill or jugular venous pressure or JVP or (alter* adj2 consciousness) or pinch test or skin turgor or sunken eye* or dry mucus membrane*).ti,ab.
19	urinalysis/
20	(urin* adj3 (output or test* or osmolalit* or gravit* or sodium or creatinine)).ti,ab.
21	creatinine/
22	urinalys*.ti,ab.
23	blood chemical analysis/
24	(blood adj2 (test* or glucose or sodium)).ti,ab.
25	blood urea nitrogen/
26	urea.ti,ab.
27	((renal or kidney) adj function).ti,ab.
28	(fluid adj3 (prescri* or admin* or need* or assess*)).ti,ab.
29	or/6-28
30	5 and 29

Embase search terms

1	dehydration/
2	hypovolemia/
3	dehydrat*.ti,ab.
4	hypovol?emi*.ti,ab.
5	or/1-4
6	*weight reduction/
7	(weight adj2 (loss* or reduc*)).ti,ab.
8	fluid balance/
9	((fluid or electrolyte*) adj2 (balance* or imbalance*)).ti,ab.
10	exp *electrolyte balance/
11	((water or fluid) adj2 (intake* or output* or loss*)).ti,ab.
12	*physical examination/
13	*clinical examination/
14	((clinical or medical of physical) adj2 (histor* or assess* or exam*)).ti,ab.
15	*clinical assessment/
16	*pulse rate/
17	pulse.ti,ab.
18	*vital sign/
19	exp *blood pressure/
20	*heart rate/
21	(blood pressure or heart rate).ti,ab.
22	(capillary refill or jugular venous pressure or JVP or (alter* adj2 consciousness) or pinch test or skin turgor or sunken eye* or dry mucus membrane*).ti,ab.
23	skin turgor/

24	*urinalysis/
25	(urin* adj3 (output or test* or osmolalit* or gravit* or sodium or creatinine)).ti,ab.
26	*urine volume/
27	*urine osmolality/
28	*sodium urine level/
29	*creatinine urine level/
30	*sodium blood level/
31	*glucose blood level/
32	(blood adj2 (test* or glucose or sodium)).ti,ab.
33	*urea blood level/
34	urea.ti,ab.
35	*kidney function/
36	((renal or kidney) adj function).ti,ab.
37	(fluid adj3 (prescri* or admin* or need* or assess*)).ti,ab.
38	or/6-37
39	5 and 38

Cochrane search terms

#1	[mh ^dehydration]
#2	[mh ^hypovolemia]
#3	dehydrat*:ti,ab
#4	(hypovolemi* or hypovolaemi*):ti,ab
#5	{or #1-#4}
#6	[mh ^"weight loss"]
#7	(weight near/2 (loss* or reduc*)):ti,ab
#8	[mh "water-electrolyte balance"]
#9	((fluid or electrolyte*) near/2 (balance* or imbalance*)):ti,ab
#10	((water or fluid) near/2 (intake* or output* or loss*)):ti,ab
#11	[mh ^"medical history taking"]
#12	[mh ^"physical examination"]
#13	((clinical or medical of physical) near/2 (histor* or assess* or exam*)):ti,ab
#14	[mh ^pulse]
#15	pulse:ti,ab
#16	[mh "vital signs"]
#17	(blood pressure or heart rate):ti,ab
#18	(capillary refill or jugular venous pressure or JVP or (alter* near/2 consciousness) or pinch test or skin turgor or sunken eye* or dry mucus membrane*):ti,ab
#19	[mh ^urinalysis]
#20	(urin* near/3 (output or test* or osmolalit* or gravit* or sodium or creatinine)):ti,ab
#21	[mh ^creatinine]
#22	urinalys*:ti,ab
#23	[mh ^"blood chemical analysis"]
#24	(blood near/2 (test* or glucose or sodium)):ti,ab
#25	[mh ^"blood urea nitrogen"]
#26	urea:ti,ab
#27	((renal or kidney) next function):ti,ab

#28	(fluid near/3 (prescri* or admin* or need* or assess*)):ti,ab
#29	{or #6-#28}
#30	#5 and #29

F.3.2 IV fluid therapy for fluid resuscitation

F.3.2.1 Fluid type for fluid resuscitation

What is the most clinically- and cost-effective fluid type for fluid resuscitation in children?

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

Population	Intervention or exposure	Comparison	Study design filter	Date parameters and other limits
Fluid resuscitation Paediatric population terms used	IV fluids	n/a	The following filters were used in Medline and Embase only: OBS, RCT, SR	See Table 1 English only Exclusion filter applied in Medline and Embase

Medline search terms

1	exp shock/
2	hypovolemia/
3	hypotension/
4	dehydration/
5	fluid therapy/
6	exp blood volume/
7	resuscitation/
8	((fluid* or volum* or rehydrat*) adj3 (restor* or resuscita* or replac* or deplet* or deficien* or replenish* or therap* or substitut* or rehydrat*)).ti,ab.
9	(fluid* adj3 (challenge or bolus)).ti,ab.
10	(hypotens* adj2 resuscit*).ti,ab.
11	((shock or resuscit* or hypotens* or dehydrat*) and fluid*).ti,ab.
12	(hypovol?emi* or sepsis syndrome* or circulatory failure*).ti,ab.
13	((circulatory or h?emodynamic) adj2 (failure* or insufficien* or abnormalit* or instabilit*)).ti,ab.
14	(shock or resuscit* or hypotens* or dehydrat*).ti.
15	(volume adj2 (expand* or expansion* or substitut*)).ti,ab.
16	((perioperativ* or intraoperativ* or postoperativ*) adj3 fluid*).ti,ab.
17	or/1-16
18	albumins/ or exp serum albumin/
19	(albumin* or albumen* or albutein or alunorm or octalbin or zenalb or flexbumin).ti,ab.
20	sodium chloride/
21	rehydration solutions/
22	(sodium or salin* or hartman* or ringer* or lactate* or acetate* or plasmalyte* or plasma-lyte* or polyelectrolyte* or poly-electrolyte*).ti,ab.
23	((balanced or physiologic*) adj2 (fluid* or solution*)).ti,ab.
24	crystalloid*.ti,ab.
25	(isotonic or hypertonic).ti,ab.

26	Gelatin/
27	plasma substitutes/ or dextrans/
28	colloids/
29	hydroxyethyl starch derivatives/
30	(gelatin* or gelofusin* or geloplasma or geloflex or gelo or isoplex or volplex).ti,ab.
31	(colloid* or hemaccel* or haemaccel* or hydrocolloid*).ti,ab.
32	(dextran* or rescueflow).ti,ab.
33	(starch* or hetastarch* or pentastarch* or pentaspan* or haes-steril or hemohes or hespan or elohaes or hexastarch* or tetrastarch* or tetraspan or venofundin or volulyte or voluven).ti,ab.
34	(plasma adj1 substitut*).ti,ab.
35	or/18-34
36	17 and 35

Embase search terms

1	exp *shock/
2	exp *hypovolemia/
3	exp *hypotension/
4	*dehydration/
5	fluid resuscitation/
6	*fluid therapy/
7	*fluid balance/
8	*blood volume/
9	*plasma volume/
10	((fluid* or volum* or rehydrat*) adj3 (restor* or resuscita* or replac* or deplet* or deficien* or replenish* or therap* or substitut* or rehydrat*)).ti,ab.
11	(fluid* adj3 (challenge or bolus)).ti,ab.
12	(hypotens* adj2 resuscit*).ti,ab.
13	((shock or resuscit* or hypotens* or dehydrat*) and fluid*).ti,ab.
14	(hypovol?emi* or sepsis syndrome* or circulatory failure*).ti,ab.
15	((circulatory or h?emodynamic) adj2 (failure* or insufficien* or abnormalit* or instabilit*)).ti,ab.
16	(shock or resuscit* or hypotens* or dehydrat*).ti.
17	(volume adj2 (expand* or expansion* or substitut*)).ti,ab.
18	((perioperativ* or intraoperativ* or postoperativ*) adj3 fluid*).ti,ab.
19	or/1-18
20	exp *albuminoid/
21	(albumin* or albumen* or albutein or alburnorm or octalbin or zenalb or flexbumin).ti,ab.
22	*sodium chloride/
23	balanced salt solution/ or hartmann solution/ or ringer acetate/ or ringer lactate solution/ or ringer solution/ or hypertonic solution/ or isotonic solution/
24	(sodium or salin* or hartman* or ringer* or lactate* or acetate* or plasmalyte* or plasma-lyte* or polyelectrolyte* or poly-electrolyte*).ti,ab.
25	((balanced or physiologic*) adj2 (fluid* or solution*)).ti,ab.
26	crystalloid*.ti,ab.
27	(isotonic or hypertonic).ti,ab.
28	*gelatin/
29	*dextran/ or *dextran 70/ or *dextran 60/ or *dextran 40/

30	*gelatin succinate/ or *gelatinol/
31	*hetastarch/
32	(gelatin* or gelofusin* or geloplasma or geloflex or gelo or isoplex or volplex).ti,ab.
33	(colloid* or hemaccel* or haemaccel* or hydrocolloid*).ti,ab.
34	(dextran* or rescueflow).ti,ab.
35	(starch* or hetastarch* or pentastarch* or pentaspan* or haes-steril or hemohes or hespan or elohaes or hexastarch* or tetrastarch* or tetraspan or venofundin or volulyte or voluven).ti,ab.
36	*plasma substitute/
37	(plasma adj1 substitut*).ti,ab.
38	exp *colloid/
39	or/20-38
40	19 and 39

Cochrane search terms

#1	[mh shock]
#2	[mh ^hypovolemia]
#3	[mh ^hypotension]
#4	[mh ^dehydration]
#5	[mh ^"fluid therapy"]
#6	[mh "blood volume"]
#7	[mh ^resuscitation]
#8	((fluid* or volum* or rehydrat*) near/3 (restor* or resuscita* or replac* or deplet* or deficien* or replenish* or therap* or substitut* or rehydrate*)) .ti,ab
#9	(fluid* near/3 (challenge or bolus)) .ti,ab
#10	(hypotens* near/2 resuscit*) .ti,ab
#11	((shock or resuscit* or hypotens* or dehydrate*) and fluid*):ti,ab
#12	(hypovolemi* or hypovolaemi* or sepsis syndrome* or circulatory failure*):ti,ab
#13	((circulatory or hemodynamic or haemodynamic) near/2 (failure* or insufficien* or abnormalit* or instabilit*)):ti,ab
#14	(shock or resuscit* or hypotens* or dehydrate*):ti
#15	(volume near/2 (expand* or expansion* or substitut*)):ti,ab
#16	((perioperativ* or intraoperativ* or postoperativ*) near/3 fluid*):ti,ab
#17	{or #1-#16}
#18	[mh ^albumins]
#19	[mh "serum albumin"]
#20	(albumin* or albumen* or albutein or alunorm or octalbin or zenalb or flexbumin):ti,ab
#21	[mh ^"sodium chloride"]
#22	[mh ^"rehydration solutions"]
#23	(sodium or salin* or hartman* or ringer* or lactate* or acetate* or plasmalyte* or plasma-lyte* or polyelectrolyte* or poly-electrolyte*):ti,ab
#24	((balanced or physiologic*) near/2 (fluid* or solution*)):ti,ab
#25	crystalloid*:ti,ab
#26	(isotonic or hypertonic):ti,ab
#27	[mh ^gelatin]
#28	[mh ^"plasma substitutes"]
#29	[mh ^dextrans]

#30	[mh ^colloids]
#31	[mh ^"hydroxyethyl starch derivatives"]
#32	(gelatin* or gelofusin* or geloplasma or geloflex or gelo or isoplex or volplex):ti,ab
#33	(colloid* or hemaccel* or haemaccel* or hydrocolloid*):ti,ab
#34	(dextran* or rescueflow):ti,ab
#35	(plasma near substitut*):ti,ab
#36	(starch* or hetastarch* or pentastarch* or pentaspan* or haes-steril or hemohes or hespan or elohaes or hexastarch* or tetrastarch* or tetraspan or venofundin or volulyte or voluven):ti,ab
#37	{or #18-#36}
#38	#17 and #37

F.3.2.2 Volume and rate of administration for fluid resuscitation

What is the most clinically- and cost-effective volume and rate of administration for IV fluid resuscitation?

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

Population	Intervention or exposure	Comparison	Study design filter	Date parameters and other limits
Fluid resuscitation Paediatric population terms used	Rate of administration	n/a	The following filters were used in Medline and Embase only: OBS, RCT, SR	See Table 1 English only Exclusion filter applied in Medline and Embase

Medline search terms

1	exp shock/
2	hypovolemia/
3	hypotension/
4	dehydration/
5	fluid therapy/
6	exp blood volume/
7	resuscitation/
8	((fluid* or volum* or rehydrat*) adj3 (restor* or resuscita* or replac* or deplet* or deficien* or replenish* or therap* or substitut* or rehydrat*)):ti,ab.
9	(fluid* adj3 (challenge or bolus)):ti,ab.
10	(hypotens* adj2 resuscit*):ti,ab.
11	((shock or resuscit* or hypotens* or dehydrat*) and fluid*):ti,ab.
12	(hypovol?emi* or sepsis syndrome* or circulatory failure*):ti,ab.
13	((circulatory or h?emodynamic) adj2 (failure* or insufficien* or abnormalit* or instabilit*)):ti,ab.
14	(shock or resuscit* or hypotens* or dehydrat*):ti.
15	(volume adj2 (expand* or expansion* or substitut*)):ti,ab.
16	((perioperativ* or intraoperativ* or postoperativ*) adj3 fluid*):ti,ab.
17	or/1-16
18	((fluid* or small* or large* or high* or low) adj2 (rate or rates or volume*)):ti,ab.

19	((restrict* or conservativ* or liberal*) adj2 (fluid* or regime* or protocol* or intake*)).ti,ab.
20	(rapid* adj3 resuscitat*).ti,ab.
21	((rapid or fast* or slow*) adj3 (infus* or administ* or fluid* or volume)).ti,ab.
22	(fluid* adj3 (challenge or bolus)).ti,ab.
23	or/18-22
24	17 and 23

Embase search terms

1	exp *shock/
2	exp *hypovolemia/
3	exp *hypotension/
4	*dehydration/
5	fluid resuscitation/
6	*fluid therapy/
7	*fluid balance/
8	*blood volume/
9	*plasma volume/
10	((fluid* or volum* or rehydrat*) adj3 (restor* or resuscita* or replac* or deplet* or deficien* or replenish* or therap* or substitut* or rehydrat*)).ti,ab.
11	(fluid* adj3 (challenge or bolus)).ti,ab.
12	(hypotens* adj2 resuscit*).ti,ab.
13	((shock or resuscit* or hypotens* or dehydrat*) and fluid*).ti,ab.
14	(hypovol?emi* or sepsis syndrome* or circulatory failure*).ti,ab.
15	((circulatory or h?emodynamic) adj2 (failure* or insufficien* or abnormalit* or instabilit*)).ti,ab.
16	(shock or resuscit* or hypotens* or dehydrat*).ti.
17	(volume adj2 (expand* or expansion* or substitut*)).ti,ab.
18	((perioperativ* or intraoperativ* or postoperativ*) adj3 fluid*).ti,ab.
19	or/1-18
20	infusion rate/
21	((fluid* or small* or large* or high* or low) adj2 (rate or rates or volume*)).ti,ab.
22	((restrict* or conservativ* or liberal*) adj2 (fluid* or regime* or protocol* or intake*)).ti,ab.
23	(rapid* adj3 resuscitat*).ti,ab.
24	((rapid or fast* or slow*) adj3 (infus* or administ* or fluid* or volume)).ti,ab.
25	(fluid* adj3 (challenge or bolus)).ti,ab.
26	or/20-25
27	19 and 26

Cochrane search terms

#1	[mh shock]
#2	[mh ^hypovolemia]
#3	[mh ^hypotension]
#4	[mh ^dehydration]
#5	[mh ^"fluid therapy"]
#6	[mh "blood volume"]
#7	[mh ^resuscitation]
#8	((fluid* or volum* or rehydrat*) near/3 (restor* or resuscita* or replac* or deplet* or deficien*

	or replenish* or therap* or substitut* or rehydrat*) .ti,ab
#9	(fluid* near/3 (challenge or bolus)) .ti,ab
#10	(hypotens* near/2 resuscit*) .ti,ab
#11	((shock or resuscit* or hypotens* or dehydrat*) and fluid*):ti,ab
#12	(hypovolemi* or hypovolaemi* or sepsis syndrome* or circulatory failure*):ti,ab
#13	((circulatory or hemodynamic or haemodynamic) near/2 (failure* or insufficien* or abnormalit* or instabilit*)):ti,ab
#14	(shock or resuscit* or hypotens* or dehydrat*):ti
#15	(volume near/2 (expand* or expansion* or substitut*)):ti,ab
#16	((perioperativ* or intraoperativ* or postoperativ*) near/3 fluid*):ti,ab
#17	{or #1-#16}
#18	((fluid* or small* or large* or high* or low) near/2 (rate or rates or volume*)):ti,ab
#19	((restrict* or conservativ* or liberal*) near/2 (fluid* or regime* or protocol* or intake*)):ti,ab
#20	(rapid* near/3 resuscitat*):ti,ab
#21	((rapid or fast* or slow*) near/3 (infus* or administ* or fluid* or volume)):ti,ab
#22	(fluid* near/3 (challenge or bolus)):ti,ab
#23	{or #18-#22}
#24	#17 and #23

F.3.3 IV fluid therapy for routine maintenance

F.3.3.1 Fluid type for routine maintenance

What is the most clinically- and cost-effective fluid type for IV fluid maintenance in children?

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

Population	Intervention or exposure	Comparison	Study design filter	Date parameters and other limits
Fluid maintenance Paediatric population terms used	IV fluids	n/a	The following filters were used in Medline and Embase only: RCT, SR	See Table 1 English only Exclusion filter applied in Medline and Embase

Medline search terms

1	fluid therapy/
2	infusions, intravenous/
3	((fluid* or volum* or electrolyte*) adj3 (therap* or intravenous* or iv or infus* or drip or drips or administrat*)):ti,ab.
4	((fluid* or electrolyte*) adj3 (balance* or imbalance* or manag* or maint* or loss* or status or monit* or assess* or evaluat* or re-evaluat* or reevaluat* or requir* or need*)):ti,ab.
5	water-electrolyte balance/
6	(euvo?emi* or normovo?emi*).ti,ab.
7	((nil or nothing) adj2 mouth) or nil-by-mouth).ti,ab.
8	insensible loss*.ti,ab.
9	((swallow* or drink*) adj2 (difficult* or problem* or unable or inabilit*)):ti,ab.
10	or/1-9

11	sodium chloride/
12	hypotonic solutions/
13	hypotonic.ti,ab.
14	isotonic solutions/
15	isotonic.ti,ab.
16	(saline or sodium or NaCl or NS or "N/2").ti,ab.
17	((balanced or physiologic*) adj2 (fluid* or solution* or salt*)).ti,ab.
18	(hartman* or ringer* or lactate* or acetate* or plasmalyte* or plasma-lyte* or polyionique or bs-g1).ti,ab.
19	glucose/
20	(glucose or dextrose).ti,ab.
21	potassium/
22	potassium.ti,ab.
23	or/11-22
24	10 and 23

Embase search terms

1	fluid therapy/
2	fluid balance/
3	exp *electrolyte balance/
4	*infusion fluid/
5	((fluid* or volum* or electrolyte*) adj3 (therap* or intravenous* or iv or infus* or drip or drips or administrat*)).ti,ab.
6	((fluid* or electrolyte*) adj3 (balance* or imbalance* or manag* or maint* or loss* or status or monit* or assess* or evaluat* or re-evaluat* or reevaluat* or requir* or need*)).ti,ab.
7	(euvo?emi* or normovol?emi*).ti,ab.
8	((nil or nothing) adj2 mouth) or nil-by-mouth).ti,ab.
9	insensible loss*.ti,ab.
10	((swallow* or drink*) adj2 (difficult* or problem* or unable or inabilit*)).ti,ab.
11	or/1-10
12	*sodium chloride/
13	hypotonic.ti,ab.
14	isotonic.ti,ab.
15	balanced salt solution/ or hartmann solution/ or ringer acetate/ or ringer lactate solution/ or ringer solution/ or hypotonic solution/ or isotonic solution/
16	(saline or sodium or NaCl or NS or "N/2").ti,ab.
17	((balanced or physiologic*) adj2 (fluid* or solution* or salt*)).ti,ab.
18	(hartman* or ringer* or lactate* or acetate* or plasmalyte* or plasma-lyte* or polyionique or bs-g1).ti,ab.
19	*glucose/
20	(glucose or dextrose).ti,ab.
21	*potassium/
22	potassium.ti,ab.
23	or/12-22
24	11 and 23

Cochrane search terms

#1	[mh "fluid therapy"]
#2	[mh ^"infusions, intravenous"]
#3	((fluid* or volum* or electrolyte*) near/3 (therap* or intravenous* or iv or infus* or drip or drips or administrat*)):ti,ab
#4	((fluid* or electrolyte*) near/3 (balance* or imbalance* or manag* or maint* or loss* or status or monit* or assess* or evaluat* or re-evaluat* or reevaluat* or requir* or need*)):ti,ab
#5	[mh ^"water-electrolyte balance"]
#6	(euvolemi* or euvolemi* or normovolaemi* or normovolemi*):ti,ab
#7	((nil or nothing) near/2 mouth) or nil-by-mouth):ti,ab
#8	insensible next loss*:ti,ab
#9	((swallow* or drink*) near/2 (difficult* or problem* or unable or inabilit*)):ti,ab
#10	{or #1-#9}
#11	[mh ^"sodium chloride"]
#12	[mh ^"hypotonic solutions"]
#13	hypotonic:ti,ab
#14	[mh ^"isotonic solutions"]
#15	isotonic:ti,ab
#16	(saline or sodium or NaCl or NS or "N/2"):ti,ab
#17	((balanced or physiologic*) near/2 (fluid* or solution* or salt*)):ti,ab
#18	(hartman* or ringer* or lactate* or acetate* or plasmalyte* or plasma-lyte* or polyionique or bs-g1):ti,ab
#19	[mh ^glucose]
#20	(glucose or dextrose):ti,ab
#21	[mh ^potassium]
#22	potassium:ti,ab
#23	{or #11-#22}
#24	#10 and #23

F.3.3.2 Rate of administration for routine maintenance

What is the most clinically- and cost-effective rate of administration of IV fluids for routine maintenance?

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

Population	Intervention or exposure	Comparison	Study design filter	Date parameters and other limits
Fluid maintenance Paediatric population terms used	Rate of administration	n/a	The following filters were used in Medline and Embase only: RCT, SR	See Table 1 English only Exclusion filter applied in Medline and Embase

Medline search terms

1	fluid therapy/
2	infusions, intravenous/
3	((fluid* or volum* or electrolyte*) adj3 (therap* or intravenous* or iv or infus* or drip or drips or administrat*)):ti,ab.

4	((fluid* or electrolyte*) adj3 (balance* or imbalance* or manag* or maint* or loss* or status or monit* or assess* or evaluat* or re-evaluat* or reevaluat* or requir* or need*)).ti,ab.
5	water-electrolyte balance/
6	(euvo?emi* or normovol?emi*).ti,ab.
7	((nil or nothing) adj2 mouth) or nil-by-mouth).ti,ab.
8	insensible loss*.ti,ab.
9	((swallow* or drink*) adj2 (difficult* or problem* or unable or inabilit*)).ti,ab.
10	or/1-9
11	((maint* or fluid* or small* or large* or high* or low) adj2 (rate or rates or volume*)).ti,ab.
12	((restrict* or conservativ* or liberal*) adj2 (fluid* or regime* or protocol* or intake*)).ti,ab.
13	((half or third* or percent* or reduc* or calculat*) adj3 (maint* or rate or rates or volume*)).ti,ab.
14	or/11-13
15	10 and 14

Embase search terms

1	fluid therapy/
2	fluid balance/
3	exp *electrolyte balance/
4	*infusion fluid/
5	((fluid* or volum* or electrolyte*) adj3 (therap* or intravenous* or iv or infus* or drip or drips or administrat*)).ti,ab.
6	((fluid* or electrolyte*) adj3 (balance* or imbalance* or manag* or maint* or loss* or status or monit* or assess* or evaluat* or re-evaluat* or reevaluat* or requir* or need*)).ti,ab.
7	(euvo?emi* or normovol?emi*).ti,ab.
8	((nil or nothing) adj2 mouth) or nil-by-mouth).ti,ab.
9	insensible loss*.ti,ab.
10	((swallow* or drink*) adj2 (difficult* or problem* or unable or inabilit*)).ti,ab.
11	or/1-10
12	infusion rate/
13	((maint* or fluid* or small* or large* or high* or low) adj2 (rate or rates or volume*)).ti,ab.
14	((restrict* or conservativ* or liberal*) adj2 (fluid* or regime* or protocol* or intake*)).ti,ab.
15	((half or third* or percent* or reduc* or calculat*) adj3 (maint* or rate or rates or volume*)).ti,ab.
16	or/12-15
17	11 and 16

Cochrane search terms

#1	[mh "fluid therapy"]
#2	((fluid* or volum* or electrolyte*) near/3 (therap* or intravenous* or iv or infusion* or drip or drips or administrat*)):ti,ab
#3	((fluid* or electrolyte*) near/3 (balance* or imbalance* or manage* or maint* or loss* or status or monit* or assess* or evaluat* or re-evaluat* or reevaluat* or require* or need*)):ti,ab
#4	[mh ^"water-electrolyte balance"]
#5	(euvo?emi* or euvoemi* or normovo?emi* or normovolemi*):ti,ab
#6	((nil or nothing) near/2 mouth) or nil-by-mouth):ti,ab
#7	insensible next loss*:ti,ab
#8	((swallow* or drink*) near/2 (difficult* or problem* or unable or inabilit*)):ti,ab

#9	{or #1-#8}
#10	((maint* or fluid* or small* or large* or high* or low) near/2 (rate or rates or volume*)):ti,ab
#11	((restrict* or conservativ* or liberal*) near/2 (fluid* or regime* or protocol* or intake*)):ti,ab
#12	((half or third* or percent* or reduc* or calculat*) near/3 (maint* or rate or rates or volume*)):ti,ab
#13	#10 or #11 or #12
#14	#9 and #13

F.3.4 IV fluid therapy for replacement and redistribution

What fluid types are the most clinically- and cost-effective to address abnormal deficits or excesses, or to replace abnormal losses?

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

Population	Intervention or exposure	Comparison	Study design filter	Date parameters and other limits
Replacement and redistribution Paediatric population terms were not used for this search	IV fluids	n/a	The following filters were used in Medline and Embase only: OBS, RCT, SR	See Table 1 English only Exclusion filter applied in Medline and Embase

Medline search terms

1	((fluid* or electrolyte* or isotonic or hypotonic) adj2 (loss* or replac* or redistribut*)):ti,ab.
2	vomiting/
3	((vomit* or emesis) and (replac* or loss* or fluid* or electrolyte*)):ti,ab.
4	intubation, gastrointestinal/
5	(nasogastric adj2 (aspirat* or intubat* or tube*)):ti,ab.
6	drainage/
7	(drain* adj3 (postoperativ* or surgical or loss*)):ti,ab.
8	diarrhea/
9	(diarrhoea* or diarrhea*):ti,ab.
10	gastroenteritis/
11	gastroenterit*.ti,ab.
12	polyuria/
13	exp diuresis/
14	(polyuri* or hyperures* or diures* or natriures* or (urin* adj2 (excess* or loss*)):ti,ab.
15	jejunostomy/
16	jejunostom*.ti,ab.
17	intestinal fistula/
18	((fistula or stoma) adj2 (intestin* or ileal or ileum or jejun* or pancrea*)):ti,ab.
19	ileostomy/
20	ileostom*.ti,ab.
21	colostomy/
22	sweating/

23	colostom*.ti,ab.
24	sweat*.ti,ab.
25	dehydration/
26	dehydrat*.ti,ab.
27	fever/
28	(fever* or pyrexia* or hyperthermi*).ti,ab.
29	blister/
30	(blister* or bulla* or bullous lesion*).ti,ab.
31	cerebrospinal fluid shunts/
32	(fluid adj2 shunt*).ti,ab.
33	or/1-32
34	albumins/ or exp serum albumin/
35	(albumin* or albumen* or albutein or albumnorm or octalbin or zenalb or flexbumin).ti,ab.
36	sodium chloride/
37	Hypotonic Solutions/
38	hypotonic.ti,ab.
39	isotonic solutions/
40	isotonic.ti,ab.
41	(saline or sodium or NaCl or NS or "N/2").ti,ab.
42	((balanced or physiologic*) adj2 (fluid* or solution* or salt*)).ti,ab.
43	(hartman* or ringer* or lactate* or acetate* or plasmalyte* or plasma-lyte* or polyionique or bs-g1).ti,ab.
44	or/34-43
45	33 and 44

Embase search terms

1	((fluid* or electrolyte* or isotonic or hypotonic) adj2 (loss* or replac* or redistribut*)).ti,ab.
2	exp *"nausea and vomiting"/
3	((vomit* or emesis) and (replac* or loss* or fluid* or electrolyte*)).ti,ab.
4	*gastric suction/
5	*stomach intubation/
6	(nasogastric adj2 (aspirat* or intubat* or tube*)).ti,ab.
7	exp *surgical drainage/
8	(drain* adj3 (postoperativ* or surgical or loss*)).ti,ab.
9	exp *diarrhea/
10	(diarrhoea* or diarrhea*).ti,ab.
11	*gastroenteritis/
12	gastroenterit*.ti,ab.
13	*polyuria/
14	exp *diuresis/
15	(polyuri* or hyperures* or diures* or natriures* or (urin* adj2 (excess* or loss*))).ti,ab.
16	*ileostomy/ or *jejunostomy/
17	jejunostom*.ti,ab.
18	Ileostom*.ti,ab.

19	*colostomy/
20	colostom*.ti,ab.
21	*intestine fistula/
22	((fistula or stoma) adj2 (intestin* or ileal or ileum or jejun* or pancrea*)).ti,ab.
23	*sweating/
24	sweat*.ti,ab.
25	*dehydration/
26	dehydrat*.ti,ab.
27	*fever/
28	(fever* or pyrexia* or hyperthermia*).ti,ab.
29	*blister/
30	(blister* or bulla* or bullous lesion*).ti,ab.
31	*cerebrospinal fluid shunting/
32	(fluid adj2 shunt*).ti,ab.
33	or/1-32
34	exp *albuminoid/
35	(albumin* or albumen* or albutein or albunorm or octalbin or zenalb or flexbumin).ti,ab.
36	*sodium chloride/
37	balanced salt solution/ or hartmann solution/ or ringer acetate/ or ringer lactate solution/ or ringer solution/ or hypotonic solution/ or isotonic solution/
38	hypotonic.ti,ab.
39	isotonic.ti,ab.
40	(saline or sodium or NaCl or NS or "N/2").ti,ab.
41	((balanced or physiologic*) adj2 (fluid* or solution* or salt*)).ti,ab.
42	(hartman* or ringer* or lactate* or acetate* or plasmalyte* or plasma-lyte* or polyionique or bs-g1).ti,ab.
43	or/34-42
44	33 and 43

Cochrane search terms

#1	((fluid* or electrolyte* or isotonic or hypotonic) near/2 (loss* or replac* or redistribut*)):ti,ab
#2	[mh ^vomiting]
#3	((vomit* or emesis) and (replac* or loss* or fluid* or electrolyte*)):ti,ab
#4	[mh ^"intubation, gastrointestinal"]
#5	(nasogastric near/2 (aspirat* or intubat* or tube*)):ti,ab
#6	[mh ^drainage]
#7	(drain* near/3 (postoperativ* or surgical or loss*)):ti,ab
#8	[mh ^diarrhea]
#9	(diarrhoea* or diarrhea*):ti,ab
#10	[mh ^gastroenteritis]
#11	gastroenterit*:ti,ab
#12	[mh ^polyuria]
#13	[mh diuresis]
#14	(polyuri* or hyperures* or diures* or natriures* or (urin* near/2 (excess* or loss*)):ti,ab
#15	[mh ^jejunostomy]
#16	jejunostom*:ti,ab

#17	[mh ^"intestinal fistula"]
#18	((fistula or stoma) near/2 (intestin* or ileal or ileum or jejun* or pancrea*)):ti,ab
#19	[mh ^Ileostomy]
#20	Ileostom*:ti,ab
#21	[mh ^colostomy]
#22	colostom*:ti,ab
#23	[mh ^sweating]
#24	sweat*:ti,ab
#25	[mh ^dehydration]
#26	dehydrat*:ti,ab
#27	[mh ^fever]
#28	(fever* or pyrexia* or hyperthermi*):ti,ab
#29	[mh ^blister]
#30	(blister* or bulla* or bullous lesion*):ti,ab
#31	[mh ^"cerebrospinal fluid shunts"]
#32	(fluid near/2 shunt*):ti,ab
#33	{or #1-#32}
#34	[mh ^albumins]
#35	[mh "serum albumin"]
#36	(albumin* or albumen* or albutein or albumorm or octalbin or zenalb or flexbumin):ti,ab
#37	[mh "sodium chloride"]
#38	[mh "Hypotonic Solutions"]
#39	hypotonic:ti,ab
#40	[mh "isotonic solutions"]
#41	isotonic:ti,ab
#42	(saline or sodium or NaCl or NS or "N/2"):ti,ab
#43	((balanced or physiologic*) near/2 (fluid* or solution* or salt*)):ti,ab
#44	(hartman* or ringer* or lactate* or acetate* or plasmalyte* or plasma-lyte* or polyionique or bs-g1):ti,ab
#45	{or #34-#44}
#46	#33 and #45

F.3.5 Managing hypernatraemia and hyponatraemia developing during IV fluid administration

F.3.5.1 Management of hypernatraemia

What are the most clinically- and cost-effective methods to address hypernatraemia developing during IV fluid administration?

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

Population	Intervention or exposure	Comparison	Study design filter	Date parameters and other limits
Hypernatraemia Paediatric population terms were not used for this	IV fluids	n/a	The following filters were used in Medline and Embase only: OBS, RCT, SR	See Table 1 English only Exclusion filter applied in Medline and

Population	Intervention or exposure	Comparison	Study design filter	Date parameters and other limits
search				Embase

Medline search terms

1	hypernatremia/
2	hypernatr?emi*.ti,ab.
3	or/1-2
4	rehydration solutions/ or isotonic solutions/ or hypotonic solutions/
5	((balanced or physiologic*) adj2 (fluid* or solution*)).ti,ab.
6	(isotonic or hypotonic).ti,ab.
7	(crystalloid* or salin* or hartman* or ringer* or plasmalyte*).ti,ab.
8	Fluid therapy/
9	(fluid* adj2 (intravenous or iv or therap* or treat*)).ti,ab.
10	or/4-9
11	3 and 10

Embase search terms

1	hypernatremia/
2	hypernatr?emi*.ti,ab.
3	or/1-2
4	exp fluid therapy/
5	(fluid* adj2 (intravenous or iv or therap* or treat*)).ti,ab.
6	hypotonic solution/ or isotonic solution/
7	crystalloid/
8	balanced salt solution/ or hartmann solution/ or ringer acetate/ or ringer lactate solution/ or ringer solution/
9	(isotonic or hypotonic).ti,ab.
10	((balanced or physiologic*) adj2 (fluid* or solution*)).ti,ab.
11	(crystalloid* or salin* or hartman* or ringer* or plasmalyte*).ti,ab.
12	or/4-11
13	3 and 12

Cochrane search terms

#1	[mh ^hypernatremia]
#2	(hypernatremi* or hypernatraemi*):ti,ab
#3	#1 or #2
#4	[mh ^"fluid therapy"]
#5	(fluid* near/2 (intravenous or iv or therap* or treat*)):ti,ab
#6	[mh ^"rehydration solutions"]
#7	[mh ^"isotonic solutions"]
#8	[mh ^"hypotonic solutions"]
#9	((balanced or physiologic*) near/2 (fluid* or solution*)):ti,ab
#10	(isotonic or hypotonic):ti,ab
#11	(crystalloid* or salin* or hartman* or ringer* or plasmalyte*):ti,ab
#12	{or #4-#11}
#13	#3 and #12

F.3.5.2 Management of hyponatraemia

What are the most clinically- and cost-effective methods to address hyponatraemia developing during IV fluid administration?

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

Population	Intervention or exposure	Comparison	Study design filter	Date parameters and other limits
Hyponatraemia Paediatric population terms were not used for this search	IV fluids	n/a	The following filters were used in Medline and Embase only: OBS, RCT, SR	See Table 1 English only Exclusion filter applied in Medline and Embase

Medline search terms

1	hyponatremia/
2	hyponatr?emi*.ti,ab.
3	((salt or sodium) adj3 deplet*).ti,ab.
4	or/1-3
5	rehydration solutions/ or isotonic solutions/
6	exp hypertonic solutions/
7	((balanced or physiologic*) adj2 (fluid* or solution*)).ti,ab.
8	(isotonic or hypertonic).ti,ab.
9	(crystalloid* or salin* or hartman* or ringer* or plasmalyte*).ti,ab.
10	fluid therapy/
11	(fluid* adj2 (intravenous or iv or therap* or treat*)).ti,ab.
12	or/5-11
13	4 and 12

Embase search terms

1	*hyponatremia/
2	hyponatr?emi*.ti,ab.
3	((salt or sodium) adj3 deplet*).ti,ab.
4	or/1-3
5	*hypertonic solution/
6	*isotonic solution/
7	*crystalloid/
8	*balanced salt solution/ or *hartmann solution/ or *ringer acetate/ or *ringer lactate solution/ or *ringer solution/
9	((balanced or physiologic*) adj2 (fluid* or solution*)).ti,ab.
10	(isotonic or hypertonic).ti,ab.
11	(crystalloid* or salin* or hartman* or ringer* or plasmalyte*).ti,ab.
12	exp *fluid therapy/
13	(fluid* adj2 (intravenous or iv or therap* or treat*)).ti,ab.
14	or/5-13
15	4 and 14

Cochrane search terms

#1	[mh ^hyponatremia]
#2	(hyponatraemi* or hyponatremi*):ti,ab
#3	((salt or sodium) near/3 deplet*):ti,ab
#4	{or #1-#3}
#5	[mh ^"rehydration solutions"]
#6	[mh ^"isotonic solutions"]
#7	[mh "hypertonic solutions"]
#8	((balanced or physiologic*) near/2 (fluid* or solution*)):ti,ab
#9	(isotonic or hypertonic):ti,ab
#10	(crystalloid* or salin* or hartman* or ringer* or plasmalyte*):ti,ab
#11	[mh ^"fluid therapy"]
#12	(fluid* near/2 (intravenous or iv or therap* or treat*)):ti,ab
#13	{or #5-#12}
#14	#4 and #13

F.3.6 Training and education of healthcare professionals for management of IV fluid therapy

What skills are needed for the adequate training and education of healthcare professionals involved in prescribing and administering IV fluids?

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

Population	Intervention or exposure	Comparison	Study design filter	Date parameters and other limits
Fluid therapy Paediatric population terms used	Training and education	n/a	The following filters were used in Medline, Embase and CINAHL only: Qualitative	See Table 1 English only Exclusion filter applied in Medline, Embase and CINAHL

Medline search terms

1	fluid therapy/
2	exp water-electrolyte balance/
3	exp water-electrolyte imbalance/
4	hypoglycemia/
5	hypovolemia/
6	((fluid* or electrolyte*) adj3 (document* or chart* or strateg* or regimen* or load*)):ti,ab.
7	((fluid* or electrolyte* or water) adj3 (requir* or need* or prescri* or intravenous or iv or infusion* or drip or drips or maint* or volume* or therap* or administrat* or manag* or balance* or imbalance* or overload* or loss* or status or monit* or assess* or reassess* or evaluat* or re-evaluat* or reevalu*)):ti,ab.
8	((fluid* or volum*) adj3 (restor* or resus* or replac* or deplet* or deficien* or replenish* or therap* or substitut* or rehydrat*)):ti,ab.
9	(fluid* adj3 (challenge or bolus)):ti,ab.
10	(volume adj2 (expand* or expansion* or substitut*)):ti,ab.
11	((perioperativ* or intraoperativ* or postoperativ*) adj3 fluid*):ti,ab.
12	(euvo?emi* or normovo?emi*):ti,ab.

13	(hypovol?em* or hypervol?em*).ti,ab.
14	insensible loss*.ti,ab.
15	hyponatr?emi*.ti,ab.
16	hypoglyc?emi*.ti,ab.
17	or/1-16
18	clinical competence/
19	exp *education/
20	health knowledge, attitudes, practice/
21	physician's practice patterns/
22	ed.fs.
23	professional practice/
24	*medication errors/
25	*medical staff, hospital/
26	(train* or educat* or teach* or instruct* or guide* or guidance or tutor*).ti,ab.
27	(profession* adj2 develop*).ti,ab.
28	(barrier* or knowledge or attitude* or competen* or calculat*).ti,ab.
29	(perception* or opinion* or ignoran* or unaware or responsibilit* or error*).ti,ab.
30	((core or clinical) adj2 (skill* or qualification or proficienc* or capablit*).ti,ab.
31	((dispensing or dispense or prescri* or administer* or administrating) adj2 (protocol* or practice* or pattern*).ti,ab.
32	staff.ti,ab.
33	audit*.ti,ab.
34	or/18-33
35	17 and 34

Embase search terms

1	fluid therapy/ or fluid resuscitation/
2	fluid balance/
3	exp *electrolyte balance/
4	exp *electrolyte disturbance/
5	*hypoglycemia/
6	*hypovolemia/ or *hypervolemia/
7	((fluid* or electrolyte*) adj3 (document* or chart* or strateg* or regimen* or load*).ti,ab.
8	((fluid* or electrolyte* or water) adj3 (requir* or need* or prescri* or intravenous or iv or infusion* or drip or drips or maint* or volume* or therap* or administrat* or manag* or balance* or imbalance* or overload* or loss* or status or monit* or assess* or reassess* or evaluat* or re-evaluat* or reevalu*).ti,ab.
9	((fluid* or volum*) adj3 (restor* or resus* or replac* or deplet* or deficien* or replenish* or therap* or substitut* or rehydrat*).ti,ab.
10	(fluid* adj3 (challenge or bolus)).ti,ab.
11	(volume adj2 (expand* or expansion* or substitut*).ti,ab.
12	((perioperativ* or intraoperativ* or postoperativ*) adj3 fluid*).ti,ab.
13	(euvo?emi* or normovo?emi*).ti,ab.
14	(hypovol?em* or hypervol?em*).ti,ab.
15	insensible loss*.ti,ab.
16	hyponatr?emi*.ti,ab.
17	hypoglyc?emi*.ti,ab.

18	or/1-17
19	competence/ or clinical competence/ or professional competence/
20	exp *education/
21	*clinical practice/
22	exp *professional practice/
23	*medication error/
24	*medical staff/
25	(train* or educat* or teach* or instruct* or guide* or guidance or tutor*).ti,ab.
26	(profession* adj2 develop*).ti,ab.
27	(barrier* or knowledge or attitude* or competen* or calculat*).ti,ab.
28	(perception* or opinion* or ignoran* or unaware or responsibilit* or error*).ti,ab.
29	((core or clinical) adj2 (skill* or qualification or proficienc* or capablit*)).ti,ab.
30	((dispensing or dispense or prescri* or administer* or administrating) adj2 (protocol* or practice* or pattern*)).ti,ab.
31	staff.ti,ab.
32	audit*.ti,ab.
33	or/19-32
34	18 and 33

Cochrane search terms

#1	[mh ^"fluid therapy"]
#2	[mh "water-electrolyte balance"]
#3	[mh "water-electrolyte imbalance"]
#4	[mh ^hypoglycemia]
#5	[mh ^hypovolemia]
#6	((fluid* or electrolyte*) near/3 (document* or chart* or strateg* or regimen* or load*)):ti,ab
#7	((fluid* or electrolyte* or water) near/3 (requir* or need* or prescri* or intravenous or iv or infusion* or drip or drips or maint* or volume* or therap* or administrat* or manag* or balance* or imbalance* or overload* or loss* or status or monit* or assess* or reassess* or evaluat* or re-evaluat* or reevaluat*)):ti,ab
#8	((fluid* or volum*) near/3 (restor* or resus* or replac* or deplet* or deficien* or replenish* or therap* or substitut* or rehydrat*)):ti,ab
#9	(fluid* near/3 (challenge or bolus)):ti,ab
#10	(volume near/2 (expand* or expansion* or substitut*)):ti,ab
#11	((perioperativ* or intraoperativ* or postoperativ*) near/3 fluid*):ti,ab
#12	(euvolemi* or normovolemi* or euvolaemi* or normovolaemi* or hypovolem* or hypovolaem* or hypervolem* or hypervolaem*):ti,ab
#13	insensible loss*:ti,ab
#14	(hyponatremi* or hyponatraemi*):ti,ab
#15	(hypoglycemi* or hypoglycaemi*):ti,ab
#16	{or #1-#15}
#17	[mh ^"clinical competence"]
#18	[mh education]
#19	[mh ^"health knowledge, attitudes, practice"]
#20	[mh ^"physician's practice patterns"]
#21	Any MeSH descriptor with qualifier(s): [Education - ED]
#22	[mh ^"Professional practice"]

#23	[mh ^"medication errors"]
#24	[mh ^"medical staff, hospital"]
#25	(train* or educat* or teach* or instruct* or guide* or guidance or tutor*):ti,ab
#26	(profession* near/2 develop*):ti,ab
#27	(barrier* or knowledge or attitude* or competen* or calculat*):ti,ab
#28	(perception* or opinion* or ignoran* or unaware or responsibilit* or error*):ti,ab
#29	((core or clinical) near/2 (skill* or qualification or proficienc* or capablit*)):ti,ab
#30	((dispensing or dispense or prescri* or administer* or administrating) near/2 (protocol* or practice* or pattern*)):ti,ab
#31	staff:ti,ab
#32	audit*:ti,ab
#33	{or #17-#32}
#34	#16 and #33

CINAHL search terms

S1	(mh "fluid therapy") or (mh "fluid resuscitation") or (mh "intravenous therapy")
S2	(mh "fluid-electrolyte balance+") or (mh "fluid-electrolyte imbalance+") or (mh "hypoglycemia")
S3	((fluid* or electrolyte*) n3 (document* or chart* or strateg* or regimen* or load*))
S4	((fluid* or electrolyte* or water) n3 (requir* or need* or prescri* or intravenous or iv or infusion* or drip or drips or maint* or volume* or therap* or administrat* or manag* or balance* or imbalance* or overload* or loss* or status or monit* or assess* or reassess* or evaluat* or re-evaluat* or reevaluat*))
S5	((fluid* or volum*) n3 (restor* or resus* or replac* or deplet* or deficien* or replenish* or therap* or substitut* or rehydrat*))
S6	(fluid* n3 (challenge or bolus))
S7	(volume n2 (expand* or expansion* or substitut*))
S8	((perioperativ* or intraoperativ* or postoperativ*) n3 fluid*)
S9	euvolemi* or euvoalaemi* or normovolemi* or normovolaemi* or hypovolem* or hypovolaem* or hypervolem* or hypervolaem*
S10	insensible loss*
S11	hyponatremi* or hyponatraemi*
S12	hypoglycemi* or hypoglycaemi*
S13	S1 or S2 or S3 or S4 or S5 or S6 or S7 or S8 or S9 or S10 or S11 or S12
S14	(mm "education+") or (mh "professional competence") or (mh "clinical competence") or (mm "health knowledge and behavior (iowa noc) (non-cinahl)+") or (mm "practice patterns") or (mm "professional practice")
S15	mw ed
S16	(mh "medication errors") or (mm "medical staff, hospital")
S17	(train* or educat* or teach* or instruct* or guide* or guidance or tutor*)
S18	(profession* n2 develop*)
S19	(barrier* or knowledge or attitude* or competen* or calculat*)
S20	(perception* or opinion* or ignoran* or unaware or responsibilit* or error*)
S21	((core or clinical) n2 (skill* or qualification or proficienc* or capablit*))
S22	((dispensing or dispense or prescri* or administer* or administrating) n2 (protocol* or practice* or pattern*))
S23	staff or audit*
S24	S14 or S15 or S16 or S17 or S18 or S19 or S20 or S21 or S22 or S23

S25	S13 and S24
-----	-------------

PsycINFO search terms

1	hypoglycemia/ or hyponatremia/
2	((fluid* or electrolyte*) adj3 (document* or chart* or strateg* or regimen* or load*)).ti,ab.
3	((fluid* or electrolyte* or water) adj3 (requir* or need* or prescri* or intravenous or iv or infusion* or drip or drips or maint* or volume* or therap* or administrat* or manag* or balance* or imbalance* or overload* or loss* or status or monit* or assess* or reassess* or evaluat* or re-evaluat* or reevaluat*)).ti,ab.
4	(fluid* adj3 (challenge or bolus)).ti,ab.
5	((fluid* or volum*) adj3 (restor* or resus* or replac* or deplet* or deficien* or replenish* or therap* or substitut* or rehydrat*)).ti,ab.
6	(volume adj2 (expand* or expansion* or substitut*)).ti,ab.
7	((perioperativ* or intraoperativ* or postoperativ*) adj3 fluid*).ti,ab.
8	(euvo?emi* or normovol?emi*).ti,ab.
9	(hypovol?em* or hypervol?em*).ti,ab.
10	insensible loss*.ti,ab.
11	hyponatr?emi*.ti,ab.
12	hypoglyc?emi*.ti,ab.
13	or/1-12
14	exp competence/
15	exp *education/
16	*health knowledge/
17	*clinical practice/
18	exp *medical personnel/
19	(train* or educat* or teach* or instruct* or guide* or guidance or tutor*).ti,ab.
20	(profession* adj2 develop*).ti,ab.
21	(barrier* or knowledge or attitude* or competen* or calculat*).ti,ab.
22	(perception* or opinion* or ignoran* or unaware or responsibilit* or error*).ti,ab.
23	((core or clinical) adj2 (skill* or qualification or proficienc* or capablit*)).ti,ab.
24	((dispensing or dispense or prescri* or administer* or administering) adj2 (protocol* or practice* or pattern*)).ti,ab.
25	staff.ti,ab.
26	audit*.ti,ab.
27	or/14-26
28	13 and 27

F.4 Health economics search

F.4.1 Health economic reviews

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

Population	Intervention or exposure	Comparison	Study design filters	Date parameters and other limits
Fluid therapy	n/a	n/a	The following filters were used in Medline and Embase only: HE	Medline and Embase 2011–22/12/2014 HEED, CRD EED

Population	Intervention or exposure	Comparison	Study design filters	Date parameters and other limits
				and HTA from date of inception to 22/12/2014 English only

Medline search terms

1	exp fluid therapy/
2	isotonic solutions/ or rehydration solutions/
3	water-electrolyte balance/
4	exp water-electrolyte imbalance/
5	hypovolemia/
6	dehydration/
7	((fluid* or volum* or electrolyte*) adj3 (therap* or substitut* or replac* or intravenous* or iv or infusion* or drip or drips or administrat* or replac* or deplet* or deficien* or rehydrat*)).ti,ab.
8	((fluid* or blood) adj2 volume).ti,ab.
9	((fluid* or electrolyte*) adj3 (balance* or imbalance* or manage* or maint* or loss* or status or monit* or assess* or evaluat* or re-evaluat* or reevaluat* or require* or need*)).ti,ab.
10	((fluid* or volum*) adj3 (restor* or resuscita*)).ti,ab.
11	(fluid* adj3 (challenge or bolus)).ti,ab.
12	(hypotens* adj2 resuscit*).ti,ab.
13	((shock or resuscit* or hypotens* or dehydrate*) and fluid*).ti,ab.
14	(hypovol?emi* or sepsis syndrome* or circulatory failure*).ti,ab.
15	((circulatory or h?emodynamic) adj2 (failure* or insufficien* or abnormalit* or instability*)).ti,ab.
16	or/1-15

Embase search terms

1	fluid therapy/ or fluid resuscitation/
2	fluid balance/
3	isotonic solution/
4	exp electrolyte disturbance/
5	electrolyte balance/
6	exp *hypovolemia/
7	*dehydration/
8	((fluid* or volum* or electrolyte*) adj3 (therap* or substitut* or replac* or intravenous* or iv or infusion* or drip or drips or administrat* or replac* or deplet* or deficien* or rehydrat*)).ti,ab.
9	((fluid* or blood) adj2 volume).ti,ab.
10	((fluid* or electrolyte*) adj3 (balance* or imbalance* or manage* or maint* or loss* or status or monit* or assess* or evaluat* or re-evaluat* or reevaluat* or require* or need*)).ti,ab.
11	((fluid* or volum*) adj3 (restor* or resuscita*)).ti,ab.
12	(fluid* adj3 (challenge or bolus)).ti,ab.
13	(hypotens* adj2 resuscit*).ti,ab.
14	((shock or resuscit* or hypotens* or dehydrate*) and fluid*).ti,ab.
15	(hypovol?emi* or sepsis syndrome* or circulatory failure*).ti,ab.
16	((circulatory or h?emodynamic) adj2 (failure* or insufficien* or abnormalit* or

	instability*)),ti,ab.
17	or/1-16

CRD search terms

#1	MeSH DESCRIPTOR fluid therapy EXPLODE ALL TREES IN NHSEED,HTA
#2	MeSH DESCRIPTOR isotonic solutions EXPLODE ALL TREES IN NHSEED,HTA
#3	MeSH DESCRIPTOR rehydration solutions IN NHSEED,HTA
#4	MeSH DESCRIPTOR water-electrolyte balance EXPLODE ALL TREES IN NHSEED,HTA
#5	MeSH DESCRIPTOR water-electrolyte imbalance EXPLODE ALL TREES IN NHSEED,HTA
#6	MeSH DESCRIPTOR hypovolemia EXPLODE ALL TREES IN NHSEED,HTA
#7	((((fluid* or volum* or electrolyte*) adj3 (therap* or substitut* or replac* or intravenous* or iv or infusion* or drip or drips or administrat* or replac* or deplet* or deficien* or rehydrat*))) IN NHSEED, HTA
#8	((((fluid* or blood) adj2 volume)) IN NHSEED, HTA
#9	((((fluid* or electrolyte*) adj3 (balance* or imbalance* or manage* or maint* or loss* or status or monit* or assess* or evaluat* or re-evaluat* or reevaluat* or require* or need*))) IN NHSEED, HTA
#10	((((fluid* or volum*) adj3 (restor* or resuscita*))) IN NHSEED, HTA
#11	((fluid* adj3 (challenge or bolus))) IN NHSEED, HTA
#12	((hypotens* adj2 resuscit*) IN NHSEED, HTA
#13	((((shock or resuscit* or hypotens* or dehydrate*) and fluid*)) IN NHSEED, HTA
#14	((hypovol?emi* or sepsis syndrome* or circulatory failure*)) IN NHSEED, HTA
#15	((((circulatory or h?emodynamic) adj2 (failure* or insufficien* or abnormalit* or instability*))) IN NHSEED, HTA
#16	#1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 or #9 or #10 or #11 or #12 or #13 or #14 or #15
#17	MeSH DESCRIPTOR child EXPLODE ALL TREES IN NHSEED,HTA
#18	MeSH DESCRIPTOR adolescent EXPLODE ALL TREES IN NHSEED,HTA
#19	MeSH DESCRIPTOR infant EXPLODE ALL TREES IN NHSEED,HTA
#20	MeSH DESCRIPTOR pediatrics EXPLODE ALL TREES IN NHSEED,HTA
#21	(child*) or (infan*) IN NHSEED, HTA
#22	((baby or babies)) IN NHSEED, HTA
#23	((neonat* or newborn* or preterm or pre-term or pre-term)) IN NHSEED, HTA
#24	((pediatric* or paediatric*)) IN NHSEED, HTA
#25	#17 or #18 or #19 or #20 or #21 or #22 or #23 or #24
#26	#16 and #25

HEED search terms

1	ax=fluid* or volum* or electrolyte*
2	ax=therap* or substitut* or replac* or intravenous* or iv or infusion* or drip or drips or administrat* or replac* or deplet* or deficien* or rehydrat*
3	ax=balance* or imbalance* or manage* or maint* or loss* or status or monit* or assess* or evaluat* or re-evaluat* or reevaluat* or require* or need*
4	ax=restor* or resuscita*
5	ax=challenge or bolus
6	ax=shock or resuscit* or hypotens* or dehydrat*
7	cs=2 or 3 or 4 or 5 or 6
8	cs=1 and 7
9	ax=hypovolaemi* or hypovolemi*

10	cs=8 or 9
11	ax=child* or infan* or baby or babies or neonat* or newborn or pediatric* or paediatric*
12	cs=10 and 11

F.5 References

- 1 National Institute for Health and Clinical Excellence. The guidelines manual. London: National Institute for Health and Clinical Excellence; 2012. Available from: <http://publications.nice.org.uk/the-guidelines-manual-pmg6/>