

Document Control

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Superseded Documents			
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1. Purpose

- 1.1. It has been shown that the majority of intravenous fluid prescribing is done by the most junior doctors (Lobo) and that fluid balance is not accurately recorded (internal audit).

NICE CG 174 states that

“The National Confidential Enquiry into Perioperative Deaths report in 1999 highlighted that a significant number of hospitalised patients were dying as a result of infusion of too much or too little fluid. The report recommended that fluid prescribing should be given the same status as drug prescribing. Although mismanagement of fluid therapy is rarely reported as being responsible for patient harm, it is likely that as many as 1 in 5 patients on IV fluids and electrolytes suffer complications or morbidity due to their inappropriate administration.”

- 1.2. The purpose of this document is to detail the process for prescribing fluids to adult patients in line with the NICE guidance. This will support all our prescribing staff to individualise their patient’s intravenous fluid prescription. The staff members who are involved in the monitoring of fluid balance and administration of intravenous fluids will also be supported.
- 1.3. **EXCLUSIONS** pregnancy, severe liver/renal disease, diabetes, burns, traumatic brain injury, electrolyte abnormalities
- 1.4. The policy applies to all Trust staff who prescribe intravenous (IV) fluids to adult patients. It also applies to all staff who may administer intravenous fluids to adult patients. Aspects around the monitoring of the patient will apply to all staff who may have a role in measuring fluid balance.
- 1.5. Patients – refers to adult patients only. Intravenous will be shortened to IV
- 1.6. Implementation of this policy will ensure that:
- Patients receive the most appropriate type of IV fluid for their needs
 - Patients receive weight based volumes of IV fluids
 - Patients receive the appropriate monitoring of their serum electrolytes
 - Patients are assessed and monitored correctly with regards to ABCDE, fluid balance, weight

- Patients requiring IV fluid resuscitation are correctly assessed and receive the correct volumes and type of IV fluid.
- Patients requiring IV fluid resuscitation will be escalated early to senior clinicians
- Guidance will be available for patients with more complex fluid management issues such as on-going losses
- Reference charts of common fluid components will be readily available.
- Educational materials will be available for prescribers on STAR
- Reminder videos will be available for administrators
- All IV fluids will be put through a pump except IV fluids for resuscitation which will be just “run through”.
- The use of pressure bags needs to be defined.
- Our Trust will be using NICE guidance, Royal college of Physicians and Resuscitation council advice as reference for these changes.
- Tools to improve fluid balance monitoring will be made available.

2. Definitions

Intravenous

- 2.1. This refers to a drug/fluid being administered directly into the patient's vein usually via a cannula.

Adult

- 2.2. Hospital inpatients aged 16 and over as per NICE CG 174

3. Responsibilities

- 3.1. All staff will be required to complete appropriate training and be professionally responsible for their prescribing, administration of the fluids and accuracy of monitoring.

Role of Clinical effectiveness lead

- 3.2. The clinical effectiveness is responsible for:
- Ensuring that the project runs on time

- Ensuring that the materials have been approved in advance of launch by all appropriate committees
- The materials will be tested in a classroom by junior doctors
- The materials will be shared in advance with clinical leads
- Liaising with improvement team regarding testing on a ward
- Liaising with senior nursing regarding the Fluid balance tools
- Linking with the subject matter experts
- Coordinating and leading the “Barnstaple wet beds” research project.

Role of DTC, PAR, PSOG Group

3.3. The DTC Group is responsible for:

- Acting as a checker for the detail of the prescribing
- Ensuring that the materials comply with the NICE recommendations

3.4 The PAR group is responsible for

- Acting as checker for the assessment/reassessment and resuscitation aspect of the IV fluids
- Ensuring this is in-line with both NICE and Resus council as well as agreeing local changes.

3.4 The PSOG group is responsible for

- Acting as final check on the materials and overall plan
- Ensuring that there is a central place to report audit results to

4. Component parts of the Adult IV fluid project

4.1. The component parts are split into sections assessment of the patient and fluid balance monitoring. Then the actual prescribing. The next section deals with education/training and monitoring of outcomes.

Assessment and reassessment of the patient

- 4.2. In line with the Resus council and NICE the ABCDE approach is advocated. In addition the materials include advice on calling for senior help and consideration of when a patient might need resuscitation fluid.
- 4.3. There is also advice on weighing the patient twice weekly – this to be recorded on the MUST chart to avoid duplication.
- 4.4. Daily renal function which includes electrolytes is mandated.
- 4.5. Maximum prescription is for 24 hours before reassessment is required.
- 4.6. Strict fluid balance is mandated for all patients receiving IV fluids

Fluid balance

- 4.7. This is an essential part of good intravenous fluid prescribing and clinical care.
- 4.8. Strict fluid balance is mandated.
- 4.9. Tools to improve accuracy are being developed namely the “wet pad/urine receptacle picture charts” and the Barnstaple wet bed chart

Three aspects of IV fluid prescribing

4.10. Routine maintenance

- This is to be weight based.
- Weight bands of 35-44kg, 45-54kg, 55-64kg, 65-74kg, 75-84kg, >85kg
- The fluid chosen is 0.18% sodium chloride with 4% glucose (this is suggested by NICE and has been used by other centres)
- Potassium containing bags are to be used unless the patient’s serum potassium is > 5mmol/l
- The routine maintenance is for the first 24hours only as it is likely that the clinical picture will have changed and more bespoke prescribing may be needed.
- Details of the daily requirements are included for water, potassium, sodium, chloride and glucose.
- The glucose is for prevention of ketosis not for nutritional value. This is also highlighted on the poster.

4.11. Resuscitation

- This is based upon the NICE algorithm with modifications to the fluid bolus volume in-line with the Resus council guidance.
- Patient requiring IV fluid resuscitation may do for a variety of reasons and in a high pressure situation some of the less common reasons may not come to mind immediately. For this reason a chart with some common causes of shock is included.
- Signs and symptoms of hypovolaemia are also highlighted by a separate box

- The type of resuscitation fluid is advised namely 0.9% sodium chloride or Plasmalyte
- The IV fluid boluses must be given over no more than 15 minutes which will mean they cannot go through the pumps so in these circumstances they will need to “run through” and be timed.
- It is important to prompt staff to call for senior help early.
- A reminder about blood loss and need for additional help and a prompt to consider massive transfusion policy is also included.
- An additional prompt on the algorithm has been added asking if help is needed after each fluid bolus.

4.12. Replacement and/or redistribution

- This can be a challenging area unless the losses can be easily measured e.g. Nasogastric tube
- The chart from NICE outlines the approximate composition for the various types of fluid in litres
- The poster has a chart showing examples of what may be used to replace losses such as vomit/Nasogastric loss or diarrhoea/colostomy loss.
- To aid this there is a chart with the compositions of the commonly used/available intravenous fluids.

5. Education/training and monitoring of outcomes

Education/training

- 5.1. A prescriber’s short module via STAR This will also have associated EMOT clinical questions ultimately.
- 5.2. An IV fluid workshop for the junior doctors
- 5.3. Videos for the administrator’s via STAR to be used as a refresher and in conjunction with the nursing cannulation training day.
- 5.4. Nurses to attend face to face training and have 3 yearly competencies signed off prior to administering IV fluids.
- 5.5. Posters and lanyard cards – will be available on induction of new staff and delivered to clinical areas on launch.

Monitoring of outcomes

5.6. This has been detailed below

6. Monitoring Compliance with and the Effectiveness of the Guideline

Standards/Key Performance Indicators

- 6.1. NICE quality standards/ NICE standards audit
- 6.2. Dr Foster/Imperial college alerts
- 6.3. Internal quality audit looking at complications
- 6.4. In time the completion of the eMOT questions

Process for Implementation and Monitoring Compliance and Effectiveness

- 6.5. Team to visit wards during the launch to support staff and hand out lanyard cards etc similar to with acute kidney injury project – this team will need to be formed.
- 6.6. Detail here the monitoring process:
 - What process will be used for monitoring the compliance

The process will be observed initially as compliance is likely to take a while to settle as the project takes hold. Additional questions relating to fluid balance chart accuracy can be added to the Meriden ward questionnaire.
 - Who will be undertaking the monitoring?

Meriden will be completed by senior nursing staff in-line with current process
 - The biochemistry lab will be alerted to look for an increase in incidence of electrolyte abnormalities to raise it with HCY/TC/ medical director
 - Datix will monitor for any fluid related incidence

- Audit against NICE standards and complications – led by HCY
- Mortality review committee will have oversight of the Dr Foster data
- What group is used for reporting any non-compliance to?
I think we have to be pragmatic and accept this will take a while to embed from reading other Trusts' experiences. Also the majority of IV fluid prescribing is undertaken by foundation doctors so by including them in the testing of the materials and then during their induction this will help embed the project.
- How often will the processes be audited / monitored and how will improvements be implemented?
The process should be audited at one month and then depending on the results the next audit time can be determined probably bimonthly initially
- What action will be taken if anyone is found not to be following the policy?
That will depend upon the individual case and how embedded the project is. The best solution would be individual education.

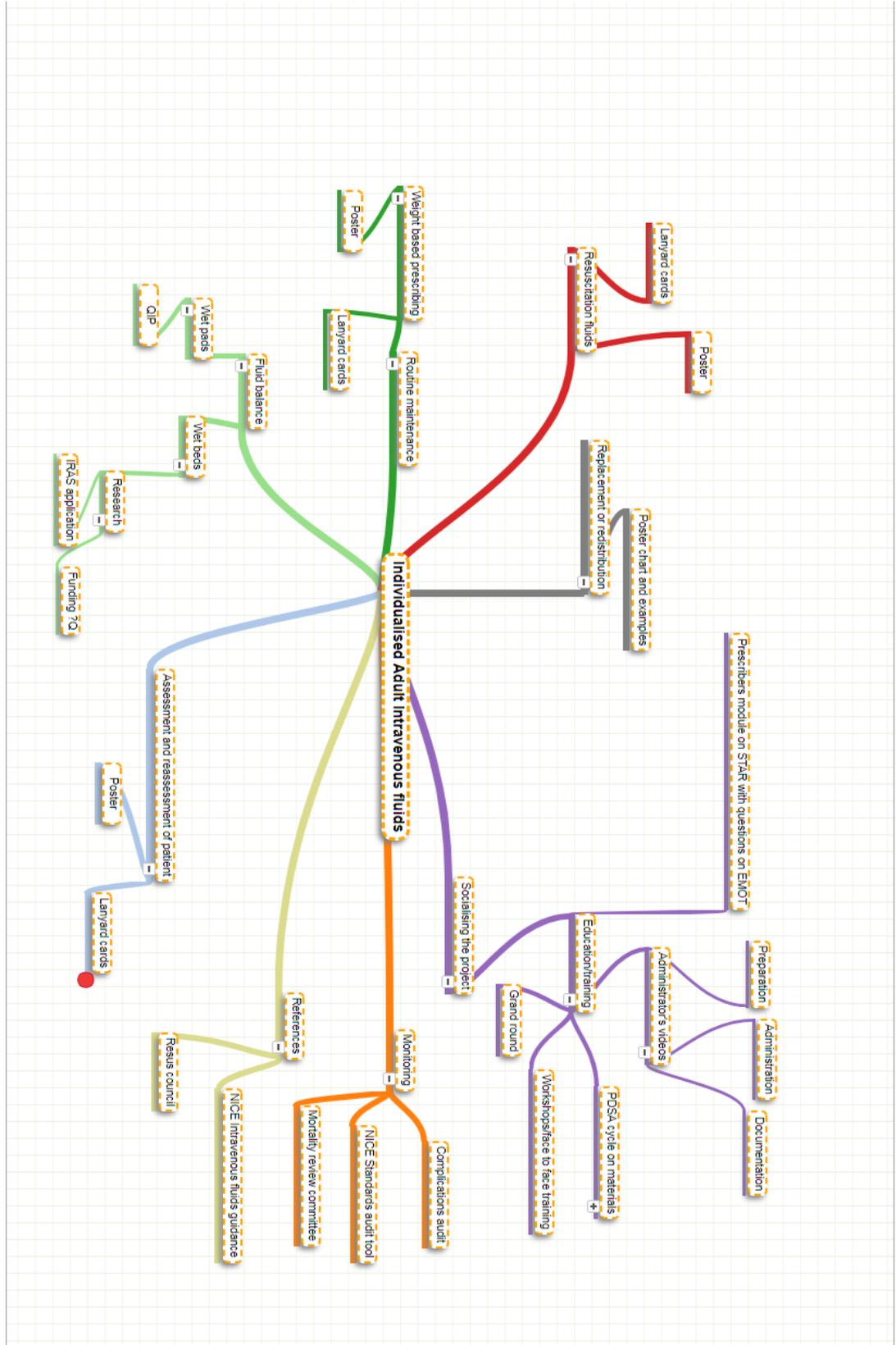
7. References

- NICE CG 174 <https://www.nice.org.uk/guidance/cg174>
- <https://www.resus.org.uk/resuscitation-guidelines/abcde-approach/>
- RCP acute care toolkit 12 <https://www.rcplondon.ac.uk/guidelines-policy/acute-care-toolkit-12-acute-kidney-injury-and-intravenous-fluid-therapy>
- Shared learning from Warrington and Halton hospitals
<https://www.nice.org.uk/sharedlearning/new-iv-fluids-very-nice>
- Problems with solutions: drowning in the brine of an inadequate knowledge base D. N. LOBO, et al, Clinical Nutrition (2001) 20(2)
- <https://www.rcpe.ac.uk/sites/default/files/wood.pdf>

8. Associated Documentation

- Adult Intravenous fluid poster
- Adult intravenous fluid lanyard card – routine maintenance
- Adult intravenous fluid lanyard card - resuscitation
- Wet pad/ urine receptacles picture chart
- Barnstaple wet bed project – in progress
- Prescriber’s module – draft complete
- Administrator’s video script - draft

Intravenous fluid project mind map – May 2018 HCY



Intravenous fluid lanyard card – resuscitation

Adult intravenous fluid resuscitation

Hypovolaemia suggested by:

- Clinical examination
- Trends in observations (inc. urine output)
- Clinical picture

Indicators that patient may need fluid resuscitation

- Systolic BP < 100mmHg
- Heart rate > 90bpm
- CRT > 2 sec
- Cold peripheries
- Resp rate > 20 breaths/min
- EWS ≥ 5
- 45° passive leg raise suggests fluid responsiveness



Types of shock:

Hypovolaemia e.g.
Blood loss – any source
Gastrointestinal loss
Trauma
Ruptured ectopic

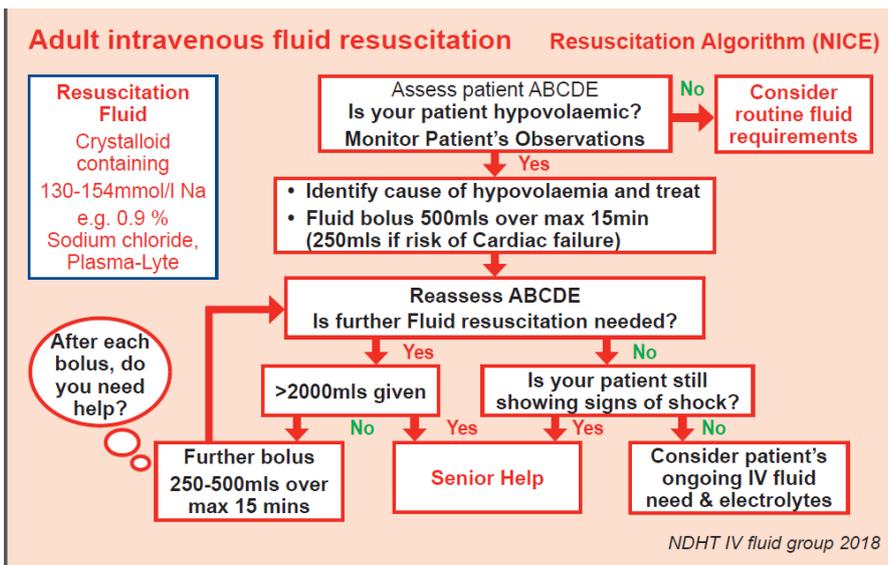
Distributive e.g.
Sepsis
Anaphylaxis
Neurogenic

Obstructive
Massive pulmonary embolism
Tension pneumothorax
Cardiac tamponade

Cardiogenic
Primary pump failure
Massive MI

 Click the drip for more information
 On-going blood loss – GET HELP!
 Attempt to control the bleeding
 Massive transfusion policy may need to be activated.

NDHT IV fluid group 2018



Intravenous fluid lanyard card – routine maintenance.

Adult intravenous routine maintenance fluids

Exclusions: Pregnancy, Severe liver/cardiac/renal disease, diabetes, burns, traumatic brain injury, electrolyte abnormalities

 ***Check serum potassium if greater than 5mmol/l omit potassium (KCL) from the fluid prescription below and recheck before prescribing any more fluids.*** 

Prescribe for first 24hrs							
Weight band	1st Bag	Volume	2nd bag	Volume	3rd bag	Volume	Rate ml/hr
35 – 44kg	0.18% sodium chloride + 4% glucose 40mmol KCL	1000 ml	0.18% sodium chloride + 4% glucose	250 ml	N/A		55 ml/hr
45 – 54kg	0.18% sodium chloride + 4% glucose 40mmol KCL	1000 ml	0.18% sodium chloride + 4% glucose	500 ml	N/A		65 ml/hr
55 – 64kg	0.18% sodium chloride + 4% glucose 40mmol KCL	1000 ml	0.18% sodium chloride + 4% glucose 20mmol KCL	500 ml	0.18% sodium chloride + 4% glucose	250 ml	75 ml/hr

Assess patient and Check renal function daily when patient on IV fluids

HCY/IV fluid group June 2018 Ref. NICE CG 174, RCP London Acute care toolkit 12: Acute kidney injury and intravenous fluid therapy  For more information click the drip

Adult intravenous routine maintenance fluids

Exclusions: Pregnancy, Severe liver/cardiac/renal disease, diabetes, burns, traumatic brain injury, electrolyte abnormalities

 ***Check serum potassium if greater than 5mmol/l omit potassium (KCL) from the fluid prescription below and recheck before prescribing any more fluids.*** 

Prescribe for first 24hrs							
Weight band	1st Bag	Volume	2nd bag	Volume	3rd bag	Volume	Rate ml/hr
65 – 74kg	0.18% sodium chloride + 4% glucose 40mmol KCL	1000 ml	0.18% sodium chloride + 4% glucose 20mmol KCL	1000 ml	N/A		85 ml/hr
75 – 84kg	0.18% sodium chloride + 4% glucose 40mmol KCL	1000 ml	0.18% sodium chloride + 4% glucose 20mmol KCL	1000 ml	0.18% sodium chloride + 4% glucose	250 ml	95 ml/hr
>85kg	0.18% sodium chloride + 4% glucose 40mmol KCL	1000 ml	0.18% sodium chloride + 4% glucose 40mmol KCL	1000 ml	0.18% sodium chloride + 4% glucose	500 ml	105 ml/hr

Assess patient and Check renal function daily when patient on IV fluids

HCY/IV fluid group June 2018 Ref. NICE CG 174, RCP London Acute care toolkit 12: Acute kidney injury and intravenous fluid therapy  For more information click the drip

Adult intravenous fluid guidance poster



NHS
Northern Devon Healthcare
NHS Trust

Individualised adult intravenous (IV) fluid management

Exclusions <16 years, pregnant women, severe cardiac/ liver/renal disease, diabetes, burns, traumatic brain injury, electrolyte abnormalities

Click the Drip on BOB home page



Assess

- Using an ABCDE approach
- Early warning score (EWS)
- Urine output?
- Could your patient be hypovolaemic? (See box below)
- Do you need senior help?
- Can your patient drink?

Hypovolaemic?

Do I need senior help?



IV Fluid Resuscitation

Hypovolaemia suggested by:

- Clinical examination
- Trends in observations (i.e. urine output)
- Clinical picture

Indications that patient may need fluid resuscitation

- Systolic BP < 90mmHg
- Heart rate > 100bpm
- CRT > 2 sec
- Cold peripheries
- Resp rate > 20 breaths/min
- JRC 2-3
- 40% passing rate suggests fluid requirements

Resuscitation Fluid
Crystalloid containing 130-150mEq/L Na
e.g. 0.9% Sodium Chloride, Plasma-Lyte

Resuscitation Algorithm (NICE)

Assess patient ABCDE
Is your patient hypovolaemic?
Monitor Patient's Observations

Yes

- Identify cause of hypovolaemia and treat
- Fluid bolus 500mls over 15 mins (200mls if risk of Cardiac Failure)

Reassess ABCDE
Is further Fluid resuscitation needed?

Yes >2000mls given
Further bolus 250-500mls over max 15 mins

No Is your patient still showing signs of shock?
Yes Senior Help

No Consider patient's ongoing IV fluid need & electrolytes

Types of shock:

Hypovolaemic e.g.
Blood loss - any source
Dehydration
Trauma
Burned scalds

Obstructive e.g.
Pneumia
Aortic dissection
Myocardial infarction

Cardiogenic
Massive pulmonary embolism
Tension pneumothorax
Cardiac tamponade

Septic
Massive pulmonary embolism
Tension pneumothorax
Cardiac tamponade

Primary pump failure
Massive MI

Ongoing blood loss - GET HELP!
Attempt to control the bleeding
Massive transfusion policy may need to be activated

Routine maintenance for first 24 hours

Check serum potassium if greater than 6mmol/L until potassium (K+) from the fluid prescription below and recheck before prescribing any more fluids.

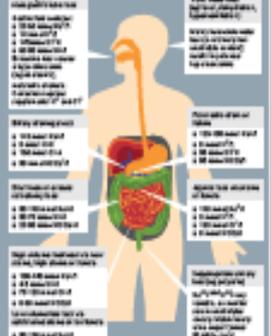
Weight band	Prescription for first 24hrs				Prescription for first 24hrs			
	1st bag	2nd bag	3rd bag	4th bag	1st bag	2nd bag	3rd bag	4th bag
20 - 40kg	0.18% sodium chloride + 4% glucose 1000ml (KCL)	100ml 1000ml NaCl 100ml 1000ml NaCl	20.75 20.75	00 00	40 40			
41 - 50kg	0.18% sodium chloride + 4% glucose 1000ml (KCL)	100ml 1000ml NaCl 100ml 1000ml NaCl	20.75 20.75	00 00	40 40			
51 - 60kg	0.18% sodium chloride + 4% glucose 1000ml (KCL)	100ml 1000ml NaCl 100ml 1000ml NaCl	20.75 20.75	00 00	40 40			
61 - 70kg	0.18% sodium chloride + 4% glucose 1000ml (KCL)	100ml 1000ml NaCl 100ml 1000ml NaCl	20.75 20.75	00 00	40 40			
71 - 80kg	0.18% sodium chloride + 4% glucose 1000ml (KCL)	100ml 1000ml NaCl 100ml 1000ml NaCl	20.75 20.75	00 00	40 40			
81 - 90kg	0.18% sodium chloride + 4% glucose 1000ml (KCL)	100ml 1000ml NaCl 100ml 1000ml NaCl	20.75 20.75	00 00	40 40			
91 - 100kg	0.18% sodium chloride + 4% glucose 1000ml (KCL)	100ml 1000ml NaCl 100ml 1000ml NaCl	20.75 20.75	00 00	40 40			

Replacement

Diagram of ongoing losses

Daily requirements in health:

Water 25-30ml/kg/24hr
Sodium 1mmol/kg/24hr
Potassium 1mmol/kg/24hr
Chloride 1mmol/kg/24hr
Glucose 50-100g/24hr (prevents ketosis)



Fluid composition per 1000mls - some are available with added potassium

	Normal plasma	0.9% sodium chloride	Plasma-Lyte	0.9% sodium chloride + 4% glucose	0.18% sodium chloride + 4% glucose	5% dextrose
Sodium mmol	135 - 145	154	154	154	154	0
Potassium mmol	3.5 - 5.5	0	0	0	0	0
Chloride mmol	98 - 106	154	98	154	154	0
Calcium mmol	1.1 - 1.3	0	0	0	0	0
Mg mmol	0.7 - 1.0	0	0	0	0	0
Glucose g/l	0.5 - 0.8	0	0	0	40	0
Dextrose mmol	2.8 - 3.9	0	0	0	0	276

Reassess

- Daily U+Es,
- Strict fluid balance,
- EWS + urine output
- Weigh on day 1,4,7 if IV fluids are continuing
- Do not prescribe more than 24hr of IV fluid without reviewing patient

