SIMPLY…. Fluids

Dr Will Dooley

Plan

- Maintenance vs Resuscitation
- Prescribing
- Common Errors ☹
- Calculations ☺
- Drip rates

Case

54 yo presents with severe diarrhoea and vomiting.

- How would you proceed?

Assessment

- History
- Examination
- Investigation

- Management

Assessment

History

Case

54 yo presents with severe diarrhoea and vomiting.

HPC
Vomiting for 3 days, 2 days of diarrhoea
Unable to tolerate oral fluids for 24hrs
Ate dodgy kebab on Saturday. No recent travel.
Feeling unwell, thirsty, light-headed when standing
Passing less urine than normal
No feverish symptoms

Normally fit and well

HISTORY
Input vs Output

?Limited intake

?High Losses

Symptoms

Urine

Co-morbidities

SIMPLY FINALS

Assessment

Examination

Case

54 yo presents with severe diarrhoea and vomiting.

<u>Examination</u>

Alert

Accessory muscles of respiration

Cool peripheries

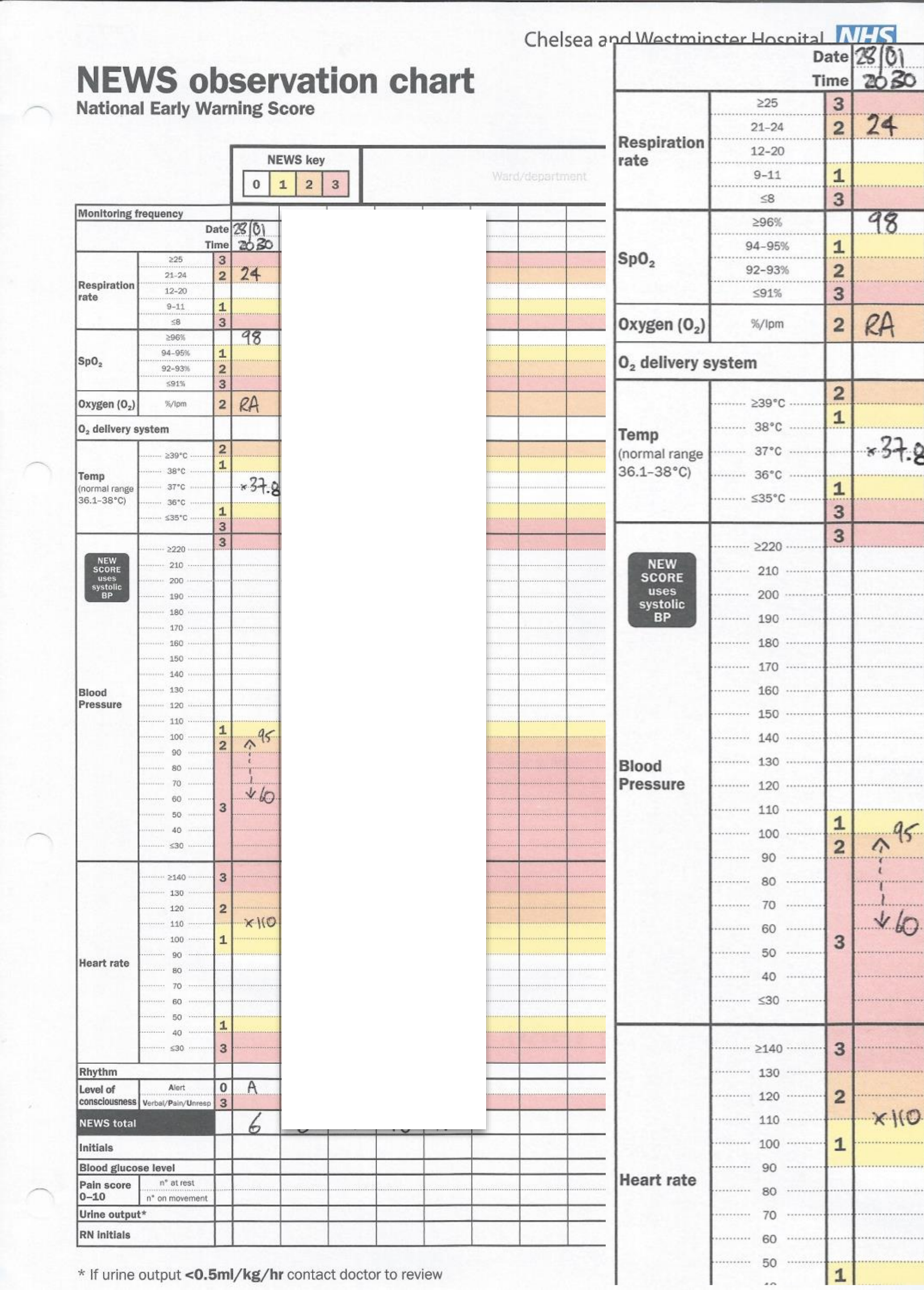
Dry mucus membranes

<u>Observations:</u>

See chart

T37.0 BP 95/60 HR 110 RR 24 98% OA

EXAMINATION	
A	
B	Respiratory Rate >20/min
C	Systolic Blood Pressure <100mmHg Heart Rate >90 bpm Cold peripherally JVP
D	Urine output < 0.5 ml/kg/hr Temperature AVPU
E	Dry mucosae



Chelsea and Westminster Hospital NHS

NEWS observation chart

National Early Warning Score

NEWS key: 0 | 1 | 2 | 3

Ward/department

			28/01 2030
Monitoring frequency			
Respiration rate	≥25	3	
	21–24	2	24
	12–20		
	9–11	1	
	≤8	3	
SpO_2	≥96%		98
	94–95%	1	
	92–93%	2	
	≤91%	3	
Oxygen (O_2)	%/lpm	2	RA
O_2 delivery system			
Temp (normal range 36.1–38°C)	≥39°C	2	
	38°C	1	
	37°C		×37.8
	36°C		
	≤35°C	1	
		3	
Blood Pressure (NEW SCORE uses systolic BP)	≥220	3	
	210–110		
	100	1	95
	90	2	
	80–≤30	3	60
Heart rate	≥140	3	
	130–120	2	
	110		×110
	100	1	
	90–60		
	50	1	
	40–≤30	3	
Rhythm			
Level of consciousness	Alert	0	A
	Verbal/Pain/Unresp	3	
NEWS total			6
Initials			
Blood glucose level			
Pain score 0–10	n° at rest		
	n° on movement		
Urine output*			
RN initials			

* If urine output <0.5ml/kg/hr contact doctor to review

Assessment

Investigation

Weight: 100kg

Urine : 4+ ketones, nil else

What should his Urine Output be over 4 hours?

Bloods:

U&E

FBC

INVESTIGATIONS

Bedside: Weight
Fluid Balance Chart
Urine dipstick

Bloods: Electrolytes

Imaging: Chest X-Ray

SIMPLY FINALS

Management

- IV Access:
  - What size cannula ?
- Fluid Challenge:
  - What type of fluid?
  - How much fluid ?

Type of fluid and rate

- Crystalloids

Clear fluids- water+electrolytes

  - 0.9% Normal Saline
  - Dextrose
  - Hartmann's

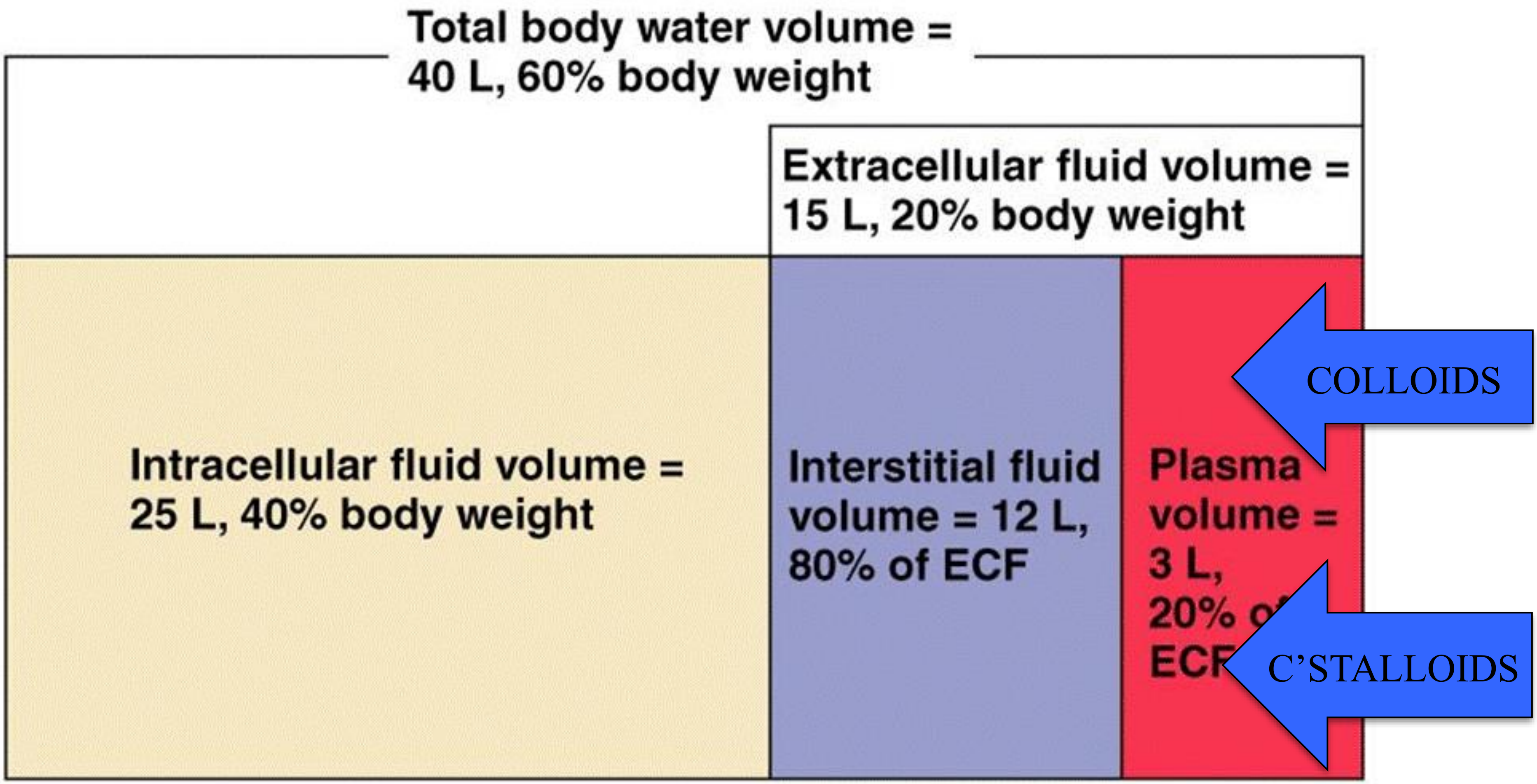
	0.9% Normal saline	Hartmann / Plasmalyte	5% glucose
Na	**154 mmol**	131 mmol	0
K	0	5 mmol	0
Cl	**154 mmol**	111 mmol	0
Osmol	303 mosm/l	279 mosm/l	253 mosm/l
Other	nil	**Lactate 29** Calcium 2	Glucose 50g/l

- Colloids

Gelatinous- particles suspended in solution

  - Volplex
  - Gelofusion
  - Blood

Fluid compartments



How much fluid?

Resuscitation

Assess- ABCDE

IF NO OVERLOAD SIGNS…

*** FLUID CHALLENGE ***

250-500mls Crystalloid

Re-assess

Further 250-500mls bolus until 2L given

RE-ASSESS

Fluid prescription

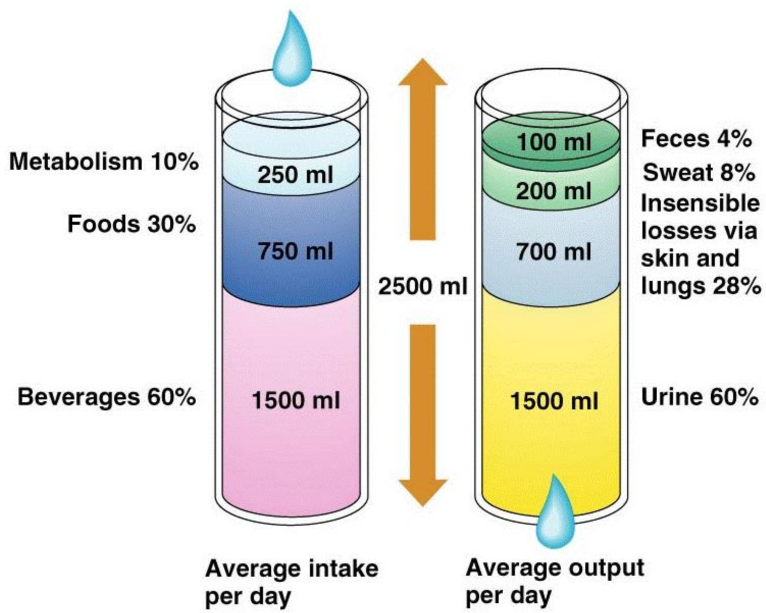
When prescribing blood check if the patient requires irradiated or CMV negative components

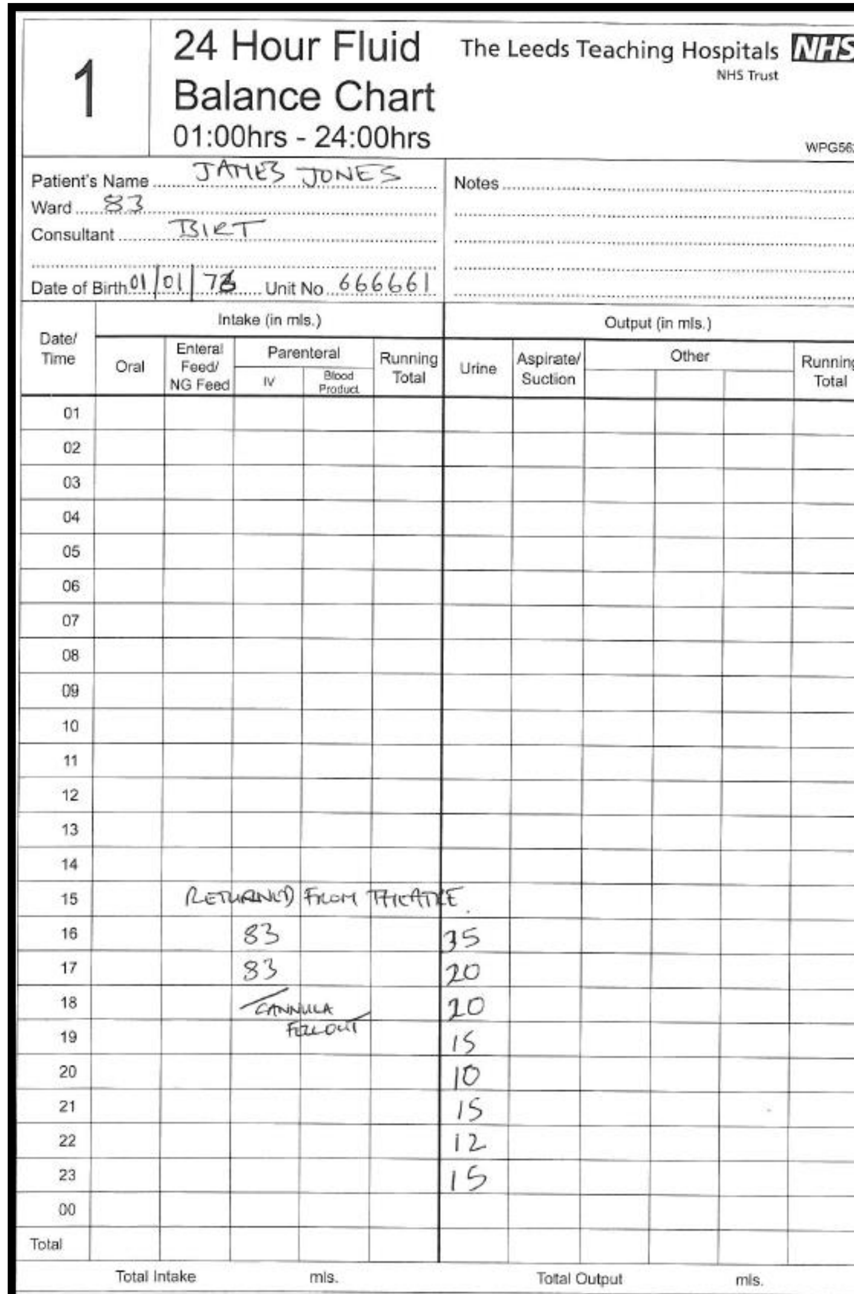
Do not make any additions to blood components

Infusions and blood and blood components											
Date	Fluid or blood / blood component	Medicine added and dose	Final vol (mls or mm if a syringe)	Route	Rate (ml/hr) or (mm/hr) or duration (hrs/mins)	Surname/ Signature/Bleep	Batch or blood component unit number	Nurse's signatures	Infusion Start time / Finish time	Vol. given	Pharmacy

Fluid balance

The patient was placed on a fluid balance chart.





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24 Hour Fluid Balance Chart
01:00hrs - 24:00hrs

The Leeds Teaching Hospitals NHS
NHS Trust

WPG562

Patient's Name: JAMES JONES
Ward: 83
Consultant: BIRT
Date of Birth: 01/01/73 Unit No: 666661

Notes

Date/ Time	Intake (in mls.) Oral	Enteral Feed/ NG Feed	Parenteral IV	Parenteral Blood Product	Running Total	Output (in mls.) Urine	Aspirate/ Suction	Other	Other	Other	Running Total
01											
02											
03											
04											
05											
06											
07											
08											
09											
10											
11											
12											
13											
14											
15		RETURNED FROM THEATRE									
16			83			35					
17			83			20					
18			CANNULA FELL OUT			20					
19						15					
20						10					
21						15					
22						12					
23						15					
00											
Total											

Total Intake .... mls. Total Output .... mls.

Case 2…

- 35yo
- Post emergency caesarean section (for sepsis and fetal distress)
- Blood loss 1300mls

- Obs

T37.0 BP 95/60 HR 110 RR 24 98% OA

- Fluid challenge…

Resuscitation

Assess- ABCDE

IF NO OVERLOAD SIGNS…

*** FLUID CHALLENGE ***

250-500mls Crystalloid

Reassess

Further 250-500mls bolus until 2L given

REASSESS

- If improves… likely hypovolaemia
- If does not improve... Likely something else

Maintenance Requirements

Fluid: 25-30 ml/kg/day
Sodium: 1-2mmol /kg/day
K^+: 0.5-1mmol /kg/day
(approx. max 10mmol/hr)
+ *Replacements*

	0.9% Normal saline	**Hartmanns**	5% glucose
Na	154 mmol	131 mmol	0
K	0	5 mmol	0
Cl	154 mmol	111 mmol	0
Osmol	303 mosm/l	279 mosm/l	253 mosm/l
Other	nil	Lactate 29 Calcium 2	Glucose 50g/l

Example… 70kg per day

- Fluid: 1750-2100ml
- Sodium: 70-140mmol
- Potassium: 35-70mmol

DOES PATIENT NEED IV FLUID???

SIMPLY *FINALS*

Prescribing maintenance fluids

HISTORY

Input vs Output

?Limited intake

?High Losses

Symptoms

Urine

Co-morbidities

EXAMINATION

A

B Respiratory Rate >20/min

C Systolic Blood Pressure <100mmHg
Heart Rate >90 bpm
Cold peripherally
JVP

D Urine output < 0.5 ml/kg/hr
Temperature
AVPU

E Dry mucosae

INVESTIGATIONS

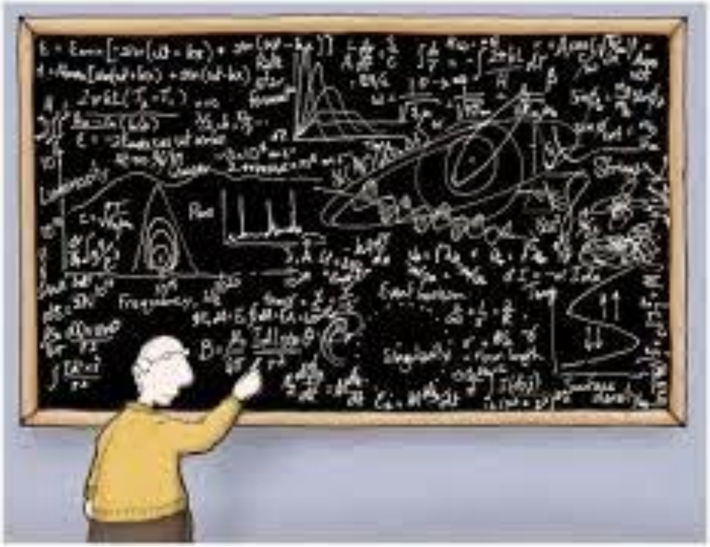
Bedside: Weight
Fluid balance
Urine dipstick

Bloods: Electrolytes

Imaging: Chest X-Ray

Depends on the case: e.g. ?NBM

Calculations



Calculating Drip Rate

What is the drip rate (drops/minute) required for a unit of blood to run over 4 hours using giving set with drop factor of 20 drops/ml?

1 unit of blood = approx 400mls

Calculating Drip Rate

- **Drip rate (drops per minute)**
- Volume (ml)
- Time (***minute***)
- Drop Factor (drops per ml) or (gtt per ml)

Three different methods… use the one you're most comfortable with

1. Know the Equation

What is the drip rate (drops/minute) required for a unit of blood to run over 4 hours using giving set with drop factor of 20 drops/ml?

$$\text{Drip rate} = \frac{\text{Volume}}{\text{Time}} \times \text{Drop Factor}$$

$$\text{Drip Rate} = \frac{400\text{mls}}{240\textbf{mins}} \times 20 \text{ gtt/ml}$$

$= 33$ drops / min

$= 32$ drops / min OR 8 drops / 15 sec

2. Think about the problem

- Drip rate is DROPS PER MINUTE
- This is TOTAL DROPS DIVIDED BY TIME
- TOTAL DROPS same as VOLUME x DROP FACTOR (as this is drops per ml)

What is the drip rate (drops/minute) required for a unit of blood to run over 4 hours using giving set with drop factor of 20 drops/ml?

TOTAL DROPS = VOLUME X DROP FACTOR = 400 X 20 = 8000

DRIP RATE = TOTAL DROPS / TIME = 8000 / 240 = 33 drops/min

3. Look at the units

Drip rate (drops per minute)

- Volume (ml)
- Time (minute)
- Drop Factor (drops per ml)

$$\text{Drip rate}\left(\frac{\text{Drops}}{\text{min}}\right) = \frac{\text{Volume}}{\text{Time}}\left(\frac{\cancel{\text{ml}}}{\text{mins}}\right) \times \text{Drop Factor}\left(\frac{\text{Drops}}{\cancel{\text{ml}}}\right)$$

$$\text{Drip Rate} = \frac{400\text{mls}}{240\textbf{mins}} \times 20\ \text{gtt/ml}$$

$$= 33\ \text{drops / min}$$

Converting drip rate to ml/hour

What is the transfusion rate in ml/hour of a blood transfusion being run at 40 drops/minute through a giving set with drop factor of 20 drops/ml?

Transfusion Rate	(ml/hr)
Drip rate	(Drops/minute)
Drop Factor	(Drops/ml)

SIMPLY FINALS

1. Know the Equation

$$\text{Transfusion Rate} = \frac{\text{Drip Rate}}{\text{Drop Factor}}$$

What is the transfusion rate in ml/hour of a blood transfusion being run at 40 drops/minute through a giving set with drop factor of 20gtt/ml?

$$\text{Transfusion Rate} = \frac{40 \times 60}{20}$$

$$= 120 \text{ ml/hr}$$

SIMPLY FINALS

2. Think about the problem

What is the transfusion rate in ml/hour of a blood transfusion being run at 40 drops/minute through a giving set with drop factor of 20 drops/ml?

- 20 drops per ml
- Therefore 40 drops = 2ml
- Therefore 2ml per minute

- Therefore 2x60 = **120 ml per hour**

SIMPLY FINALS

3. Look at the units

What is the transfusion rate in ml/hour of a blood transfusion being run at 40 drops/minute through a giving set with drop factor of 20 drops/ml?

Transfusion Rate **(Ml/hr)**
Drip rate (Drops/minute)
Drop Factor (Drops/ml)

$$\text{Ml/hr} = \frac{\text{drops}}{\text{hr}} \textbf{ divided by } \frac{\text{drops}}{\text{ml}} = \frac{\cancel{\text{drops}}}{\text{hr}} \times \frac{\text{ml}}{\cancel{\text{drops}}}$$

= 40 x 60 divided by 20

= 120 ml per hour

SIMPLY FINALS

Try these later…

What is the drip rate (drops/minute) required for a 1 litre bag of saline to run over 5 hours using giving set with drop factor of 10 drops/ml?

Drip rate $= \frac{\text{Volume}}{\text{Time}} \times$ Drop Factor

Drip rate $= \frac{1000 \times 10}{60 \text{x} 5}$ $= 33$ gtt/min

What is the transfusion rate in ml/hour of a blood transfusion being run at 20 drops/minute through a giving set with drop factor of 15 drops/ml?

Transfusion Rate $= \frac{\text{Drip Rate}}{\text{Drop Factor}}$ $= \frac{20 \times 60}{15}$ $= 80$ ml/hr

SIMPLY FINALS

Summary

- IV only if not PO
- Calculations…
  - Take your time!
  - Is your answer sensible?
- Practice!

Any Questions?

SIMPLY FINALS

Calculations

1. 0.01% Adrenaline. How many grams of adrenaline are in 1 litre of saline?

- Same as 1:10,000 adrenaline
- So 1 unit adrenaline in 10,000 units saline
- Or 1g Adrenaline in 10,000ml saline
- So 0.1g in 1 litre
- (one decimal place to the right)

2. What should the urine output for a 80kg patient over 4 hours be?

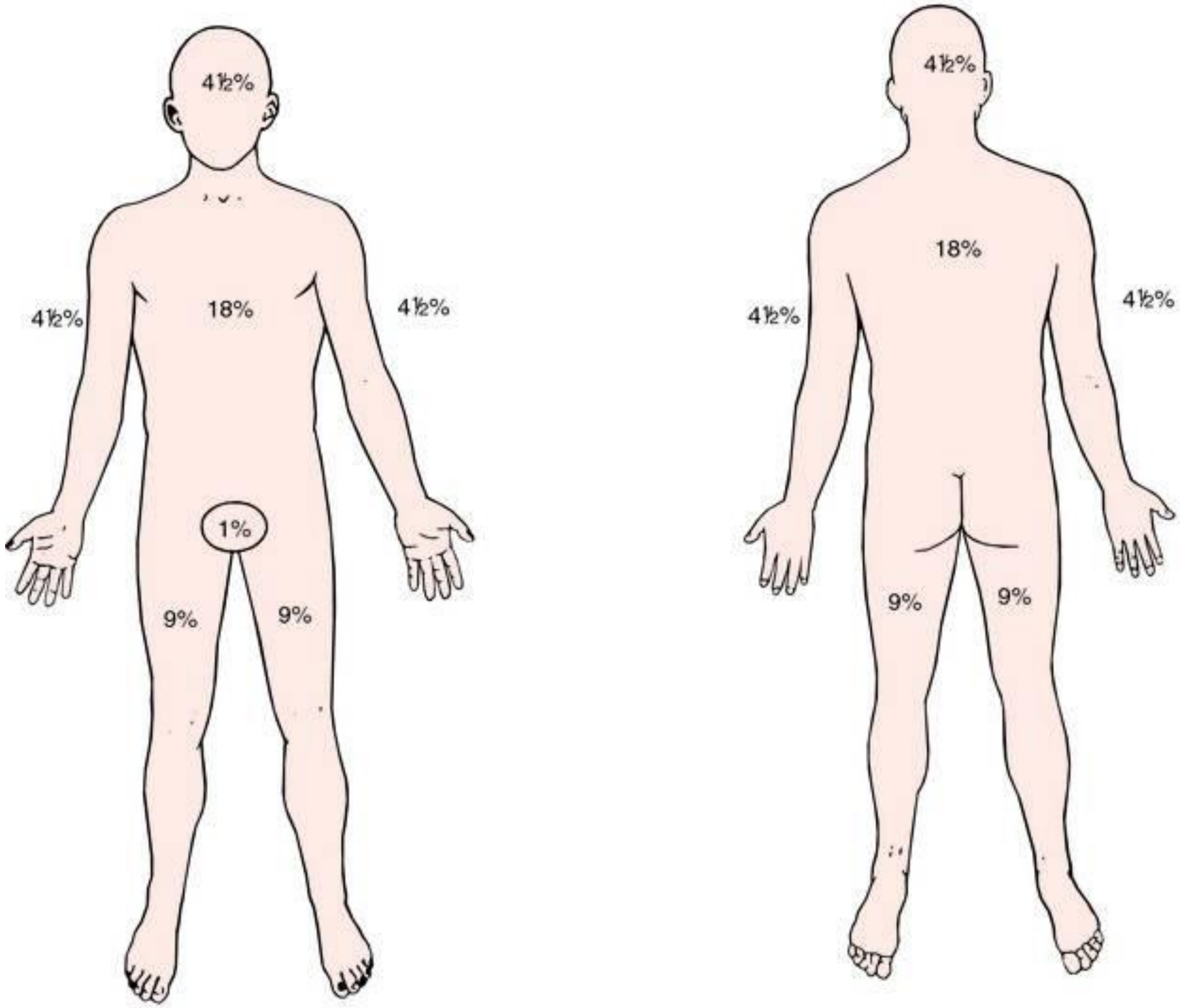
- UO > 0.5 ml / kg / hr
- So at least 0.5 x 80 x 4 = 160ml

Burns

A patient presents with burns from fire. The burns are affecting both his arms, his face and head.

- **What percentage body area has been effected?**

Herndon Rule of 9s



Arm	9%
Head	9%
Neck	1%
Leg	18%
Anterior trunk	18%
Posterior trunk	18%