Analgesia *et al.*

Dr William Dooley

Plan

- **Pain assessment**
- **Acute vs. Chronic pain**
- **Overdose / Toxicity**

- **Other common meds**
  - **Anti-emetics**
  - **Laxatives**
- **Some calculations**

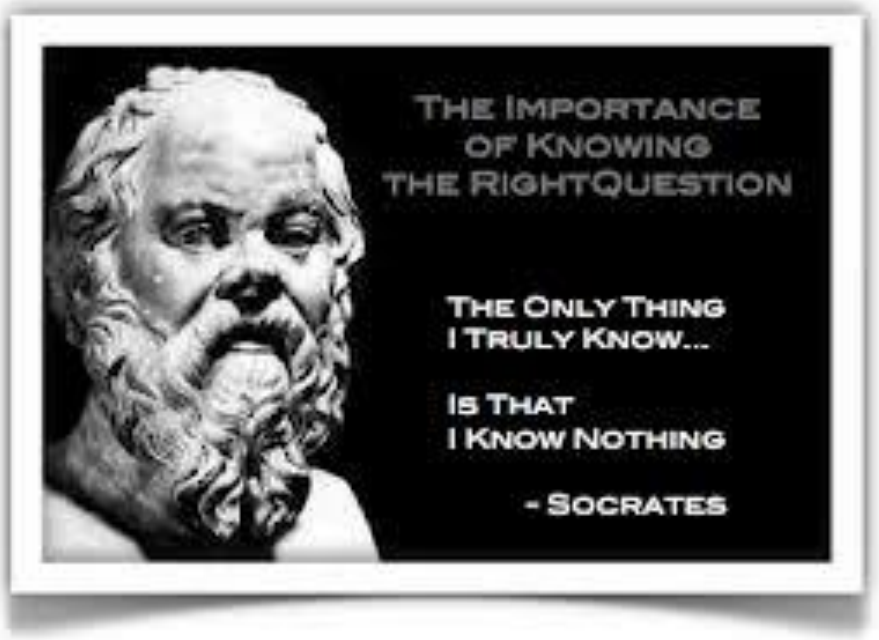
SIMPLY FINALS

Pain assessment

The 5th Vital Sign

History, History, History

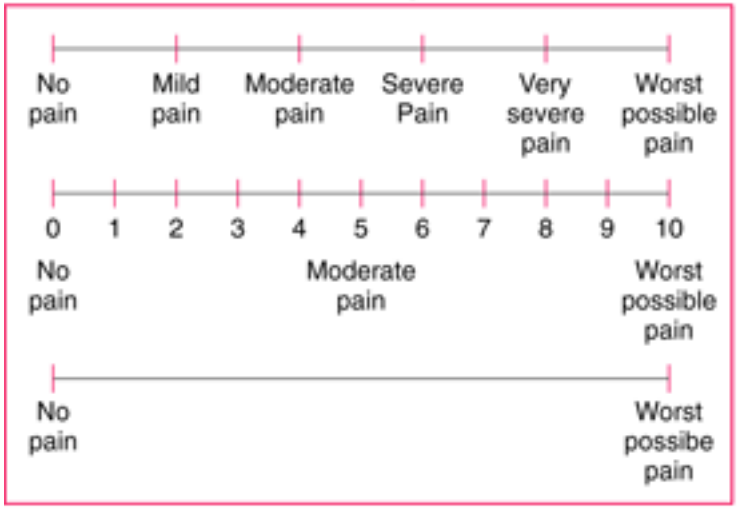
- **S ite**
- **O nset**
- **C haracter**
- **R adiation**
- **A ssociated symptoms**
- **T ime**
- **E xcaerbating/Reliveing factors**
- **S everity**

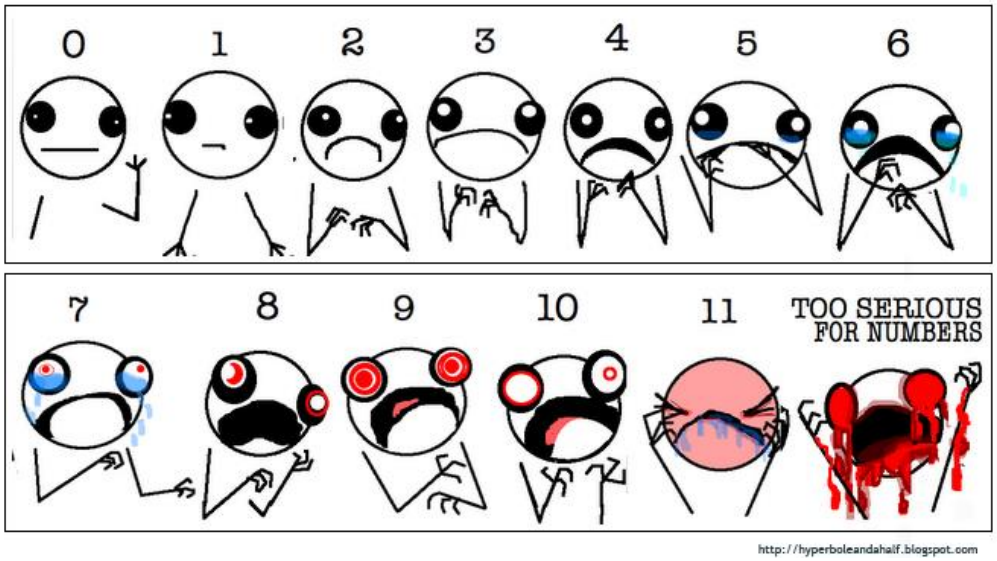


SIMPLY FINALS

Pain assessment

Visual Analog Scale





Graphic Scale

Verbal Scale

"On a scale of 0 to 10, with 0 meaning no pain and 10 meaning the worst pain you can imagine, how much pain are you having now?"

Functional Pain Scale

0 = No pain
1 = Tolerable and pain does not prevent any activities
2 = Tolerable and pain prevents some activities
3 = Intolerable and pain does not prevent use of telephone, TV viewing, or reading.
4 = Intolerable and pain prevents use of telephone, TV viewing, or reading.
5 = Intolerable and pain prevents verbal communication

SIMPLY FINALS

Common Analgesia

- Paracetamol
- NSAIDs
- Weak opioids
- Strong opioids

Paracetamol *(Acetominophen)*

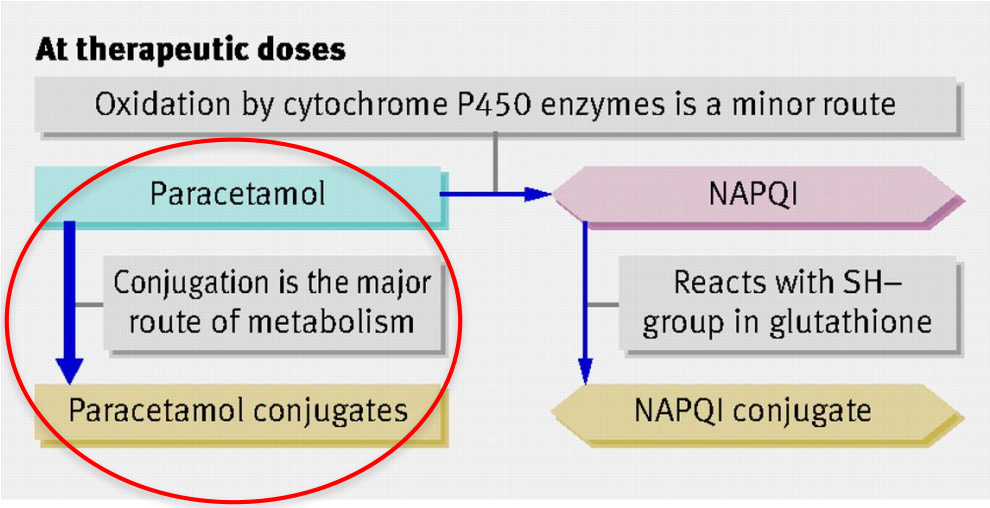
500mg-1g QDS (Max. 4g/24hrs)
PO/PR/IV

Analgesia / Anti-pyrexial

Onset of action 10-30 mins
Half life 1-4 hours

Metabolised by the liver and is hepatotoxic
Metabolites are then excreted by the kidney

SIMPLY FINALS



Ferner R E et al. BMJ 2011;342:bmj.d2218

BMJ

SIMPLY FINALS

Case of Overdose

What are his risk factors for suicide?

What more would you ask in the history??

SIMPLY FINALS

Paracetamol Overdose

History / History / History

HPC

- **Dose- ?reliable historian / mixed**
- **Time – once or staggered overdose**
- **Symptoms – nausea and vomiting → RUQ pain**
- **Psych- intentional / support / planned / alone / cry for help / warning / letter**

PMH

- **ETOH Abuse**
- **Previous DSH / Suicide attempts**
- **Chronic Liver Disease**

DH

- **Enzyme inducing drugs**
  (e.g. Carbamazepine, phenobarbital, phenytoin, rifampicin, St John's wort etc.)

SIMPLY FINALS

Paracetamol Overdose

Examination

- Low BMI / malnourished
- Liver damage- jaundice / reduced GCS / asterixis / RUQ tenderness

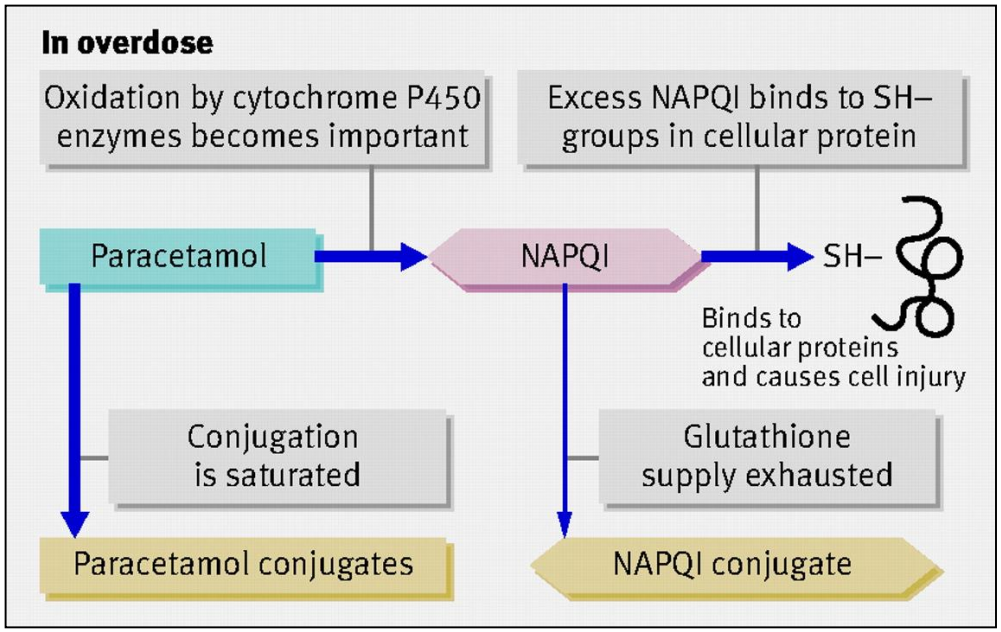
Investigation

- Serum Paracetamol level – measured between 4-16hrs post ingestion
- LFTs (particularly transaminases)
- Clotting and INR
- U+E

Factors that increase the risk of liver injury

High chance of glutathione depletion:

- **Malnourished**
- **Eating disorders (anorexia or bulimia)**
- **Failure to thrive or cystic fibrosis in children**
- **Immunocompromised / AIDS**
- **Cachexia**
- **Chronic Alcoholism**



Treatment of Paracetamol OD

Activated charcoal
Decreases absorption of paracetamol
Needs to be given quickly (within 1hr)

N-acetylcysteine (NAC)
Antedote
Acts as precursor to glutathione to increase levels and reduce liver damage

Adverse effects
Nausea and vomiting
Anaphylactoid reaction which is histamine mediated

NAC use

1. Do they need treatment

2. Dose of treatment

Case

54yo female, PMH- depression (previous suicide attempts), chronic ETOH abuse, malnourished. Found unconscious with multiple packets of meds.

1.Do they need treatment

2.Dose of treatment

Would you treat these?

1. OD 15x500mg tablets at 12:00.
   Blood at 18:00.
   PPC= 100mg/litre

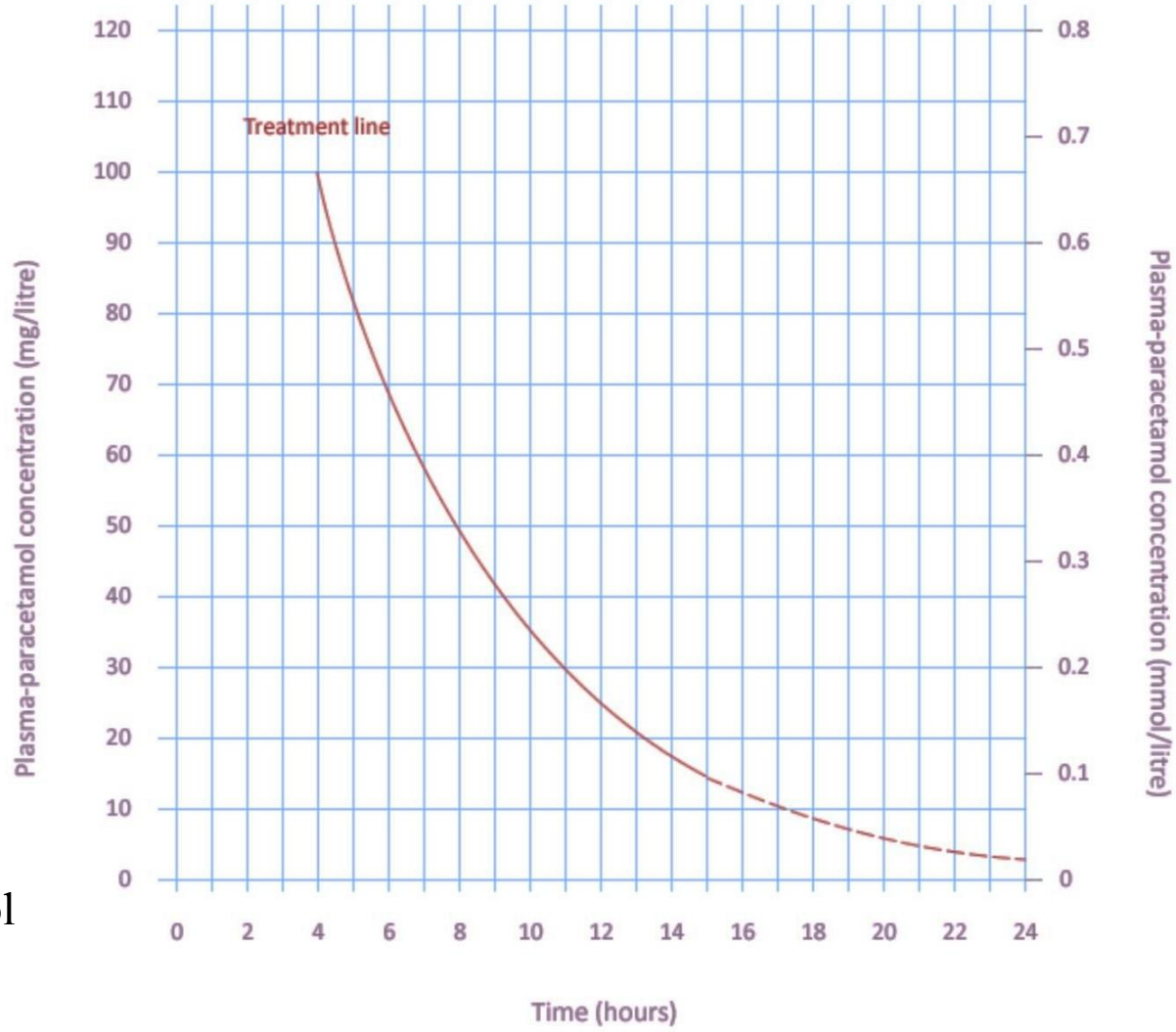
2. OD 24x 500mg tablets at
   09:00. Blood at 17:00
   PPC= 30mg/litre

3. OD at 20:00 ?amount. Blood
   at 07:00. PPC= 30mg/litre

What would you do ?

4. Staggered OD between 0900 and 1600. Admits taking 50 Paracetamol tablets. Presents at 1630.

5. OD at 0800. Admits taking 4 tablets with ETOH XS. Presents at 1100.



SIMPLY FINALS

Would you treat these?

1. OD 15x500mg tablets at 12:00.
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   PPC= 100mg/litre

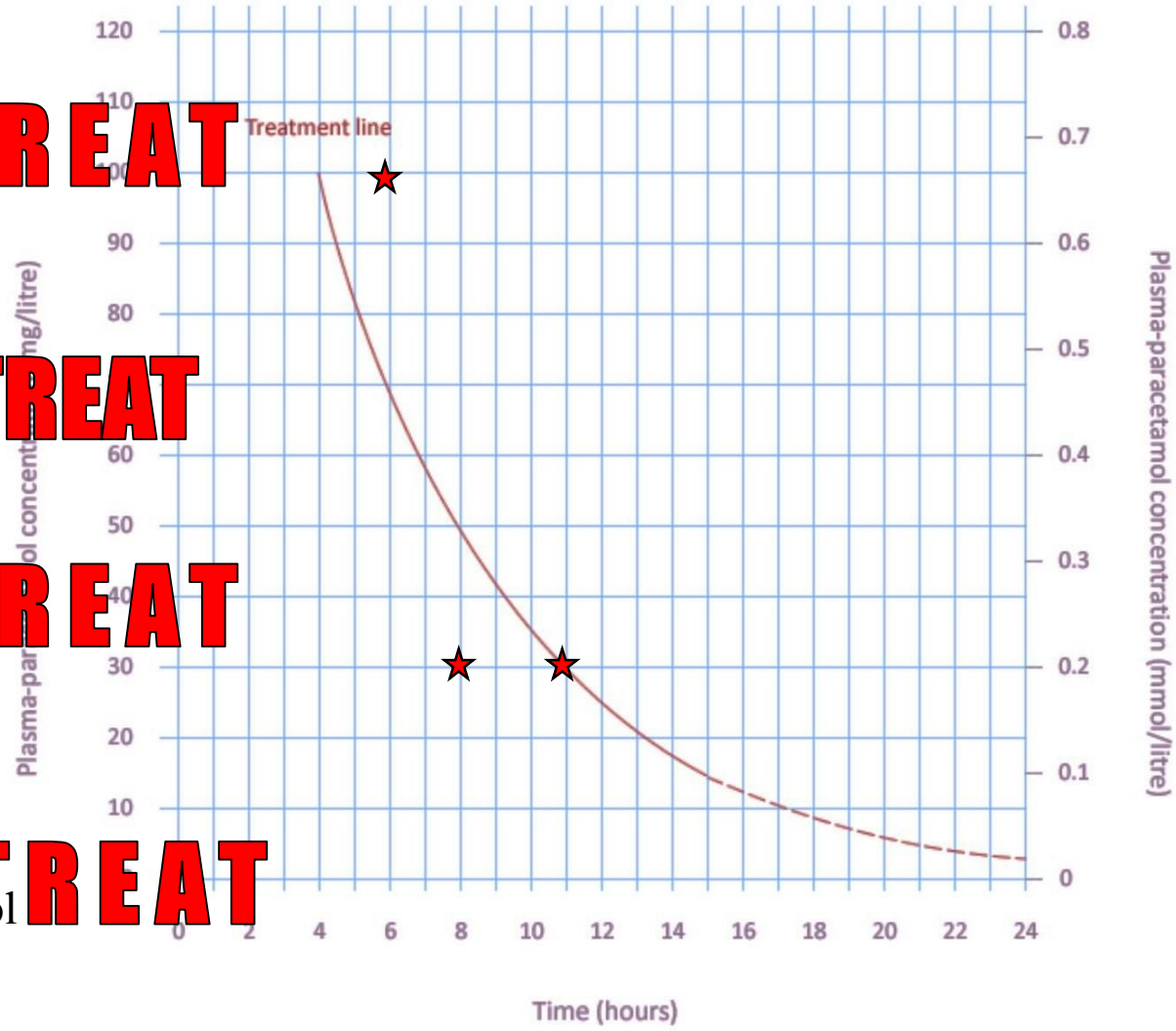
TREAT

2. OD 24x 500mg tablets at 09:00. Blood at 17:00
   PPC= 30mg/litre

DON'T TREAT

3. OD at 20:00 ?amount. Blood at 07:00. PPC= 30mg/litre

TREAT



What would you do ?

4. Staggered OD between 0900 and 1600. Admits taking 50 Paracetamol tablets. Presents at 1630.

TREAT

5. OD at 0800. Admits taking 4 tablets with ETOH XS. Presents at 1100.

WAIT!

SIMPLY FINALS

Case

54yo female, PMH- depression (previous suicide attempts), chronic ETOH abuse, malnourished. Found unconscious with multiple packets of meds.

1. Do they need treatment

2. Dose of treatment

2. Dose of treatment

Total dose (300 mg/kg in 20 hours)
150 mg/kg in 200ml glucose 5% over first 15 minutes
50 mg/kg over next 4 hours in 500ml
100 mg/kg over next 16 hours in 1 litre

For a 50kg patient:

1. **What is the total dose of NAC required?**

   A. 300 mg
   B. 1500 mg
   C. 15 g
   D. 30 g
   E. 150 g

2. **What is the rate (mls/hr) for the first 15 minutes of the regime?**

   A. 15 mls/hr
   B. 150 mls/hr
   C. 200 mls/hr
   D. 600 mls/hr
   E. 800 mls/hr

SIMPLY FINALS

Liver Transplant

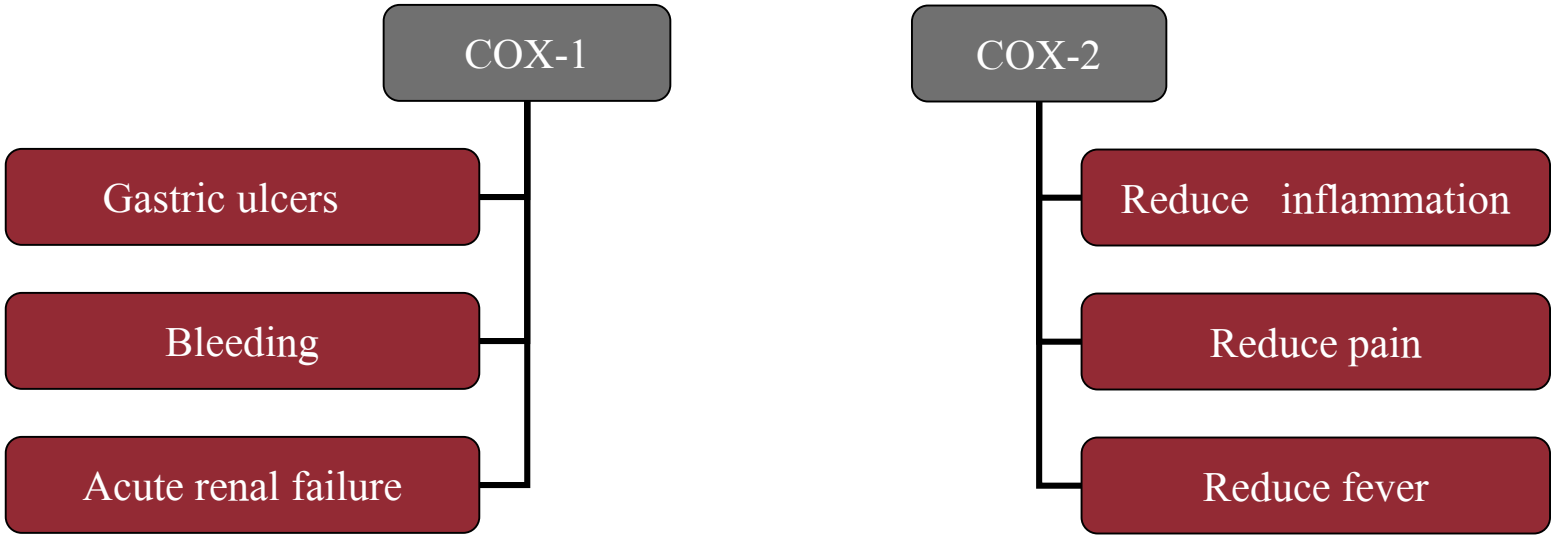
Criteria for possible transplant:

- **Metabolic Acidosis - Arterial pH less than 7.30**
- **Hepatic encephalopathy grade III/IV and serum creatinine concentration >300 µmol/L and prothrombin time >100 seconds**
- **Arterial lactate concentration >3.5mmol/L at 4hrs post or >3.0mmol/L 24 hours post paracetamol ingestion**
- **Hyperphosphataemia - 48-96hr phosphate >3.7ml/dl**

Discuss with liver transplant unit as soon as the *possible* need is identified

Non-Steroidal Anti-Inflammatory Drugs

Drug name	Dose	Anti-inflammatory	Side effect risk
Ibuprofen	300-400mg TDS	+	+
Naproxen	500mg BD	++	++
Diclofenac	75-150mg total/day	++	++
Indometacin	50-200mg total/day	+++	+++



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Diclofenac	**75-150mg total/day**	**++**	**++**
Indometacin	**50-200mg total/day**	**+++**	**+++**

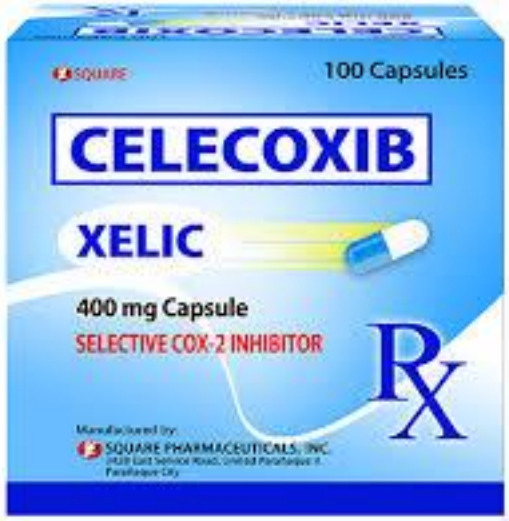
Side Effects:
COMMON… especially in elderly

Gastric- indigestion/nausea and gastric erosions (+/- UGI Bleed).
Co-prescribe proton pump inhibitor if patient also on anti-coagulant

Bronchospasm- type 1 hypersensitivity reaction. C/I in those with asthma

Less common; fluid retention, hypertension, acute kidney injury

COX-2 inhibitors



Celecoxib / Etoricoxib

+ Reduce GI side effects by 50%
- Expensive

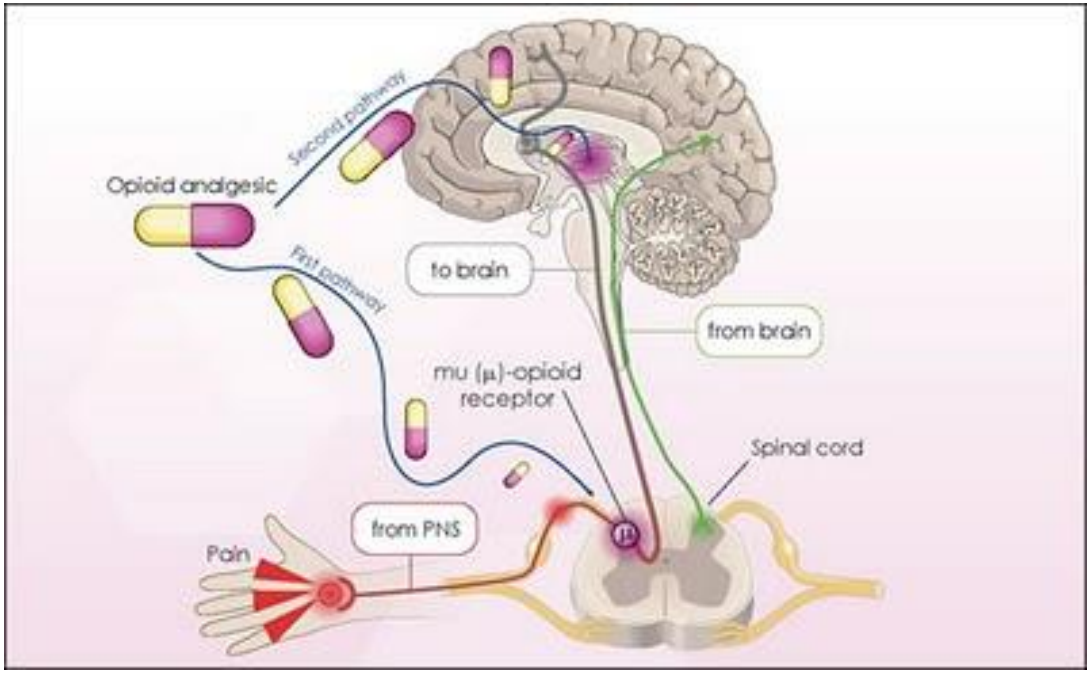
Contraindicated
- CV Disease or cerebrovascular disease
Relatively with CV risk factors

Try NSAIDs first

SIMPLY FINALS

Opioids

- Act on opioid receptors within CNS (mainly mu-1 & kappa)



SIMPLY FINALS

Opioids

Morphine

SC/IM/PO
2.5 - 20mg, titrate to symptoms/response

Side effects
(as non-specific to mu-1, actions on mu-2 receptors)
Nausea and vomiting → co-prescribe antiemetic (e.g. Metoclopramide)
Constipation → co-prescribe laxative (e.g. lactulose PRN)
Respiratory depression

Overdose
Accidental / Iatrogenic / Intentional
Reversal with NALOXONE 100mcg-400mcg IV (increased by 100mcg/ 2 mins PRN)
Naloxone half life < Morphine half life (so may need multiple doses)

SIMPLY FINALS

Opioids

Codeine

- 1/12th analgesic effect of morphine
- 30-60mg 4 hourly (max 240mg/24hrs)
- Orally
- Analgesia (normally used in combination with above e.g. co-codamol/co-dydramol)

Tramadol

- 50-100mg 4 hourly
- Orally (rarely IV)
- Opioid action + enhancement of the serotonergic and adrenergic pathways

Fentanyl

- Patches 25 / 100 ug/hr
- Change every 72 hours

Patient Controlled Analgesia

Allows self administration of pre-determined dose of medication e.g. morphine

Can determine:

- Dose (usually start with 1mg morphine)
- Maximum dose (over 24hours)
- Lock-out period (usually 5 mins)

SIMPLY FINALS

Palliative Symptom Control

Palliative Care;
Active & total care of incurable disease aim to improve QOL within wide MDT

Symptoms can be caused by disease or treatment
Detailed history and examination required to determine cause/best treatment options

Main symptom groups:

- **GI Symptoms**

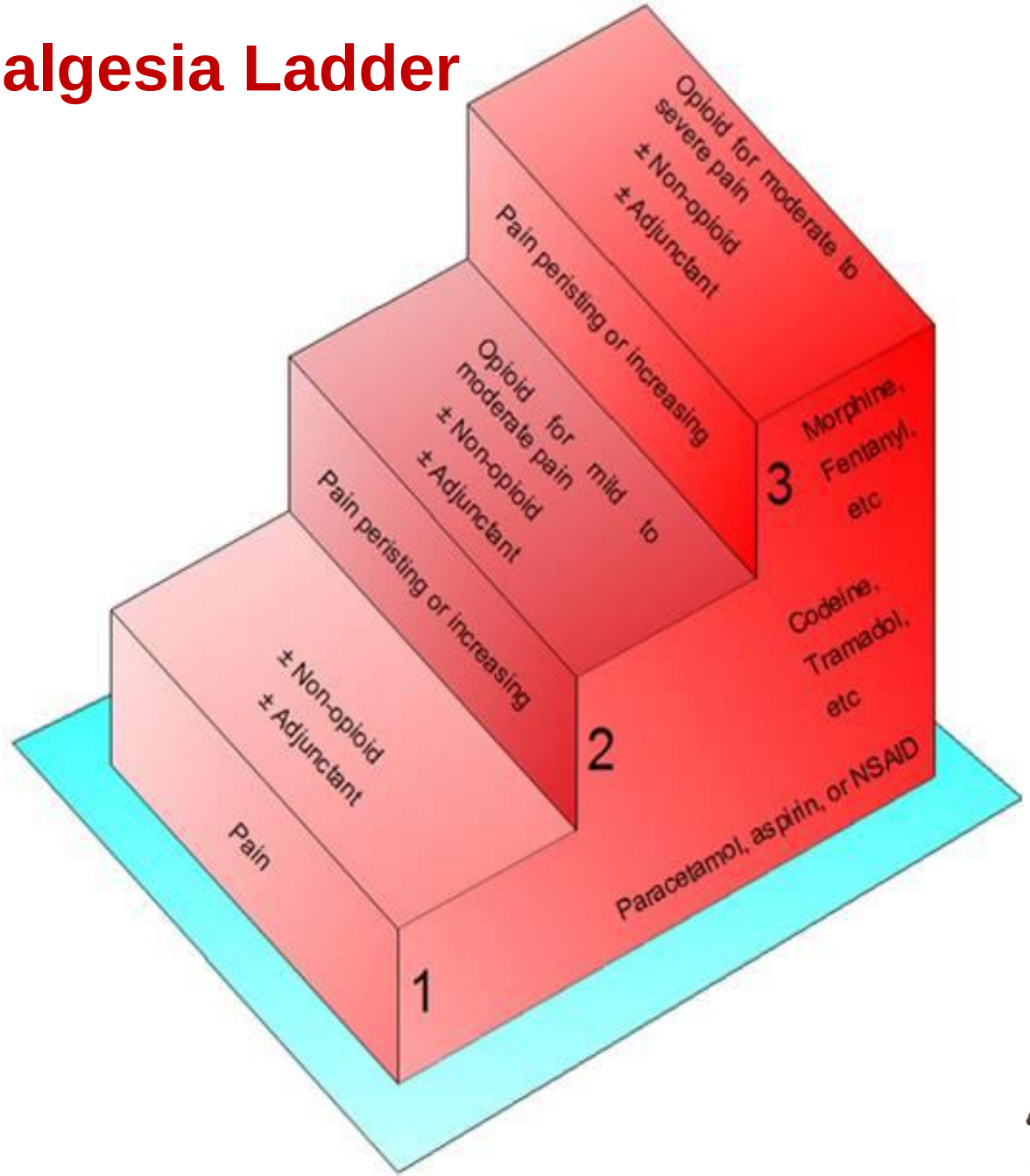
e.g. nausea/vomiting, anorexia, constipation, bowel obstruction

- **Respiratory Symptoms**

e.g. Breathlessness, secretions

- **Pain Symptoms… 70% of cancer patient experience severe pain**

Analgesia Ladder



SIMPLY FINALS

Case…

Mrs CA is a 80yo has known inoperable metastatic breast cancer. She is complaining of significant pain which has previously been managed with non-opioid analgesia.

What dose of morphine would you prescribe?

Morphine Sulphate 2.5-10mg every 4 hours

With Morphine Sulphate 5-20mg PRN 2-4hrly

Case…

Mrs CA's pain is relieved by Morphine Sulphate 10mg but the **relief is not sustained until the next dose 4 hours later.**

How would you change the regular prescription?

Increase dose by 50%

So now; Morphine Sulphate 15mg every 4 hours

With Morphine Sulphate 5-20mg PRN 2-4hrly

Case…

Mrs CA is eventually controlled over a 24 hour period using morphine sulphate as prescribed below:

0800	Morphine Sulphate	15mg	2100	Morphine Sulphate	5mg
1200	Morphine Sulphate	15mg	2200	Morphine Sulphate	10mg
1400	Morphine Sulphate	5mg	2400	Morphine Sulphate	15mg
1600	Morphine Sulphate	15mg	0400	Morphine Sulphate	15mg
2000	Morphine Sulphate	15mg	0600	Morphine Sulphate	10mg

Would you change the prescription?
If so, how?

SIMPLY FINALS

Case…

To change regular immediate acting morphine prescription into regular prescription

Work out total 24 hour analgesia requirement to control pain…

0800	**Morphine Sulphate**	**15mg**
1200	**Morphine Sulphate**	**15mg**
1400	**Morphine Sulphate**	**5mg**
1600	**Morphine Sulphate**	**15mg**
2000	**Morphine Sulphate**	**15mg**
2100	**Morphine Sulphate**	**5mg**
2200	**Morphine Sulphate**	**10mg**
2400	**Morphine Sulphate**	**15mg**
0400	**Morphine Sulphate**	**15mg**
0600	**Morphine Sulphate**	**10mg**

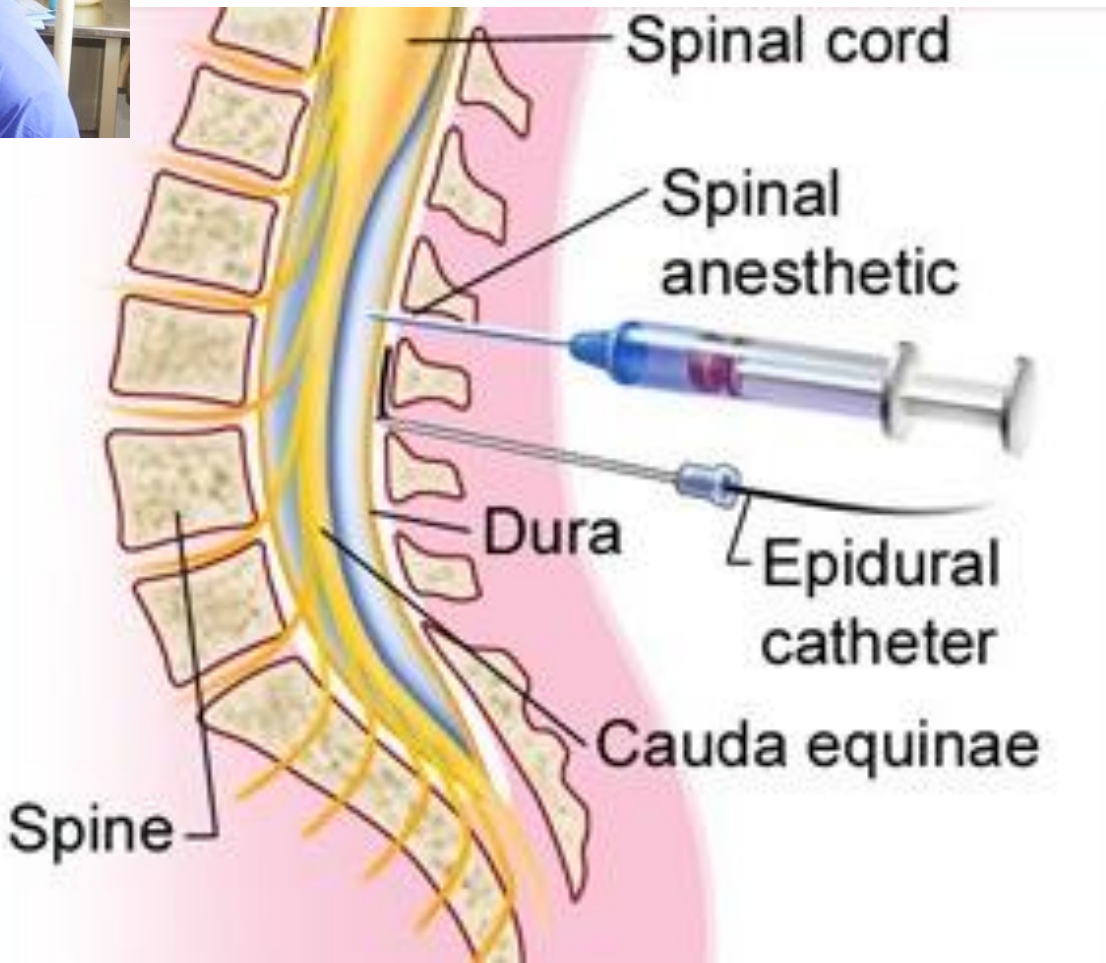
Total = 120mg

REMEMBER SIDE EFFECTS

1. Change to Controlled Release morphine preparation
Either : Morphine Sulphate MR / MST 120mg OD or 60mg BD

2. Plus Breakthrough Pain prescription PRN
One-sixth of total dose
Morphine Sulphate 20mg PRN

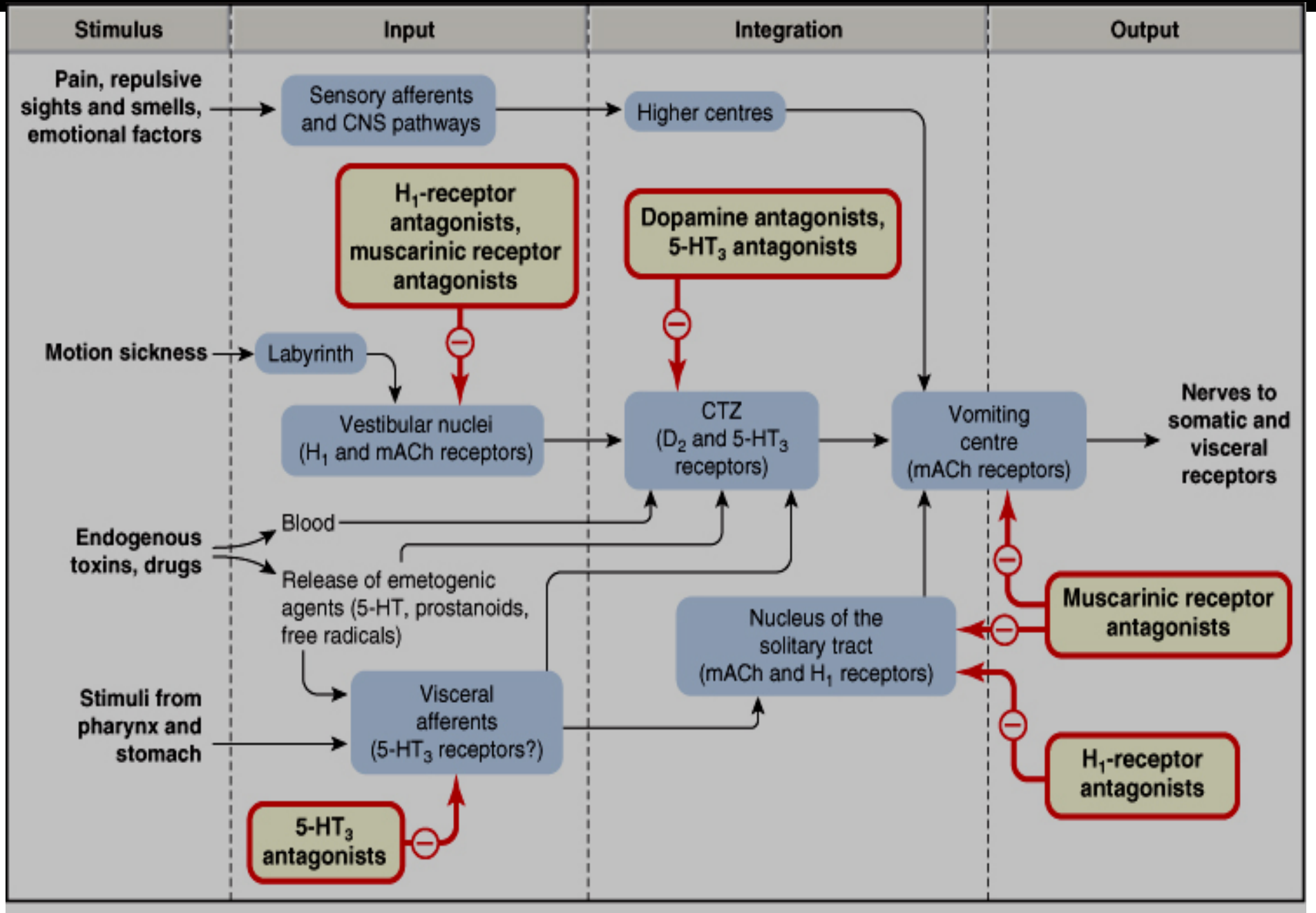
Spinal vs. Epidural



Anti-emetics

Vomit Centre can be triggered by:

- **stimulation of Chemoreceptor Trigger Zone (CTZ) in medulla (opioid, dopamine and seratonin receptors) e.g. by opioids**
- **Distubance of Vestibular system (muscarinic, histamine receptors) e.g. motion sickness**
- **Central Nervous System trigger e.g. smells / emotion**
- **Peipheral Trigger e.g. GIT containing seratonin receptors**



Anti-emetics

Ondansetron *4-8mg BD PO/IM/IV* **5-HT3 antagonist**
Directed towards CTZ & Peripheral Triggers
Used in chemo/radiotherapy related vomiting

Metoclopramide *10-20mg TDS PO/SC/IM/IV* **Dopamine antagonist**
Does pass blood brain barrier
S/e include extra-pyramidal e.g. dyskinesia
Domperidone *10-20mg TDS PO* **Dopamine antagonist**
Does not pass blood brain barrier (nb. CTZ is outside BBB)

Cyclizine *50mg TDS PO/IM/IV* **Anti-histamine**
For hyperemesis or motion sickness

Hyoscine hydrobromide PO/Patch/IV **Anti-muscarinic**
For motion sickness, no role in chemo related

Anti-Emetic Receptor Sites

Avoid prescribing anti-emetics that act on the same receptor site, see table below for details

	D_2-receptor antagonist	H_1-receptor antagonist	Muscarinic receptor antagonist	$5HT_3$-receptor antagonist	$5HT_2$-receptor antagonist	$5HT_4$-receptor agonist	Neurokinin -1-Inhibitor
Metoclopramide	++	0	0	+	0	++	0
Domperidone [a]	++[a]	0	0	0	0	0	0
Haloperidol	+++	0	0	0	0	0	0
Prochlorperazine	++	+	0	0	0	0	0
Cyclizine	0	++	++	0	0	0	0
Hyoscine hydrobromide	0	0	+++	0	0	0	0
Ondansetron	0	0	0	+++	0	0	0
Dexamethasone [b,c]	?	?	?	?	?	?	?
Levomepromazine	++	+++	++	0	+++	0	0
Aprepitant	0	0	0	0	0	0	+++

Pharmacological activity:

0 = none or insignificant

+ = slight

++ = moderate

+++ = marked

a domperidone does not cross the blood-brain barrier so rarely causes extra-pyramidal effects

b mode of action unknown, possibly within the cerebral cortex or other higher centres in the brain

c please half the dose of Dexamethasone when using Aprepitant

Laxatives

Osmotic
Non-absorbable salts which increase water retained in large bowel
e.g. Lactulose, macrogols

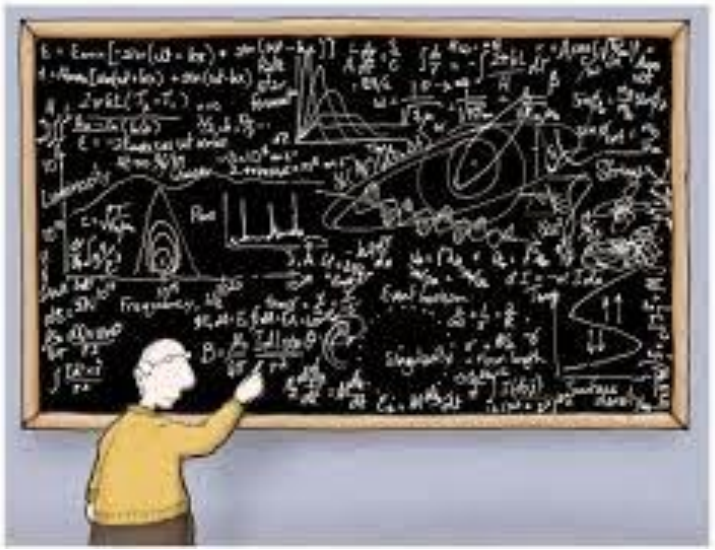
Bulk-forming
Increase faecal mass which stimulates perstalisis. For those with small hard stools.
e.g. Dietary fibre, Ispaghula Husk

Stimulant
Increase intestinal motility. s/e abdo cramping
e.g. Senna, docusate sodium

Suppositories
Glycerin: Absorbs water into colon
Bisacodyl: Induces peristalsis

Enemas: Hyperosmotic
e.g. Fleet enema: Osmotically draws water into colon

Calculations



SIMPLY FINALS

Calculations

1.
0.01% Adrenaline. How much adrenaline in 1 litre of saline?
Same as 1:10,000 (0.01%) adrenaline
So 1 unit adrenaline in 10,000 units saline
Or 1g Adrenaline in 10,000ml saline
So 0.1g in 1 litre

(Simple Method: Move one decimal place to the right)

2.
What should the minimum 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

SIMPLY FINALS

Calculations

3. Prescribe fluid for 14kg child in ml/hr

Weight Range	Required Daily Fluid
0-10 kg	100 mL per kg
10-20 kg	1,000 mL + 50 mL per each kg above 10 kg
20-70 kg	1,500 mL + 20 mL per each kg above 20 kg
Over 70 kg	2,500 mL

(100x10) + (50 x4) = 1200ml/day

1200 / 24 = 50ml/hour

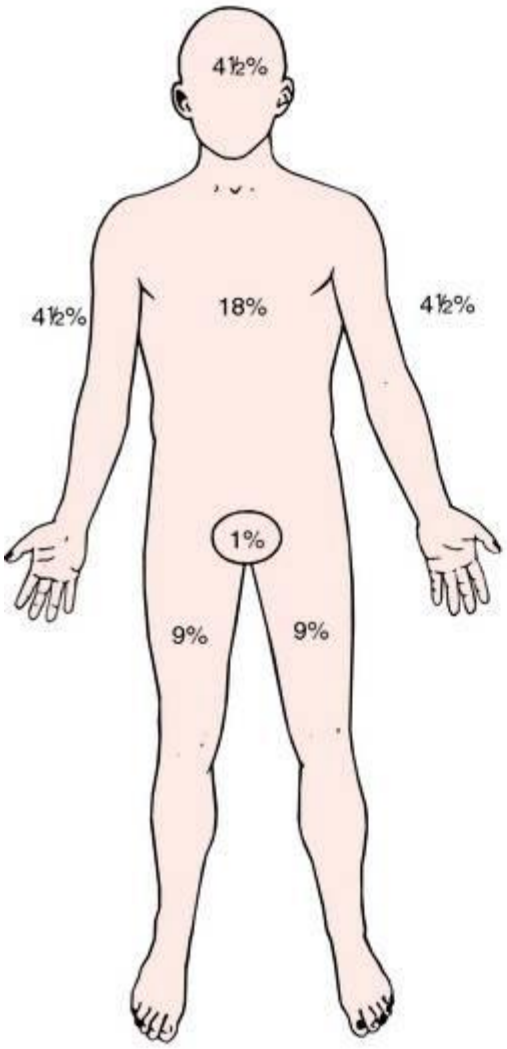
SIMPLY FINALS

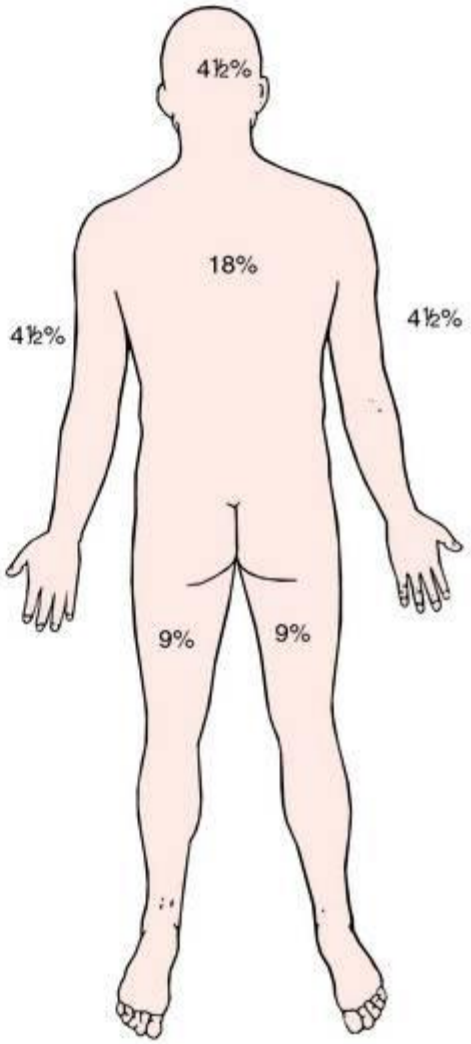
Calculations

4. Patient presents with burns from fire.
   Effecting both his arms, his face and head.

Approximately 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%

Patient:
Arms x2 = 18%
Head / Face = 9%

Total = 27%

SIMPLY FINALS

Summary

Take your time and think about the problem

Is your answer sensible?

Practice!

Any Questions?