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Paediatric Gastrointestinal and liver emergencies

St. Mark's Hospital and Academic Institute

Chelsea and Westminster Hospital NHS
NHS Foundation Trust

Aims

- To review common gastrointestinal emergencies seen by general paediatricians
- Understand the role for oral rehydration in dehydrated children
- Understand "golden hour" care for paediatric GI emergencies
- Cover related issues e.g. IV feeding line sepsis.
- Approach to a child with a frightening GI emergency e.g. GI bleeding
- Beware child with relentless vomiting

Outcomes

- Feel confident about conditions you see uncommonly
- Understand initial care for ingestion of objects and caustic
- Feel more confident about ORS for dehydrated children – even if severe
- Understand outcomes for conditions you should know about e.g. intussusceptions or GI bleeding
- Know which guidelines are out these already on common conditions
- Know who needs transfer to a GI unit and who you can safely keep at your hospital

Clinical scenario

- Jamie, age 14, acute onset abdominal pain, for 24 hours, followed by vomiting frank blood.
- Then later that day passed 3 stools with description of melaena

- Possible diagnosis
- Investigations of choice

Gastrointestinal bleeding

Causes of haemotemesis by age

- Infant:
- Esophagitis
  Gastritis
  Stress ulcer
  Duplication cyst
  Vascular malformation
  Vitamin K deficiency
  Hemophilia
  Varices

- Child
- Esophagitis
  Gastritis
  Peptic ulcer disease
  Mallory-Weiss tear
  Esophageal varices/gastric varices
  Portal hypertensive gastropathy
  Pill ulcerations
  Foreign body ingestion
  NSAID use

- Adolescent.
- Esophagitis
  Gastritis
  Peptic ulcer disease
  Mallory-Weiss tear
  Esophageal varices/gastric varices
  Portal hypertensive gastropathy
  Pill ulcerations
  Foreign body ingestion
  NSAID use

Clinical scenario

- Jamie, age 14, acute onset abdominal pain, for 24 hours, followed by vomiting frank blood.
- Then later that day passed 3 stools with description of melaena

- Possible diagnosis
- Investigations of choice
  - FBC
  - Urea
  - Clotting
  - LFT

ASSESSING GI BLEEDING IN HOSPITAL

PRE-ENDOSCOPIC RISK ASSESSMENT

D **All patients presenting with acute upper gastrointestinal bleeding should have an initial *(pre-endoscopic)* Rockall score calculated. Patients with a Rockall score of 0 should be considered for non-admission or early discharge with outpatient follow up.**

D **In patients with initial *(pre-endoscopic)* Rockall score >0 endoscopy is recommended for a full assessment of bleeding risk.**

ACUTE UPPER GASTROINTESTINAL BLEEDING – INITIAL ASSESSMENT PROTOCOL

Consider for discharge or non-admission with outpatient follow up if:

- age <60 years, and;
- no evidence of haemodynamic disturbance (systolic blood pressure ≥100 mm Hg, pulse<100 beats per minute), and;
- no significant comorbidity (especially liver disease, cardiac disease, malignancy), and;
- not a current inpatient (or transfer), and;
- no witnessed haematemesis or haematochezia.

Consider for admission and early endoscopy (and calculation of full Rockall score) if:

- age ≥60 years (all patients who are aged >70 years should be admitted), or;
- witnessed haematemesis or haematochezia (suspected continued bleeding), or;
- haemodynamic disturbance (systolic blood pressure <100 mm Hg, pulse ≥100 beats per minute), or;
- liver disease or known varices.

ACUTE LOWER GASTROINTESTINAL BLEEDING – INITIAL ASSESSMENT PROTOCOL

Consider for discharge or non-admission with outpatient follow up if:

- age <60 years, and;
- no evidence of haemodynamic disturbance, and;
- no evidence of gross rectal bleeding, and;
- an obvious anorectal source of bleeding on rectal examination/ sigmoidoscopy.

Consider for admission if:

- age ≥60 years, or;
- haemodynamic disturbance, or;
- evidence of gross rectal bleeding, or;
- taking aspirin or an NSAID, or;
- significant comorbidity.

POST-ENDOSCOPIC RISK ASSESSMENT

D **Patients with a full *(post-endoscopic)* Rockall score <3 have a low risk of rebleeding or death and should be considered for early discharge and outpatient follow up.**

	Score				
Variable	0	1	2	3	
Age	<60 years	60-79 years	≥80 years		Initial score criteria
Shock	'no shock'; SBP* ≥100 mm Hg, pulse <100 beats per minute	'tachycardia'; SBP≥100 mm Hg, pulse ≥ 100 beats per minute	'hypotension'; SBP <100 mm Hg,		
Comorbidity	no major comorbidity		cardiac failure, ischaemic heart disease, any major comorbidity	renal failure, liver failure, disseminated malignancy	
Diagnosis	Mallory-Weiss tear, no lesion identified and no SRH	all other diagnoses	malignancy of upper GI tract		Additional criteria for full score
Major stigmata of recent haemorrhage (SRH)	none, or dark spot only		blood in upper GI tract, adherent clot, visible or spurting vessel		

**SBP - systolic blood pressure *SRH - Stigmata of recent haemorrhage*
Maximum additive score prior to diagnosis = 7
Maximum additive score after diagnosis = 11.

ORGANISATION OF SERVICES

DEDICATED GI BLEEDING UNIT

D **Patients with acute upper gastrointestinal haemorrhage should be admitted, assessed and managed in a dedicated gastrointestinal bleeding unit.**

RESUSCITATION AND INITIAL MANAGEMENT

FLUID RESUSCITATION

D

- **Shocked patients should receive prompt volume replacement.**
- **Red cell transfusion should be considered after loss of 30% of the circulating volume.**

EARLY PHARMACOLOGICAL MANAGEMENT

A **Proton pump inhibitors should not be used prior to diagnosis by endoscopy in patients presenting with acute upper gastrointestinal bleeding.**

EARLY ENDOSCOPY

C **Early endoscopic examination should be undertaken within 24 hours of initial presentation, where possible.**

MANAGEMENT OF NON-VARICEAL UPPER GI BLEEDING

ENDOSCOPY

D **Endoscopic therapy should only be delivered to actively bleeding lesions, non-bleeding visible vessels and, when technically possible, to ulcers with an adherent blood clot.**

A **Combinations of endoscopic therapy comprising an injection of at least 13 ml of 1:10,000 adrenaline coupled with either a thermal or mechanical treatment are recommended in preference to single modalities.**

B **Endoscopy and endo-therapy should be repeated within 24 hours when initial endoscopic treatment was considered sub-optimal *(because of difficult access, poor visualisation, technical difficulties)* or in patients in whom rebleeding is likely to be life threatening.**

REBLEEDING FOLLOWING ENDOSCOPIC THERAPY

D **Non-variceal upper gastrointestinal haemorrhage not controlled by endoscopy should be treated by repeat endoscopic treatment, selective arterial embolisation or surgery.**

PHARMACOLOGICAL THERAPY

A **Patients with peptic ulcer bleeding should be tested for Helicobacter pylori *(with biopsy methods or urea breath test)* and a one week course of eradication therapy prescribed for those who test positive. A further three weeks ulcer healing treatment should be given.**

A **In non-NSAID users, maintenance antisecretory therapy should not be continued after successful healing of the ulcer and Helicobacter pylori eradication.**

B **Biopsy samples to test for presence of Helicobacter pylori should be taken at initial endoscopy prior to commencing proton pump inhibitor therapy. Biopsy specimens should be histologically assessed when the rapid urease test is negative.**

☑

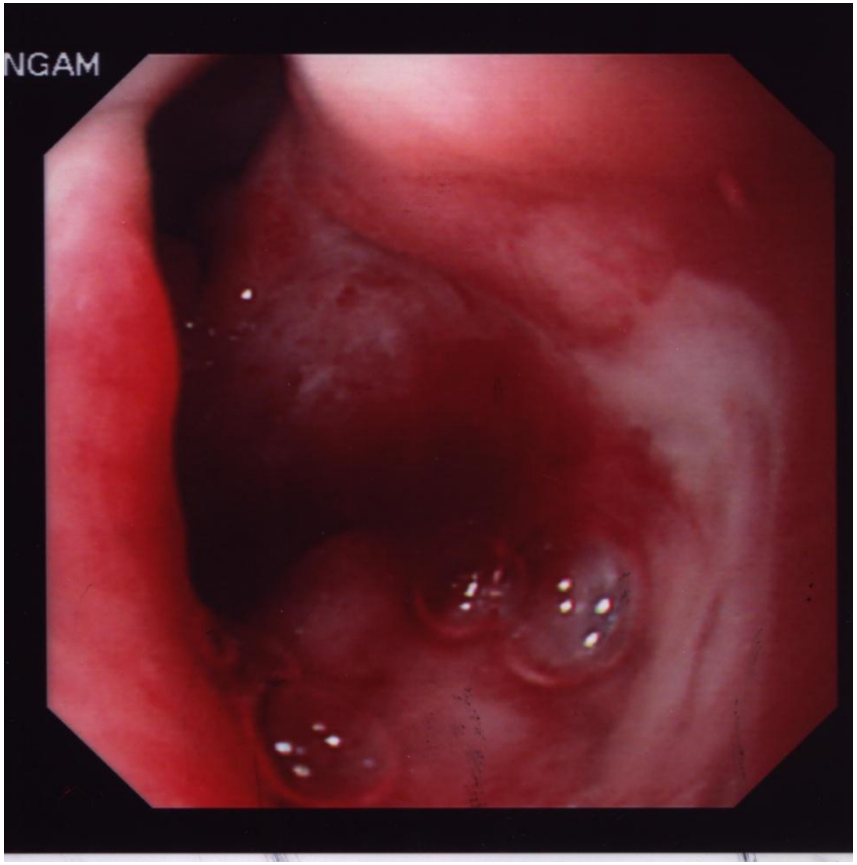
- Successful Helicobacter pylori eradication should be confirmed by breath test or biopsy to minimise the risk of rebleeding from peptic ulcer.
- Second line treatment should be prescribed in the case of eradication failures.

☑ Helicobacter pylori testing to confirm successful eradication should only be taken after proton pump inhibitor and antibiotic therapy has been completed and discontinued.

☑ Follow up endoscopy should be performed to confirm healing of gastric ulcers if there is suspicion of malignancy.

Management in emergency room

- Prompt fluid resusciation
- Assess volume loss – replace with blood if >30%
- Undertake the Rockall score
- In adult protocols, hold off PPI and scope within 24 hours
- Endoscopic management has been clearly nationally defined.
  - PPI can be withheld until the endoscopy
  - Endoscopy within 24 hours
  - Endoscopic therapy to bleeding lesions



Endoscopy

Combination of endoscopic therapy with injection solution coupled with either thermal or mechanical treatment

Repeat at 24hrs if suboptimal therapy or next selective arterial embolisation or surgery

THE LANCET

Selection of patients for early discharge or outpatient care after acute upper gastrointestinal haemorrhage

*T A Rockall, R F A Logan, H B Devlin, T C Northfield, for the National Audit of Acute Upper Gastrointestinal Haemorrhage**

	Score			
Variable	*0*	*1*	*2*	*3*
Age	<60 Years	60–79 Years	>=80 Years	
Shock	'No shock', systolic BP >=100, pulse <100	'Tachycardia', systolic BP >=100, pulse >=100	'Hypotension', systolic BP <100	
Comorbidity	No major comorbidity		Cardiac failure, ischaemic heart disease, any major comorbidity	Renal failure, liver failure, disseminated malignancy
Diagnosis	Mallory-Weiss tear, no lesion identified and no SRH	All other diagnoses	Malignancy of upper GI tract	
Major SRH	None or dark spot only		Blood in upper GI tract, adherent clot, visible or spurting vessel	

- Treat and eradicate H pylori
- After haemostatic therapy, then provide high dose IV PPI therapy – bolus and infusion if required.
  - ? Give before endoscopy to stabilise the clot?
- Avoid NSAID
- Avoid SSRIs
- Avoid anticoagulants and steroids

Variceal bleeding

- Needs variceal band ligation
- Terlipressin should be given to patients suspected of variceal haemorrhage
- After endoscopic treatment, give a vasoactive drug – terlipressin, octreotide, or high dose somatostation
- Give antibiotics if concurrent liver disease
- If fails to settle by band ligation, then consider balloon tamponade, ß blocker, nitrate

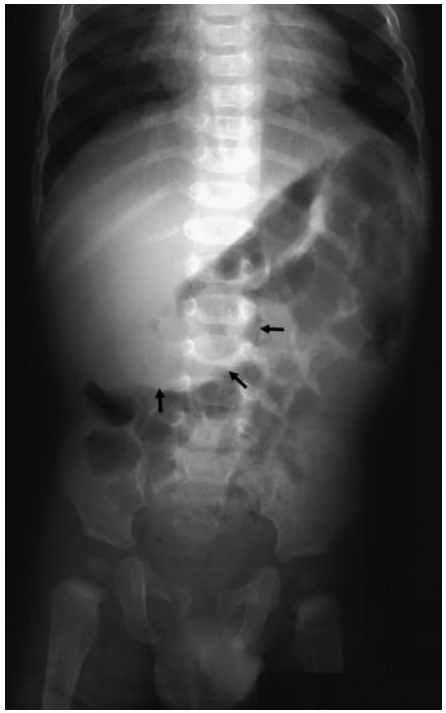
Intussception

Useful facts

- Lead points found in <4% of children < 2 years
- Risk factors - ? Adenovirus, old versions of rotavirus vaccine, ? Antibiotic usage,
- Intussception is the leading cause of small bowel intestinal obstruction in children
- Up to a fifth are lethargic, hypotonic, altered LOC
- Predictive symptoms:
  - Pain and vomiting 80%
  - Mass 60%
  - Bleeding 50%

Management

- Fluid resuscitation
- If advanced, will need NG decompression, systemic antibiotics, may need ABC resus.
- Xray is a useful investigation
- Ultrasound
- CT abdomen

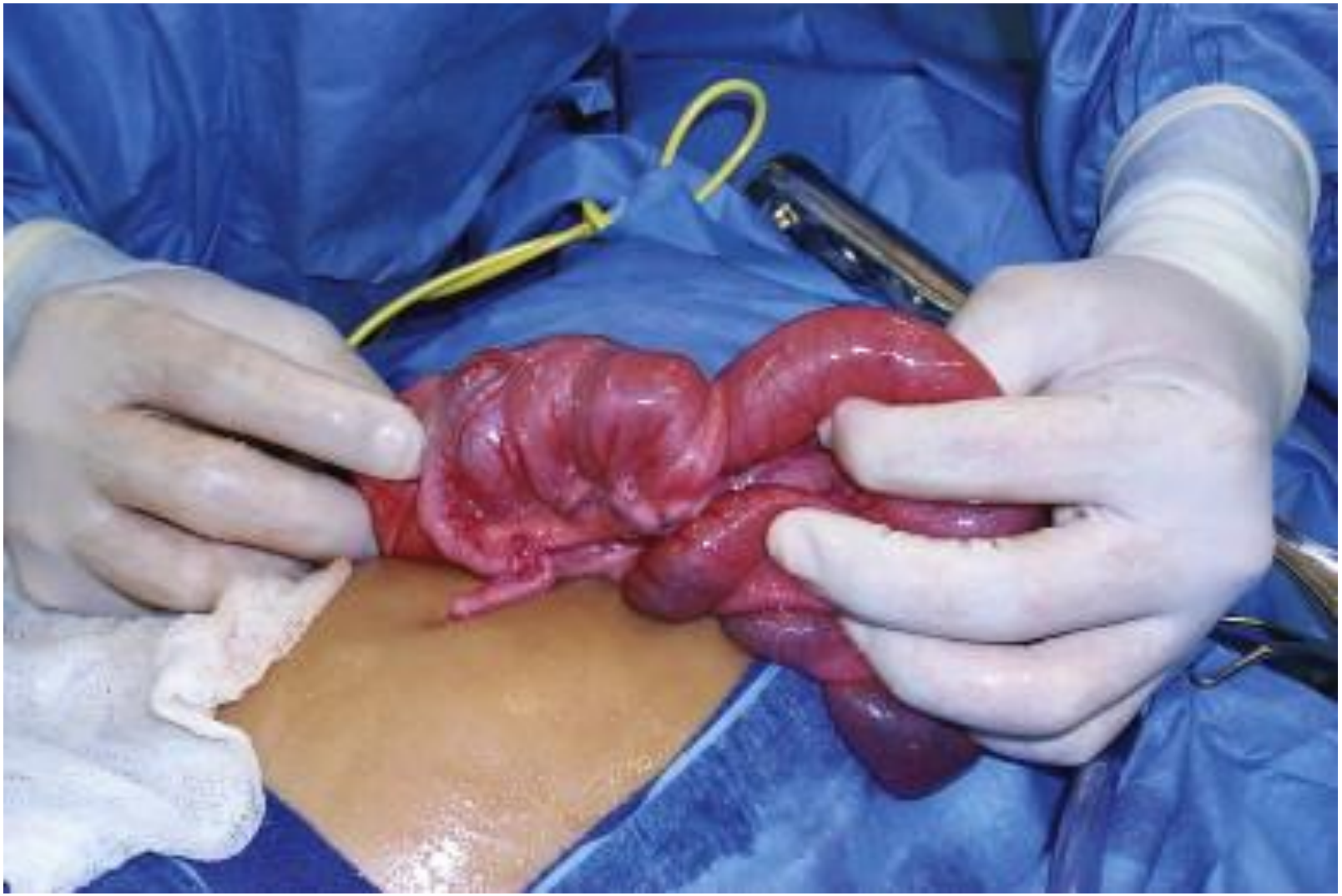


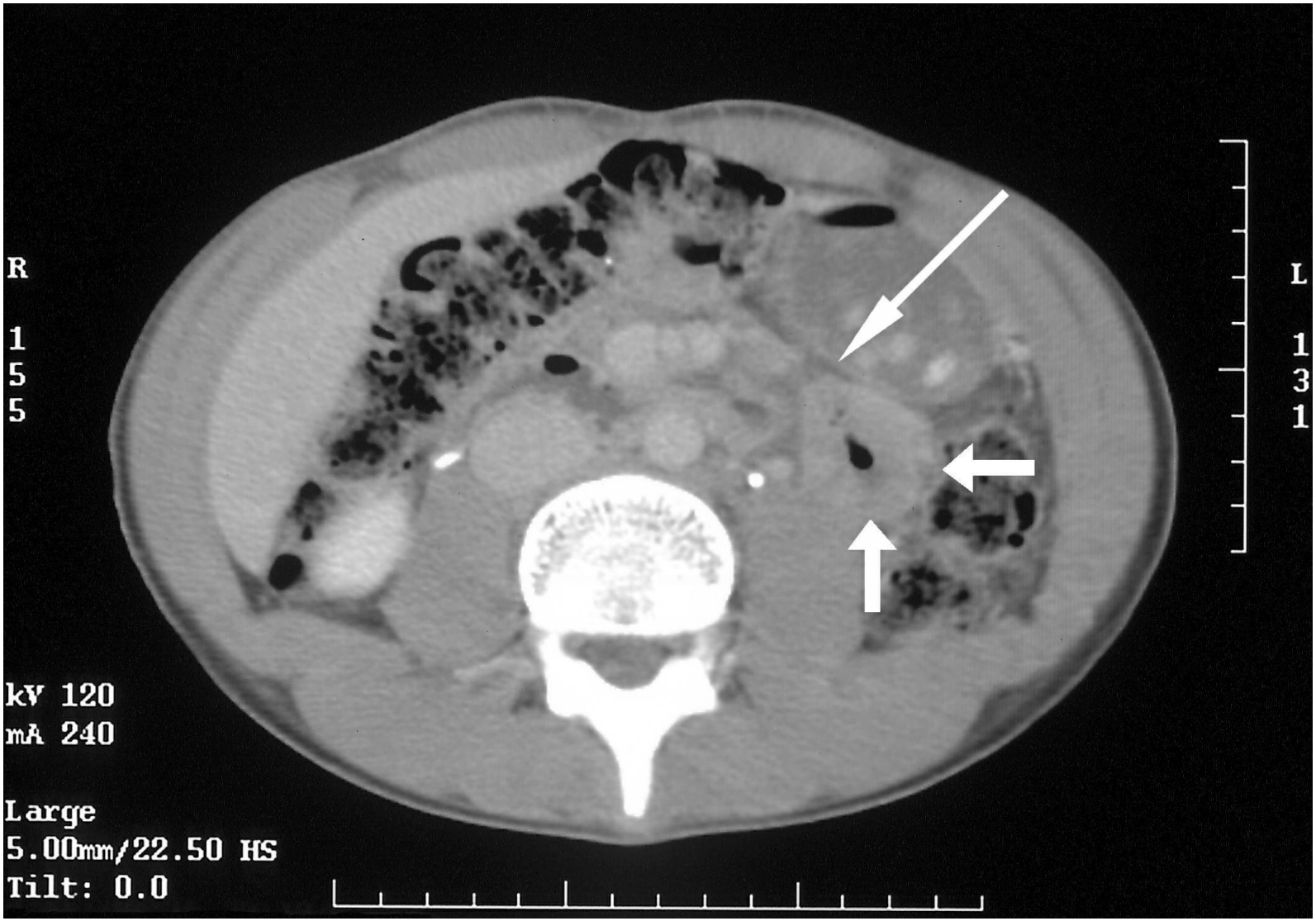
Reduction

- Pneumatic reduction of intussusecption using air and fluoroscopic guidance
- Use of US as a way of monitoring reduction
- Some studies with no radiological monitoring
- Surgery if fails to reduce on 3-4 attempts, or rest for 2 hours
- Less likely to reduce:
  - Premature
  - Age > 2years
  - Symptoms >48hrs
  - Jejuno-ileal

Do not advocate pneumatic reduction with a defined pathological lead point

Type of Lead Point	***Number of Cases***						
							Total (*n* = 179)
Meckel's diverticulum	27	6	14	7	12	7	73 (40.8)
Intestinal polyps	12	2	8	1	8	3	34 (19.0)
Duplication cyst	4	4	5	2	3	1	19 (10.6)
Lymphoma	5	1	1	6	3	1	17 (9.5)
Henoch-Schönlein purpura		2	1		6		9 (5.0)
Lymphoid hyperplasia				5	1		6 (3.4)
Cystic fibrosis		2			4		6 (3.4)
Appendiceal disease/mucocele			1	2	2	1	6 (3.4)
Carcinoid	2						2 (1.1)
Ectopic pancreatic tissue				2			2 (1.1)
Neutropenic colitis					2		2 (1.1)
Celiac disease		1					1 (0.6)
Leiomyoma				1			1 (0.6)
Leukemia		1					1 (0.6)

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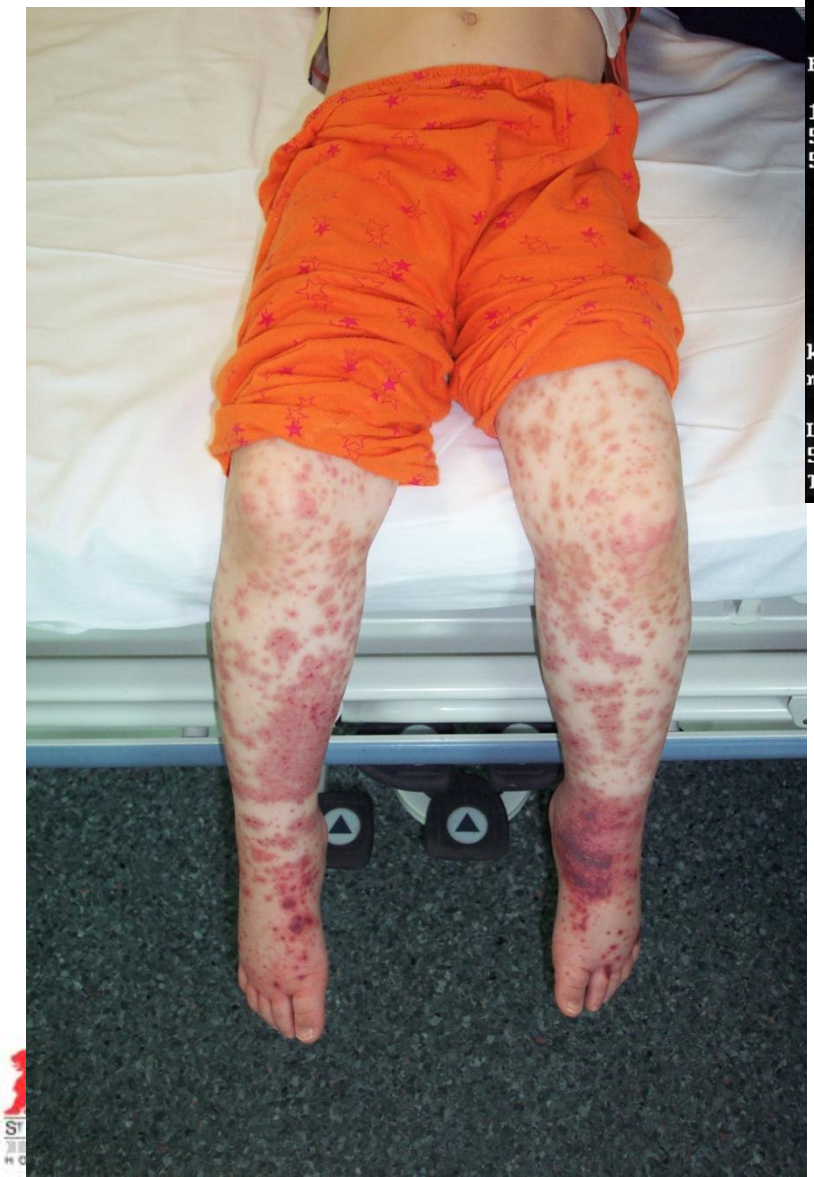

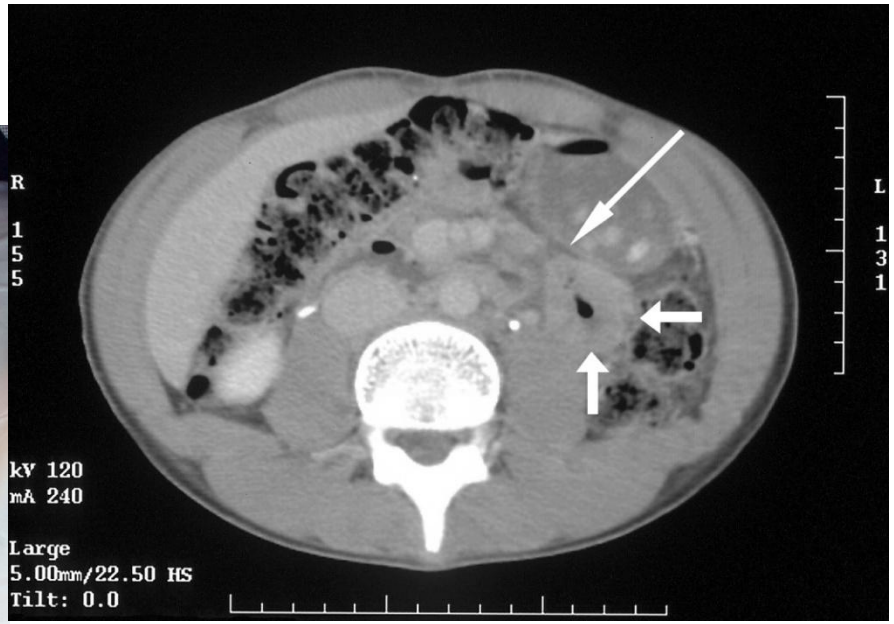
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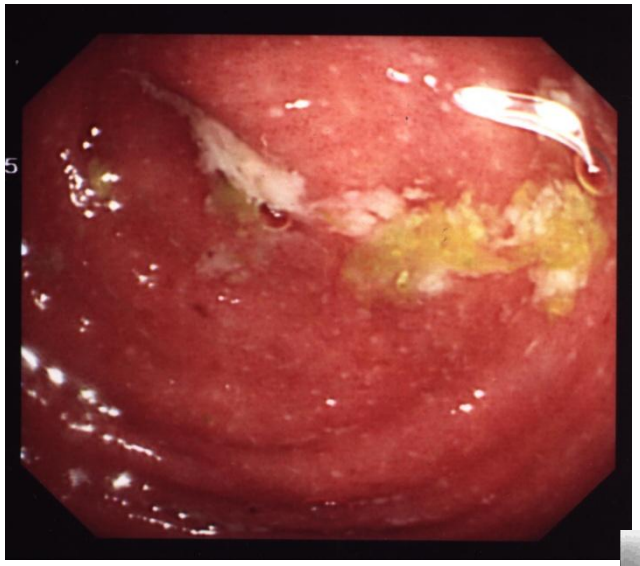
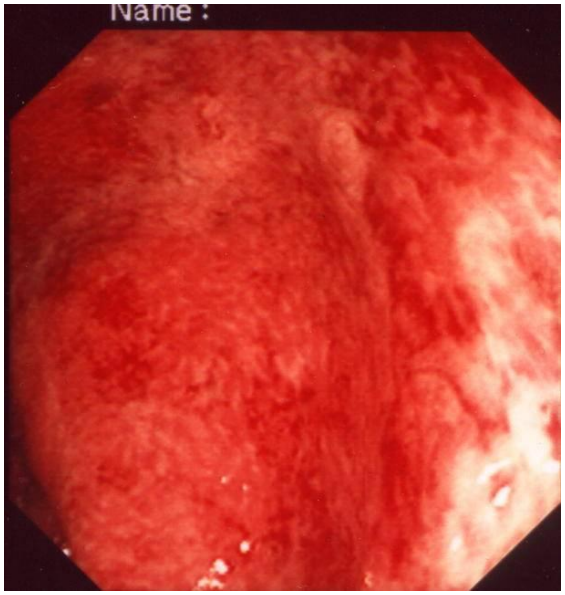
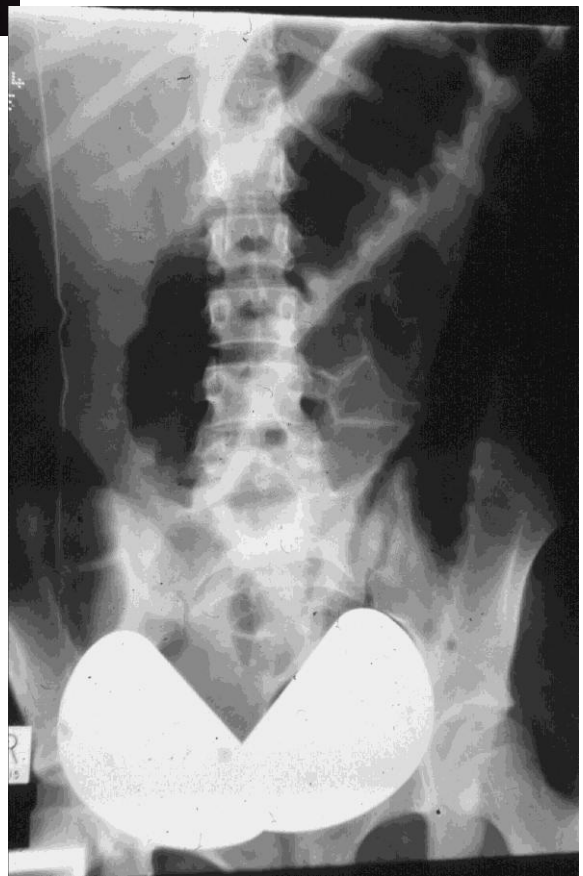
Acute colitis







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ECCO statement 5D

Severe active ulcerative colitis is best defined by Truelove and Witts' criteria [EL3, RG C]. Patients with bloody diarrhoea $\geq$6/day and signs of systemic toxicity (tachycardia >90 bpm, fever >37.8 °C, Hb <10.5 g/dL, or an ESR >30 mm/h) should be admitted to hospital for intensive treatment [EL5, RG D]

Implications

- Carries a mortality – albeit much reduced
- Up to 29% colectomy rate
- Joint care between Paediatric Gastroenterologist and Colorectal surgeon
- 2/3rd will respond to IV steroids – high dose
- K+ supplement
- Early sigmoidoscopy to seek CMV infection
- Stool for culture
- If possible continue nutrition esp if patient has malnutrition

Further considerations

- No anticholinergic medication
- Subcutaneous heparin ✓✓

Antibiotics only if infection is considered (such as in an acute, first attack of short duration, or after recent admission to hospital), or immediately prior to surgery. Controlled trials of oral or intravenous metronidazole, tobramycin, ciprofloxacin or vancomycin in acute colitis have shown no consistent benefit in addition to conventional therapy.[43–48]
Blood transfusion to maintain a haemoglobin >10 g/dl.

Assessing progress (adult)

- Stools > 12 a day on day 2 has a 55% chance of colectomy
- Stools > 8 a day on day 3 has a 85% chance of colectomy
- Watch CRP, albumin, pH, ESR, fever.
  - ESR > 75 or fever >38°C = 5-9 fold risk of colectomy
  - Beware colonic dilatation on Xray
- Use these indices to decide early about ciclosporin, infliximab or tacrolimus
- Chance of colectomy if you get through this admission is ≈35%.

Pancreatitis

	Common	Rare
Symptoms	Abdominal pain Irritability in infants Nausea Vomiting Anorexia	Back pain Jaundice Fever Feed intolerance Resp distress
Signs	Abdominal tenderness Abdominal distension Dehydration	Turners sign Cullens sign Ascities Pleural effusion

Investigations

- Amylase or lipase > 3 times URL
- US for pancreatic hypertrophy, dilated ducts, peripancreatic fluid, gallstones
- CT is probably the best imaging modality
- Then MRCP reveals pancreaticobiliary disorders

treatment

- Rapid and aggressive fluid management
- Parenteral narcotics
- Avoid starving the patient
  - Enteral nutrition within 24 hours
  - NG or NJ if necessary
  - Presently, opinion is to give a low fat diet
- Can take 2 weeks to settle
- Watch for complications

Acute jaundice

Colour of urine and stool

DD

- Gilbert's syndrome
- Viral hepatitis
- Autoimmune hepatitis
- Red cell anolmalies and haemolysis
- Drugs
- Veno occlusive disease

Plan when faced with jaundice patients

Haemolysing

- Call a haematologist
- Take all your bloods before you transfuse e.g. G6PD etc

Not haemolysing

- Sit and think about the most likely causes before sending off all bloods
- US will be helpful
- Often don't need admitting
- If confused, think metabolic and liver disease

Relentless vomiting

Important differential diagnoses – conditions you'd never forgive yourself if you missed

- Pyloric stenosis
- Intestinal obstruction
- Brain tumour or ↑ ICP
- UTI in an infant
- Diabetic ketoacidosis
- Metabolic disorder (primary)
- Sigmoid volvulus esp in neurodevelopmental children

Beware the child that vomits

Useful diagnosis to consider

Cyclical vomiting syndrome

Caustic ingestion

Management of suspected caustic ingestion

- Acids cause scarring that limits their damage
- Alkalis combine with the tissues, causing saponification and deeper injuries
- Look for burns around the mouth
- Do not induce vomiting
- Do not induce an antidote
- Do not offer charcoal

Next step

- Acidosis with a pH <7.22 is a bad prognostic feature
- Endoscopy within 24 hours especially if symptomatic
  - Can be delayed if volumes are low and no symptoms
- Endoscopy is prognostic:

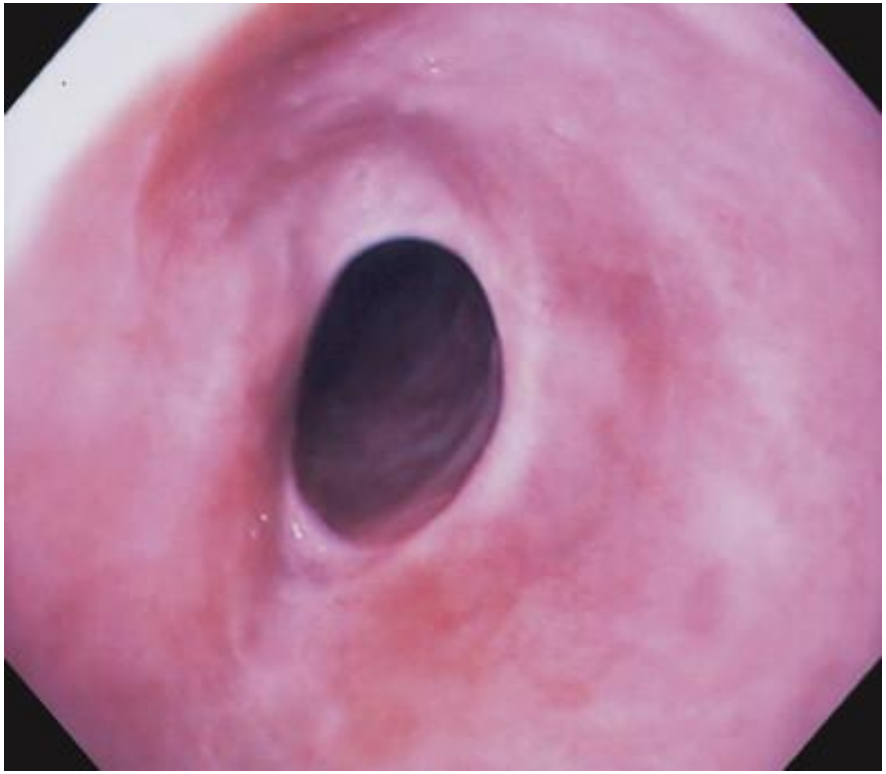
Table 1: Endoscopic classification of oesophageal burns.

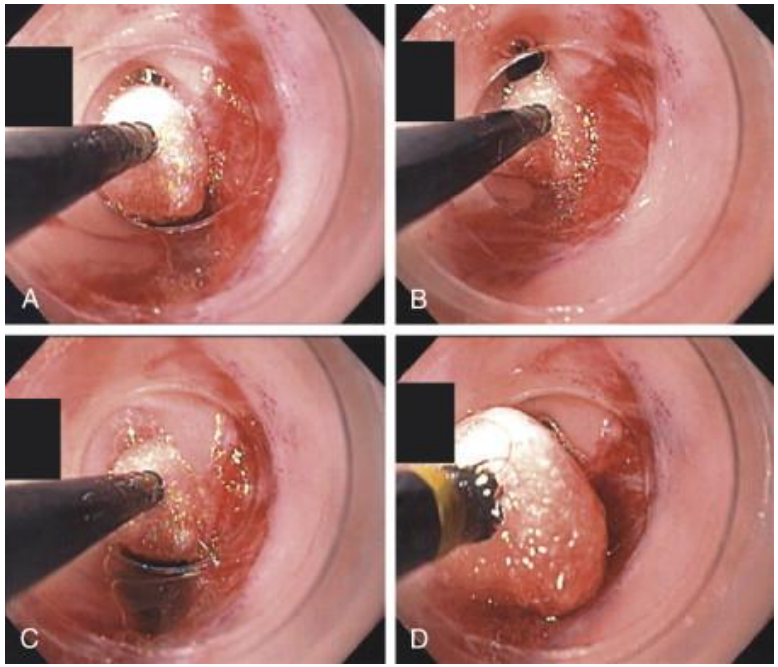
Endoscopic findings	Extension of lesions
No lesions	
Erythema	
Pseudomembrane	Not circumferential
Ulceration/necrosis	Not circumferential
Pseudomembrane	Circumferential
Ulceration/necrosis	Circumferential

Table 2: Medical therapy in caustic ingestion.

	Grade I	Grade II	Grade III
Corticosteroids	No	No	Yes
PPI	No	Yes	Yes
Antibiotics	No	No	Yes

- Endoscopic therapies:
  - Dilatation from week 4
  - Mitomycin C- to slow fibroblastic proliferation




A
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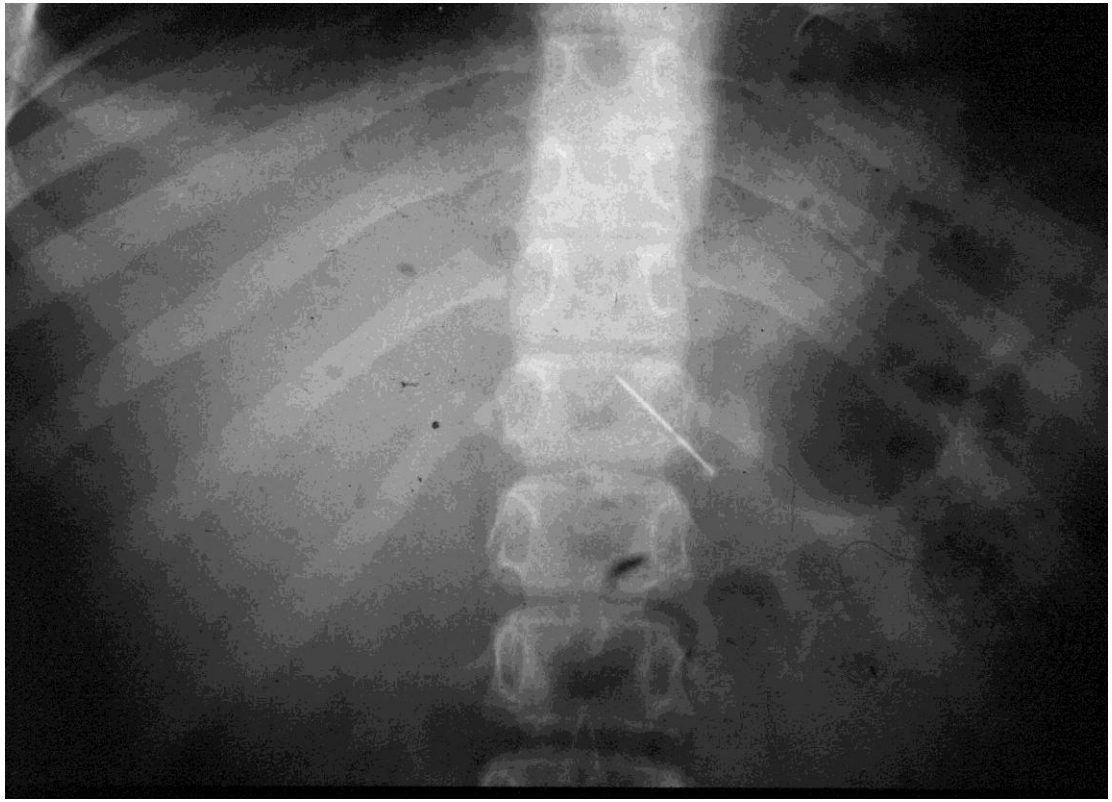
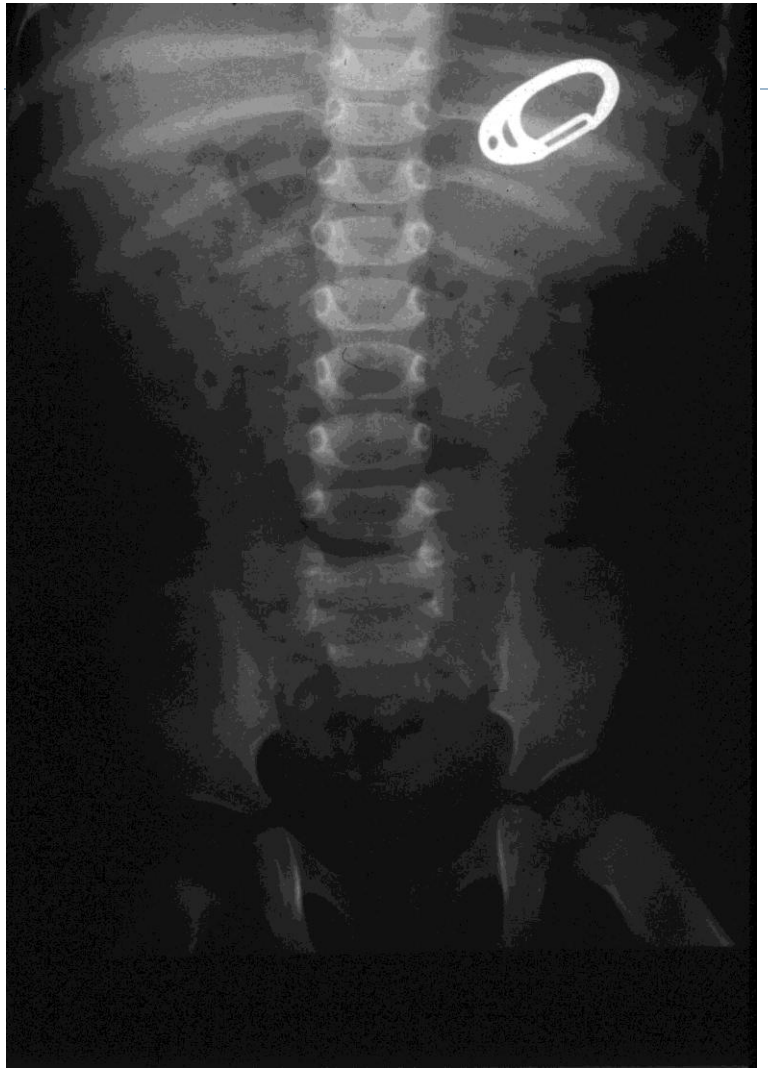
D

Foreign object ingestion






cm 1
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Consider other GI pathologies that may assist impaction

Localization	Type of FB	Timing of endoscopy
Crycopharinx/impact on stenosis	Any type	Emergency
Oesophagus	Batteries/dangerous or toxic-containing FB	Urgency
Oesophagus	Harmless FB, round-shaped—symptomatic patient	Urgency
Oesophagus	Harmless FB—asymptomatic patient	Delayed urgency, after some hours and new X-ray
Stomach	Dangerous/toxic-containing FB	Urgency
Stomach	Batteries	Delayed urgency max 48 hours
Stomach	Harmless FB in asymptomatic patient	Election (discharge and first X-ray 4 weeks later, if elimination by stools failed)
Duodenum	Dangerous FB	Urgency
Duodenum	Harmless FB	No indication
Any location	Lead containing DB	Urgency

Dangerous = disk batteries, multiple magnets, open pins

Intravenous Line sepsis

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41:S54–S62 © November 2005 ESPGHAN. Reprinted with permission.

9. Venous Access

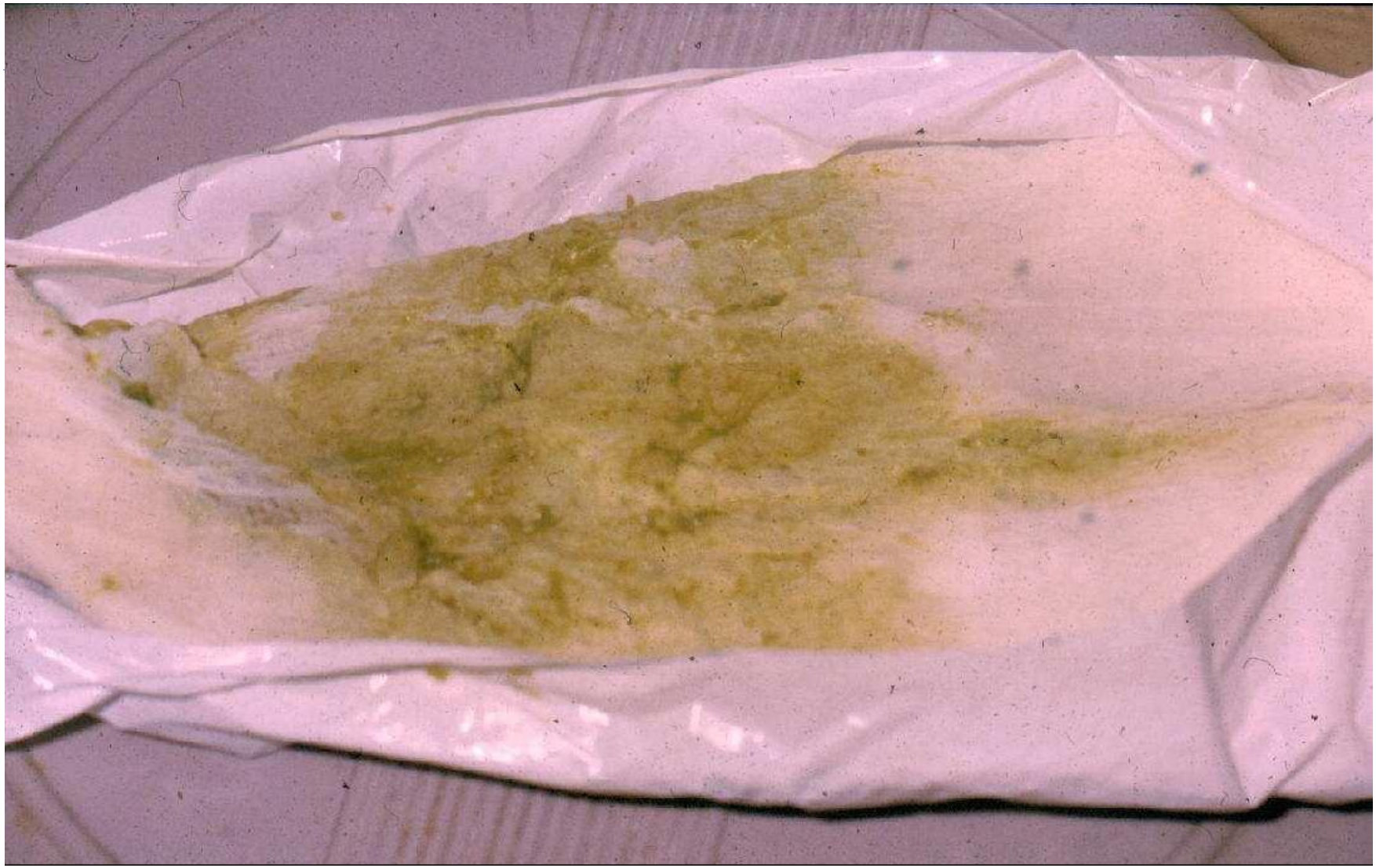
- Numerous aspects of catheter care is in place to prevent line infection
- Of those on home TPN at least 2.5 admission per year
  - 1.2/1000 Home TPN days
  - Equal number of admissions for fever without catheter infection

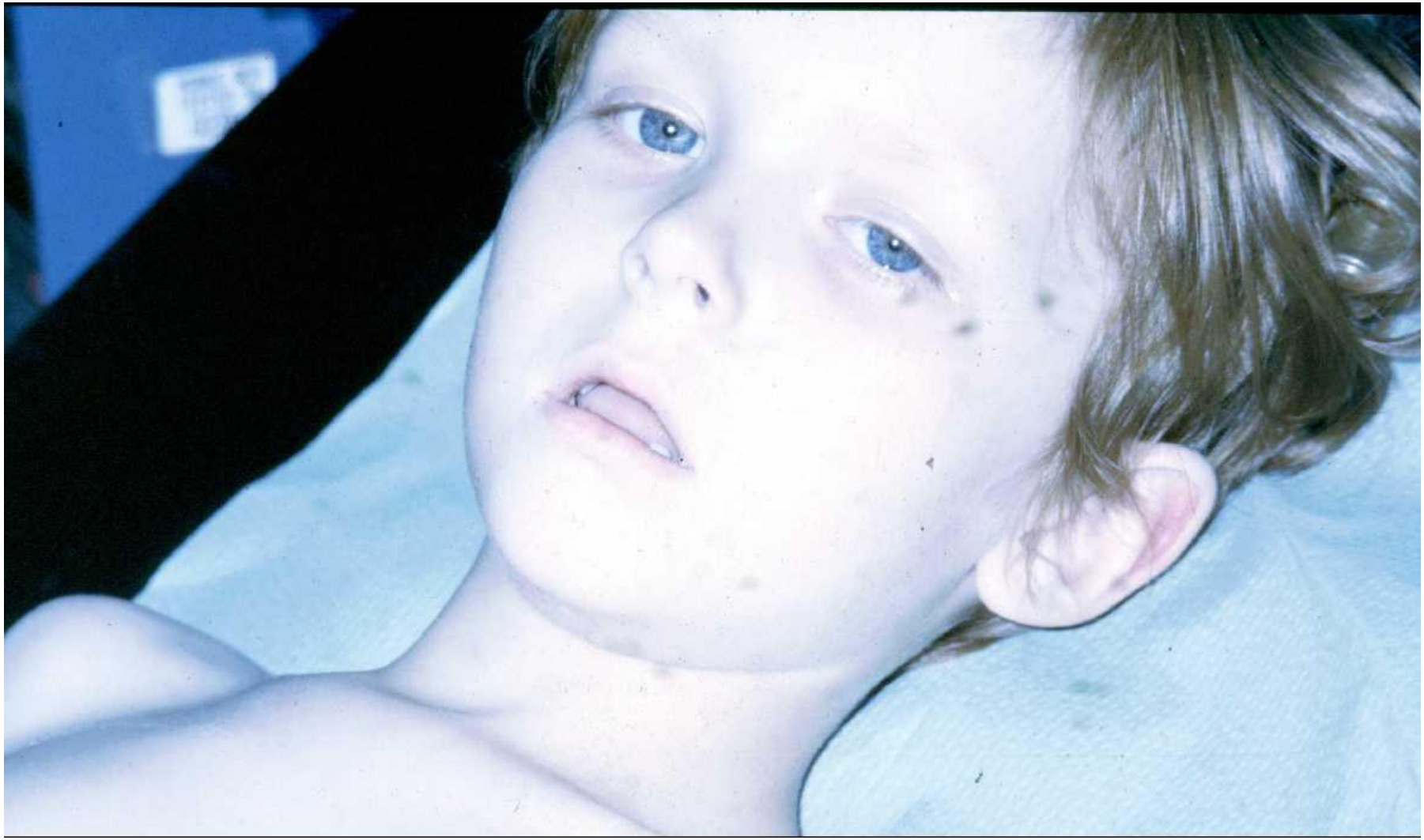
Approach to adopt

- These central lines are precious – preserve them at every cost
- Large volume blood cultures out of lines
- Broad spectrum antibiotics
- Admit
- Hold off TPN for 24 hours
- Consider delayed introduction of lipd or hyperglycaemic TPN

- Freddie weighs 10kg, age 14 months.
- He vomited 8 times yesterday and had 4 watery stools and has not eaten or drunk for 24hrs.
- He was warm, HR140/min, lethargic, warm peripherally, and had a dry nappy.

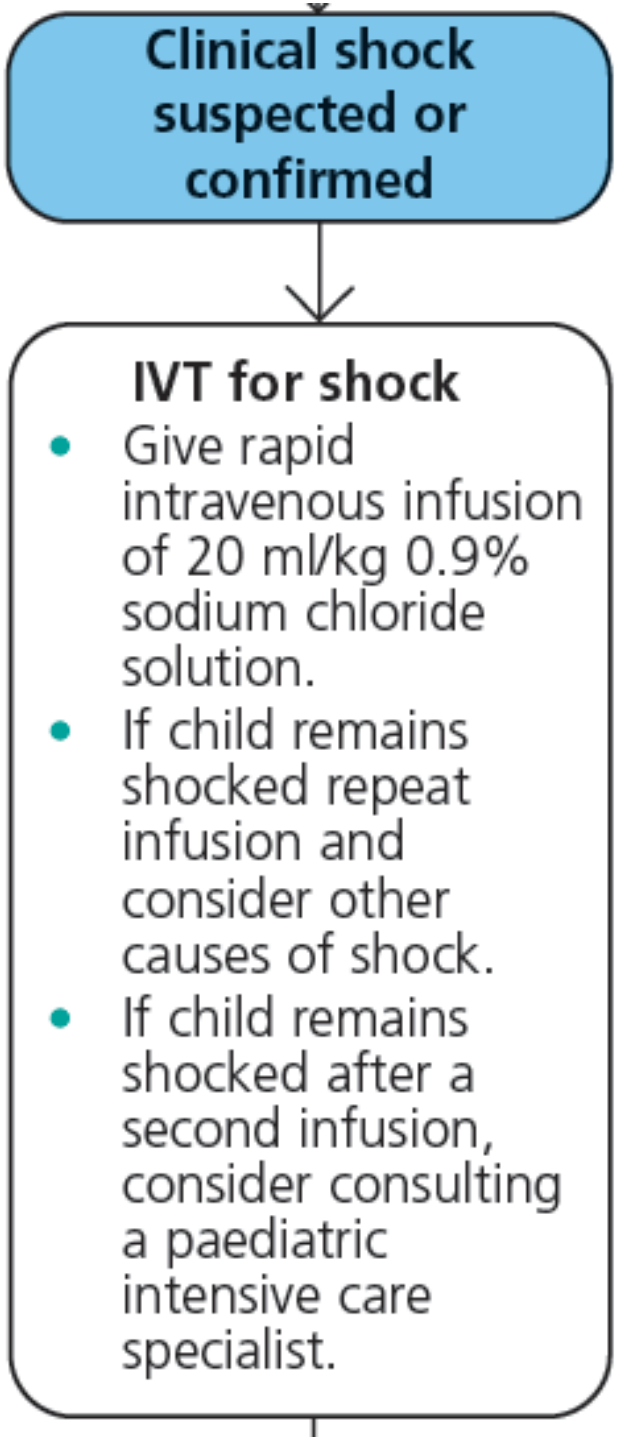
- What is your first course of action?

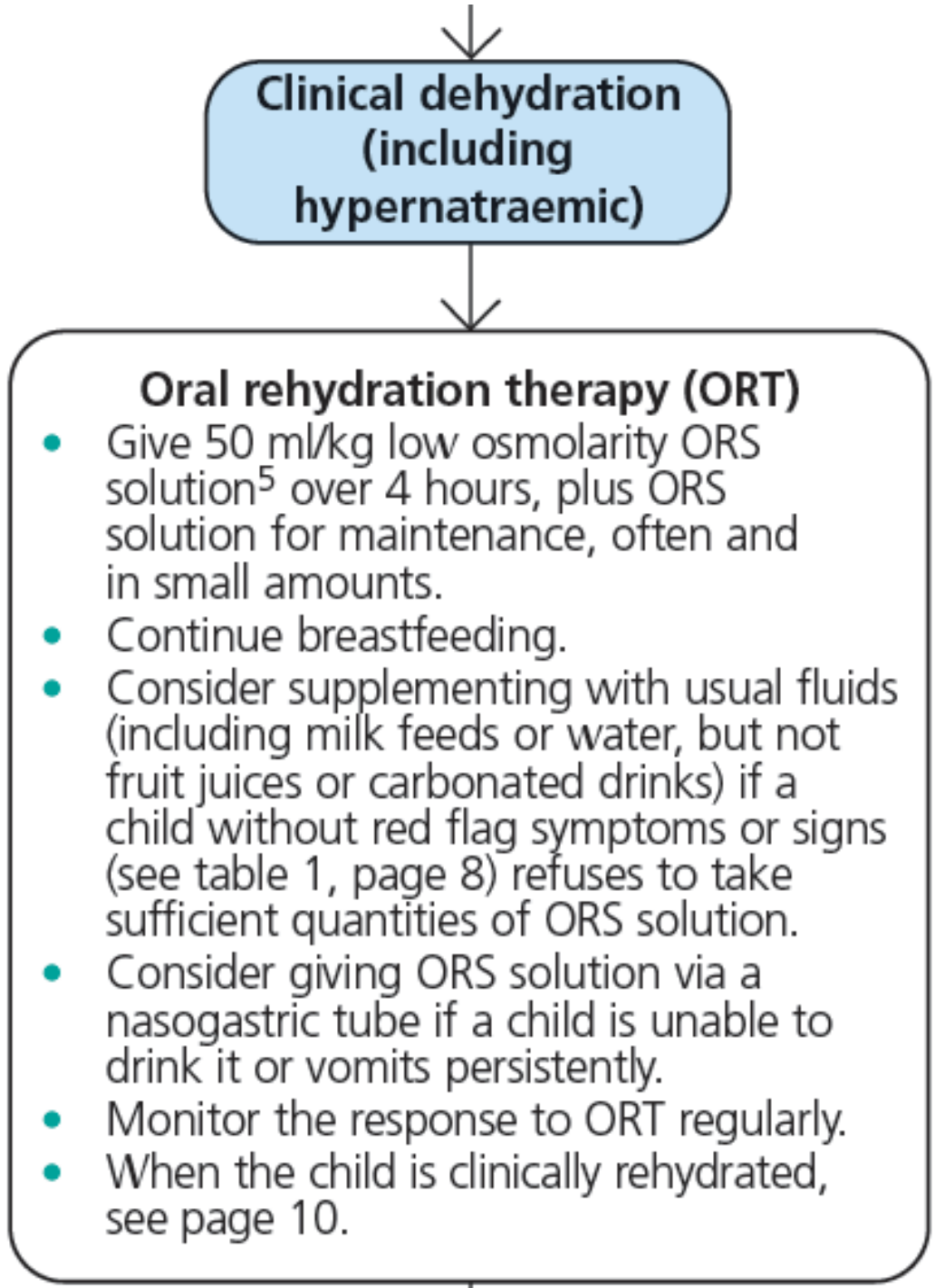




Increasing severity of dehydration →

	No clinically detectable dehydration	Clinical dehydration	Clinical shock
Symptoms (remote and face-to-face assessments)	Appears well	Appears to be unwell or deteriorating	–
	Alert and responsive	Altered responsiveness (for example, irritable, lethargic)	Decreased level of consciousness
	Normal urine output	Decreased urine output	–
	Skin colour unchanged	Skin colour unchanged	Pale or mottled skin
	Warm extremities	Warm extremities	Cold extremities
Signs (face-to-face assessments)	Alert and responsive	Altered responsiveness (for example, irritable, lethargic)	Decreased level of consciousness
	Skin colour unchanged	Skin colour unchanged	Pale or mottled skin
	Warm extremities	Warm extremities	Cold extremities
	Eyes not sunken	Sunken eyes	–
	Moist mucous membranes (except after a drink)	Dry mucous membranes (except for 'mouth breather')	–
	Normal heart rate	Tachycardia	Tachycardia
	Normal breathing pattern	Tachypnoea	Tachypnoea
	Normal peripheral pulses	Normal peripheral pulses	Weak peripheral pulses
	Normal capillary refill time	Normal capillary refill time	Prolonged capillary refill time
	Normal skin turgor	Reduced skin turgor	–
	Normal blood pressure	Normal blood pressure	Hypotension (indicates decompensated shock)


Clinical shock suspected or confirmed
IVT for shock
Give rapid intravenous infusion of 20 ml/kg 0.9% sodium chloride solution.
If child remains shocked repeat infusion and consider other causes of shock.
If child remains shocked after a second infusion, consider consulting a paediatric intensive care specialist.

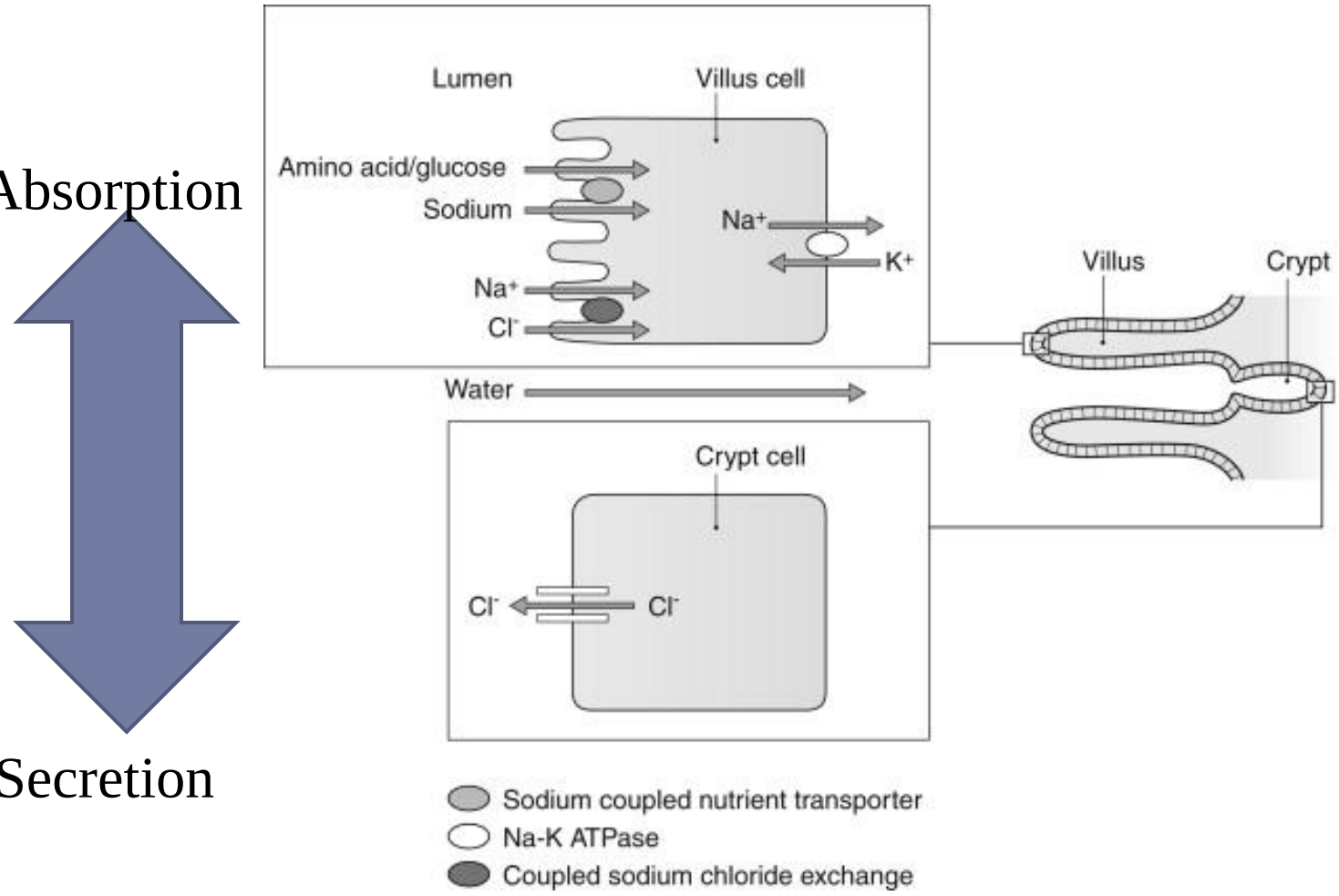


IVT for rehydration

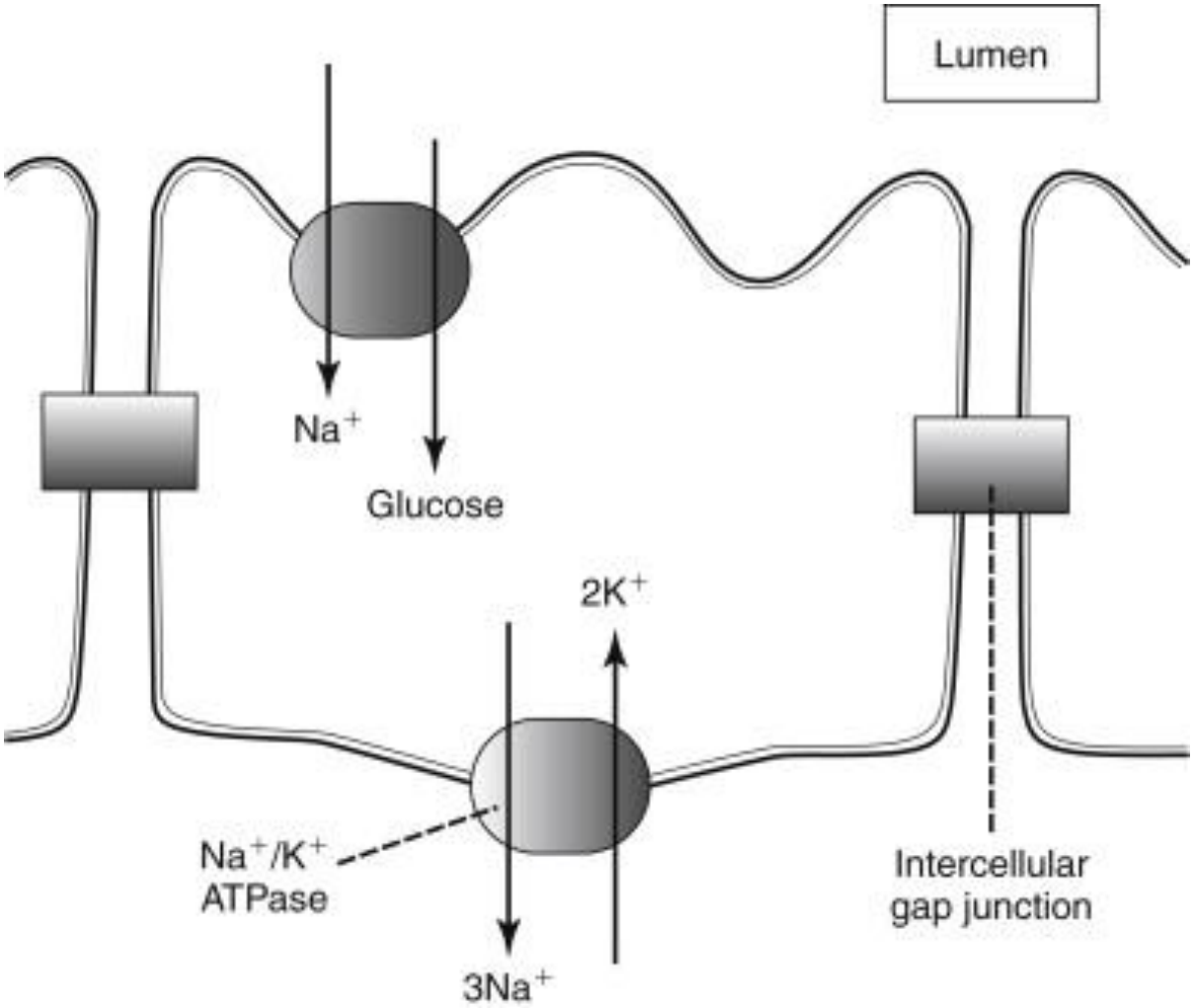
- Give an isotonic solution[6] for fluid deficit replacement and maintenance.
- Add 100 ml/kg for children who were initially shocked, or 50 ml/kg for children who were not initially shocked, to maintenance fluid requirements.
- Monitor the clinical response.
- Measure plasma sodium, potassium, urea, creatinine and glucose at the start, monitor regularly, and change fluid composition or rate of administration if necessary.
- Consider intravenous potassium supplementation when plasma potassium level is known.
- Continue breastfeeding if possible.
- If hypernatraemic at presentation:
  – obtain urgent expert advice on fluid management
  – use an isotonic solution[6] for fluid deficit replacement and maintenance
  – replace the fluid deficit slowly (typically over 48 hours)
  – aim to reduce the plasma sodium at less than 0.5 mmol/l per hour.

Infectious diarrhoea and rehydration

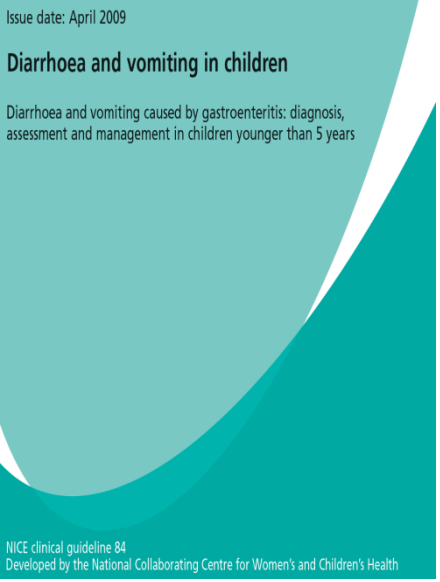
Absorption



Secretion

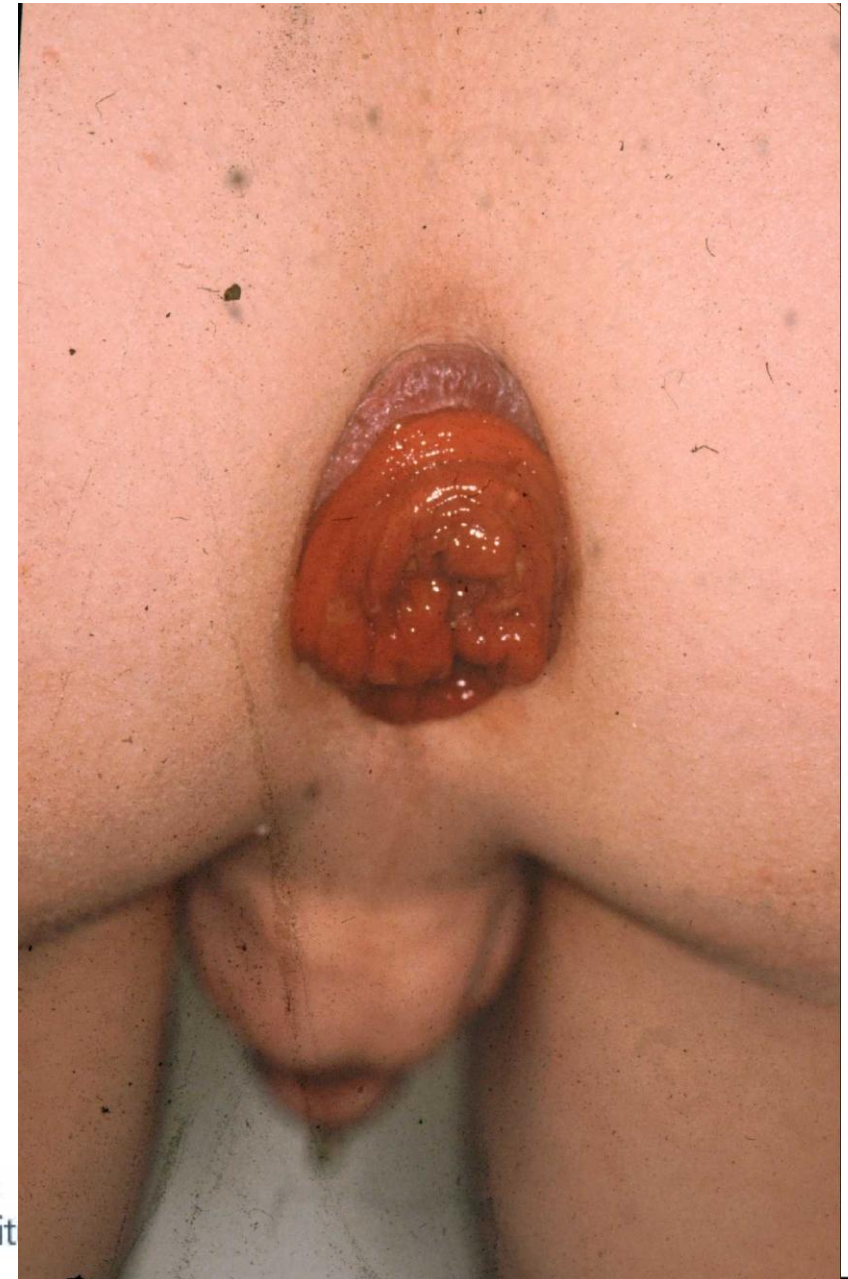

Lumen
Na^+
Glucose
$2K^+$
Na^+/K^+
ATPase
$3Na^+$
Intercellular
gap junction

omponent	Old WHO ORS	AAP ORS	ESPGHAN ORS	New Hypo-osmolar WHO ORS
Sodium (mmol/L)	90	45	60	75
Glucose (mmol/L)	111	138	74-111	75
Osmolarity (mmol/L)	311	250	225-260	245
Chloride (mmol/L)	80	60	60	65
Potassium (mmol/L)	20	20	20	20
Citrate (mmol/L)	10	10	10	10



ORS is still under utilised

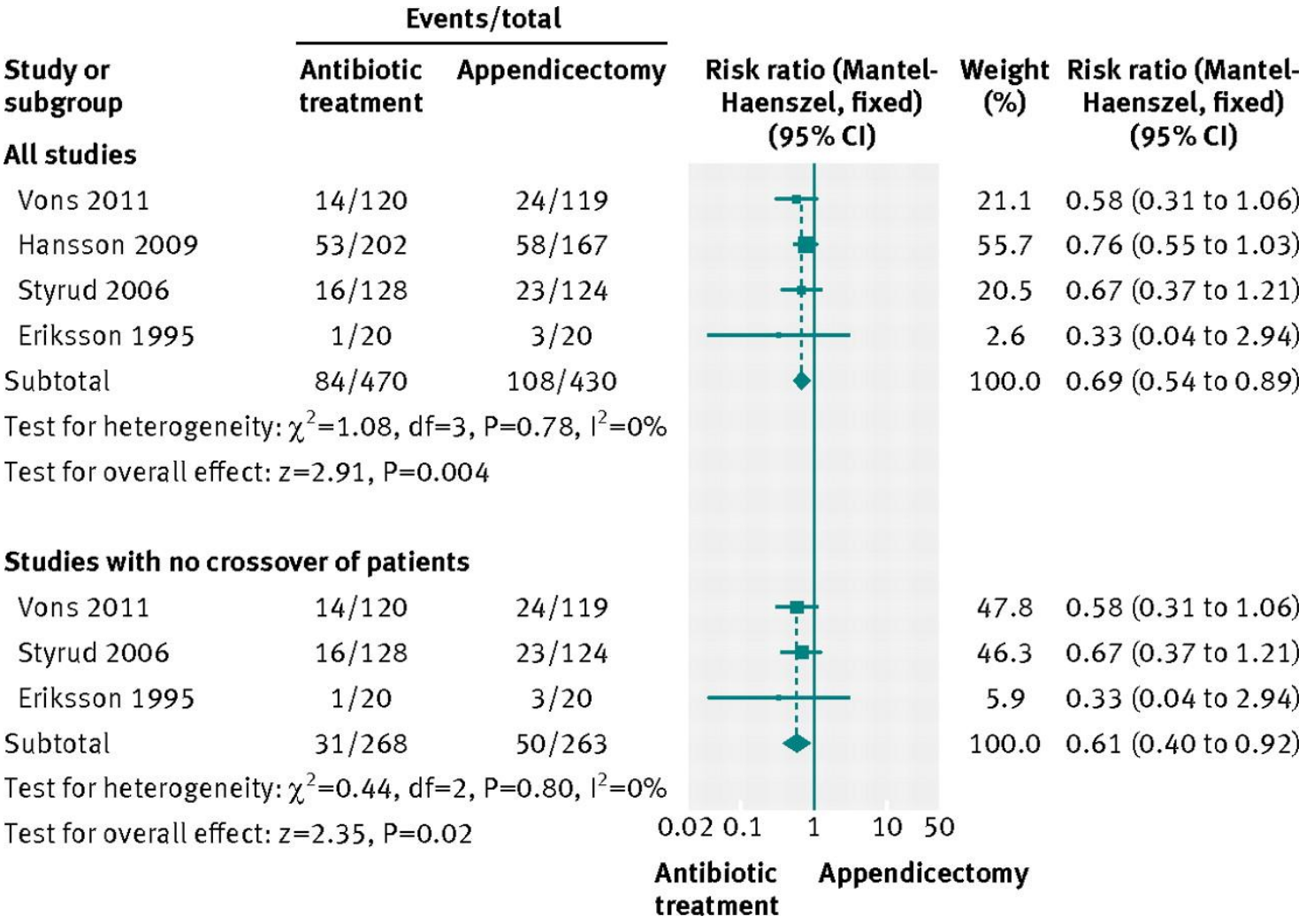
And one emergency for fun.....



Appendicitis

- Argument for antibiotics has arisen whilst CT can be used to identify those with uncomplicated appendicitis in adults
- We know the sensitivity and specificity of WBC and CRP in appendicitis in children J Paed Surg 2007
  - WBC or CRP ↑ has sensitivity of 98%
- US is a poor tool, CT is superior

Fig 4 Antibiotic treatment versus appendicectomy for uncomplicated appendicitis: forest plot for complications.



Varadhan K K et al. BMJ 2012;344:bmj.e2156

EDITORIALS

Should conservative treatment of appendicitis be first line?

No, appendicectomy for uncomplicated appendicitis will probably continue in light of current evidence

Olaf J Bakker *MD*

Department of Surgery, University Medical Centre Utrecht, 3508 GA, Utrecht, Netherlands

- 20% chance of reoccurence – 20% perforated
- Need CT scan
- Risks of an abscess

Food reactions coming to ER

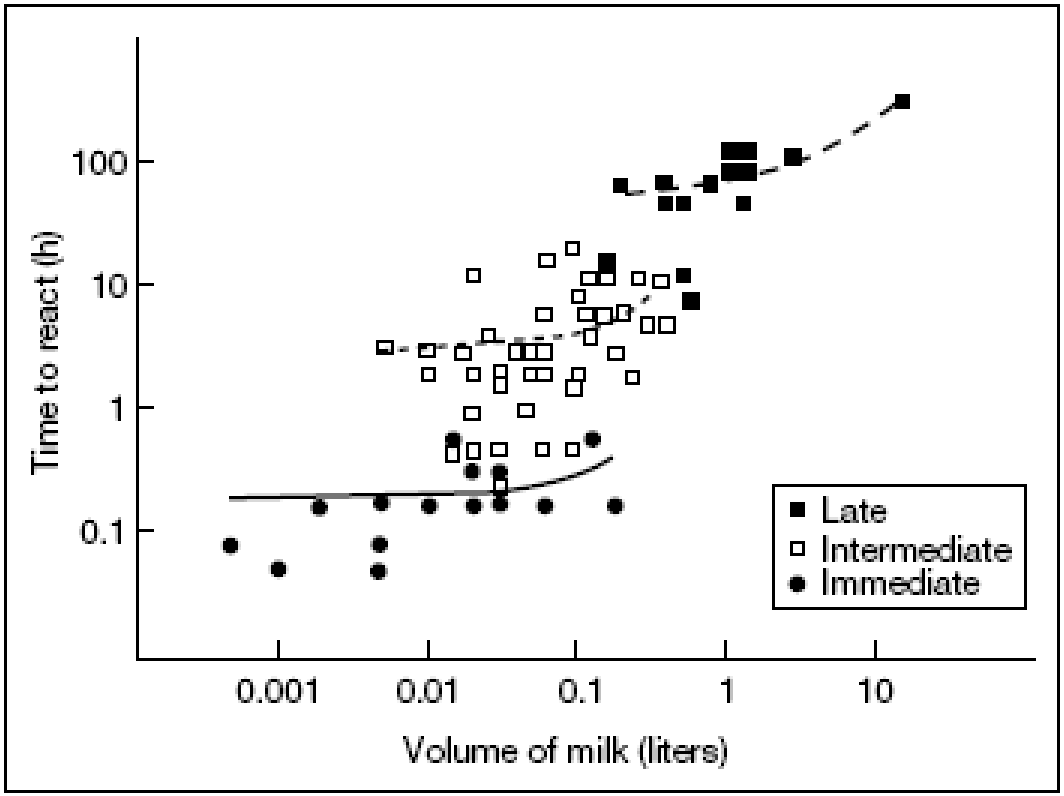


Fig. 1. Onset of reactions in CMA [2]. The time to onset of reactions is plotted against the volume of milk ingested. The 3 groups are indicated by the different symbols. The second-degree polynomial, the line of best fit for each of the groups, is shown. Reproduced with permission from Hill et al. [2].

Resuscitation Council (UK)

Emergency treatment of anaphylactic reactions

Guidelines for healthcare providers

Working Group of the Resuscitation Council (UK)

January 2008

St. Mark's Hospital and Academic Institute

Chelsea and Westminster Hospital NHS
NHS Foundation Trust

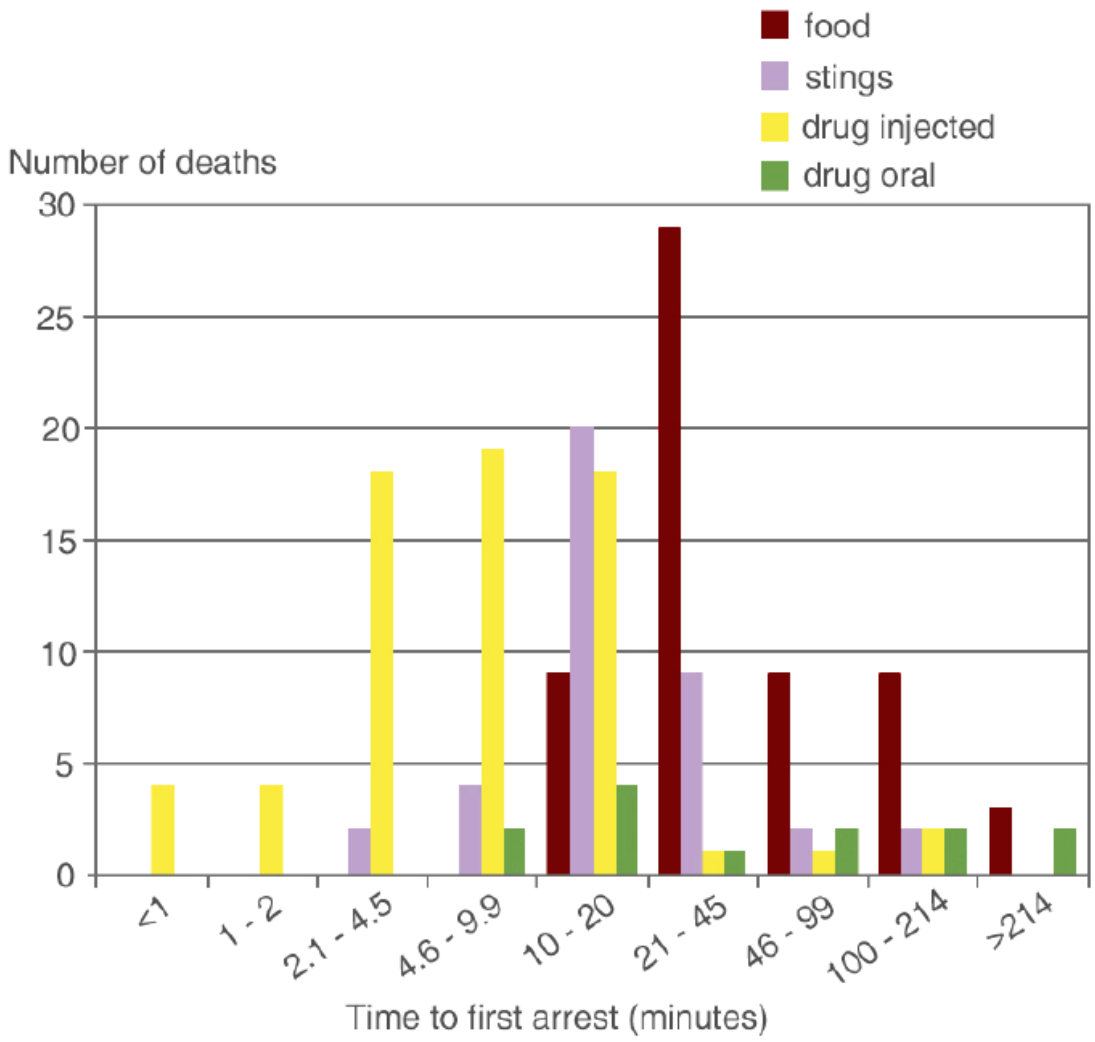
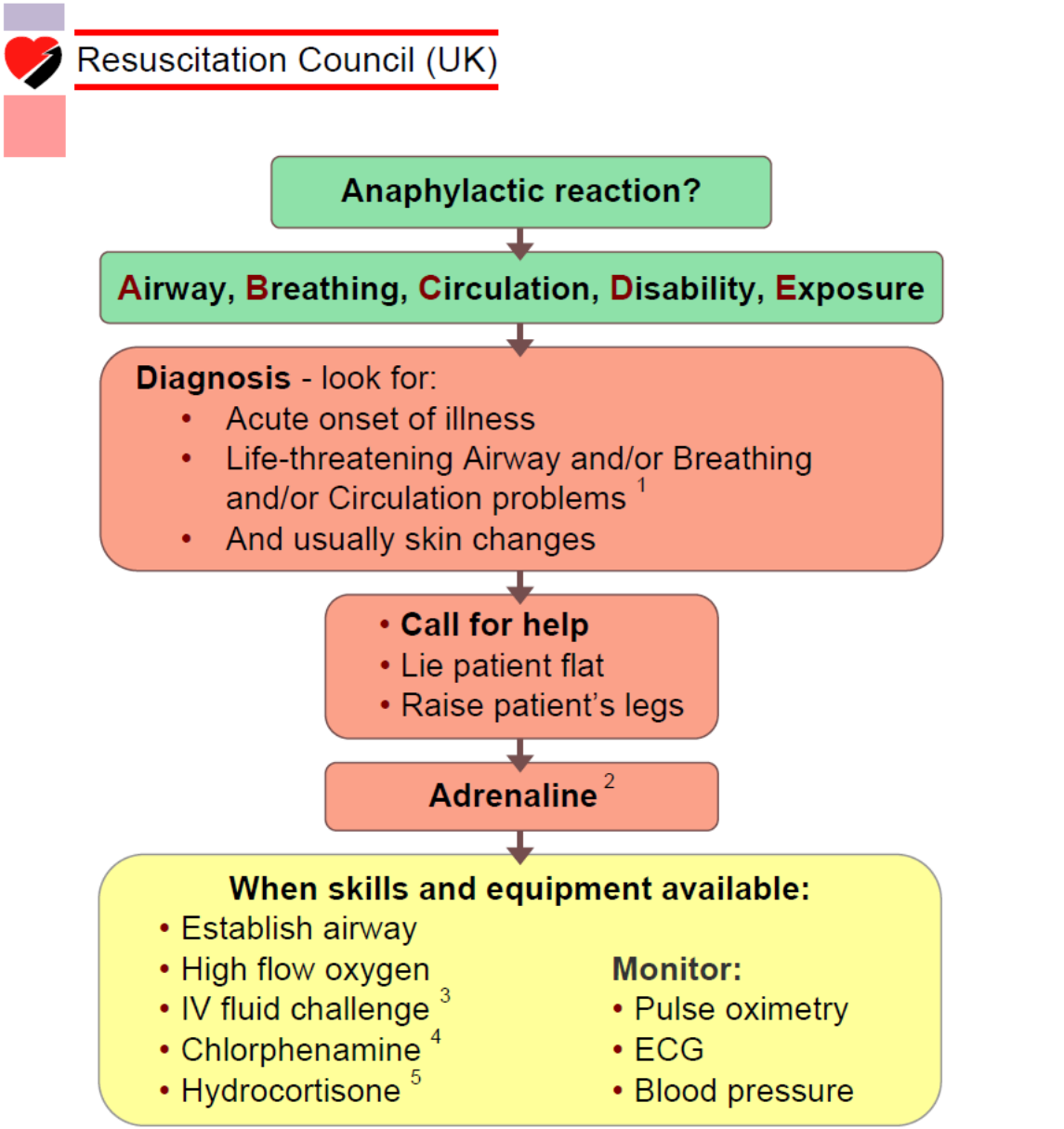


Figure 2. Time to cardiac arrest following exposure to triggering agent [25]


Resuscitation Council (UK)
Anaphylactic reaction?
Airway, Breathing, Circulation, Disability, Exposure
Diagnosis - look for:
• Acute onset of illness
• Life-threatening Airway and/or Breathing and/or Circulation problems 1
• And usually skin changes
• Call for help
• Lie patient flat
• Raise patient's legs
Adrenaline 2
When skills and equipment available:
• Establish airway
• High flow oxygen
• IV fluid challenge 3
• Chlorphenamine 4
• Hydrocortisone 5
Monitor:
• Pulse oximetry
• ECG
• Blood pressure

1 Life-threatening problems:

Airway: swelling, hoarseness, stridor

Breathing: rapid breathing, wheeze, fatigue, cyanosis, SpO_2 < 92%, confusion

Circulation: pale, clammy, low blood pressure, faintness, drowsy/coma

2 Adrenaline *(give IM unless experienced with IV adrenaline)*

IM doses of 1:1000 adrenaline (repeat after 5 min if no better)

- Adult 500 micrograms IM (0.5 mL)
- Child more than 12 years: 500 micrograms IM (0.5 mL)
- Child 6 -12 years: 300 micrograms IM (0.3 mL)
- Child less than 6 years: 150 micrograms IM (0.15 mL)

Adrenaline IV to be given **only by experienced specialists**

Titrate: Adults 50 micrograms; Children 1 microgram/kg

3 IV fluid challenge:

Adult - 500 – 1000 mL

Child - crystalloid 20 mL/kg

Stop IV colloid if this might be the cause of anaphylaxis

	4 Chlorphenamine (IM or slow IV)	**5 Hydrocortisone** (IM or slow IV)
Adult or child more than 12 years	10 mg	200 mg
Child 6 - 12 years	5 mg	100 mg
Child 6 months to 6 years	2.5 mg	50 mg
Child less than 6 months	250 micrograms/kg	25 mg

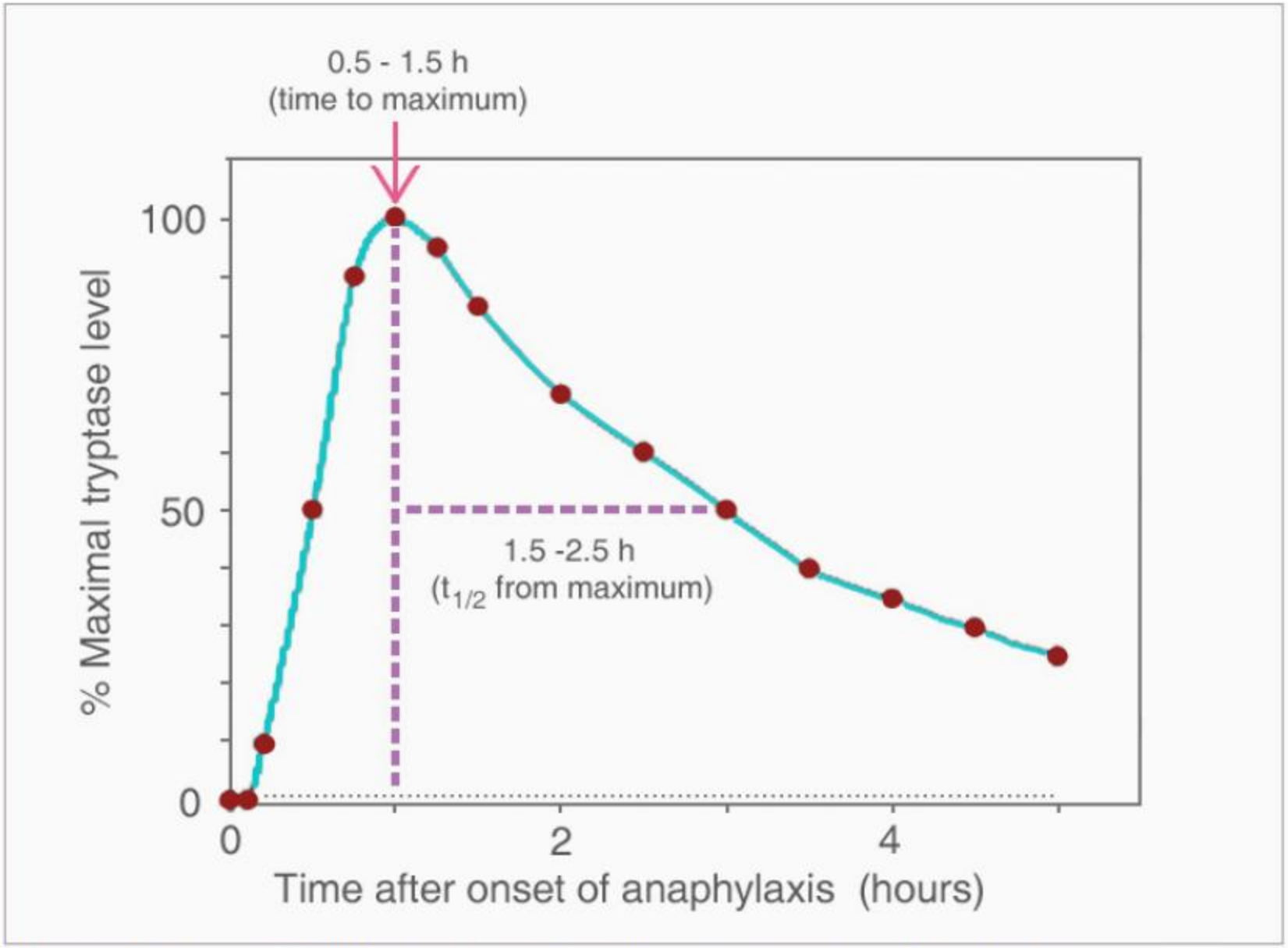
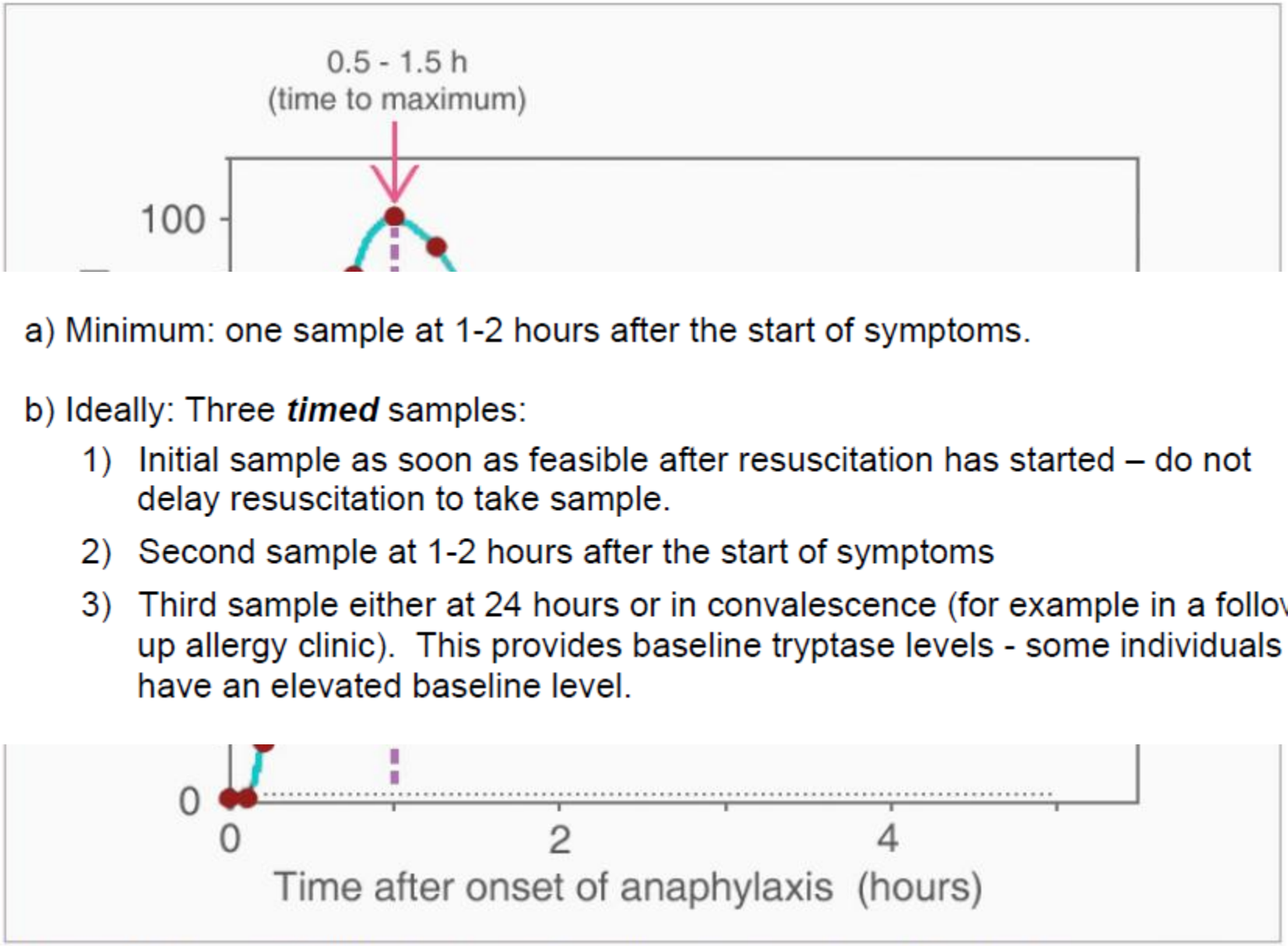


Figure 4. Suggested time course for the appearance of tryptase in serum or plasma during systemic anaphylaxis.[66]



a) Minimum: one sample at 1-2 hours after the start of symptoms.

b) Ideally: Three ***timed*** samples:

1) Initial sample as soon as feasible after resuscitation has started – do not delay resuscitation to take sample.
2) Second sample at 1-2 hours after the start of symptoms
3) Third sample either at 24 hours or in convalescence (for example in a follow-up allergy clinic). This provides baseline tryptase levels - some individuals have an elevated baseline level.

Figure 4. Suggested time course for the appearance of tryptase in serum or plasma during systemic anaphylaxis.[66]

Outcomes

- Feel confident about conditions you see uncommonly
- Feel more confident about ORS for dehydrated children – even if severe
- Understand outcomes for conditions you should know about e.g. intussusceptions or GI bleeding
- Know which guidelines are out these already on common conditions
- Know who needs transfer to a GI unit and who you can safely keep at your hospital