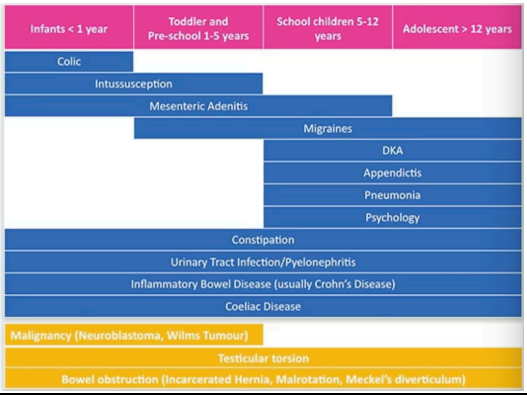
PAEDIATRIC GASTROENTEROLOGY

DDx of paediatric abdo pain:



RED FLAGS for abdo pain:

- PR bleeding
- Disproportionate pain
- Obstipation OR chronic diarrhoea
- Dysphagia
- Fever
- UWL, poor feeding, FTT
- Nocturnal pain
- Dysphagia
- **Peritonism signs** – involuntary guarding, rebound po percussion tenderness

Diagnostic tests for abdo pain:

- Anaemia → IBD, coeliac, malignancy
- Raised ESR/CRP → IBD
- Anti-TTG or anti-EMA → Coeliac
- Raised faecal calprotectin → IBD
- BSL + ketones → DKA
- +ve dipstick (nitirites, lecocytes) → UTI
- Urine/serum B-HCG – ectopic
- AXR = SBO/LBO
- Air enema = ISS

Medical causes			Surgical Causes		Non-organic
GI cause	**Urology/Gynae**	**Other**	**GI cause**	**Non-GI cause**	
• Constipation (**common**) • Infantile colic • Coeliac • IBD • IBS • Mesenteric adenitis • Abdominal migraine	• UTI - urethritis, cystitis, pyelonephritis • Mittleschirmz (ovulation pain) • Dysmenorrhoea (Period pain) • PID • STI	• HSP • DKA • Malignancy (neuroblastoma, Wilm's)	• Appendicitis • Bowel obstruction • Incarcerated hernia • Malrotation / volvulus • ISS • Hirschsprung • Mesenteric ischaemia	• Testicular torsion • Ovarian torsion • Ectopic	• Functional cause – no underlying pathology (very common in children > 5yo)

COMMON ABDO PAIN – Dx of Exclusion

	RECURRENT abdo pain	Abdominal migraine
PP	Child presents w/ repeated non-organic/functional abdo pain episodes with NO underlying cause	Migraine lasting > 1hrs WITH central abdo pain
RF	Stressful life events (?increased sensitivity & stimulation of visceral nerves in gut)	Children > adults
DDx	Abdominal migraine, IBS, functional abdo pain	Recurrent abdo pain, IBS, functional abdo pain ICH, classical migraine
Sx	Recurrent abdo pain	Central abdo pain - anorexia, pallor Migraine Sx – N/V, photophobia, headache,
Ix	None	None
Mx	*Careful education + reassurance* ➢ Distraction techniques for pain ➢ Encourage sleep, regular meals, balanced diet, regular PA ➢ AVOID NSAIDs ➢ Refer to school counsellor or child psychologist	*Careful education + reassurance* ➢ Acute Mx = Panadol + NSAID, + triptans + keep in dark room ➢ Long-term Mx = **Pizotifen (serotonin agonist),** propranolol, CCB *Slow weaning of pizotifen – prevent withdrawal Sx – depression, anxiety, poor sleep and tremor

CONSTIPATION IN CHILDREN

➢ VERY common issue -- most is idiopathic or functional constipation (NO underlying cause)

Typical Sx	RF	DDx – organic	Comp.	Mx
• < 3x stools/week • **Hard stools** (difficult to pass) – rabbit droppings • **Straining** • **Abdo pain** → ISS, SBO/LBO • **Vomiting** → SBO/LBO, Hirsch • **No meconium** → Hirsch, CF • **Ribbon stools** → anal stenosis • **Abnormal anus** → anal stenosis, sexual abuse, IBD • **Abnormal buttock OR lower limb FNDs**→ Spina bifida, SC lesion, sacral agenesis • **FTT** → Coeliac, hypothyroidism, safeguarding • Retentive posturing • **Overflow soiling** – **ENCOPARESIS** (due to faecal impaction) – *loose smelly stool* • *May be lose sensation to control bowels*	• Low fibre diet • Inadequate hydration • Inactivity • Habitually not opening bowels → **desensitization of rectum → feacal impaction** • Psychosocial issues (e.g. home difficulties, stresses)	*GI CAUSES:* • Hirschsprung's • Cystic fibrosis (meconium ileus) • Bowel obstruction • Cow's milk intolerance • Anal stenosis / atresia *OTHER:* • Hypothyroidism • SC lesion • Sexual abuse	• **Pain** • **Reduced sensation** • **Anal fissures** • **Haemorrhoids** • **Faecal soiling** (overflow diarrhoea) • **Psychosocial morbidity**	**Educate + reassure – may take months to resolve** • Correct reversible cause • High fibre diet + adequate hydration • Laxatives (e.g. Movicol – osmotic laxatives) **For psychosocial, idiopathic cause** • Bowel diary • Reward for visit toilet

COMMON MEDICAL CAUSES

	GORD	GASTROENTERITIS	COELIAC DISEASE	IBD	BILIARY ATRESIA
PP	Stomach contents reflux through LES into oesophagus, throat and mouth	• Acute gastritis (stomach) • Inflamed intestines (enteritis) *Viral causes:* Loose stools / diarrhoea (need to have diarrhoea to be GE ➢ **ROTAVIRUS, NOROVIRUS)** *adenovirus – less common – subacute diarrhoea) *Bacterial causes* ***BLOODY Diarrhoea,** vomit, fevers, abdo cramps* • **Campylobacter** → poor hygiene, unpasteurized milk, raw poultry, contam. Water • **E. coli O157** → Poor hygiene – unwashed salads, contaminated water, infected faeces • **Shigella** → swimming pool, dirty water and food • **Salmonella** → raw eggs, poultry, infected faeces → **watery diarrhoea** • **Yersinia entercolitica** → raw pork or mammal urine /faeces (**lymphadenopathy (mesenteric lymphadenitis)** • **Bacillus Cereus** → fried rice left unheated (quick recovery) **(cereulide toxin)→**, 1) vomit within 5 hrs 2) watery diarrhoea after 8 hrs • **S. aureus** → eggs, dairy, meat **(enterotoxin)–** rapid onset 12-24 hrs of profuse vomit, fever, diarrhoea • **Giardiasis** → parasite cysts in stools of pets, farm animals	Autoimmune response due to gluten exposure – inflammation of small intestines (**usu. jejunum)**	Inflammation of GIT with periods of remission and exacerbation (flares)	Narrowed or absent bile duct causing cholestasis
RF	• Pre-term babies (immature LES)		FHx of autoimmune disease ➢ New T1Dm diagnosis ➢ Thyroid disease ➢ Autoimmune hepatitis ➢ PBC ➢ PSC ➢ Down's (T21)	FHx of autoimmune disease ➢ New T1Dm diagnosis ➢ Thyroid disease ➢ Autoimmune hepatitis)	• Idiopathic • Pre-term
Sx	• Vomiting food contents • Chronic cough • Hoarse cry • Distressed after feeding • Poor feeding • FTT – poor wt gain • Recurrent pneumonia		➢ **FTT (**poor wt gain**)** ➢ **Watery diarrhoea** ➢ **Abdo distension (bloating)** ➢ **Mouth ulcers** ➢ **Anaemia – Fe, B12, folate def.** **Extra-intestinal** ➢ **Dermatitis herpetiformis** (itchy blistering skin rash – across abdomen) ➢ **Peripheral neuropathy** ➢ **Cerebellar ataxia** ➢ **Epilepsy**	Crohn's (NESTS) ➢ **NO** blood/mucus ➢ **ENTIRE** GIT ➢ **SKIP** lesions ➢ **TERMINAL** ileum ➢ **TRANSMURAL** (full thickness) inflamed ➢ **SMOKING** = RF UC (UC- CLOSE-UP) ➢ **CONTINUOUS** inflamed ➢ **LIMITED** to colon and rectum ➢ **ONLY** superficial mucosa ➢ SMOKING = protective ➢ **EXCRETE** – mucus/blood ➢ **USE** – aminosalicylates ➢ **PSC**	➢ **Persistent jaundice lasting** **> 14 days in term** **> 21 days in pre-term** ➢ Pale stools ➢ Dark / brown urine ➢ Hepatomegaly ➢ Hepatic encephalopathy
Comp.	Beware of **SANDIFER'S SYNDROME** ➢ Rare cause of GORD ➢ Brief episodes of abnormal movements ➢ **Torticolli**s (forceful neck twist) ➢ **Dystonia** (abnormal tone – cause back arching and abnormal postures) ➢ **Rx: *none – self-resolves but must exclude West syndrome***	**Acute untreated:** ➢ Dehydration – hypovolaemic shock **If E. coli O157 or Shigella infection** ➢ HUS **Post-GE** ➢ Lactose intolerance ➢ IBS ➢ Reactive arthritis ➢ GBS	➢ Vitamin Def – malnutrition ➢ Anaemia ➢ OP ➢ Ulcerative jejunitis ➢ NHL ➢ EATL (Enteropathy, T-cell lymphoma) of intestine ➢ Small bowel AC	*GI ISSUES:* ➢ Fistulas ➢ Abscesses ➢ Strictures ➢ CRC *Extra-intestinal issues* ➢ **Skin** – clubbing, erythema nodosum, pyoderma gangrenosum ➢ **Joints** – enteropathic arthritis, polyarthritis ➢ **Eye** – anterior uveitis, episcleritis , iritis	
Ix	None ➢ Barium meal (if severe)	➢ Stool M/C/S – for ABx selection ➢ Stool O/C/P – giardiasis **C. difficile toxin** (post ABx usage - penicillin, clindamycin, quinolones) • IV vanc OR fidaxomicin (oral liq)	➢ **FBC., EUC, LFT, CRP** ➢ **HLA-DQ2** (high Sn) ➢ **Anti-TTG** ➢ **Anti-EMA** (IgA) ➢ **Anti-DGP** (IgA) ➢ **Duodenal biopsy** – villous atrophy, crypt hyperplasia, intraepith lymphocytes ***If IgA def – would give normal Anti-EMA, Anti-DGP → need to do IgG test or biopsy**	• FBC, EUC, LFT, CRP • Faecal calprotectin • Endoscopy (OGD or colonoscopy) → **gold standard (biopsy)** *Imaging:* • USS, CT, MRI • To identify fistulas, abscesses or strictures	• LFT – HIGH **conjugated bilirubin**
Mx	***Self-resolves*** 90% stop reflux by 1 year ***Supportive Rx:*** • Small frequent meals • Burping regularly to allow milk to settle • NO over-feeding • Keep upright ***If unresponsive to Rx:*** ➢ Gaviscon ➢ Thickened milk or formula ➢ PPI ➢ Fundoplication (last result)	➢ **INFECTION CONTROL →** Isolation to prevent spread within hospital ○ **Avoid school for 48 hrs** ➢ **Main concern is dehydration** ○ IVF or PO fluids – hydrolyte every 5-10mins ○ Fluid balance chart ○ Most bacterial infection resolves within 1 week **DO NOT GIVE** ➢ ABx – increases risk of HUS ➢ Anti-diarrheal (in children) → Loperamide, ➢ Anti-emetic (in children) → metoclopramide **ABx ONLY if causative organism confirmed** ➢ Shigella, Campylobacter – **azithromycin or cipro** ➢ Giardiasis → **metronidazole**	➢ Gluten free trial diet (lifelong) ➢ Check antibody levels to monitor disease	***MDT approach*** • GP • Dietician • Specialist nurse • Colorectal surgeon ***Crohn's*** Induce remission • Steroids (PO pred or IV hydrocort) Maintain Remission • 1st line =azathioprine • 2nd line = MTX, anti-TNF • Resect terminal ileum to prevent flares, strictures, fistulas ***UC*** Induce remission • 1st line = Aminosalicylate (mesalazine PO or PR) • 2nd line = PO or IV steroids Maintain Remission • 1st line = Aminosalicylate • 2nd line = azathioprine • Pan-proctocolectomy → will need permanent ileostomy or J-pouch	*Kasai portoenterostomy* ➢ *Attach section of small intestine to liver opening where bile duct normally attaches* *Last resort – full liver transplant* ➢ *Curative intent*

COMMON SURGICAL CAUSES

GASTRO CAUSE FOR VOMITING

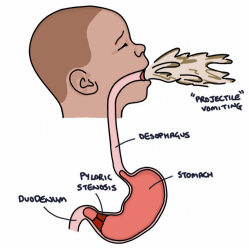
- Overfeeding
- GORD
- Pyloric stenosis (projectile vomit)
- Gastritis / gastroenteritis
- Appendicitis
- Bowel obstruction
- Cow's milk protein allergy (rash, angioedema, **bloody stools**)
- Bulimia

NON-GI CAUSE OF VOMITING

- A – AKI, stones
- B – brain (raised ICP, vertigo, migraine)
- C – atypical ACS
- D – DKA, Addison
- E – ear (otitis media or vertigo)
- F – FB, or foreign drug A/E
- G - *glaucoma*
- H – *Hyperemesis gravidarum*
- I – Infections (meningitis, tonsillitis, UTI)

RED FLAGS

- ***Not keeping down any feed*** (PS, SBO/LBO or GORD)
- ***Projectile*** or ***forceful vomiting*** (PS, SBO/LBO, biliary atresia)
- ***Bile stained*** vomit (SBO/LBO, duodenal atresia)
- ***Haematemesis*** or ***melaena*** (peptic ulcer, oesophagitis or varices)
- ***Abdominal distention*** (SBO/LBO)
- ***Reduced LOC***, ***bulging fontanelle*** or ***FND signs*** (meningitis or raised ICP)
- ***Respiratory symptoms*** (aspiration and infection)
- ***Blood in the stools*** (gastroenteritis or cows milk protein allergy)
- ***Signs of infection*** (pneumonia, UTI, tonsillitis, otitis or meningitis)
- ***Rash***, ***angioedema*** and ***signs of allergy*** (cows milk protein)
- ***Apnoeas*** are a concerning feature and may indicate serious underlying pathology and need urgent assessment

	HIRSCHSPRUNG'S DISEASE	PYLORIC STENOSIS	ISS	INTESTINAL OBSTRUCTION	APPENDICITIS
PP	**CONGENITAL →** Failure of neural crest cells to migrate into myenteric plexus of bowel (**Auerbach's plexus**) which forms the enteric nervous system NO PSNS ganglion cells	Hypertrophy of pyloric sphincter causes narrowing of pylorus ➢ Proximal stomach dilatation ➢ Distal small bowel narrowing	Bowel invaginates or telescopes into itself ➢ Proximal dilation ➢ distal narrowing at folded area = palpable mass	➢ Physical obstruction to passage of faeces through intestines	Inflammation of the appendix (vestigial organ of caecum) trapped faeces causes infection
When	**1st few months of life**	2-6 wks old	➢ Mths – 2 years	➢ any time	Any time
RF	Idiopathic ➢ **Genetics** ➢ **Down's** ➢ **NF** ➢ **Waardenburg syndrome** - pale blue eyes, hearing loss, white skin and hair patches • **MEN type 2**	•	• 6/12 – 2 yo • Recent viral illness • HSP • CF • Intestinal polyps ➢ Meckel's diverticulum	➢ Pre-term ➢ CF – Meconium ileus ➢ Atresia / stenosis (anal, duodenal) ➢ Malrotation ➢ Hernia	• Children (10-20 yo) ***DDx:*** ➢ Ectopic ➢ Ovarian/ testicular torsion ➢ Ovarian cyst rupture ➢ Mesenteric adenitis ➢ Meckel's diverticulum • **Appendix mass** - when omentum surrounds and stocks inflamed appendix forming mass
Sx	➢ **Obstipation (meconium ileus)** ➢ **Chronic constipation since birth** ➢ **Abdo pain + distension** ➢ **Reflux + vomiting** • **FTT – poor wt gain**	• 1st weeks of life • FTT • Projectile non-bilous vomit (due to powerful peristalsis) • Firm large olive mass in RUQ • Visible peristalsis	➢ **Severe colicky** abdo pain ➢ **Indrawing** of knees ➢ **Pale unwell** child ➢ **Sausage shaped RUQ mass** (folded bowel) ➢ **Obstructive signs** **Late sign** ➢ Red currant jelly stools (20%)	➢ Obstipation ➢ Projectile bilous green vomit ➢ Intra-Abdo pain + distension ➢ Abnormal BS – high-pitched tinkling sounds → absent (late sign)	• Migratory RLQ pain • N/V • Anorexia • Fever • **Rosving's,** • **Obturator (pelvic)** • **Psoas sign (retrocaecal)** ➢ **Peritonism** – invol guarding, rigidity, rebound tenderness, percussion tenderness
Comp.	➢ **Aganglionic section** of bowel – does not relax – becomes constricted ➢ **Total colonic aganglionosis** (entire colon affected) • Hirschsprung-associated enterocolitis (HAEC) – 20% of neonates → sepsis signs	•	• Obstructed bowel ➢ Ischaemic bowel → gangrenous → perforation → peritonitis	➢ **Perforation** ➢ **Ischaemic bowel** ➢ **Sepsis**	• Gangrene • Appendix Perforation • Peritonitis
Ix	➢ **AXR** – distended bowel loops ➢ **Rectal biopsy** (confirm Dx – absence of ganglionic cells)	• ABG – hypochloraemic hypokalemic metabolic alkalosis • USS – thickened pylorus • AXR – double bubble sign	• USS – target sign Contrast barium enema	**AXR (best modality)** ➢ Dilated bowel loops (SBO vs LBO) ➢ NO air in rectum	• FBC, EUC, LFT • Urine or serum B-HCG • Raised CRP • USS – enlarged oedematous appendix
Mx	**General mx for obstruction** ➢ **NBM** ➢ **NGT** ➢ **IVF** ➢ Surgical removal **Aganglionic** section of bowel **Hirschsprung-associated enterocolitis (HAEC)** ➢ Life-threatening ➢ Urgent ABx (empirical) ➢ IVF ➢ NGT – decompress bowel Surgical removal **Aganglionic** section of bowel	***Main Rx: Surgery*** Laparoscopic pyloromyomectomy "Ramstedt's operation" ➢ Incision into smooth muscle of pylorus to widen pyloric canal ➢ Good prognosis post-op 	**Therapeutic enema** ➢ (Dx + Rx) ➢ using contrast, water or air ➢ Aim to force folded bowel out of bowel into normal position ***Surgical reduction if:*** ➢ *Enema infective* *Perforated bowel*	**Urgent referral to:** ➢ Paediatric general surgeon ➢ Paediatric anaesthetist ➢ NBM ➢ NGT ➢ IV access – IVF *(correct dehydration or any electrolyte imbalance)* ➢ Bloods – FBC, EUC, coags, Group and hold	Call paed surgery (<10 yo) Call gen surgery (>10 yo) Call anaesthetist Call OT nurses ABCDE ➢ NBM ➢ IV access – IVF ➢ Analgesia + anti-emetics ➢ Bloods – FBC, EUC, coags, Group and hold ➢ Laparoscopic appendicectomy *Complications of appendicectomy* ➢ Bleeding, infection ➢ Damage to adjacent organs ➢ Anaesthetic risks VTE (DVT/PE)

*__Meckel's diverticulum__ (2% population (M: F = 2:1), 2% in first 2 years of life, 2 inches long, 2 feet from ileocaecal valve) → volvulus, ISS or cause rupture, bleeding and inflammation