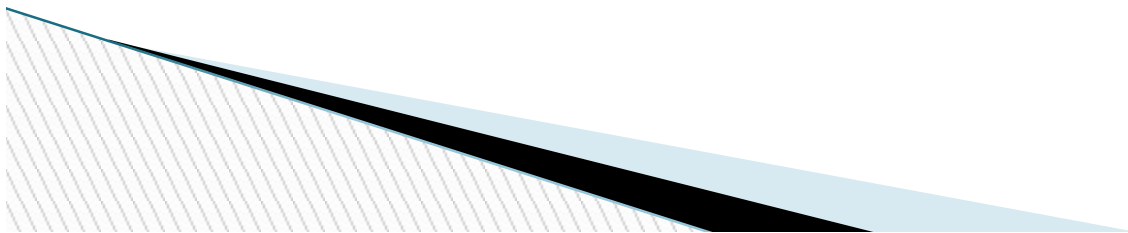


# Non surgical causes of acute abdomen in children

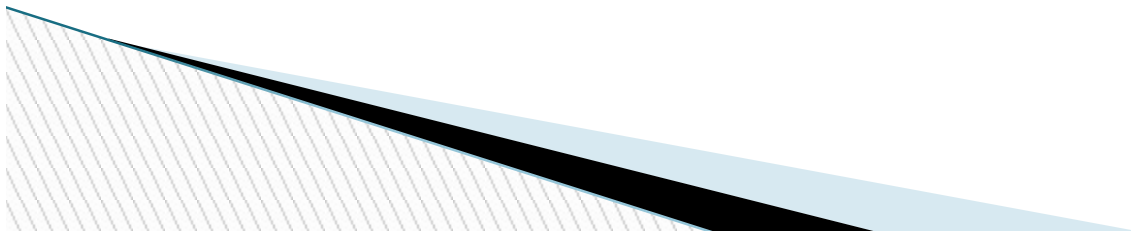
Moderator  
Dr. Srinivas Behra

Presenter  
Bhavani Deepthi  
1<sup>st</sup> year PG–Paediatrics

- Acute abdominal pain is a common complaint in childhood, and it can be caused by a wide range of underlying surgical and non-surgical conditions.
- Abdominal pain in children varies with age, associated symptoms, and location of the pain.
- The most common non-surgical condition is **gastroenteritis**, while the most common surgical condition is appendicitis.



# CAUSES



|                  |   |
|------------------|---|
| <b>Abdominal</b> | <b>Gastro enteritis<br/>Constipation<br/>Worm infestation<br/>Infantile colic<br/>Acute Pancreatitis<br/>Peptic Ulcer Disease<br/>Mesenteric lymphadenitis<br/>Inflammatory Bowel Disease<br/>Viral hepatitis<br/>Urinary Tract Infection</b> |
| <b>Pulmonary</b> | <b>Pneumonia<br/>Pleurisy<br/>Pulmonary embolus<br/>Empyema</b>   |
| <b>Cardiac</b>   | <b>Pericarditis<br/>CCF<br/>Cardiac tamponade</b>   |

|                  |   |
|------------------|---|
| <b>Metabolic</b> | <b>Metabolic acidosis</b><br><b>Acute Intermittent Porphyrria</b><br><b>Acute Adrenal insufficiency</b><br><b>Hyperlipidemia</b><br><b>Uremia</b> |
| Poisonings       | Lead poisoning<br>Snake bite  |
| Drugs            | Salicylates   |
| Miscellaneous    | Sickle cell crisis<br>Henoch Schonlein purpura<br>Herpes Zoster<br>TB abdomen<br>Hereditary angio-neurotic edema                                  |
|                  |   |

## Faces Pain Scale – Revised (FPS-R)

In the following instructions, say "hurt" or "pain," whichever seems right for a particular child.

"These faces show how much something can hurt. This face [point to left-most face] shows no pain. The faces show more and more pain [point to each from left to right] up to this one [point to right-most face] – it shows very much pain. Point to the face that shows how much you hurt [right now]."

Score the chosen face 0, 2, 4, 6, 8, or 10, counting left to right, so '0' = 'no pain' and '10' = 'very much pain.'

Do not use words like 'happy' and 'sad'. This scale is intended to measure how children feel inside, not how their face looks.

Hicks CL, von Baeyer CL, Spafford P, van Kesteren I, Goodenough B. The Faces Pain Scale – Revised: Toward a common metric in pediatric pain measurement. *Pain* 2001;93:173-183. Scale adapted from: Bleil D, Reeve R, Champion GD, Addicott L, Ziegler J. The Faces Pain Scale for the self-assessment of the severity of pain experienced by children: Development, initial validation and preliminary investigation for ratio scale properties. *Pain* 1990;41:139-150.

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0 2 4 6 8 10



0 2 4 6

8

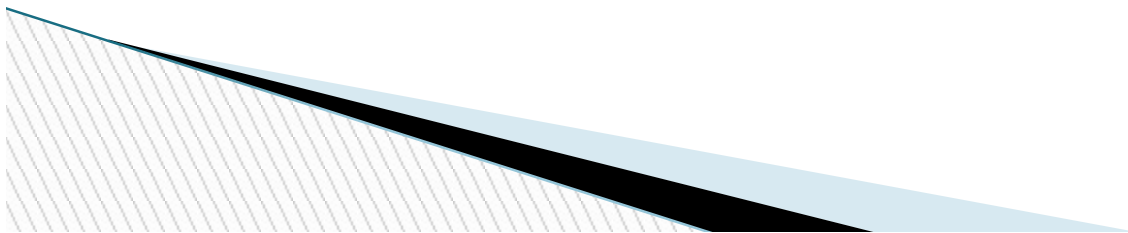
10

NO PAIN

VERY MUCH PAIN

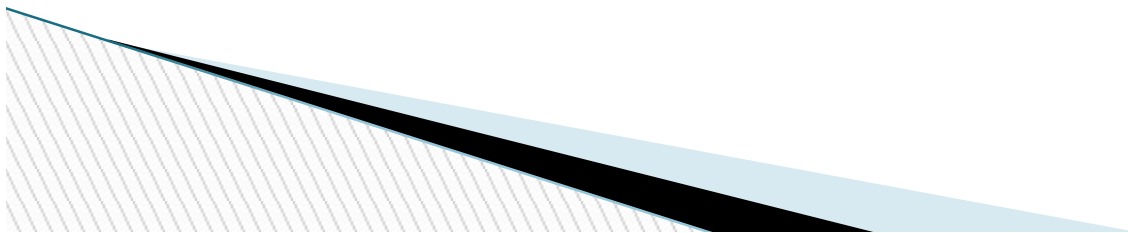
# Gastroenteritis

- Most common medical cause of abdominal pain in children.
- **Viruses** including Rotavirus, Norwalk virus, Adenovirus, & Enterovirus are the most frequent causes .
- **Bacteria** and **Parasites** can also cause acute gastroenteritis in children
- **Worm infestation** is one of the important causes of acute abdomen in children



# Constipation

- } Constipation is defined as a delay or difficulty in defecation present for **2 weeks or longer**, significant to cause distress to the patient.
- } Functional constipation typically starts after the neonatal period.
- } Usually, there is an intentional or subconscious withholding of stool.





## Table 324-2 CHRONIC CONSTIPATION: ROME III CRITERIA

### INFANTS AND TODDLERS

At least 2 of the following:

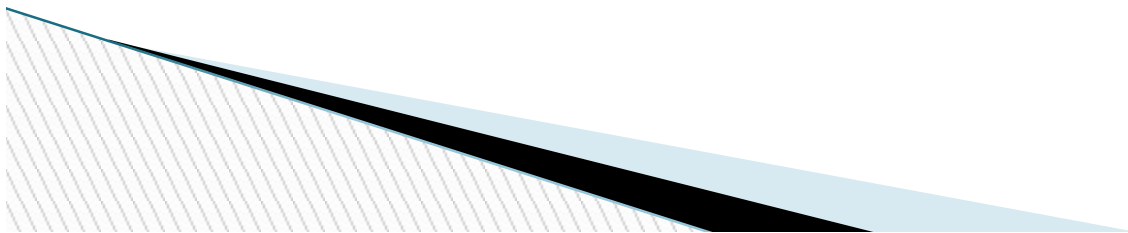
- $\leq 2$  defecations per week
- $\geq 1$  episode of incontinence after the acquisition of toilet training skills
- History of excessive stool retention
- History of painful or hard bowel movements
- Presence of a large fecal mass in the rectum
- History of a large-diameter stool that might obstruct the toilet

### CHILDREN WITH A DEVELOPMENTAL AGE OF 4-18 YEARS

At least 2 of the following:

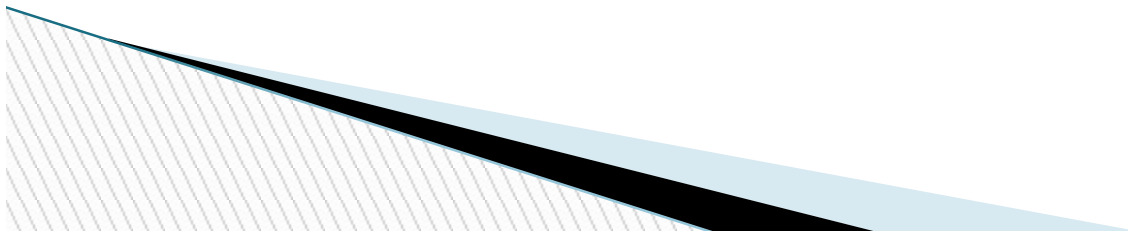
- $\leq 2$  defecations per week
- $\geq 1$  episode of fecal incontinence per week
- History of retentive posturing or excessive volitional stool retention
- History of painful or hard bowel movements
- Presence of a large fecal mass in the rectum
- History of a large-diameter stool that might obstruct the toilet

- } Therapy for functional constipation includes patient education, relief of impaction, and softening of the stool.
- } High fiber diet should be advised.
- } A regular bowel training program should be encouraged.
- } Typical regimens include the use of polyethylene glycol preparations, lactulose, or mineral oil.



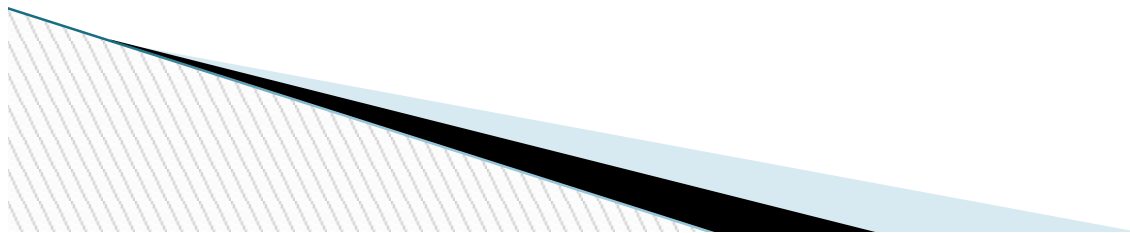
# Acute Pancreatitis

- } Acute pancreatitis, the most common pancreatic disorder in children, is increasing in incidence.
- } In children, blunt abdominal injuries, multisystem disease, biliary stones and drug toxicity are the most common etiologies.
- } Valproic acid, Carbamazepine, and azathioprine are the most common causes of drug-induced pancreatitis.



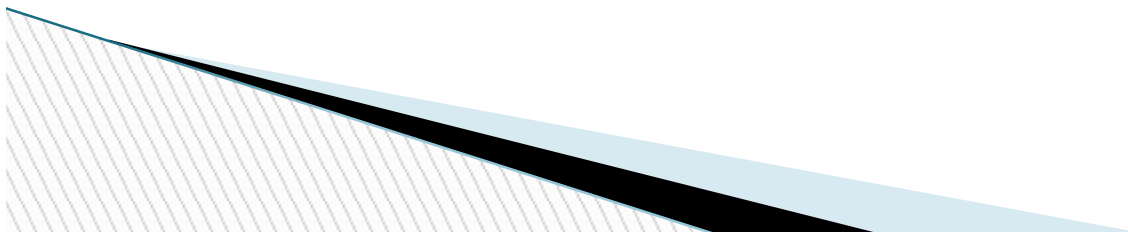
# Clinical features

- } **Mild Acute Pancreatitis:** The patient with abdominal pain, vomiting, and fever.
- } The pain is epigastric or in upper quadrant–antalgic position with hips and knees flexed.
- } **Severe acute pancreatitis:** patient is acutely ill with shock, high fever, jaundice, ascites, hypocalcemia and pleural effusion.
- } A bluish discoloration may be seen around the umbilicus (**Cullen sign**) or in the flanks (**Grey Turner sign**).

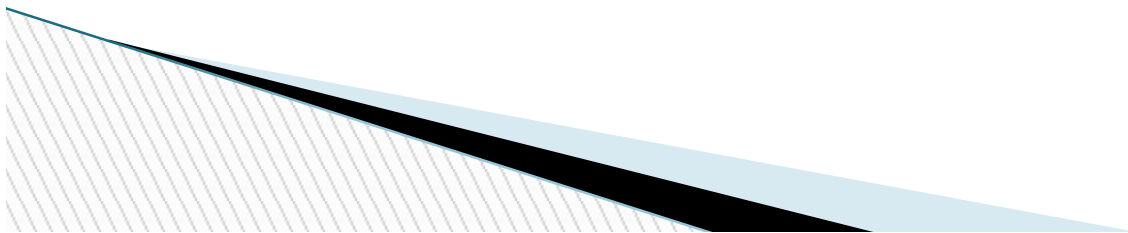


# Management

- } **Serum lipase** is now considered the test of choice for acute pancreatitis as it is more specific than amylase.
- } **CT scanning** has a major role in the diagnosis and follow-up of children with pancreatitis.
- } The aims of medical management are to relieve pain and restore metabolic homeostasis.

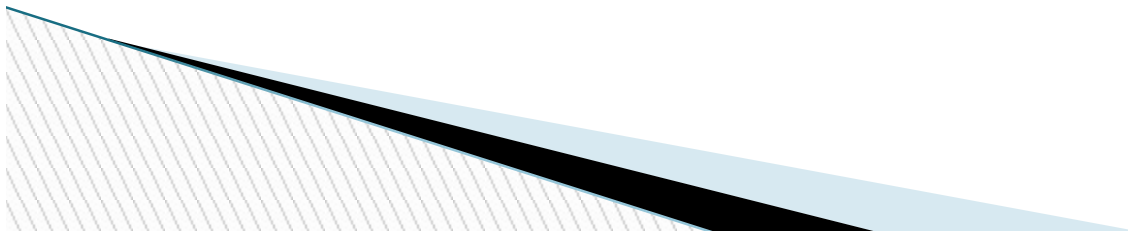


- } Fluid, electrolyte and mineral balance should be restored and maintained.
- } Nasogastric suction is useful in patients who have vomitings.
- } In severe pancreatitis, prophylactic antibiotics are used to prevent infection of pancreas.



# Peptic Ulcer disease

- } Peptic ulcer disease, the end result of inflammation due to an imbalance between **cytoprotective and cytotoxic factors** in the stomach and duodenum.
- } Symptoms such as dyspepsia, epigastric abdominal pain or fullness are seen in older children.
- } Younger children usually present with feeding difficulty, vomiting, crying episodes, hematemesis, or melena.



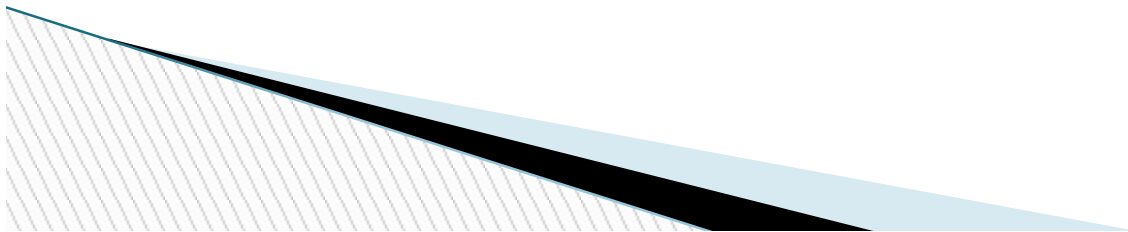
| MEDICATIONS           | DOSE                            | DURATION OF TREATMENT |
|-----------------------|---------------------------------|-----------------------|
| Amoxicillin           | 50 mg/kg/day in 2 divided doses | 14 days               |
| Clarithromycin        | 15 mg/kg/day in 2 divided doses | 14 days               |
| Proton pump inhibitor | 1 mg/kg/day in 2 divided doses  | 1 mo                  |
| <i>or</i>             |                                 |                       |
| Amoxicillin           | 50 mg/kg/day in 2 divided doses | 14 days               |
| Metronidazole         | 20 mg/kg/day in 2 divided doses | 14 days               |
| Proton pump inhibitor | 1 mg/kg/day in 2 divided doses  | 1 mo                  |
| <i>or</i>             |                                 |                       |
| Clarithromycin        | 15 mg/kg/day in 2 divided doses | 14 days               |
| Metronidazole         | 20 mg/kg/day in 2 divided doses | 14 days               |
| Proton pump inhibitor | 1 mg/kg/day in 2 divided doses  | 1 mo                  |

11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100



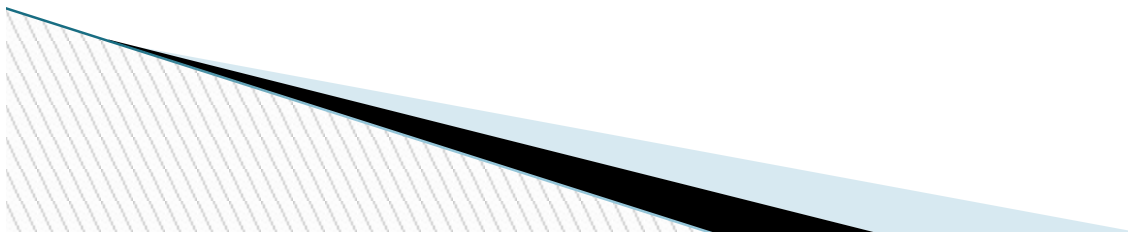
# Urinary Tract Infections

- } Prevalence of UTI is more in boys in first year of life, thereafter increases among **girls** in later life.
- } UTIs are caused mainly by colonic bacteria—*Escherichia coli*, *Klebsiella* spp and *Proteus* spp.
- } UTI is of three forms: **Pyelonephritis, cystitis, asymptomatic bacteriuria.**



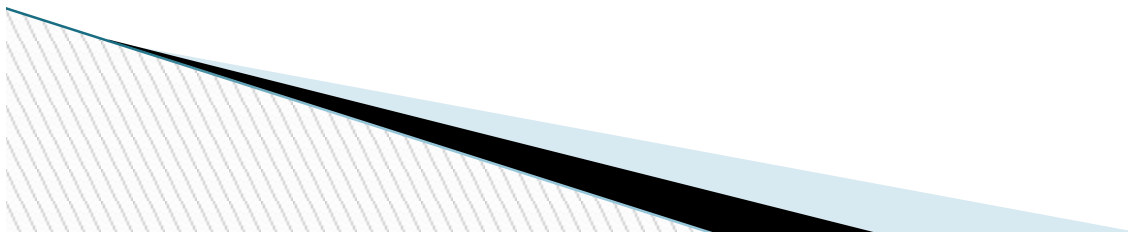
# Management

- } **Urine culture** is necessary for confirmation and appropriate therapy.
- } Sample collection in children should be done without contamination.
- } **Oral 3rd-generation cephalosporins** such as cefixime are as effective as parenteral ceftriaxone against a variety of gram negative organisms.



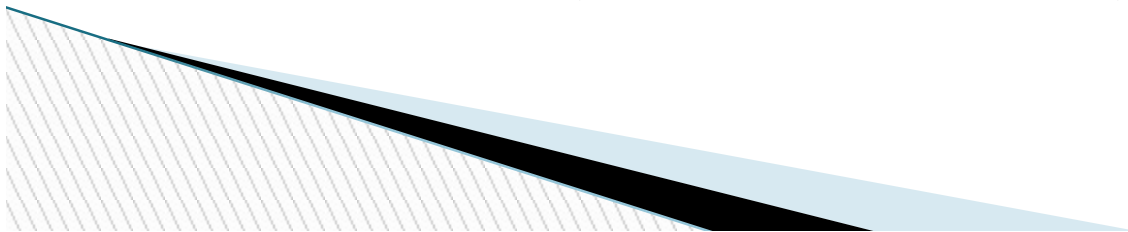
# Infantile colic

- } It is an **excessive** and **paroxysmal** crying mostly in the **evenings** seen in infants.
- } Causes may be GERD,
  - Inexperienced parents with over or under feeding
  - Inadequate burping
- } **Dicyclomine** hydrochloride



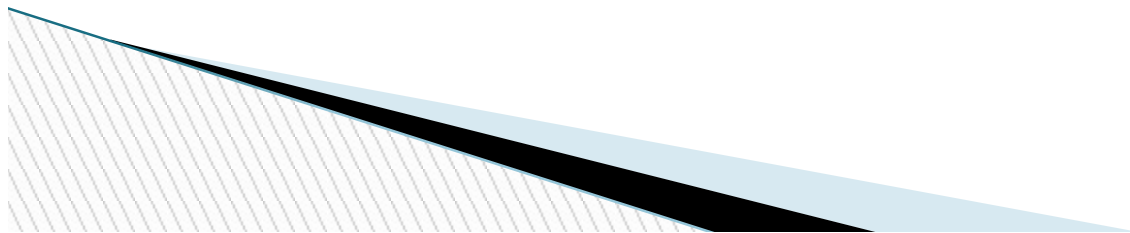
# Mesenteric lymphadenitis

- } As mesenteric lymph nodes are usually in the **right lower quadrant**, this condition sometimes mimics appendicitis, except the pain is more diffuse.
- } Etiologies of mesenteric lymphadenitis include viral and bacterial gastroenteritis, inflammatory bowel disease, and lymphoma.
- } **Viral infection** is most common .
- } Often lymphadenitis established by ultrasound, clinical course, or surgery .

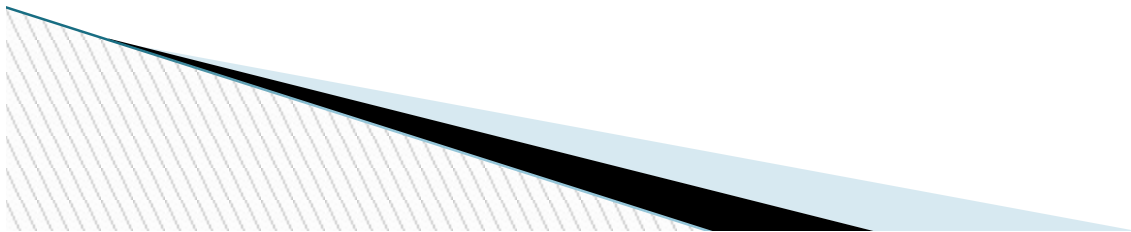


# Inflammatory Bowel Disease(IBD)

- } These are **idiopathic chronic inflammatory disorders.**
- } Usually onset of IBD is during the preadolescent or adolescent era and young adulthood.
- } Blood, mucus, and pus in the stool as well as diarrhea are the typical presentation of IBD. Constipation may also be present.
- } Symptoms such as tenesmus, urgency, cramping abdominal pain (especially with bowel movements), and nocturnal bowel movements are common.

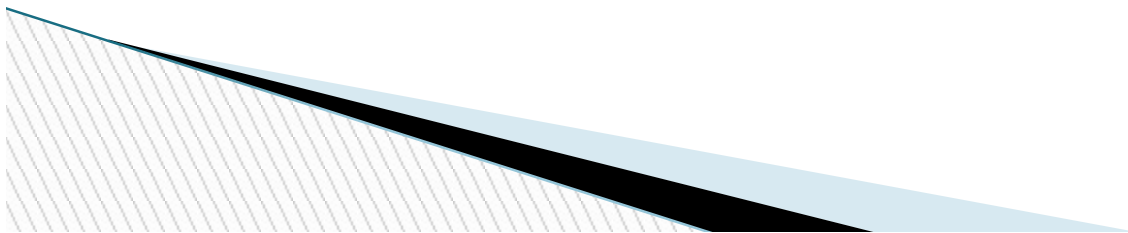


- } Fever, severe anemia, hypoalbuminemia, leukocytosis, and more than 5 bloody stools per day – **fulminant colitis**.
- } **Extraintestinal manifestations** – pyoderma gangrenosum, sclerosing cholangitis and ankylosing spondylitis are associated with above symptoms.

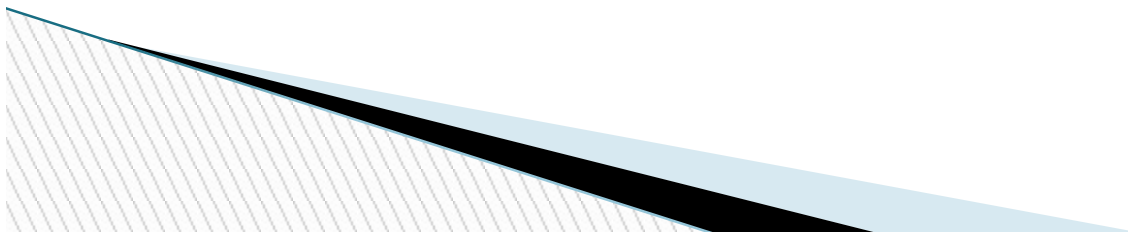


# Viral Hepatitis

- } Viral Hepatitis is caused by hepatotropic viruses–A,B,C,D,E.
- } Necrosis is usually marked in the centrilobular areas. An acute mixed inflammatory infiltrate predominates in the portal areas but also affects the lobules.
- } Fatty change is rare except with HCV infection.



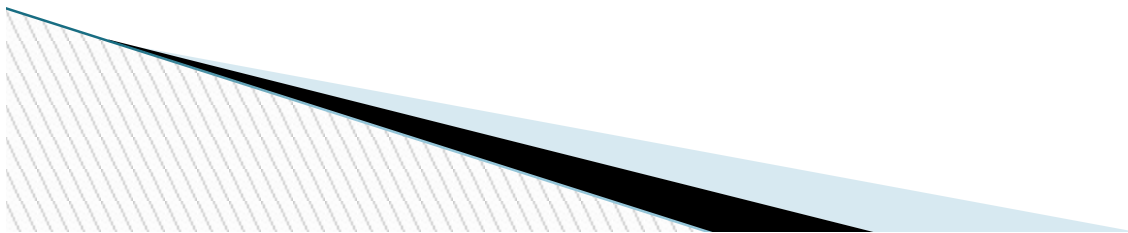
- } Diffuse Kupffer cell hyperplasia is noticeable in the sinusoids.
- } Supportive treatment consists of intravenous hydration as needed and fat-soluble vitamins.





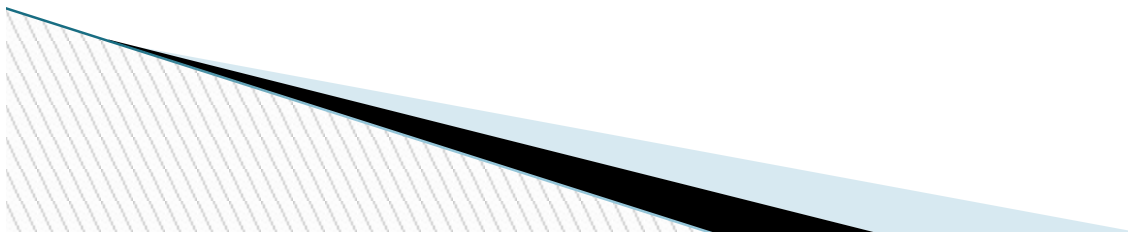
# Pulmonary causes

- } Lower lobe pneumonia or pulmonary infarction of lower lobe may cause pain in the right upper quadrant of abdomen.
- } Pain abdomen in cases of Pleuritis and Empyema is due to referred pain.



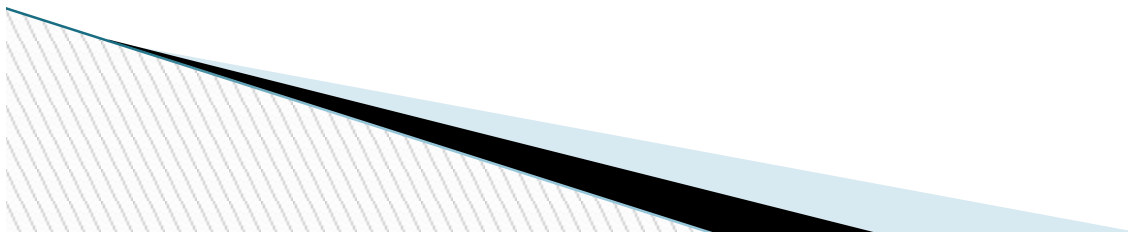
# Cardiac causes

- } Right upper quadrant abdominal pain in **CCF** and **cardiac tamponade** is secondary to hepatic venous congestion.
- } Abdominal pain in acute **Pericarditis** and **Myocarditis** is due to referred pain.

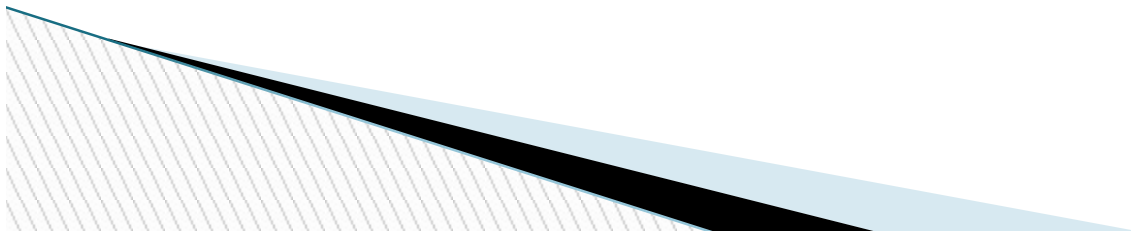


# Metabolic Causes

- Pain in **metabolic acidosis** is due to gastric distension and stretching of liver capsule.
- Causes of metabolic acidosis–Diabetic keto acidosis, Lactate acidosis.
- Abdominal Pain in **acute intermittent porphyria** is diffuse and mild as it is neurologic rather than inflammatory.
- It is due to accumulation of porphyrins which are toxic to the neurons.

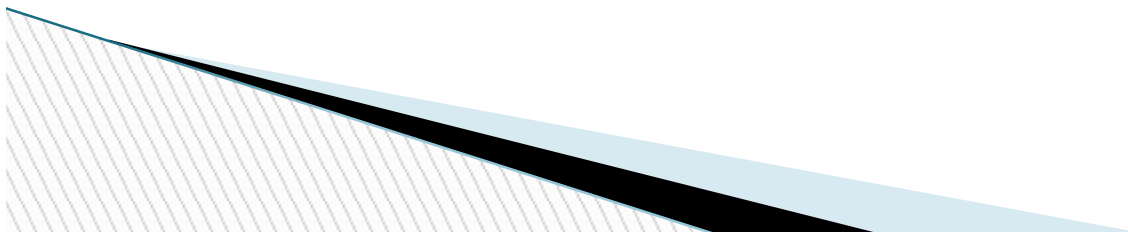


} **Acute adrenal insufficiency** mimics acute abdomen with abdominal pain, nausea, vomiting, fever associated with hypoglycemia, hyponatremia due to reduced cortisol levels.

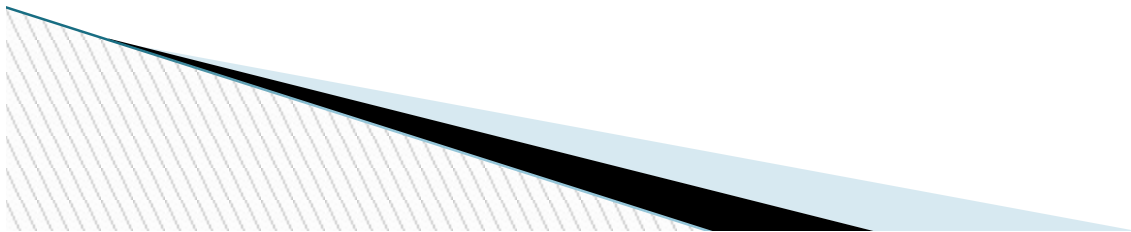


# Poisonings

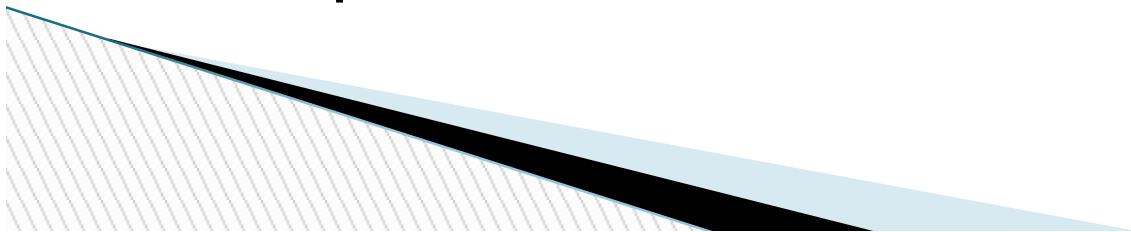
- } **Saturnine colic**: Lead poisoning presenting as abdominal pain.
- } Lead interferes with enzymes of **heme biosynthesis** which leads to accumulation of substrates which are toxic to neurons.
- } Usual sources—swallowing of lead paint on pencils, toys, windows, storage batteries
- } Fatal dose: Lead acetate—20 gms, carbonate—30gms



- } Abdominal colic: first symptom of chronic lead poisoning
- } Gingivitis, stomatitis, **Burtonian line** on gums
- } Chelation Therapy:
  - Ca-EDTA
  - DMSA
  - BAL
  - D-Pencillamine

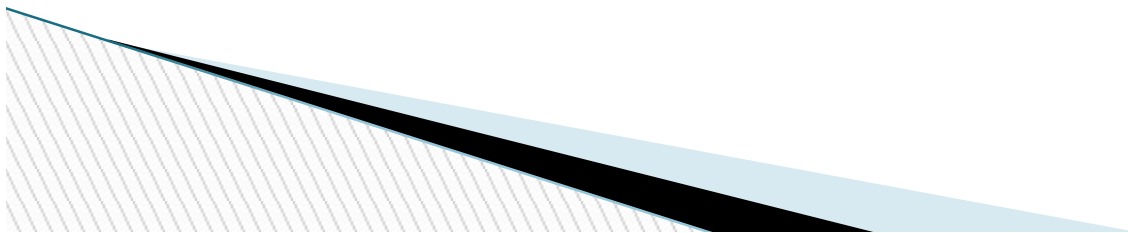


- } Abdominal pain in **Salicylate poisoning** is due to severe gastric irritation and metabolic acidosis.
- } It is also associated with nausea, vomiting, profuse sweating, delirium, hallucinations, convulsions & stupor.
- } Fatal dose–200 mg/kg body weight.
- } Supportive therapy plays a vital role in the management of salicylate poisoning as there is no specific antidote.



**Snake bite** presenting as abdominal pain:

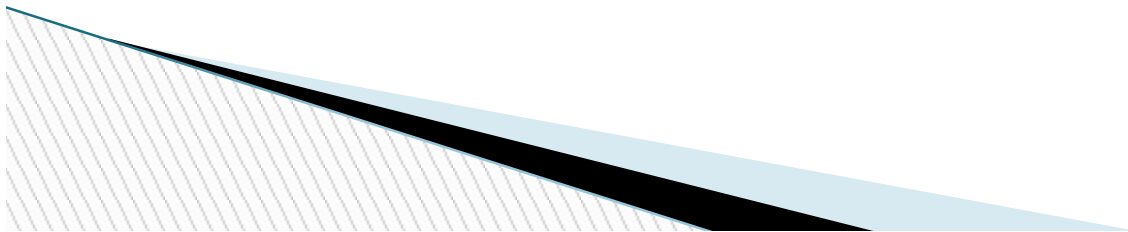
- } Viper bites causing **internal haemorrhage** and abdominal distention.
- } Krait or cobra bites present with abdominal pain –as a feature of **neurotoxicity**.
- } Bite itself can cause **local pain**.



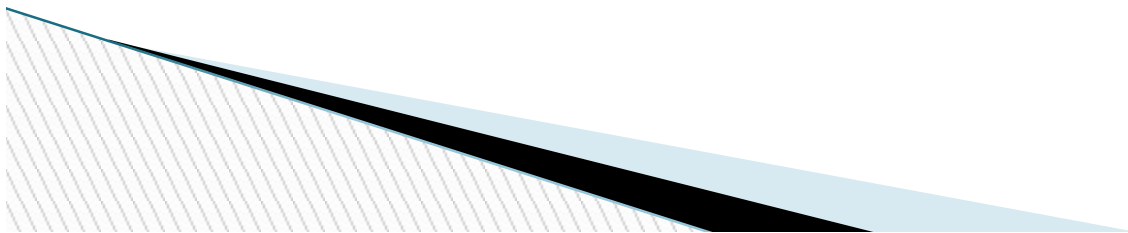


# Sickle cell crisis

- } The pathogenesis is initiated when blood flow is disrupted in the microvasculature by sickle cells, resulting in **tissue ischemia**.
- } **Precipitating causes** of painful episodes can include physical stress, infection, dehydration, hypoxia, local or systemic acidosis, exposure to cold, and swimming for prolonged periods

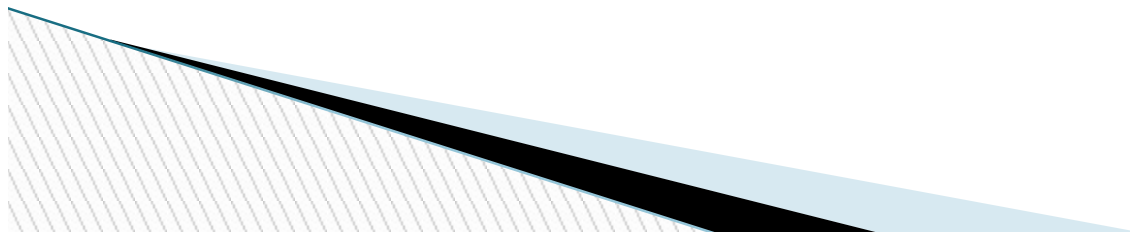


- } Patients with multiple painful episodes requiring hospitalization within a year or with pain episodes that require hospital stays  $> 7$  days should be evaluated for comorbidities and psychosocial stressors.
- } **Hydroxyurea** is the only effective drug proved to reduce the frequency of painful episodes.



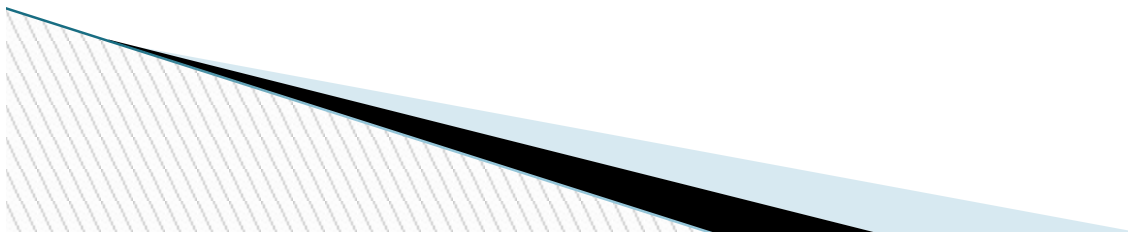
# Treatment

- } Starting dose of hydroxyurea is 15–20 mg/kg given daily, with an incremental dosage increase every 8 wk of 2.5–5.0 mg/kg (maximum of 35 mg/kg per dose.)
- } Monitoring children on hydroxyurea– with initial visits every 2 wk to monitor for hematologic toxicity with dose escalations and then monthly.

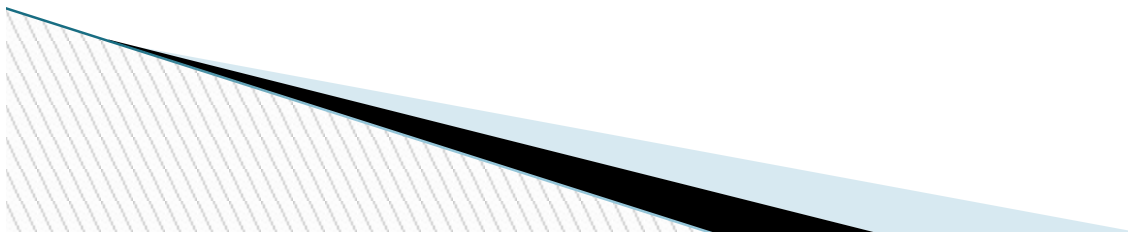


# Henoch–Schonlein purpura

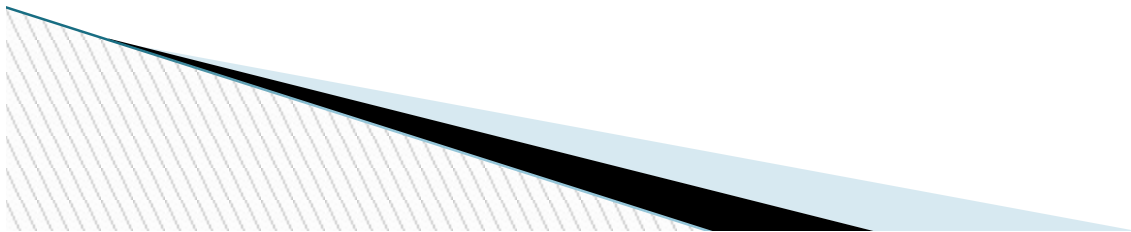
- } Henoch–Schonlein purpura (HSP) is the most common vasculitis of childhood characterized by **immunoglobulin (Ig) A deposition** in the small vessels in the skin, joints, gastrointestinal tract, and kidney.
- } The common finding of deposition of IgA, specifically IgA 1, suggests that HSP is a **disease mediated by IgA immune complexes.**



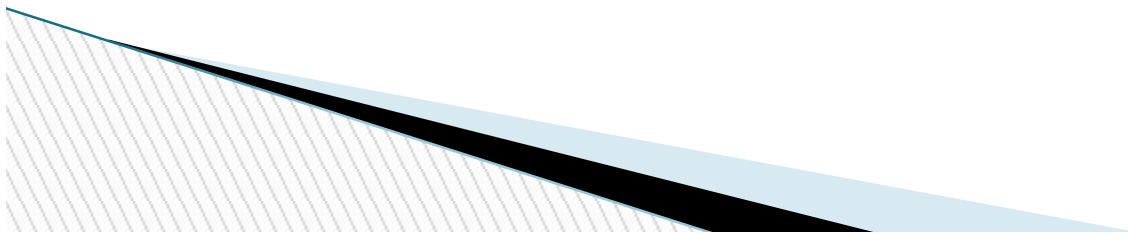
- } The exact pathogenesis of HSP remains unknown.
- } Given the frequency of preceding upper respiratory infections, including group A streptococcal infections, an infectious trigger is suspected.



- } The hallmark of HSP is its **rash**: palpable purpura starting as pink macules or wheals and developing into petechiae, raised purpura, or larger ecchymoses.
- } **Gastrointestinal manifestations** of HSP occur in up to 80% of children with HSP.
- } They include abdominal pain, vomiting, diarrhea, paralytic ileus, melena, intussusception, and mesenteric ischemia or perforation.

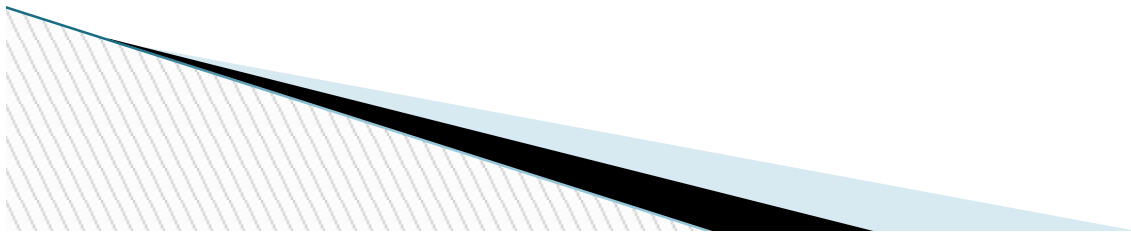


- } **No laboratory finding is diagnostic of HSP.**
- } Common but nonspecific findings include leukocytosis, thrombocytosis, mild anemia, and elevations of erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP).
- } **Occult blood is frequently found in stool specimens.**
- } **Ultrasound** is often used in the setting of gastrointestinal complaints to look for bowel wall edema or the rare occurrence of an associated intussusception



# Treatment

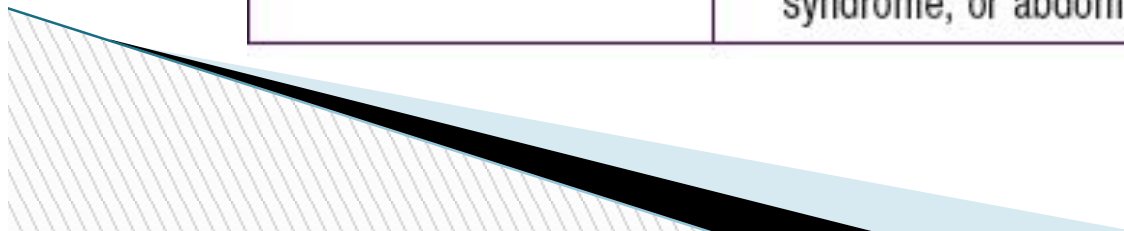
- } Treatment of HSP is **supportive**, with an emphasis on assuring adequate hydration, nutrition, and analgesia.
- } **Steroids** are most often used to treat significant gastrointestinal involvement or other life-threatening manifestations.
- } Empiric use of **Prednisone** (1 mg/kg/day for 1 to 2 wk, followed by taper) reduces abdominal and joint pain but does not alter overall prognosis.



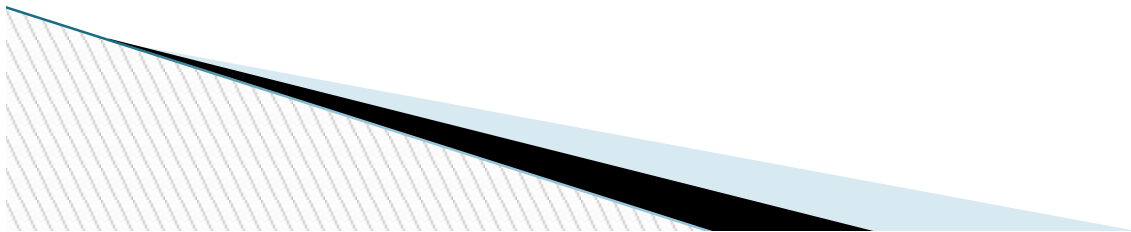


# Functional abdominal pain

|                                    |  |
|------------------------------------|--|
| Functional abdominal pain          | Abdominal pain without demonstrable evidence of pathologic condition, such as anatomic metabolic, infectious, inflammatory or neoplastic disorder. Functional abdominal pain can manifest with symptoms typical of functional dyspepsia, irritable bowel syndrome, abdominal migraine or functional abdominal pain syndrome. |
| Functional dyspepsia               | Functional abdominal pain or discomfort in the upper abdomen   |
| Irritable bowel syndrome           | Functional abdominal pain associated with alteration in bowel movements  |
| Abdominal migraine                 | Functional abdominal pain with features of migraine (paroxysmal abdominal pain associated with anorexia, nausea, vomiting or pallor as well as maternal history of migraine headaches)   |
| Functional abdominal pain syndrome | Functional abdominal pain without the characteristics of dyspepsia, irritable bowel syndrome, or abdominal migraine.   |

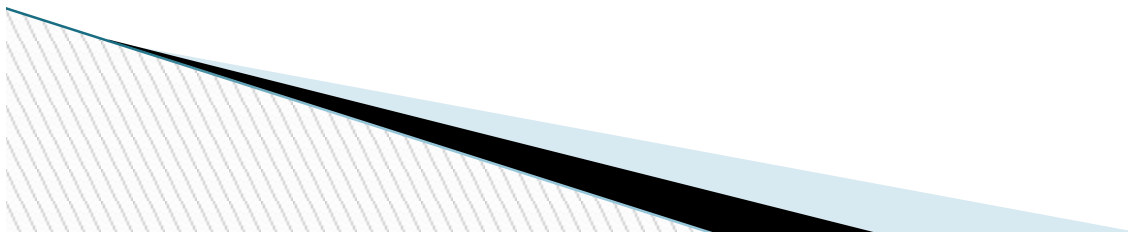


- } **Visceral hypersensitivity** and **motility disturbances** are thought to be involved in functional abdominal pain.
- } Visceral hypersensitivity leading to abnormal bowel sensitivity to stimuli (physiologic, psychologic, noxious) might have a more dominant role in functional abdominal pain.



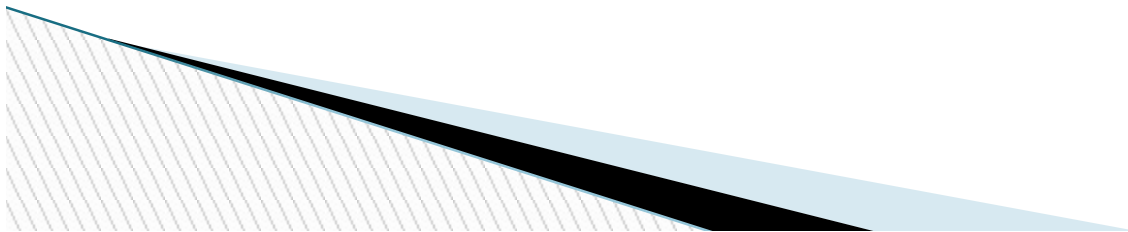
# Management

- } Child can be labelled to have functional abdominal pain only after proper history, examination and investigations to rule out organic causes.
- } The most important component of the treatment is reassurance and education of the child and family.
- } Treatment goals should be set for return to function and minimizing pain.
- } Cognitive-behavioral therapy is helpful in managing pain and functional disability.



# References

- } Nelson's Text book of Paediatrics – 19<sup>th</sup> Edition
- } Paediatric Gastro enterology – 2<sup>nd</sup> Edition.



**Thank you**

