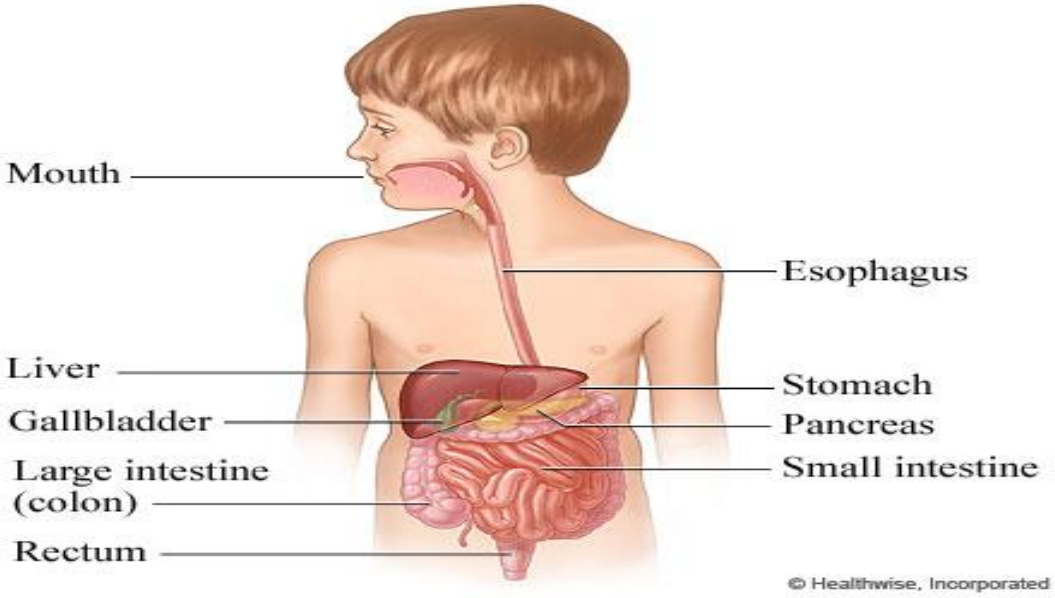
Gastrointestinal System of Children

Introduction and Overview of Digestive System

Disorders that affect the digestive (gastrointestinal) system are called digestive disorders. The digestive system is responsible for breaking down food we eat into smaller components so that nutrients can be easily absorbed by the body and the waste discarded.

Several body parts, including the mouth, esophagus, stomach, small intestine, large intestine, and anus, make up the digestive (gastrointestinal) tract.



Classification of digestive diseases

A- Congenital and structure disorders of digestive

1. Cleft lip and Palate.
2. Esophageal Atresia and Tracheoesophageal Fistula.
3. Pyloric Stenosis.
4. Intussusceptions.
5. Hirschsprung's Disease.
6. Hernias.
7. Imperforated anus.

B- Infection and inflammatory Disorders

1. Appendicitis.
2. Peptic Ulcer.
3. Diarrhea.
4. Gastritis and Gastroenteritis.
5. Stomatitis.

C- Disorders of Motility

☒ Constipation.

D- Allergic and Malabsorption disorders

☒ Celiac Disease.

Common terminology

Enteritis: Inflammation of the intestines and especially of the human ileum.

Gastroenteritis: is means inflammation of the stomach and intestines. It is a very common and infectious illness involving vomiting and diarrhea.

Oral rehydration therapy (ORT): The administration of special fluids by mouth.

Oral rehydration solution (ORS): A liquid specially formulated to be given as a drink to correct the water, mineral, and nutritional deficiencies in an individual, especially an infant, who is affected by dehydration.

Vomiting: Throw up stomach contents: to expel the contents of the stomach through the mouth as a result of a series of involuntary spasms of the stomach muscles.

Stomatitis: Is inflammation of the mouth and lips.

Meconium: is the infant's first stool, composed of amniotic fluid and its constituents, intestinal secretions, shed mucosal cells, and possibly blood (ingested maternal blood or minor bleeding of alimentary tract vessels).

Transitional Stools: these usually appear by the **third day** after initiation of feeding. They are greenish brown to yellowish-brown, thin, and less sticky than meconium and may contain some milk curds.

Milk Stools: these usually appear by the fourth day.

In breastfed infants stools are yellow to golden, are pasty in consistency, and have an odor similar to that of sour milk.

In formula-fed infants stools are pale yellow to light brown, are firmer in consistency, and have a more offensive odor.

Assessment of GI Disorders includes

1. Child History.
2. Birth weight.
3. Prematurity.
4. History of maternal infection.
5. Feeding.

The nurse Ask about:

1. Duration of illness.
2. Frequency of stools and associated vomiting.
3. Color of vomit (if green bilious vomit, consider obstruction).
4. Nature of stools, including presence of blood in stool.
5. Feeds (fluid and food intake).
6. Urine output (number of wet nappies).
7. Exposure to infect.
8. Recent antibiotic use
9. Weight loss.
10. Underlying problems e.g. Low birth-weight, malnutrition, neuro-disability.

Nurse Assessment

1. Weight, including any previous recent weight.
2. Temperature, pulse, respiratory rate.
3. Degree of dehydration.
4. Complete systemic examination.
5. Abdominal distention.
6. Abdominal circumference.
7. Abdominal pain.

Common GI Diagnostic Test

1. General stool examination
2. Barium swallow/ enema.
3. Abdominal ultrasound.
4. CT scan with or without contrast.
5. MRI.
6. Endoscopy.

Diarrhea

Diarrhea is defined either as watery stool or increased frequency (or both) when compared to a normal amount.

Types of Diarrhea

1. Acute diarrhea (short-term, less than 14 days), which is usually related to bacterial or viral infections.
2. Chronic diarrhea (long-term, longer than 14 days), which is usually related to functional disorders, such as irritable bowel syndrome, or may be due to diseases such as ulcerative colitis, celiac sprue, or Giardia.

Common Causes of Diarrhea

Examples	Causes
Intestinal infection	Viral (Rotavirus), Bacterial (E. coli, Vibrio cholera), Parasites (Giardia).
Food sensitivity	Gluten, Cow's milk.
Food intolerance	Overfeeding, Introduction of new foods.
Medications	Iron, Antibiotics.
Colon disease	Ulcerative colitis, Cancer.
Surgical alteration	Short bowel syndrome.
Emotional stress	Anxiety, Fatigue.

When Admit Children with Diarrhea and Vomiting

Children should be admitted to hospital if they are:

- ☒ Moderately dehydrated (observe for 4–6 hours to ensure adequate rehydration).
- ☒ Severely dehydrated or in shock (intravenous fluids are required).
- ☒ At high risk of dehydration (< 6 months old, high).
- ☒ Frequency of watery stools or vomits, minimal oral intake, worsening symptoms.

- ☒ At high risk of complications (children with significant underlying disease) (e.g., diabetes, renal failure), high fever, poor nutrition.
- ☒ Suspected of having another diagnosis (e g, appendicitis, intussusceptions).

Symptoms of diarrhea

1. Cramping.
2. Abdominal pain.
3. Bloating.
4. Nausea.
5. Fever.
6. Bloody stools.
7. Dehydration.

Warning Signs of Severe Diarrhea

1. Abdominal pain.
2. Blood in the stool.
3. Frequent vomiting.
4. Loss of appetite.
5. High fever.
6. Dry, sticky mouth.
7. Weight loss.
8. Urinates less frequently (wets fewer than 6 diapers per day).
9. Frequent diarrhea.
10. Extreme thirst.
11. No tears when crying.
12. Depressed fontanel (soft spot) on infant's head.

Treatment for Diarrhea

Treatment of diarrhea depends on the cause. Treatment usually involves **replacing lost fluids**.

Antibiotics may be prescribed when bacterial infections are the cause.

Dangerous of Diarrhea

Diarrhea can be dangerous if not treated properly because it **drains water and salts from the child**. If these are not put **back quickly**, dehydration can occur, and hospitalization may be **necessary**. It is most important that the child with diarrhea **continues to drink an appropriate quantity of fluids to avoid dehydration**.

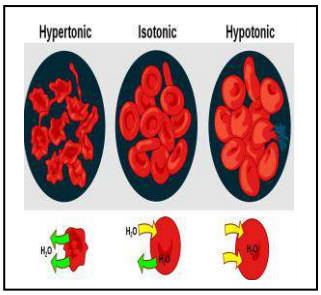
Dehydration

A loss of body fluids, which are made up of water and salts. When sick children vomit or have diarrhea, they can lose large amounts of salts and water from their bodies and can become dehydrated very quickly. Dehydration can be very dangerous, especially for babies and toddlers. Children can even die if they are not treated.

Types of Dehydration

1. Isotonic: electrolyte and Water are lost in equal amounts.
2. Hypotonic (hyponatremic): Electrolyte deficit exceeds water deficit.
3. Hypertonic (hypernatremic): Water loss exceeds electrolyte loss. This type of dehydration is the most dangerous and requires much more specific fluid therapy.

Degree of Dehydration



1. Mild. (Weight loss— infants 3%-5%, children 3%-4%).
2. Moderate (Weight loss— infants 6%-9%, children 6%-8%).
3. Severe. (Weight loss— infants ≥10%, children 10%).

Signs of dehydration

1. Decreased urination (less than four wet diapers in 24 h).
2. No tears.
3. Dry skin, mouth, and tongue.
4. Sunken eyes.
5. Grayish skin.
6. Sunken soft spot (fontanel) on infant's head.



Oral Rehydration Solutions

They are exact mixtures of water, salts, and sugar. These solutions can be absorbed by the body, even when infection is causing the child to vomit.

Assessment of dehydration

Characteristic	Mild	Moderate	Severe
General appearance	Normal	Lethargic or thirsty	cold, cyanotic extremities, drowsy
Radial pulse	Normal	Slightly increased	Very increased
Respiration	Normal	Slight tachypnea (rapid)	Hyperpnea (deep and rapid)
Skin elasticity	Capillary refill >2 sec	Slowed capillary refill (2-4 sec [decreased turgor])	Very delayed capillary refill (>4 sec)

Anterior fontanel	Normal	Normal to Sunken	Sunken
Tears	Present	Decreased	Absent, sunken eyes
Mucous membranes	Normal (moist)	Dry	Parched
Urine output	Decrease	Oliguria	Oliguria or anuria
Behavior	Normal	Irritable, more thirsty	Hyperirritable to lethargic
Thirst	Slight	Moderate	Intense

Treatment of Mild Dehydration:

1. Give extra fluid more than usually to prevent dehydration such as ORT.
2. Increase breast feeding.
3. IF the not breast feeding give ORT (50 ml/kg) in 4 hr. or food-based fluid (such as soup, rice water).
4. The mother should know how prepare and how much ORS give for her child.
5. Take child to hospital when: the signs and symptoms of severe dehydration appear.

Treatment of Moderate Dehydration:

1. Extra fluid.
2. Continuous feeding.
3. ORS (100 ml/kg) in 4 hr.
4. Take child to hospital when: the signs and symptoms of severe dehydration appear.

Treatment of Severe Dehydration:

1. Intravenous fluid will be given.
2. The child needs to stay in hospital until the dehydration is controlled.
3. Reassess the child every 1-2 hrs.

General Nursing responsibility toward child with Gastroenteritis

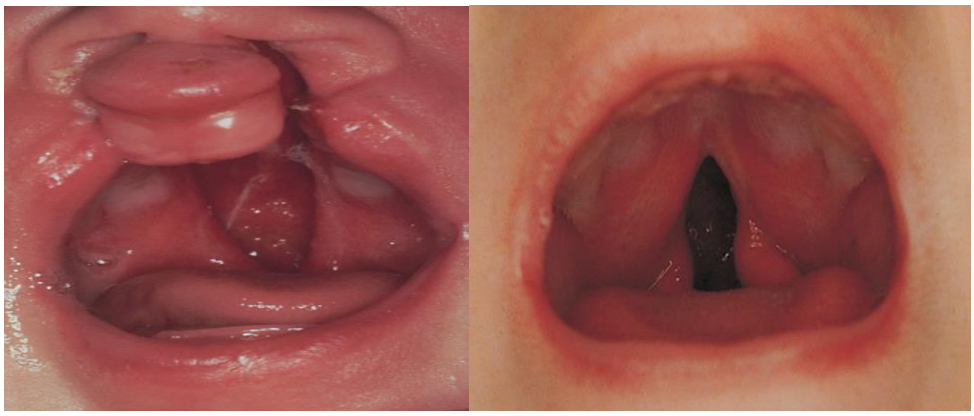
Nurse and child

1. Frequent monitor intake and output.
2. Monitor vital signs every 2-4 hrs.
3. Observe and record the stool or vomiting contain (amount ,color ,consistency, odor and frequency).
4. Wash hands before and after contact with the child.
5. Daily measure body weight.
6. Give special care hygiene for child skin, mouth).
7. Determine the causes of G.E.
8. Isolate child until the cause determined.
9. Assess the level of consciousness.
10. Provide and maintain fluid and electrolyte (ORT or IV fluid).
11. Promote child at rest and comfort.

12. When child become better a normal diet for the child's age is slowly reintroduced.

Cleft Lip and Cleft Palate

Cleft lip (CL) with or without cleft palate (CP) is the most common birth defect.
Isolated CL with or without CP is more common in males and CP alone is more common in females.



A, Bilateral cleft lip with complete cleft palate. Cleft extends from soft to hard palate, exposing nasal cavity.
B, Midline cleft of soft palate.

Etiology

1. Combination of genetic and environmental factors.
2. Alcohol use.
3. Cigarette smoking.
4. Prescription drugs, including anticonvulsants, and steroids.
5. Folic acid supplements may protect against clefting.

Therapeutic Management

Multidisciplinary team, including plastic surgery, orthodontics, speech-language pathology, pediatrics, nursing, audiology, social work, and psychology.
Repaired within the first year of life.
Management of both defects is directed toward surgical closure of the cleft, prevention of complications, and facilitation of normal growth and development of the child.

Surgical Correction: Cleft Lip

- ☒ Occurs when the baby is between 2 and 3 months of old.
- ☒ Surgical correction is performed when the infant is free of any oral, respiratory, or systemic infection.
- ☒ Lip, nose, and scar revisions may be required at a later age.

Surgical Correction: Cleft Palate

- ☒ Completed between 6 and 12 months.
- ☒ Early repair of the cleft palate may restrict skeletal growth of the mid-face, delaying palate repair after first words emerge may result in significant speech disorders.

Nursing Care Management

1. Feeding the infant and dealing with the parental reaction to the defect.
2. Parents emotional needs.
3. Encourage expression of parental grief and fears.

4. Promote attachment in the preoperative period.
5. Emphasize the positive aspects of the infant's physical appearance and to express optimism regarding surgical correction while acknowledging the parents' concern.

Preoperative Care

1. Encourage the transition to cup-feeding before CP surgery, and this feeding method is used postoperatively as well.
2. Alternative methods, such as syringe-feeding,
3. Medication is determined by the surgeon and anesthesiologist.

Postoperative Care: Cleft Lip

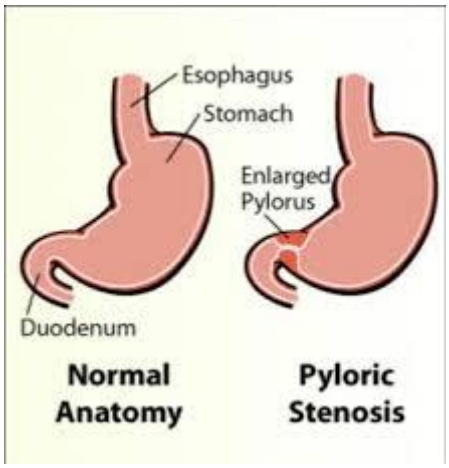
1. Protecting the operative site.
2. Avoid the prone position to prevent suture damage.
3. Return to breastfeeding or bottle-feeding, while others require syringe-feeding once the child is awake and alert.
4. Prevent the infant from rubbing the suture line.
5. Careful supervision of the child is recommended to ensure that the suture line not damaged by an object or fingers entering the mouth.
6. Pain management (analgesic).
7. Antibiotic ointment may be prescribed for application to the suture line for three days, followed by application of type jelly for several weeks.
8. Parents should be using water or diluted hydrogen peroxide.
9. Prevent airway obstruction by secretions, blood, or the tongue.
10. Gentle aspiration of mouth and nasopharyngeal secretions may be necessary to prevent aspiration and respiratory complications.
11. Monitoring operative sites for bleeding.
12. Excessive swallowing may be a sign of bleeding and swallowing blood.

Postoperative Care: Cleft Palate

1. Closely observed postoperatively for signs of airway obstruction, Hemorrhage, Laryngeal spasm.
2. A face mask is often used to deliver oxygen.
3. A tongue stitch may be used to prevent the tongue from obstructing the airway.
4. Check vital signs and oxygen saturation.
5. Signs of stridor, croup, or difficulty breathing and/ or swallowing should be carefully evaluated.
6. Clear liquids for 24 hours followed by a liquid diet for 2 weeks.
7. A soft diet may be encouraged for a full 6 weeks following palate repair.
8. Acceptable feeding devices include open cup for liquids, but rigid utensils such as spoons, to avoid accidental injury to the repair.
9. Keep the hands away from the mouth.
10. Assess the infant for pain postoperatively.

Hypertrophic Pyloric Stenosis

Hypertrophic pyloric stenosis (HPS) occurs when the circumferential muscle of the pyloric sphincter becomes thickened, resulting in elongation and narrowing of the pyloric canal.



This produces an outlet obstruction and compensatory dilation, hypertrophy, and hyperperistalsis of the stomach.

This condition usually **develops in the first few weeks of life, causing**:

1. Non-bilious vomiting, which occurs after a feeding.
2. Projectile vomiting may develop, and the infant is fussy and hungry after vomiting.
3. If the condition is not diagnosed early, dehydration, metabolic alkalosis,
4. Failure to thrive may occur.
   - Common in firstborn children.
   - Boys are affected four to six times more frequently than girls.
   - It is more likely to affect full-term infants than premature infants.

Therapeutic Management

Surgical relief of the pyloric obstruction by pyloromyotomy is the standard therapy for this disorder.

Nursing care

A. Preoperative care

1. Restoring hydration and electrolyte balance.
2. The infant is kept NPO and given IV fluids of dextrose.
3. Careful monitoring of the IV fluids.
4. Strict monitoring of intake and output are important.
5. Record accurate description of any vomiting and the number and character of stools.
6. Observations include assessment of vital signs, (indicate fluid or electrolyte imbalances).
7. Assess the skin and mucous membranes for alterations in hydration status.
8. Ensuring that the NG tube is patent and functioning properly and that the type and amount of NG drainage is recorded.

B. Postoperative care

1. Notify if vomiting during the first 24 to 48 hours.
2. IV fluids are administered until the infant is taking and retaining adequate amounts by mouth.
3. Observation of vital signs.
4. Monitoring of IV fluids.

5. Careful monitoring of intake and output.
6. Appropriate analgesics if pain is continuous.
7. Feedings are usually instituted within several hours postoperatively, beginning with clear liquids.
8. If the infant has been breastfed, breast milk expressed by the mother may be given by bottle when the infant is able to tolerate feedings.
9. Observe the operative site for any drainage or signs of inflammation.

Hirschsprung disease (HD) is a congenital anomaly that results in mechanical obstruction from inadequate motility of part of the intestine.

It accounts for about one fourth of all cases of neonatal intestinal obstruction. The incidence is 1 in 5000 live births.

It is four times more common in males than in females.

In more than 80% of cases the a ganglionosis is restricted to the internal sphincter, rectum, and a few centimeters of the sigmoid colon and is termed short-segment disease.

Pathophysiology

The pathology of HD relates to the absence of ganglion cells in the affected areas of the intestine, resulting in a loss of the recto sphincteric reflex and an abnormal microenvironment of the cells of the affected intestine.

The absence of ganglion cells in the affected bowel results in a lack of enteric nervous system stimulation, which decreases the internal sphincter's ability to relax.

Clinical Manifestations of Hirschsprung Disease

Newborn Period

1. Failure to pass meconium within 24 to 48 hours after birth.
2. Refusal to feed.
3. Bilious vomiting.
4. Abdominal distention.

Infancy

1. Failure to thrive.
2. Constipation.
3. Abdominal distention.
4. Episodes of diarrhea and vomiting.
5. Signs of enterocolitis.
   - Explosive, watery diarrhea.
   - Fever.
   - Appears significantly ill.

Childhood

1. Constipation.
2. Ribbon like, foul-smelling stools.
3. Abdominal distention.
4. Visible peristalsis.
5. Easily palpable fecal mass.

6. Undernourished, anemic appearance.

Diagnostic Evaluation

1. Intestinal obstruction or failure to pass meconium.
2. Chronic pattern of constipation.
3. On examination the rectum is empty of feces.
4. A contrast enema (megacolon).
5. Rectal biopsy (absence of ganglion cells).

Therapeutic Management

The majority of children with HD require one of three operative procedures:

1. Soave pull-through.
2. The Swenson procedure.
3. The Duhamel procedure.

Once the child is stabilized with fluid and electrolyte replacement and colonic cleansing with enemas, if needed, surgery is performed, usually with a high rate of success.

Surgical management consists primarily of the removal of the aganglionic portion of the bowel to relieve obstruction, restore normal motility, and preserve the function of the external anal sphincter.

Constipation and fecal incontinence are chronic problems in a small proportion of patients after surgical correction for HD.

Nursing Care Management

The nursing concerns depend on the child's age and the type of treatment.

Preoperative care

1. Prepare the parents for the medical-surgical intervention.
2. Prepare the parents to assume the care of the child after surgery.
3. Child who is malnourished may not be able to withstand surgery until his or her physical status improves.
4. Emptying the bowel with repeated saline enemas and decreasing bacterial flora with oral or systemic antibiotics and colonic irrigations using antibiotic solution. Enterocolitis is the most serious complication of HD.
5. Monitoring of vital signs.
6. Signs of shock;
    a. Monitoring fluid and electrolyte replacements
    b. Plasma or other blood derivatives
    c. Observing for symptoms of bowel perforation, (fever, increasing abdominal distention, vomiting, increased tenderness, irritability, dyspnea, and cyanosis).

Postoperative care

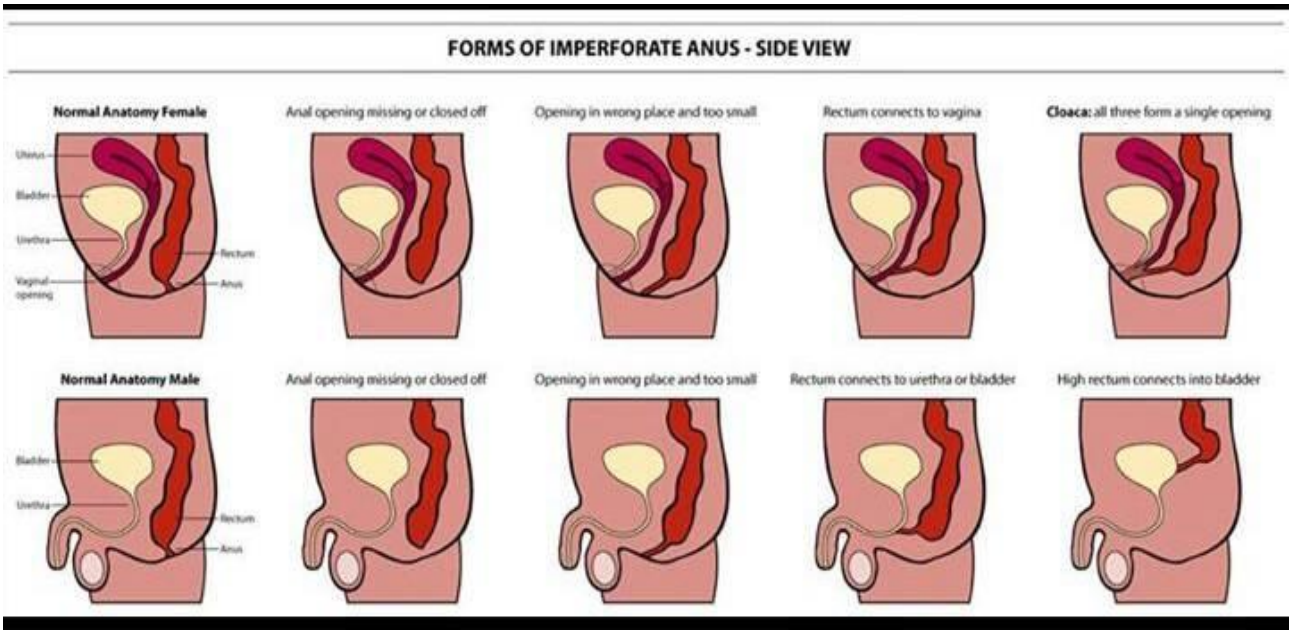
1. Feedings.
2. Observe for signs of wound infection, irregular passage of stool (constipation or true incontinence).
3. Parents need instruction concerning the development of complications such as enterocolitis, fecal incontinence, and obstruction.

4. Some children will require daily anal dilatations to avoid anastomotic strictures.
5. Parents are often taught to perform the procedure in the home and will need encouragement and detailed instructions in order to perform these dilatations.
6. Colostomy may be performed in some children with HD (skin care to prevent skin breakdown).

Approximately 10% of adults who had HD as a child report problems with severe diarrhea, 5% report severe constipation, and 5% report severe soiling.

Anorectal Malformations

- ☒ More common congenital malformations caused by abnormal development.
- ☒ Simple imperforate anus to include other associated complex anomalies of Genitourinary and pelvic organs, require extensive treatment for fecal, urinary, and sexual function.
- ☒ Rectal atresia and stenosis occur when the anal opening appears normal, there is a midline intergluteal groove, and usually no fistula exists between the rectum and urinary tract.
- ☒ Rectal atresia is a complete obstruction (inability to pass stool) and requires **immediate surgical intervention**.
- ☒ Rectal stenosis may not become apparent until later in infancy when the infant has a history of difficult stooling, abdominal distention, and ribbon-like stools.
- ☒ A persistent cloaca is a complex anorectal malformation in which the rectum, vagina, and urethra drain into a common channel opening into the perineum.



Diagnostic Evaluation

☒ Physical finding:

1. Absent anal opening.
2. Abdominal distention and vomiting.
3. Absence of meconium passage, or presence of meconium in the urine.
4. Absence of a midline intergluteal groove.

5. Pelvic MRI, radiography, ultrasound, and fluoroscopic examination of pelvic anatomic contents and lower spinal anatomy.

Therapeutic Management

1. The primary management of anorectal malformations is surgical.
2. The newborn is stabilized and kept NPO for further evaluation.
3. IV fluids are provided to maintain glucose and fluid and electrolyte balance.
4. Possibly a combination of several, of the following procedures: anoplasty, colostomy, posterior sagittal anorectoplasty (PSARP), and colostomy (take-down) closure.
5. Minimizes surgical risks, associated morbidity.
6. Postoperative pain management.

Nursing Care Management

☒ Assisting in identification of anorectal malformations.

1. A newborn that does not pass stool within 24 hours after birth or has meconium that appears at a location other than the anal opening requires further assessment.

Postoperative care includes:

1. IV fluids.
2. Healing the surgical site without other complications.
3. A program of anal dilations is usually initiated when the child returns for the 2-week checkup.
4. Feedings are started soon after surgical repair, and breastfeeding is encouraged because it causes less constipation.
5. Colostomy is performed to allow fecal elimination and avoid fecal contamination.
6. With a colostomy, postoperative nursing care is directed toward maintaining appropriate skin care at the stoma sites (both distal and proximal).
7. Managing pain.
8. Administering IV fluids and antibiotics.
9. Postoperative NG decompression may be required with laparotomy.
10. Maintenance of appropriate drainage.
11. Parents are instructed in perineal and wound care or care of the colostomy as needed.
12. Anal dilations may be necessary for some infants.
13. Parents should observe stooling patterns and observe for signs of anal stricture or complications.

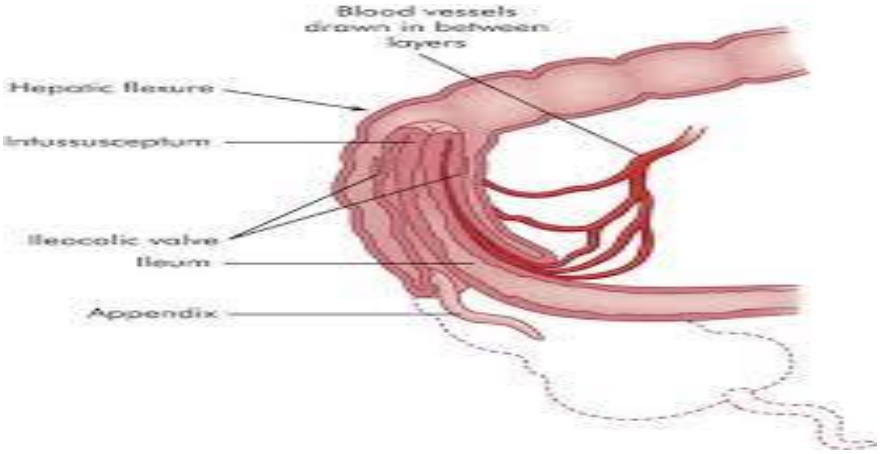
Intussusception

☒ Intussusception is the most common cause of intestinal obstruction in children between the ages of 3 months and 6 years. More common in males than females

☒ More common in children under the age of 2 years.

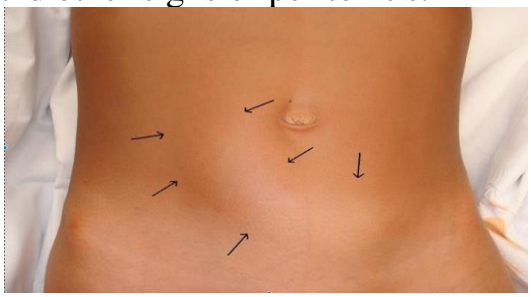
☒ The cause is unknown.

☒ More than 90% of intussusceptions do not have a pathologic lead point, such as a polyp, lymphoma, or Meckel diverticulum. The idiopathic cases may be caused by hypertrophy of intestinal lymphoid tissue secondary to viral infection.



Clinical Manifestations of Intussusception

1. Sudden acute abdominal pain.
2. Child screaming and drawing the knees onto the chest.
3. Child appearing normal and comfortable between episodes of pain.
4. Vomiting.
5. Lethargy.
6. Passage of red, currant jelly–like stools (stool mixed with blood and mucus).
7. Tender, distended abdomen.
8. Palpable sausage-shaped mass in upper right quadrant.
9. Empty lower right quadrant (Dance sign).
10. Fever, prostration, and other signs of peritonitis.



Nursing Care Management

Post-procedural care includes:

1. Observations of vital signs.
2. Intact sutures and dressing, and the return of bowel sounds.
3. Observes for passage of water-soluble contrast material (if used) and the stool patterns.