Diarrheal Diseases in children

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Introduction

- World wide particularly in developing countries diarrheal diseases constitute significant causes of mortality & morbidity.
- According to conservative estimate, almost 500 million children suffer from acute diarrhea annually, out of them 5million die every year.
- In India alone nearly 1.5 million children die due to acute diarrhea every year.

Definition

- Diarrhea is defined as an increase in number of stools and its volume, and decrease in their consistency.
- Diarrhea is also defined as passage of three or more loose or watery stool in a 24hours of period, a looses stool being one that would take the shape of container.

Anatomical consideration of intestine

- The length of small intestine at the time of birth is 270 cm.
- It increases to adult size by 4yrs of age with the length of 450 – 550 cm.
- The length of colon is 75-100 cm. Because of its anatomical variations small intestine lesions cause severe diarrhea and dehydration in contrast to colon.
- Absorption of fluid at various places are: Jejunum 3-5 liter, Illeum 2-4litre, colon 1-2liter, stool loss 100-20ml, wt. of the stool in infants 10g/kg.

Causes

- **Antibiotics:** It alters the normal intestinal flora resulting in an overgrowth of other bacteria such as Closterium difficile, Salmonella & staphylococcus aureus.
- **Oro-fecal route** through contaminated food & water spread from person to person where there is close contact (Day care centers).
- **Lack of:** Clean water, crowding, poor hygiene, nutritional deficiency, poor sanitation are major risk

Cause contd

Cause of Bacterial, viral & protozoal:

- Viral: 70-80% of infectious diarrhea in developed countries.
- Bacterial: 10-20% of infectious diarrhea but responsible for most cases of severe diarrhea.
- Protozoan: less than 10%.

(Details as Agents, Pathology, Characteristics & comments: Refer A Judie, Wong's essentials of pediatric Nursing, First south Asia edition, chapter 24, pg. no 659 to 661.)

- **Non – infective causes:**

1. Inflammatory bowel diseases like Necrotizing enterocolitis of new born, non specific enterocolitis in infancy.
2. Anatomic & Mechanical causes like Short bowel syndrome, fistula, partial bowel obstruction, malrotation, Hirschsprung's disease.
3. Pancreatic and hepatic disorders like pancreatic hypoplasia, Cirrhosis, hepatitis, chronic pancreatitis, biliary atresia.
4. Biochemical causes like Glucose – galactose malabsorption, lipoproteinemia, Celiac disease.
5. Neoplastic causes like Neuroblastoma, lymphoma, pancreatic islet tumor.
6. Immunodeficiency like HIV,AIDS, Acquired hypogammaglobinemia.
7. Malnutrition like PEM.
8. Dietary factors like Overfeeding, introduction of new food.
9. Food intolerance like milk and soya protein intolerance.
10. Psychogenic or functional disorder like irritable bowel syndrome.
11. Toxic diarrhea like ingestion of heavy metal – arsenic lead, drug like ferrus

Pathophysiology

Invasion of the pathogen in G.I. tract.

⬇

Increase intestinal secretion as a result of enterotoxin, cytotoxic mediators or decreased intestinal absorption secondary to intestinal damage or inflammation.

⬇

Pathogen attached to mucosal cell and cuplike pedestal on which the bacteria rest.

⬇

The pathogenesis of diarrhea depends on whether the organism remains attach to the cell surface resulting in secretary toxins (non-invasive toxin producing non inflammatory type diarrhea)

Or Penetrate the mucosa creates (Systemic diarrhea)

⬇

Immune mediated extraintestinal manifestations of enteropathogenic organism, which cause **diarrhea**.

⬇

Further the most serious and immediate physiologic disturbances associated with severe diarrheal diseases are:

1. Dehydration.
2. Acid base imbalances with acidosis.
3. Shock that occurs when dehydration progresses, to the point that circulatory status is seriously impaired.

Clinical Features

- **Fever** indicates infections and it is also due to dehydration.
- **Vomiting** is due to non involvement of upper GIT. It is caused by virus, enterotoxin producing bacteria, giardiasis, campylobacter. It also can cause with non infectious causes.
- **Diarrhea**: The stool may be either loose watery or mixed with blood and mucous (dysentery). The site of the lesion can be detected by the type of the stool. If the small bowel is affected the patient has profuse, painless or mild pain, and watery diarrhea. If the large bowel is affected, the patient passes small quantity of the stools mixed with blood and mucous.
- **Dehydration**: It is classified into three types depending on the amount of fluid loss. Mild 5%, Moderate 10%, Severe 15%.
- **Electrolyte disturbances**: Potassium -Hypokalemia <3meq/L, Sodium –

Principles of Treatment

- General assessment of child.
- Assessment of hydration status. A number clinical sign and symptoms can help in detecting dehydration.
- Correction of electrolyte and acid base imbalance.
- Propper feeding to provide normal nutritional requirements
- Zinc supplementation.
- Treatment of associated problem like dysentery and persistent diarrhea

Management of Diarrhea

- The major goals in the management acute diarrhea is:

1. Assessment of fluid and electrolyte imbalance.
2. Rehydration.
3. Maintenance of fluid therapy.
4. Re-introduction of adequate diet.

Assessment of fluid and electrolyte imbalance:

- Observe the infant or child's general appearance and behavior.
- Assess for the dehydration such as decreased urinary output, weight loss, dry mucous membrane, poor skin turgor, sunken fontanels and pale cool dry skin with severe dehydration.
- Increase pulse and respiration.
- Decreased blood pressure.
- Prolonged capillary refilling time (>2seconds)

(These indicate child may impending shock).

Maintenance of fluid therapy

- ORS: (**Assignment**)

1. WHO ORS.
2. Super ORS.
3. Rice based ORS.
4. Diluted ORS.
5. Low osmolarity ORS.
6. ReSoMal.

(Uses of ORS, Limitation of ORS, Mode of use of ORS,)

Treat severe dehydration with I/V fluids

Age	First give 30ml/kg in:	Then give 70ml/kg in:
Infants under 12 months	1 Hour	5 Hours
Children 12 months up to 4yrs.	30 mins	2 and half hours

Home available fluids

- **Recommended**

1. Salt sugar solution
2. Lemon water(Sikanji)
3. Rice water / Kanjee
4. Soups
5. Dal water
6. Lassi
7. Coconut water

- **Non Recommended**

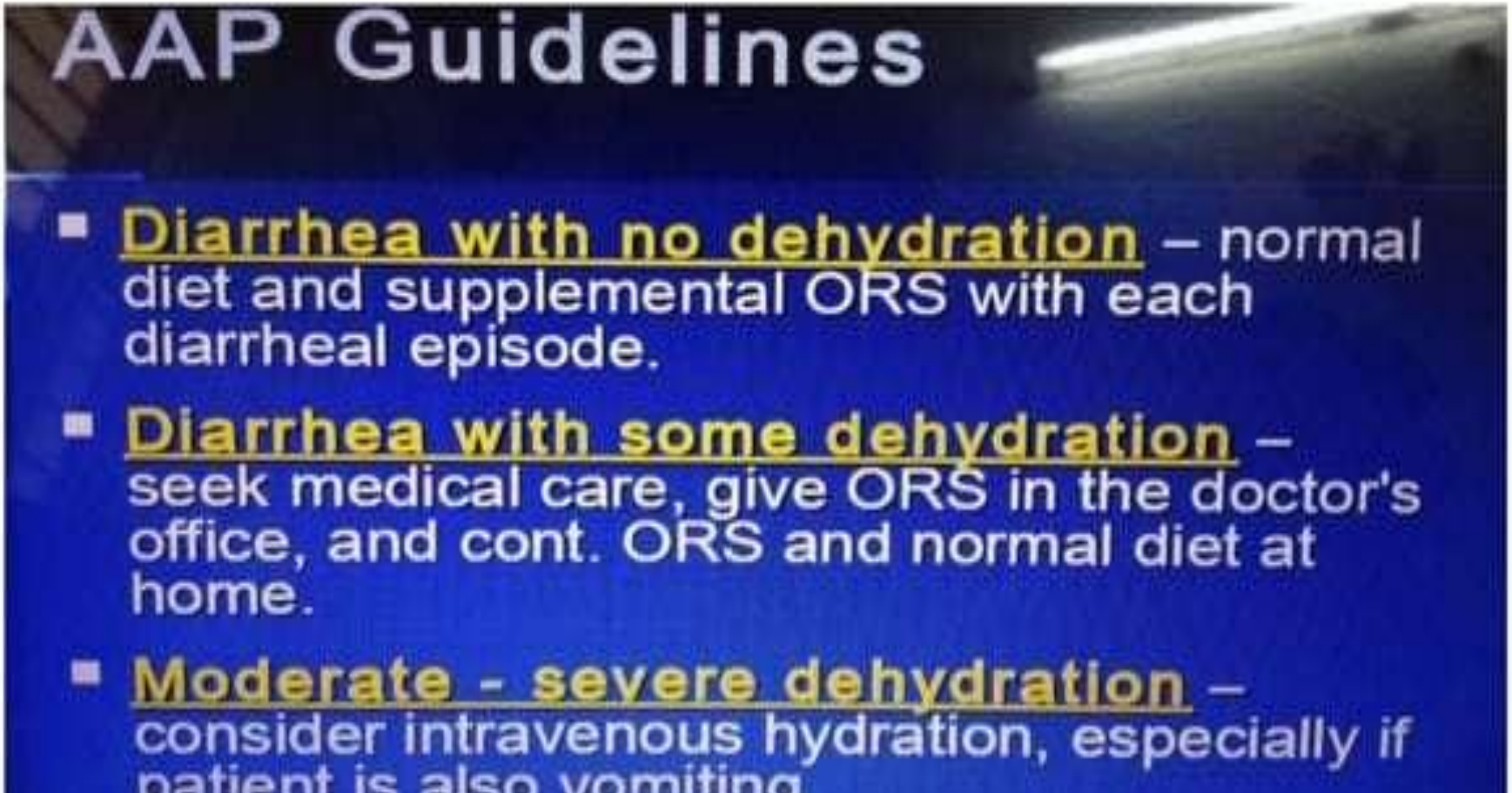
1) Simple sugar solution
2) Glucose solution
3) Carbonated soft drinks
4) Fruit juices-tinned or fresh
5) Fluids for athletes
6) Gelatin desserts
7) Tea/Coffee

Rehydration

BOX 24-1 MODEL FOR REHYDRATION

- Rehydration solution should consist of 75 to 90 mEq/L of sodium (Na^+).
- Give 40 to 50 ml/kg of rehydration solution over 4 hours.
- Replacement and maintenance solution should consist of 40 to 60 mEq/L of Na^+.
- Reevaluate the need for further rehydration; initiate maintenance therapy using maintenance formulations, with daily volumes not to exceed 150 ml/kg/day.
- In children with diarrhea without significant dehydration, the maintenance phase may be initiated without the need for rehydration solution.
- If additional fluids are needed, use low-salt fluids such as breast milk

Re-introduction of adequate diet.



Stage of Hydration	Recommended schedule of feeding
During Rehydration phase	
• Breastfed infants. • Non Breastfed infants. • Severely malnourished children.	Breastfed infant. -Should be preferable given only ORS till they are rehydrated. -Animal milk/food should be offered, if rehydration takes longer than 4hrs. Offer some food as soon as possible
After Rehydration phase	
• Breastfed infants. • Non Breastfed infants • Infants 6-12months. • For older children.	Breastfed more frequently. Offer undiluted milk. Give easily digestible energy rich complementary foods in addition to breast and animal milk Give thick preparation of staple food with extra vegetable oil or animal fat, rich in potassium (Legumes, Banana) Carotene (Dark green leafy vegetable, red pam oil, carrot, pumpkin)

Zinc supplementation

- Zinc deficiency is common in developing countries because of intake of predominant vegetarian diets. Increased fecal losses during many episodes of diarrhea aggravate pre-existing zinc deficiency.
- WHO and IAP recommends zinc supplementation as adjunct to ORS in the treatment of diarrhea.
- It is recommended children older than 6months suffering from diarrhea should receive a uniform dose of 20mg immediate diarrhea starts and continue for total period of 14days. Children aged 2-6 months advised 10mg per day

Antibiotics

- Antibiotic therapy generally not beneficial and can be harmful, but applied with bacterial cause.
- Those with more than eight stools/day, Diarrhea >1 wk, volume depletion, immuno-suppresion, warning signs for to use antibiotics.
- Choice of drug is Fluoroquinolone or Azithromyzin (low dose)

Complications

With appropriate use of oral rehydration therapy access to plain water and continued feeding, the risk of electrolyte disturbances is minimized.

However following electrolyte disturbances may be encountered in some cases.

1. **Hypernatremia**: It follows due to hypertonic drinks such as Canned fruit juices, Carbonated cold drinks, and incorrectly prepared salt and sugar solutions, ORS with high glucose content. (Sodium is >150 mEq/L & osmolality >295 mOsm/kg) are extremely thirsty.
2. **Hyponatremia**: Children who ingest large amt of water, watery drinks with very little salt may present with hyponatremia (Sodium is <130 mEq/L & osmolality <275 mOsm/kg). Clinically associated with lethargy

contd

3. **Hypokalemia**: Inadequate potassium replacement during diarrhea can lead to potassium depletion and hypokalemia(Sr. potassium <3mEq/L) which may result in muscle weakness, paralytic ileus, respiratory paralysis.

Hypoglycemia: Severely malnourished with diarrhea are in risk of hypoglycemia. Sick young infants (<2months) with diarrhea are not able to breastfed and have low weight for age presented with hypoglycemia.

Metabolic Acidosis: During acute diarrhea large amt of bicarbonate may lost in the stool. If it is not appropriately replaced it develop the metabolic acidosis.

Hypovolemic shock: It occurs as a result of rapid loss of water and electrolyte in severe diarrhea.

Acute renal failure: Severe dehydration and shock lead to decrease in blood flow resulting in prerenal type of acute renal failure.

Hemolytic uremic syndrome: It develop due to organism like E.coli, S dysenteriae (Neurotoxin liberation) ... Needs to manage in hospital setting.

Prognosis

- Acute diarrhea is self limiting disorder.
- Early administration of ORS or home available fluids prevents onset of dehydration.
- Appropriate use of low osmolarity ORS in some dehydration and ringer lactate in severe dehydration can prevent all diarrheal deaths.

Prevention of Diarrhea

- It involves intervention at two levels.
- Primary prevention:

1. Rotavirus and measles vaccines.
2. Hand washing with soap.
3. Environmental sanitation.

- Secondary Prevention:

1. Promote breast feeding.
2. Vitamin A supplementation.
3. Treatment with zinc.

Nursing management

- Restoring fluid and electrolyte balance by ORS and IV therapy.
- Prevention of spread of infection by good hand washing practices, hygienic disposal of stools, care of diapers, general cleanliness and universal precautions
- Preventing skin breakdown by frequent change of diaper, keeping the perineal area dry and clean.
- Providing adequate nutritional intake by appropriate dietary management.
- Reducing fear and anxiety by explanation, reassurance, answering questions and providing necessary information.

Contd

- Giving health education for prevention of diarrhea, home management of diarrheal diseases, importance of ORS, dietary management etc..

WRITTEN ASSIGNMENT

- Advice to the mother.
- Precautions to be taken to reduce risk of diarrhea.
- Usefulness of prebiotic and probiotic therapy in diarrhea.
- Specific nursing diagnosis with implementations.

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Thanks!
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