

DIARRHOEA IN CHILDREN

Presented by
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Diarrhea



- Defined as change in consistency and frequency of stools, i.e. liquid or watery stools, that occur >3 times a day.
- However it is **the consistency of the stools rather than the number that is more important.**
- If stools associated with blood it is termed as dysentery.
- ***Frequent passage of normal stool is not diarrhoea.***



Classification

- Diarrhoea is classified as
 - *acute* if <2 weeks,
 - *persistent* if 2–4 weeks,
 - *chronic* if >4 weeks




Magnitude of the problem: *World*

- Diarrhoeal disease is the **2nd leading cause of death in children under 5 yrs** of age.
- Globally, there are about **3-5 Bn cases** of diarrhoeal disease every yr.
- Diarrhoeal disease **kills 2 Mn** children every yr.
- Diarrhea accounts for over 20% of all deaths in under 5 children.
- It is both **preventable** and **treatable**.



Consequences

- 
- Impaired absorption
 - Loss of nutrients
 - Increased catabolism
 - Improper feeding

Malnutrition

Dehydration

- diarrhea

Risk Factors

- Poor sanitation & personal hygiene
- Contaminated food & drinking water
- Low rates of BF & immunization
- Malnutrition in younger children (2yr)
- **For prolonged episodes**
- Selective IgA deficiency
- HIV infection
- C.difficile infection (d/t antibiotic usage)



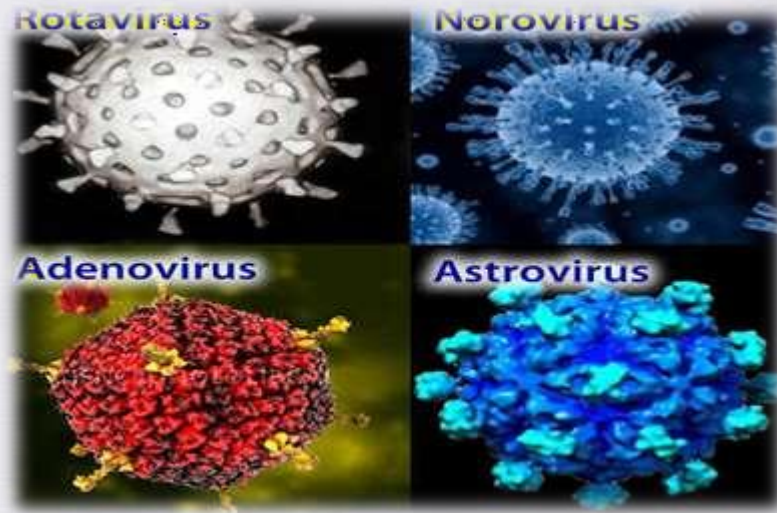
Etiology

- 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%



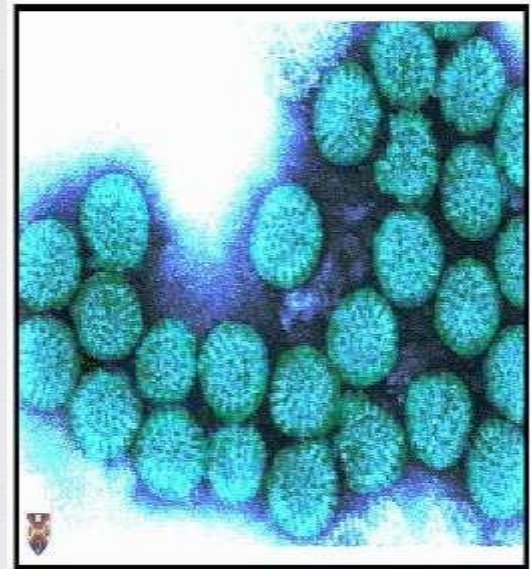
Viral Diarrhea

- Rotavirus
- Norovirus (Norwalk-like)
- Enteric Adenovirus (serotypes 40 & 41)
- Astrovirus



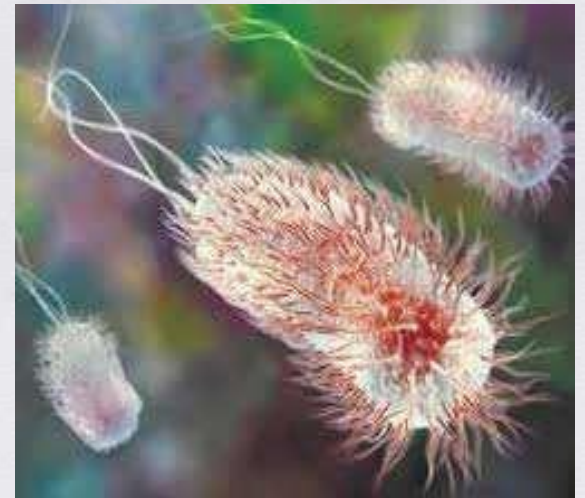
Summary of Viral Diarrhea

- Most likely cause of infectious diarrhea
- Rotavirus and Norovirus are most common
- Symptoms usually include low grade fever, nausea and vomiting, abdominal cramps, and watery diarrhea lasting up to 1 week
- Viral shedding can occur for weeks after symptoms resolve
- Feco-oral transmis



Bacterial Diarrhea

- Escherichia coli (EHEC, ETEC)
- Shigella
- Vibrio cholera (serogroups O1 & O139)
- Salmonella
- Campylobacter



Summary of Bacterial Diarrhea

- Can affect all age groups
- Fecal-oral transmission, often through contaminated food & water
- Typical symptoms include bloody diarrhea, severe cramping, and malaise
- Antibiotic treatment not always necessary

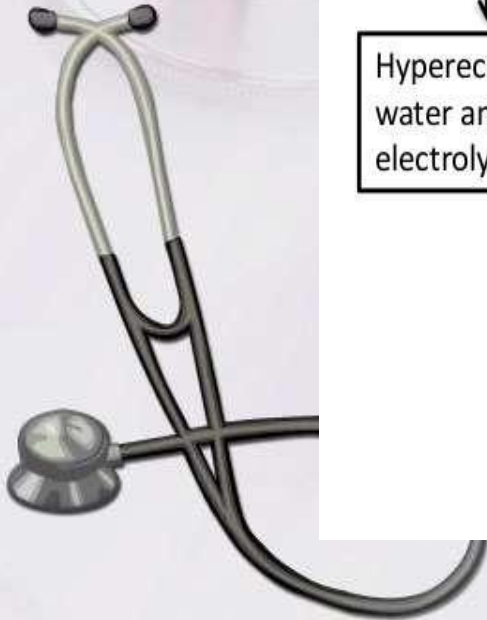
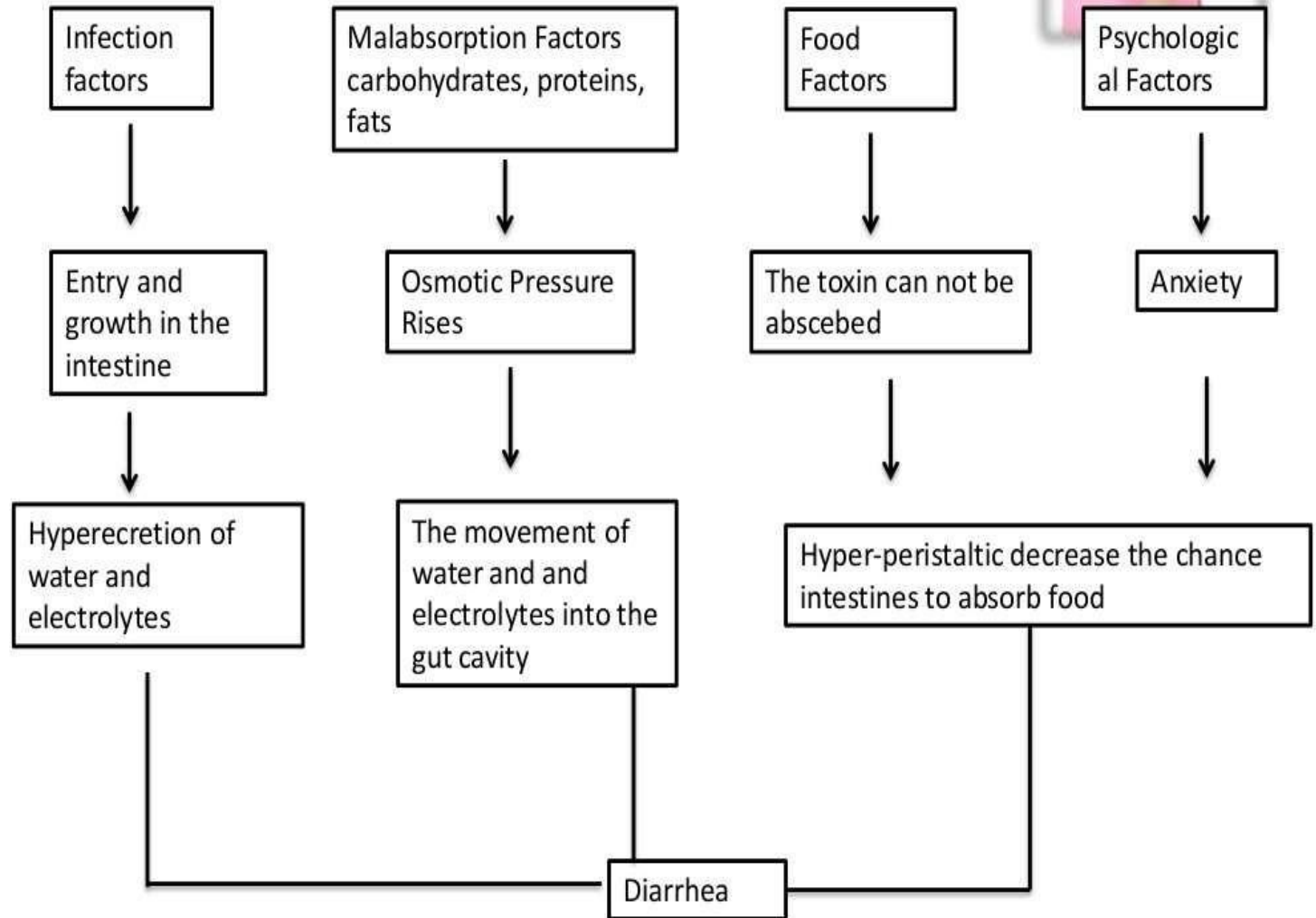


Parasitic

- *Giardia lamblia*
- *Cryptosporidium parvum*
- *Entamoeba histolytica*
- *Cyclospora cayetanensis*
- *Isospora belli*



Pathophysiology



Clinical Features

- **Mild**
- Slightly irritable & thirsty
- **Moderate**
- More irritable, pinched look, depressed fontanelle, sunken eyes, dry tongue, distended abd. urine output at longer intervals
- **Extreme case**
- Moribund look, weak and thready pulse, low blood pressure, reduced urine output



Assessment of Child

- Type of diarrhea
- Look for dehydration
- Assess for malnutrition
- Rule out systemic infection
- Assess feeding



History

- Onset, duration and no.of stools per day
- Blood in stools
- No. of episodes of vomiting
- Associated symptoms
- Oral intake
- Drugs or other local remedies taken
- Immunization history



Physical Examination

- Vitals, vitals, vitals!
- Abdominal exam
- Presence of occult blood
- Signs of dehydration



Laboratory Evaluation

- Can be managed effectively without lab investigations
- **Stool microscopy** in selected situations like cholera (darting motion)
giardiasis (trophozoites)
- **Stool culture** to decide on antibiotic therapy in patients with *shigella* dysentery



Principles of Management

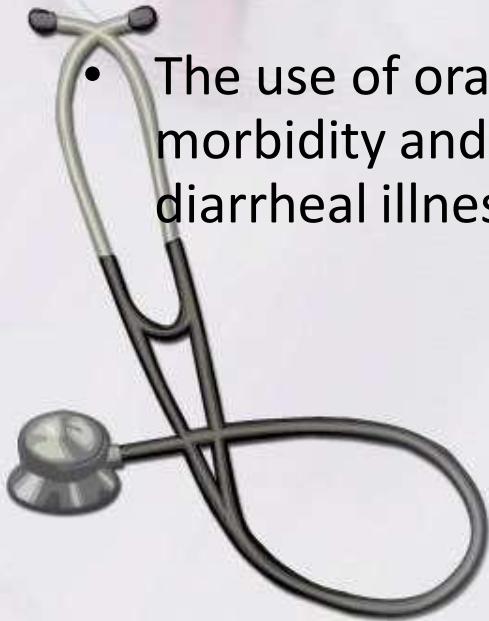
4 Major components:

- Rehydration and maintaining hydration
- Ensuring adequate feeding
- Oral supplementation of Zn
- Early recognition of danger signs and treatment of complications



INTRODUCTION:

- Dehydration resulting from acute diarrheal illness is one of the most significant causes of morbidity and mortality in the population.
- In some cases, it accounts for **more than 50%** of the deaths during the initial stages of a humanitarian emergency.
- Worldwide, over 3 million children under 5 years die from dehydration every year. (WHO)
- The use of oral rehydration therapy (ORT) has markedly reduced the morbidity and mortality associated with dehydration caused by diarrheal illness regardless of the etiology.



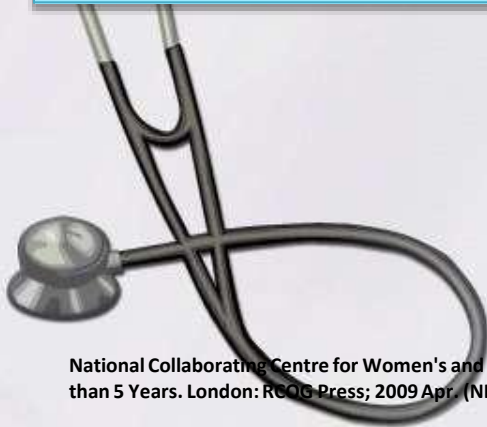
DEFINITION:

- **Dehydration** is a condition that can occur with excess loss of water and other body fluids. Dehydration results from decreased intake, increased output (renal, gastrointestinal or insensible losses), a shift of fluid (eg, ascites, effusions), or capillary leak of fluid (eg, burns and sepsis).

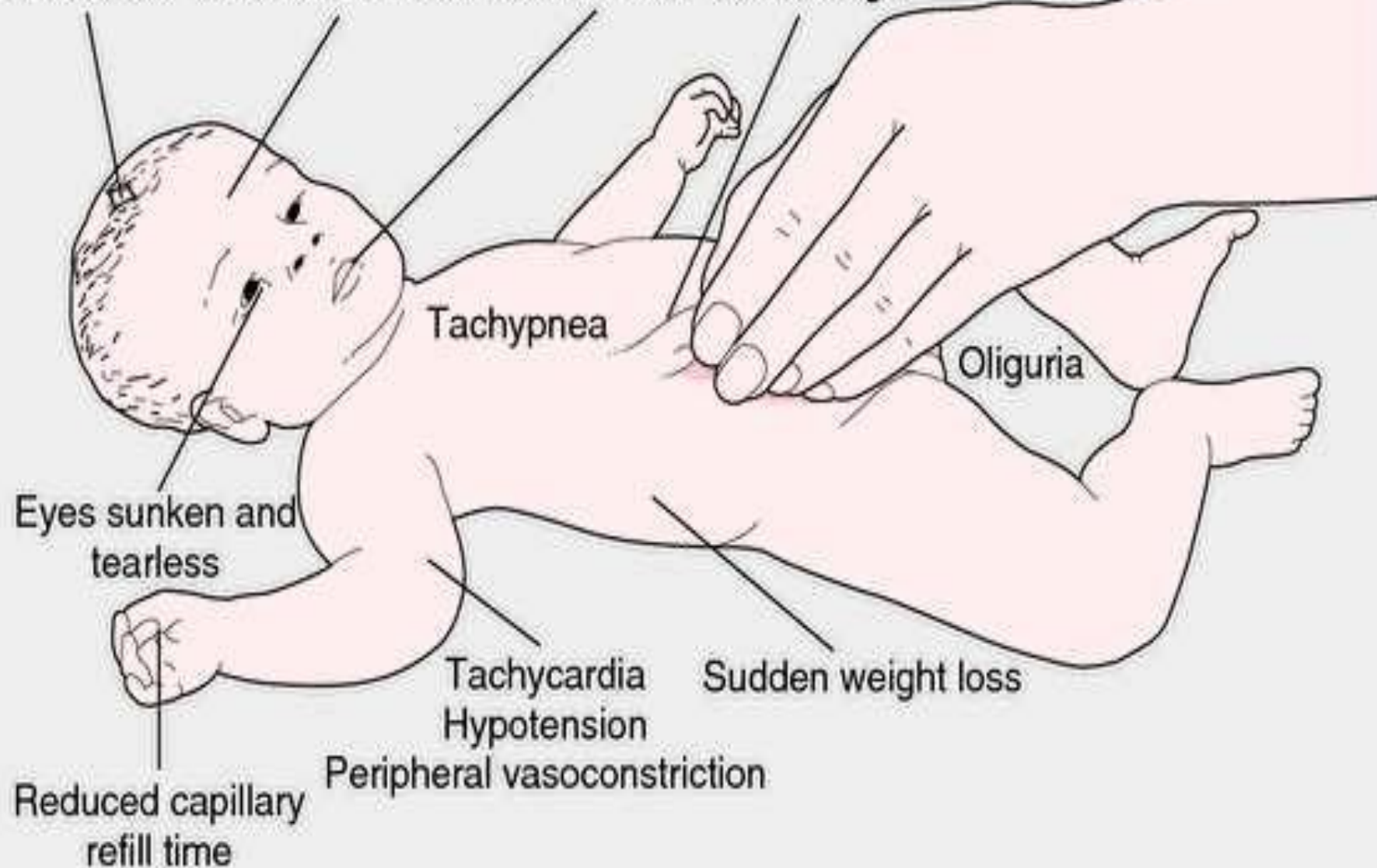


CLASSIFICATION OF DEHYDRATION SEVERITY BY WHO

NO DEHYDRATION	SOME DEHYDRATION	SEVERE DEHYDRATION
Not enough signs to classify as some or severe dehydration	<ul style="list-style-type: none">•Two or more of the following signs: restlessness, irritability•sunken eyes•drinks eagerly, thirsty•skin pinch goes back slowly	<ul style="list-style-type: none">•Two or more of the following signs: lethargy/unconsciousness•sunken eyes•unable to drink or drinks poorly•skin pinch goes back very slowly (≥ 2 seconds)



Sunken fontanelle Reduced level of consciousness Dry mucous membranes Reduced tissue turgor



Degree of Dehydration

<u>Factors</u>	Mild <u>Older Child</u> 3% (30ml/kg) <u>Infant</u> 5% (50ml/kg)	Moderate <u>Older Child</u> 6% (60ml/kg) <u>Infant</u> 10% (100ml/kg)	Severe <u>Older Child</u> 9% (90ml/kg) <u>Infant</u> 15% (150ml/kg)
General Condition	Well, alert	Restless, thirsty, irritable	Drowsy, cold extremities, lethargic
Eyes	Normal	Sunken	Very sunken, dry
Anterior fontanelle	Normal	depressed	Very depressed
Tears	Present	Absent	Absent
Mouth + tongue	Moist	Sticky	Dry
Skin turgor	Slightly decrease	Decreased (1-2 sec)	Very decreased (>2sec)
Thirst	Normal	Drinks eagerly, thirsty	Unable to drink or drinks poorly
Pulse (N=110-120 beat/min)	Slightly increase	Rapid, weak	Rapid, sometime impalpable
BP (N=90/60 mm Hg)	Normal	Deceased	Deceased, may be unrecordable
Respiratory rate	Slightly increased	Increased	Deep, rapid
Urine output	Normal	Reduced	Markedly reduced
Treatment	Plan A	Plan B	Plan C

Management of Dehydration

- General Principles:

1. Supply Maintenance Requirements
2. Correct volume and electrolyte deficit
3. Replace ongoing abnormal losses



Ongoing Losses

- Regardless of the degree of dehydration, give additional **10ml/ kg** of ORS for each additional diarrheal stool.



Severe Dehydration

- Management of severe dehydration requires IV fluids.
- Choice of fluid: Normal saline(NS) or Ringer Lactate (RL)
- Fluid selection and rate should be dictated by
 - The type of dehydration
 - The serum Na
 - Clinical findings
- Aggressive IV NS bolus remains the mainstay of early intervention in all subtypes



Monitoring Therapy

- Vital signs:
 - Pulse
 - Blood pressure
- Intake and output:
 - Fluid balance
 - Urine output
- Physical examination
 - Weight
 - Clinical signs of depletion or overload
- Electrolytes



WHO TREATMENT PLANS



**World Health
Organization**

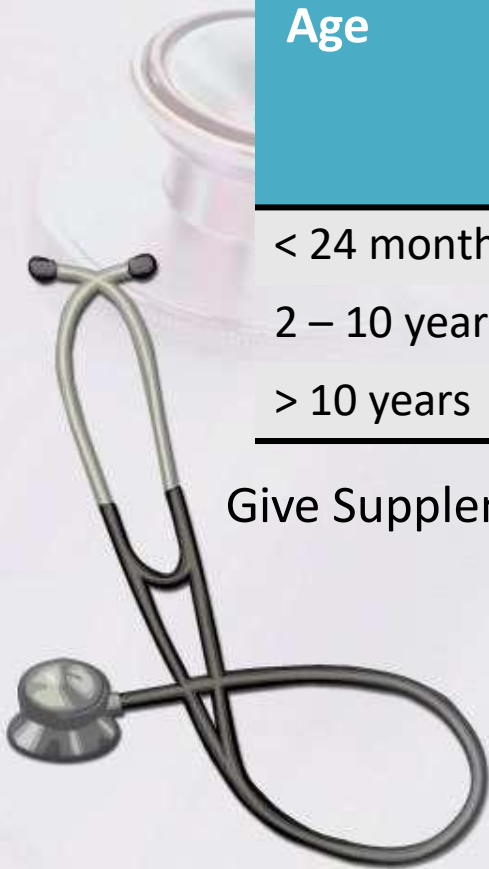


Plan A (No Dehydration)

Oral rehydration therapy to prevent Dehydration

Age	ORT fluids to give ORS to after each loose stool provide for use at home	Amount of
< 24 months	50 - 100 ml	500 ml/ day
2 – 10 years	100 – 200 ml	1000 ml/ day
> 10 years	Ad lib	2000 ml/ day

Give Supplemental Zinc (10-20 mg) to the child, everyday for 10 to 14 days



Plan B(Some Dehydration)

1. Daily fluid requirement:

- Up to 10 kg = 100 ml/ kg
- 10 - 20 kg = 50 ml/ kg
- > 20 kg = 20 ml/ kg

2. Deficit replacement:

75 ml/ kg ORS to be given over 4 hours

3. Replace losses:

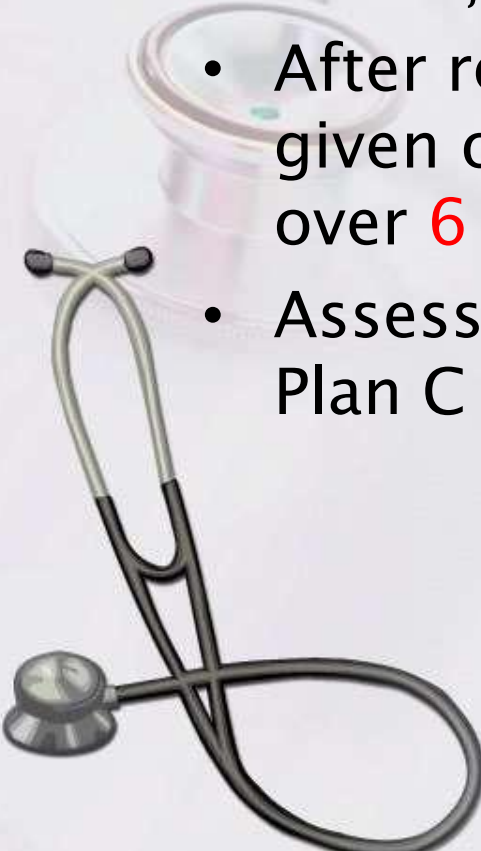
ORS should be administered in volumes equal to diarrheal losses. Maximum of **10 ml/ kg** per stool.

4. Give Supplemental Zinc (20 mg) to the child, everyday for 10 to 14 days



Plan C (Severe Dehydration)

- Treated with **20 mL/ kg** IV of isotonic crystalloid over **10 to 15 minutes**. Repeat as necessary.
- Monitor pulse strength, capillary refill time, mental status, urine output and electrolytes.
- After resuscitation: A total of **100 ml/ kg** of fluid given over **3 hours** in children > 12 months and over **6 hours** in children < 12 months.
- Assess the patient every 3 hours accordingly repeat Plan C or shift to Plan B



Age	30 ml/ kg	70 ml/ kg
< 12 months	1 hour	5 hour
> 12 months	30 min	2 ½ hour

ORS

STANDARD WHO ORS

Constituent	g/L	Osmole / ion	mmol/ L
Sodium chloride	3.5	Sodium	90
Glucose	20	Glucose	111
Potassium chloride	1.5	Potassium	20
Trisodium citrate	2.9	Citrate	10
		Chloride	80
Total Osmolarity			311

LOW OSMOLARITY ORS

Constituent	g/L	Osmole/ion	mmol/L
Sodium chloride	2.6	Sodium	75
Glucose	13.5	Glucose	75
Potassium chloride	1.5	Potassium	20
Trisodium citrate	2.9	Citrate	10
		Chloride	65
Total Osmolarity			245

Other types of ORS

- Zinc fortified ORS
- ORS fortified with amino acids.
- Home made ORS
 - 4g salt + 40g sugar in 1 L of water



Contraindications to ORT

- Ileus or intestinal obstruction
- Unable to tolerate (Persistent vomiting)



Home available fluids

Acceptable Home available Fluids

Fluids that contain Salt (Preferable)

ORS, Salted drinks (Salted rice water/salted yogurt drink), vegetable or chicken soup with salt

Fluids that do not contain salt
(Acceptable)

Plain water, water in which cereal has been cooked, unsalted soup, yogurt drinks without salt, green coconut water, weak unsweetened tea, unsweetened fresh fruit juice

Unsuitable home available fluids

Commercial carbonated beverages, commercial fruit juices, sweetened tea.

Early Refeeding

- Luminal contents help promote growth of new enterocytes and facilitate mucosal repair
- Can shorten duration of the disease
- Lactose restriction is not necessary except in severe disease

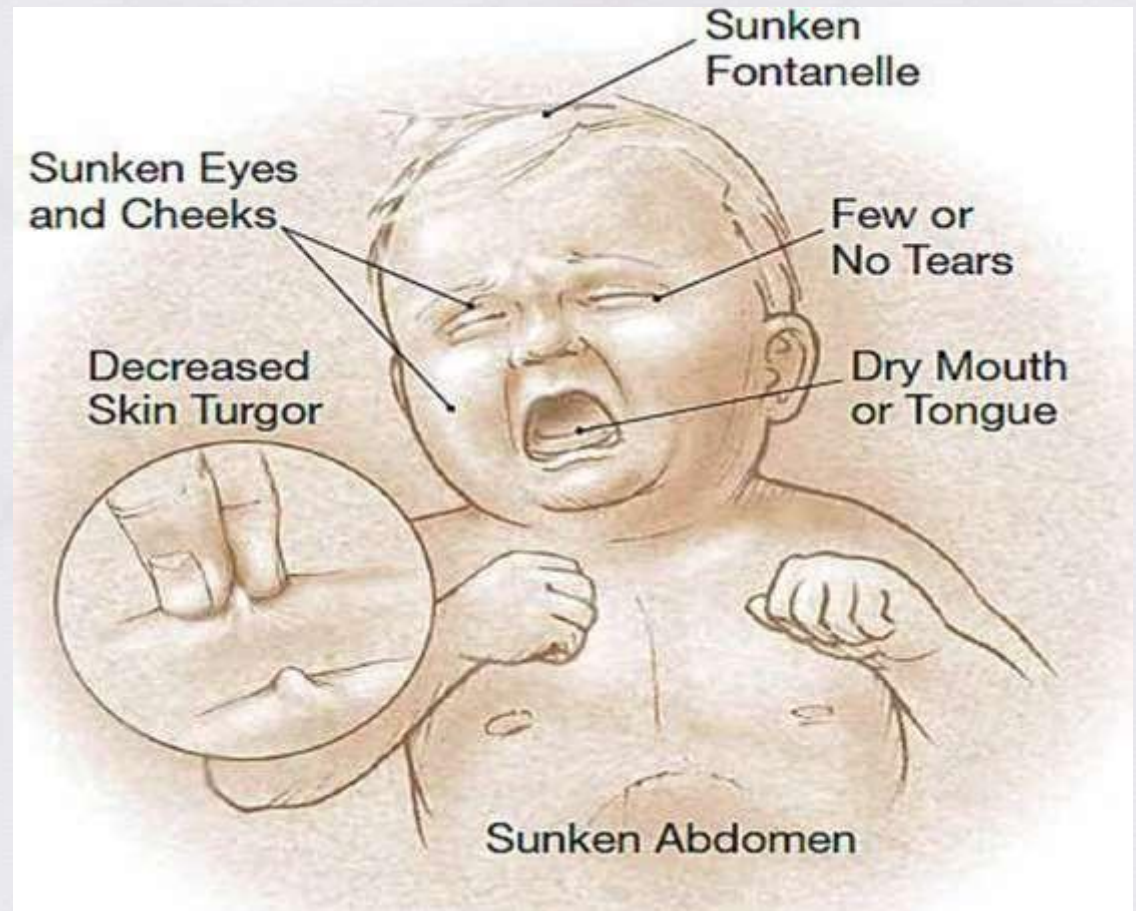


Oral **Zn** Supplementation

- 3-6 months 10mg daily x 2 weeks.
- >6 months 20mg daily x 2 weeks.



Danger signs



Prevention

- Keep your hands clean
- Boiling water
- Wash fruits and vegetables
- Refrigerate and cover food
- Eat well-cooked foods



Contd...

- Rotavirus and measles vaccination
- Early and exclusive breastfeeding
- Vitamin A supplementation
- Promotion of **hand washing** with soap
- Improved drinking water supply and safe storage of household food & water
- Community-wide sanitation promotion



RotaTeq® 
(Rotavirus Vaccine,
Live, Oral, Pentavalent)

Two Oral Doses
NEW Rotarix®
Rotavirus Vaccine,
Live, Oral
Providing Early Protection

बालातिसार

गुदेन् बहुद्रवसरणमतिसारः

Excess mala nirharan from guda that only known as अतिसार when it happen to bala that is known as बालातिसार




firstcry
Parenting

**Diarrhoea
in Babies**
Treatment & Prevention



पुर्वरूप

ह्यन्नाभिपायूदरकुक्षितोदगत्रावसादानिलसन्निरोधाः ।
विट्सङ्ग आध्मानमथविपाको भविष्यतस्तस्य पुरःसराणि ॥ मा.नि.3/5

- 
- Pricking pain at heart, nabhi, guda, udara, and kukshi
 - अधोवायु अवरोध
 - अन्गशिथिलता
 - मलप्रवृत्ति अभाव
 - आध्मान
 - Indigestion of food

પ્રકાર & its રૂપ

1. સામાન્ય અતિસાર

1. વાતાતિસાર
2. પૈત્તિક અતિસાર
3. કફજ અતિસાર
4. ત્રિદોષજ અતિસાર
5. રક્તાતિસાર
6. જ્વરાતિસાર
7. આગન્તુજ અતિસાર
8. આમાતિસાર
9. પ્લવાતિસાર

2. બાલાતિસાર



वातातिसार

अरुणं फेनिलं रूक्षमल्पमल्पं मुहुर्मुहुः ।
शक्रुदामं सरुक्शब्दं मरुतेनातिसार्यते ॥ मा.नि.

Stool comes out with sound and pain which is अरुणं in colour with foam and रूक्ष in nature which comes out frequently within small amount.



पैतिक अतिसार

पित्तात्पीतं निलमालोहितं वा
तृष्णामूर्छादाहपाकोपपन्नम् । मा.नि.

In पैतिक अतिसार stool is of yellowish-green in colour or reddish colour patient suffers with associated symptoms like

- तृष्णा
- मूर्छा
- सर्वान्गदाह
- गुदपाक



कफज अतिसार

शुक्लं सान्द्रं शलेषमणा श्लेष्मयुक्तं विस्त्रं शीतं ह्यष्टरोमा मनुष्यः ।
मा.नि.

➤ In कफज अतिसार stool is whitish coloured associated with thick in consistency , कफयुक्त , दुर्गन्धि and शीत

➤ Patient suffers from रोमहर्ष



त्रिदोषज अतिसार

वराहस्नेहमाम्साम्बुसद्रुशं सर्वरूपिणम् ।
कृच्छसाध्यमतिसारं विधादोशत्रयोद्भवम् ॥ मा.नि.

➤ In त्रिदोषज अतिसार stool looks like fate of pig, or water mixed with mamsa (मांसधोवन)

➤ This type of अतिसार is कृच्छसाध्य

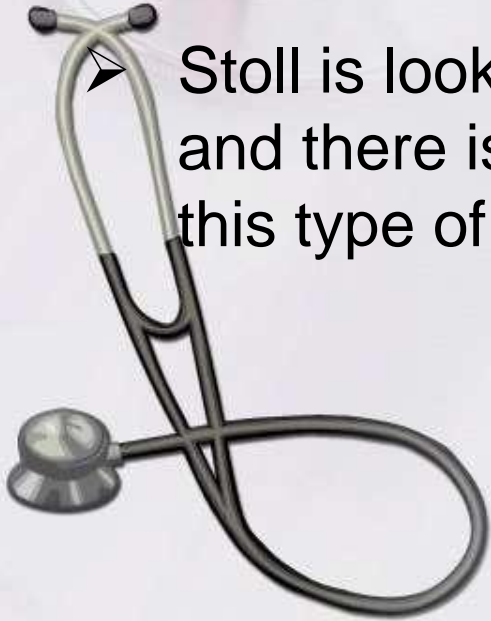


रक्तातिसार

पित्तकृन्ति यदाऽत्यर्थं द्रव्याण्यश्नाति पैतिके ।
तदोपजयतेऽभिक्षणं रक्तातिसार उल्बणः ॥ मा.नि.

➤ When patient is suffering from पैतिक अतिसार and the if patient indulge with पैतिक आहार विहार then he suffers from very dangerous and difficult to treat रक्तातिसार

➤ Stoll is looks like blood only or reddish-yellow in colour and there is symptoms of पैतिक अतिसार also visible in this type of patient



ज्वरातिसार

ज्वरातिसारयोरुक्तं निदानं यत् पृथक् पृथक् ।
तस्याज्वरातिसारस्य तेन नात्रोदितं पुनः ॥ मा.नि.

➤ There is diffract nidanas for jvara and atisara when patient indulge with both nidana then he suffers from ज्वरातिसार



आगन्तुज अतिसार

आगन्तु द्वावतिसारौ मानसौ भयशोकजौ ।
ततयोर्लक्षणं वायोर्यदतीसारलक्षणम् ॥ च.चि.19/24

➤ According to आचार्य चरक there is mainly two type of आगन्तुज अतिसार they are भयाज and शोकज

➤ Bothe are associated with मानस भाव

➤ लक्षण of all आगन्तुज अतिसार are same as वातज अतिसार



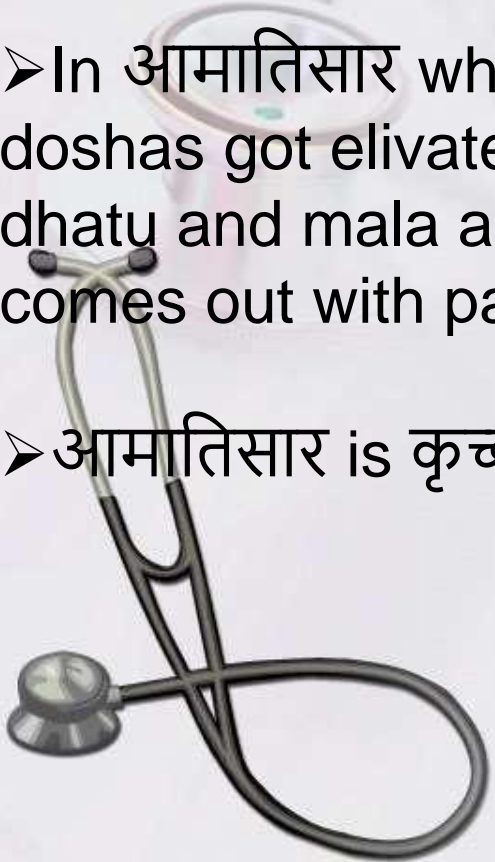
आमातिसार

आमाजिर्णोपद्रुताः क्षोभयन्तः कोष्ठं दोषाः संप्रदुष्टाः साभाक्तम् ।
नानावर्ण नैकशः सारयन्ति कृच्छाज्जन्तोः षष्ठमेनं वदन्ति ॥

सु.उ.40/16

➤ In आमातिसार when pachana of anna does not accure then doshas got elivated in kusta and it produce dusana to raktadi dhatu and mala and produce different coloured stool which is comes out with pain and repeatedly that is आमातिसार

➤ आमातिसार is कृच्छसाध्य



पञ्चवातिसार

संसृष्टमेभिर्दोषैस्तु न्यस्तमप्स्ववसीदति ।
पुरीषं भृशदुर्गन्धि विच्छिन्नम् चामसंज्ञकम् ॥

एतान्ये व तु लिङ्गानि विपरीतानि यस्य तु ।
लाघवञ्च मनुष्यस्य तस्य पक्षं विनिर्दिशेत् ॥

ਸੁ.ਤ.40/17-18

- When there is no लक्षण of आममल seen and patient feel free after malanirharana that is known as प्क्वातिसार
- Here in प्क्वातिसार लक्षण are same as amatisara but only difference is in stool there will be no aam.

बालातिसार

क्षिरदोशजन्य	बालग्रह	व्यधिजन्य	अन्य कारनजन्य
पैतिक क्षिरदोष त्रिदोषज वैवर्ण्य पारिगर्भिक	नागमैष पितृग्रह शकुनिग्रह पुतना ग्रह शितपुतना ग्रह अन्धपुतना रेवतिग्रह सुशकरेवति ग्रह	विभिन्न व्यधि उपद्रव उत्प्लुल्लिका क्रुमि तालुकन्तक	मृतिकाभक्शन जन्य त्रास जन्य दन्तोद्भेद जन्य



सामान्य सम्प्राप्ति

सम्शम्यपां धातुरग्निं प्रवृद्धः शक्रुन्मिश्रो वयुनाऽधः प्रणुन्नः
सरत्यतिवातिसरं तमाहुर्व्याधिं धोरं षड्विधं तं वदन्ति ॥ मा .नि.3/4

➤ When increase jaliya dhatu decreased pachakangni and got mixed up with mala with the help of prakupita vayu it comes out from guda marga this type of bhyankar vyadhi known as atisara



चिकित्सा

चिकित्सा सिद्धान्त

- 1) निदान परिवर्जन
- 2) in सामावस्था - first दीपन पाचन with बालचतुर्भद्र , लवन्भास्कर चूर्ण ,
- 3) in निरामवस्था - गङ्गाधर चूर्ण , कर्पूर रस etc
- 4) लघुसंशोधन
- 5) पोषक युष is use full as पानक



औषधि विवेचन

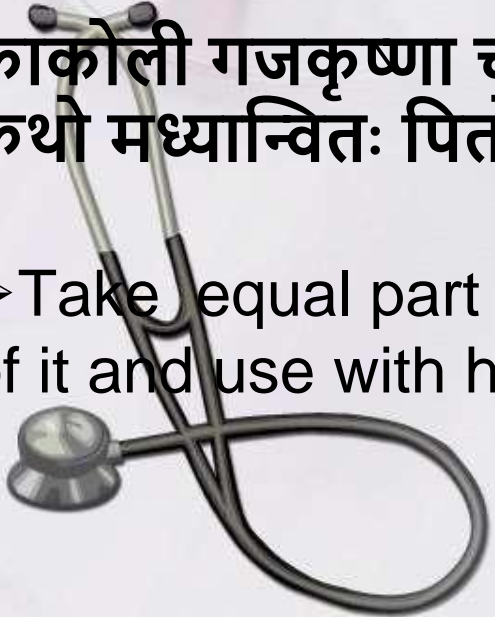
in रावणकृत कुमर्तन्त्र there is many योग are explained

बिल्वं च पुष्पाणि च धातकिनां जलं सलोध्रं गजपिप्पली च ।
कथोऽवलेहो मधुना विमिश्रो बालेषु योज्यः कटीधारितेषु ॥

➤ We can use kwath or avaleha of bilva, dhataki pushpa, sugandhbala, lodra and gajapipali for katidharana in Balatisara.

काकोली गजकृष्णा च लोध्रमेषं समांशतः ।
कथो मध्यान्वितः पितो बलातिसार हन्मतः॥

➤ Take equal part of kakoli, gajakrushna, and lodhra, make kwath of it and use with honey for the treatment of Balatisara



लाजा सैन्धवमांरास्थिचुर्णमेषां समांशतः ।
हन्ति छर्दिमतिसारं मधुना सह भक्षितम् ॥

➤ Take laja , saindhava and aamaraasthi make churna and use with honey for chardi and atisara in children

आम्रबिजं तथा लोध्रं धात्रिफलरसं तथा ।
पीत्वा महिषतक्रेण बालातिसारनाशनम् ॥

➤ Amrabija, lodhra and dhataki rasa is helpful with mahish takra in balatisara

समङ्गाधातकीलोध्रसारिवाभिः श्रुतं जलम् ।
दुधरेडपि शिशोर्देयमतिसारे समक्षिकम् ॥ यो.र.बा.रो.चि.पृ.441

➤ Manjistha, dhataki, lodhra, and sariva take all in equal quantite and make kwath out of it use it ith madhu for all type of balatisara

घनक्रुष्णारुणाश्रुन्निचूर्णं क्षौद्रेण संयुतम् ।
शिशोर्ज्वरातिसारघ्नं कासं श्वासं वर्मिं हरेत् ॥ यो.र.बा.रो.चि.पृ.441

➤ Nagmotha , karkatshrungi, pipali, atisha mixed all in equal quantite make churna out of it and use it with honey for removal of jwaratisara, kasha,swasha, vamana(in bhiajya ratnavali it is known as balachaturbhadrachurana)

➤ **चूर्ण** - धातक्यादि चूर्ण , बालचातुरभद्र चूर्ण , लवङ्गचतुःसम चूर्ण , दाडिमचतुःसम चूर्ण

➤ **क्वाथ** - धातक्यदि , कर्करादि

➤ **घृत** - चाङ्गेरी घृत

➤ **लेह** - बालकुटजावलेह, लवङ्गचतुःसम अवलेह , धातक्यादि अवलेह

➤ **रस** - महागन्धक रस , कर्पूररस , बालार्क रस,

➤ **क्षार** - चिञ्चा क्षार



