Guidelines for the Management of Diarrhoea in Children Under 5
Using Zinc and ORS supplementation
By the end of the session, participants should be able to:

► Understand acute diarrhoea in children under 5
► Prescribe the recommended treatment for acute diarrhoea in children under 5
Definition

Diarrhoea is the passage of 3 or more loose/watery stools over a period of 24 hours (WHO)

- The consistency of the stools rather than the number is what is most important.
- In babies consuming only breast milk, frequent passing of formed stools and passing of loose, pasty stools is not diarrhoea.
Types of diarrhoea

► Acute watery diarrhoea
► Acute bloody diarrhoea (dysentery)
► Persistent diarrhoea
► Diarrhoea with severe malnutrition
Introduction—Mortality of children under 5 (U/5 mortality)

- Worldwide, of the 6.6 million deaths of children under 5 (U/5 mortality) in 2012, most were from preventable and treatable childhood infections (pneumonia, diarrhoea, or malaria).
- Deaths like these are avoidable.
- We have lifesaving preventive and curative interventions. We just need to deliver them.

Rotavirus is the leading cause of diarrhoea in children under 5  
(The Journal of Infectious Diseases)

Diarrhoea occurs when there is a change in the two-directional flow of water and electrolytes in the small intestine (ie, increased secretion, decreased absorption, or both)

Microbial toxins like bacteria, viruses, etc, may cause diarrhoea

Ingestion of osmotically active substances (eg, lactulose) can cause diarrhoea

Pathophysiology
Children may be prone to diarrhoea if they:

- Are HIV positive or sick with AIDS
- Have not been immunised
- Lack the proper diet as per their age’s dietary requirements
- Lack safe and clean drinking water
- Are exposed to poor sanitary and domestic hygiene (food preparation, disposal of excreta)
The major complications of diarrhoea are:

- Dehydration
- Malnutrition

- Diarrhoea causes changes to the digestive system, making the body less able to absorb fluids and nutrients.
  - Also, there is an increase in the amount of fluids and minerals that the body secretes.
- These changes cause the body to lose fluids and minerals like zinc, sodium, and potassium.
- When these fluids and minerals aren’t replaced, this can lead quickly to dehydration and malnutrition.
- And zinc loss weakens the immune system, leaving a child less able to fight disease.

Assessment

A child with diarrhoea should always be assessed for:

• Signs of dehydration
• Blood in stool
• Frequency and consistency of stools
• Duration of diarrhoea
• Signs of malnutrition

This can be achieved by performing a thorough:

• History taking
• Physical examination
Assessing the Signs of Dehydration

- Sunken eyes
- Pinching the child’s abdomen to test for decreased skin turgor
- Slow return of skin pinch in severe dehydration
# Classification of dehydration

- Treatment course is based on the degree of dehydration

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Classification</th>
<th>Treatment</th>
</tr>
</thead>
</table>
| Two of the following signs:                                               | *Severe Dehydration* | • REFER URGENTLY to hospital or clinic for treatment with IV (intravenous) fluids  
  • Followed by home management: ORS to be given as soon as child can take  
  • Zinc Therapy                                                                            |
|   • Lethargic or unconscious                                               |                      |                                                                                                                                           |
|   • Sunken eyes                                                            |                      |                                                                                                                                           |
|   • Not able to drink or drinking poorly                                   |                      |                                                                                                                                           |
|   • Skin pinch goes back very slowly                                       |                      |                                                                                                                                           |
| Two of the following signs:                                               | *Some Dehydration*   | • Refer to clinic for treatment  
  • Give ORS at the clinic until skin pinch is normal, thirst is over and child is calm  
  • Give first zinc supplement in the clinic  
  • Breastfeed and or continued feeding                                                                 |
|   • Restless, irritable                                                   |                      |                                                                                                                                           |
|   • Sunken eyes                                                            |                      |                                                                                                                                           |
|   • Drinks eagerly, thirsty                                               |                      |                                                                                                                                           |
|   • Skin pinch goes back slowly                                           |                      |                                                                                                                                           |
| Not enough signs to classify as Some or Severe Dehydration                | *No Dehydration*     | • Give ORS solution and other fluids  
  • Continue feeding, encourage ongoing breastfeeding  
  • Give zinc supplementation for 10 days in recommended dosage                                                                 |

- Zinc Therapy
Management of acute diarrhoea

• The WHO, UNICEF, and MOH recommends the 3 essential elements in the management of all children with diarrhoea:
  – Rehydration therapy
  – Zinc supplementation
  – Counseling for continued feeding and prevention

• A limited, selective use of antibiotics is also recommended

Role of reduced osmolarity ORS

- Replaces lost fluids and essential salts
- Right balance of essential glucose and salts, which work together to ensure that fluids are absorbed at optimal rate
  - Sodium allows water to be absorbed through the intestinal wall
  - Glucose enables the intestine to absorb the fluid and the salts more efficiently
  - Potassium stimulates the appetite and activity of the child
- Efficacy of ORS treatment is improved by reducing osmolarity (from 311 mOsm/L to 245 mOsm/L)
  - Osmolarity means the concentration of a substance in a liquid
- The standard ORS solution (with higher osmolarity than plasma) increases risk of hypernatremia and increased stool output
The differences between original ORS and low-osmolarity ORS

Original ORS vs low-osmolarity ORS: what are they made of?

<table>
<thead>
<tr>
<th></th>
<th>Original ORS (mOsm/L)</th>
<th>Low-osmolarity ORS (mOsm/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glucose</td>
<td>111</td>
<td>75</td>
</tr>
<tr>
<td>Sodium</td>
<td>90</td>
<td>75</td>
</tr>
<tr>
<td>Chloride</td>
<td>80</td>
<td>65</td>
</tr>
<tr>
<td>Potassium</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Citrate</td>
<td>30</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total osmolarity</strong></td>
<td><strong>311</strong></td>
<td><strong>245</strong></td>
</tr>
</tbody>
</table>

Benefits of low-osmolarity ORS over ORS

- Lower stool output: Total stool output is 39% greater with original ORS vs L-ORS
- Shorter duration of diarrhoea: Duration of diarrhoea is 22% longer with original ORS vs L-ORS
ORS dosage and administration

Child under 2 years:
► 50 to 100 mL after each loose stool

Child age 2 to 10 years:
► 100 to 200 mL after each loose stool
ORS mixing

• Instructions
  – Mix contents in 1 litre of boiled drinking water
  – Give frequent small sips from a cup
  – If the child vomits, wait 10 minutes. Then continue, but more slowly
  – **Continue giving ORS until the diarrhoea stops**
  – Breastfeed more frequently and for longer at each feed
  – If the child is exclusively breastfed, give ORS solution in addition to breastmilk
Mechanism of action of zinc in diarrhoea

1. Zinc improves the absorption of water and electrolytes
2. Zinc helps regenerate the intestinal epithelium
3. Zinc enhances the immune response, allowing for a better clearance of the pathogens

Pharmacokinetics of zinc

Absorption:
• Poorly absorbed from the gastrointestinal tract (only 20% to 30%)

Distribution:
• Widely distributed, stored in red blood cells, white blood cells, muscles, bones, skin, kidneys, liver, pancreas, retina, and prostate
  – Plasma albumin binding is 60% to 70%
  – Peak plasma concentration occurs in approximately 2 hours

Elimination:
• Excreted mainly in the feces (90%); only traces in the urine
The role of zinc in the management of diarrhoea: Research findings

Research found that zinc supplementation in children less than 5 years of age resulted in:

- **25% reduction** in duration of acute diarrhoea
- **29% reduction** in duration of persistent diarrhoea
- **40% reduction** in treatment failure or death in persistent diarrhoea

Benefits of zinc

- Reduces the **severity** of diarrhoea
- Reduces the **duration** of diarrhoea
- Reduces the **incidence** of diarrhoea in the subsequent 2 to 3 months after the diarrhoea episode
- Contributes to **restoring appetite** and energy of a child, an aspect that is particularly important to mothers as a sign that their child is improving

It’s safe, efficacious, and affordable
Zinc dosage and administration

Child younger than 6 months:
- 10 mg (1/2 tablet) daily for 10 days or
- One 5-mL teaspoon syrup daily for 10 days

Child older than 6 months:
- 20 mg (1 tablet) daily for 10 days or
- Two 5-mL teaspoons syrup daily for 10 days

- Dissolve tablet in a small amount of expressed breast milk, ORS, or clean water in a cup
- Older children may chew or swallow the tablet

IMPORTANT: Mother should continue to give zinc for 10 days even if the diarrhoea stops earlier
Drug interactions of zinc

- Oral tetracyclines, calcium salts, dairy products, and brown bread decrease zinc absorption
- Coffee and iron supplements inhibit zinc absorption
- Zinc also reduces absorption of quinolones
- Zinc should be taken 2 to 4 hours before or after to avoid the mentioned interactions
### Side effects of zinc

**Side effects include:**

- Stomach upset
- Heartburn
- Nausea

**Rare side effects include:**

- Fever
- Sore throat
- Mouth sores
- Weakness and fatigue
Antibiotics should rarely be used for diarrhoea

► Antibiotics only work on bacterial infections, but most diarrhoea is caused by viruses
► Antibiotics can cause side effects and increase antibiotic resistance
► Antibiotics should only be used for dysentery, cholera, shigellosis, or serious nonintestinal infections (like pneumonia)
Why antidiarrhoeals are not recommended

Antidiarrhoeal agents (including loperamide, Imodium®️, Pepto-Bismol®, and Kaopectate®️) are *never* recommended for children. These drugs:

- **Can mask worsening symptoms and delay treatment**
- **Can have dangerous side effects (such as paralyzing the child’s intestines)**
- Do not help rehydration
- Do not kill the infectious organisms
- Can prevent the immune system from clearing the infection from the body
- Can prevent the body from creating its own antigens against the virus
Why antiparasitic drugs are not recommended

- Antiparasitics are only helpful if the child has confirmed giardiasis, amoebiasis, or strongyloidiasis
- Antiprotozoal drugs are rarely indicated
Talking to customers about Zinc + ORS

• Treating diarrhoea with both Zinc + ORS will be new to many mothers. Each mother may need extra guidance

• You can tell mothers that Zinc + ORS:
  – **Stops diarrhoea** quickly
  – **Restores strength** to the child
  – **Prevents diarrhoea from returning** for 2 to 3 months
Talking to customers about Zinc + ORS (cont’d)

• Zinc tablets can and should be promoted instead of antidiarrhoeals and unnecessary antibiotics
  – Antidiarrhoeals are dangerous for children
  – Antibiotics often don’t stop diarrhoea and don’t improve the child’s energy

• Make sure customers understand the importance of giving a zinc tablet daily for 10 days, even **after** the diarrhoea stops

• Make sure customers understand the importance of giving ORS **until** the diarrhoea stops
Low-osmolarity ORS combined with a dosage of 20 mg of elemental zinc per day for 10 days has been shown to be effective and safe in children 6 months to 5 years; 10 mg for children under 6 months.