

Management of Diarrhea in low- resource settings

Outline

- Epidemiology
- Determining type of diarrhea and level of dehydration
- Overview of management
 - Rehydration
 - WHO Guidelines for Dx & Rx of dehydration
 - Pharmacologic Therapy
 - Zinc
 - +/- antibiotics -- probably only for gross blood in stools, Shigella pos cx, cholera, assoc systemic infxn, or malnutrition
 - Continued Feeding, micronutrients

Epidemiology

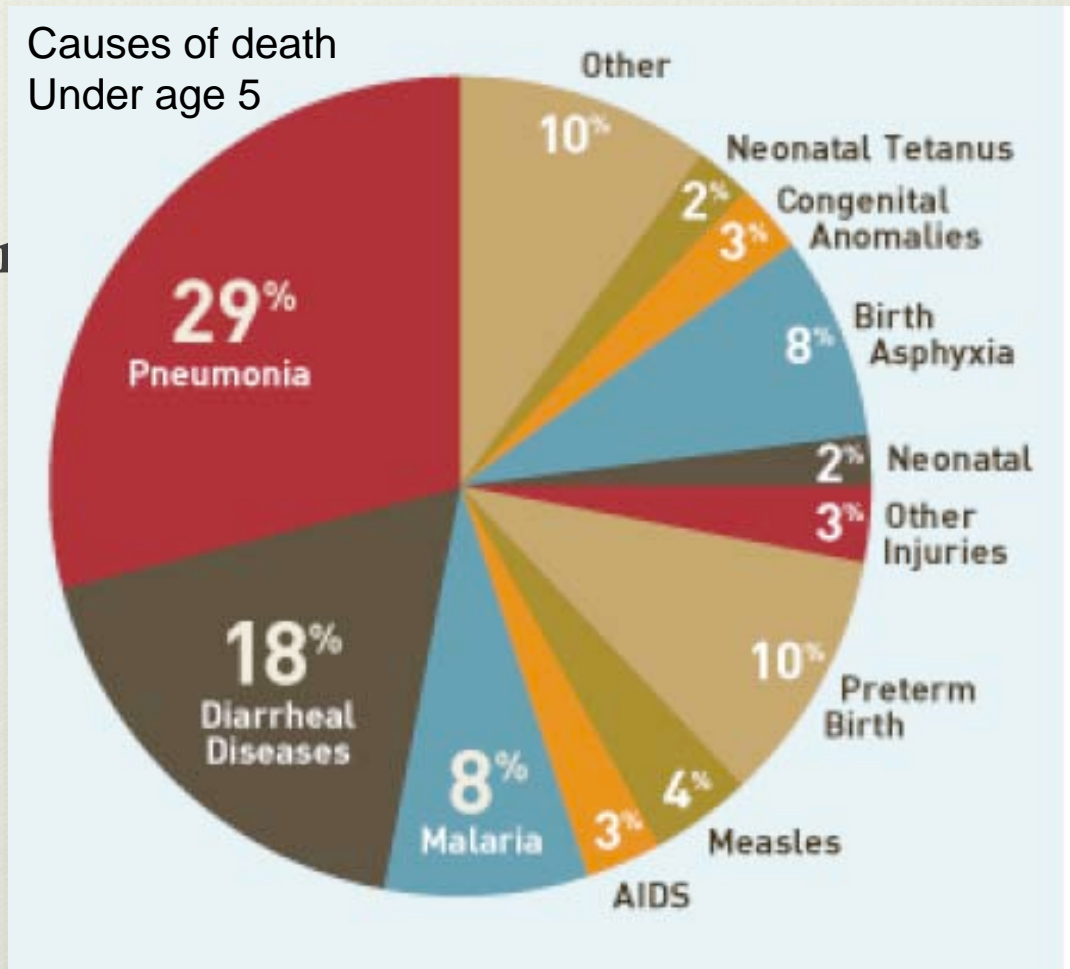
- ❖ **2 billion cases per year worldwide**
- ❖ **1.5 - 2.2 million children will die from diarrhoea and related diseases this year, most of them in developing countries.**

80% of them in the first two years of their life;
42,000 a week,
6,000 a day,
four every minute,
one every fourteen seconds

- ❖ (counter on <http://rehydrate.org/diarrhoea/index.html>)

Epidemiology

- ❖ 2nd leading cause of death in children under 5yo – second only to pneumonia
- ❖ Most caused by contaminated food and water sources.
- ❖ Leading cause of malnutrition in children <5yo



It has been estimated that in any given 24 hour period, 200 million people on earth have gastroenteritis. The amount of diarrheal water passed in any given 24 hour period equals the amount of water passing over Victoria Falls in one minute.



Traveler's Diarrhea

Travel expands the mind and loosens the bowels"
Sherman Gorbach, 1982

- Affects 30-50% of travelers
- Usually begins within first week of travel
- **Fever absent** or low grade ($< 38^{\circ}\text{C}$)
- Nausea, watery stools, abdominal cramps
- Resolves spontaneously in 3-5 days
- Dysentery with tenesmus, **bloody stool** $< 10\%$ of traveler's diarrhea.

- ❖ Keys to guide management are
 - ❖ 1. Classifying type of diarrhea and
 - ❖ 2. Classifying the level of dehydration

Overview of WHO Treatment Guidelines

Does the child have diarrhoea?

IF YES, ASK:

- For how long?
- Is there blood in the stool?

LOOK AND FEEL:

- Look at the child's general condition, is the child:

Lethargic or unconscious?
Restless and irritable?

- Look for sunken eyes.

- Offer the child fluid. Is the child:

Not able to drink or drinking poorly?
Drinking eagerly, thirstily?

- Pinch the skin of the abdomen.
Does it go back:

Very slowly (longer than 2 seconds)?
Steadily?

for
DEHYDRATION

**Classify
DIARRHOEA**

and if diarrhoea
14 days or more

and if blood
in stool

Two of the following signs

- Lethargic or unconscious
- Sunken eyes
- Not able to drink or drinking poorly
- Skin pinch goes back very slowly

**SEVERE
DEHYDRATION**

- If child has no other severe classification:
Give fluid for severe dehydration (Plan C)
OR

- If child also has another severe classification:
Refer **URGENTLY** to hospital with mother giving frequent sips of ORS on the way.
Advise the mother to continue breastfeeding.

- If child is 2 years or older and there is cholera in your area, give antibiotics for cholera.

Two of the following signs

- Restless, irritable
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**SOME
DEHYDRATION**

- Give fluid, zinc supplements and food for some dehydration (Plan B)

- If child also has a severe classification:
Refer **URGENTLY** to hospital with mother giving frequent sips of ORS on the way.
Advise the mother to continue breastfeeding.

- Advise mother when to return immediately.

Not enough signs to classify as some or severe dehydration

**NO
DEHYDRATION**

- Give fluid, zinc supplements and food as listed elsewhere in home plan (A)
- Advise mother when to return immediately.

- Dehydration present

**SEVERE
PERSISTENT
DIARRHOEA**

- Treat dehydration before referral unless the child has another severe classification.
- Refer to hospital

- No dehydration

**PERSISTENT
DIARRHOEA**

- Advise the mother on feeding a child who has **PERSISTENT** diarrhoea.
- Give multivitamin and minerals (including zinc) for 14 days.
- Follow-up in 7 days.

- Blood in the stool

BLOOD IN STOOL

- Treat for 7 or 14 days with an oral antimicrobial recommended for *Shigella* in your area. Treat dehydration and give zinc.
- Follow-up in 7 days.

Determine Type of Diarrhea

Types of Diarrhea

- Acute diarrhea – at least 3 liquid stools per day for less than 2 weeks
- Persistent diarrhea – Episodes of diarrhea with acute onset lasting more than 2 weeks

Types of Diarrhea

- ❖ Acute diarrhea – at least 3 liquid stools per day for less than 2 weeks
 - ❖ Simple diarrhea without blood
 - ❖ Viruses (cause 60% of cases; e.g. rotavirus, enterovirus)
 - ❖ Bacteria (Cholera, enterotoxigenic E. coli, non-typhi salmonella, Yersinia enterocolitica)
 - ❖ Parasites (Giardiasis)
 - ❖ Non-GI infections (malaria, viral URI, pneumonia)
 - ❖ Dysentery or bloody diarrhea
 - ❖ Bacteria (Shigellosis in 50% of cases, campylobacter, enteroinvasive or enterohaemorrhagic E. coli, salmonella)
 - ❖ Parasites (intestinal amoebiasis)
- ❖ Persistent diarrhea – Episodes of diarrhea with acute onset, lasting more than 2 weeks.

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**NO
DEHYDRATION**

- Give fluid, zinc supplements and food as usual (normal diet and home plan A).
- Advise mother when to return immediately.

- Dehydration present

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Types of Diarrhea

- ❖ Acute diarrhea – at least 3 liquid stools per day for less than 2 weeks
- ❖ Persistent diarrhea – Episodes of diarrhea with acute onset, lasting more than 2 weeks.
 - Continuing/new infections (Giardia, flukes, Strongyloides, etc)
 - Secondary events (secondary hypolactasia, tropical sprue)
 - Delayed recovery (malnutrition, zinc deficiency)
 - Other dz (HIV enteropathy, liver dz, IBD, ileocecal TB)

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**NO
DEHYDRATION**

- Give fluid, zinc supplements and food as listed elsewhere in home (Plan A)
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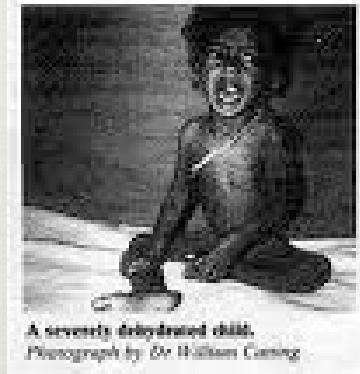
Case 1

- ❖ 2 yo boy brought by mother for 1 week of bloody diarrhea and fever. Not eating well, sluggish.....

Assess & Treat for Dehydration

Assessment of Dehydration (in 4 easy steps)

- ❖ Mental status
- ❖ Eyes
- ❖ Eating
- ❖ Skin



WHO Assessment of Dehydration

	No dehydration	Mild dehydration (≥ 2 signs)	Severe dehydration (> 2 signs)
Mental Status	alertness normal	restless or irritable	abnormally sleepy or lethargic
Eyes	no sunken eyes	sunken eyes	sunken eyes
Eating	normal drinking	drinks eagerly	drinking poorly or not at all
Skin	immediate skin pinch	slow skin pinch (< 2 seconds)	very slow skin pinch (> 2 seconds)

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- Give fluid, zinc supplements and food as listed elsewhere in home plan (A).
- Advise mother when to return immediately.

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Treatment of diarrhea with “no dehydration” (plan A)

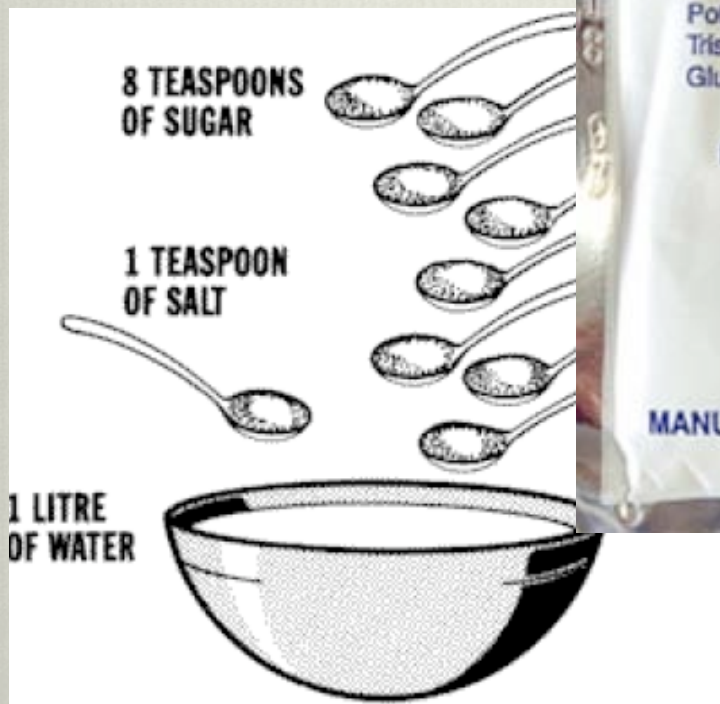
- ❖ Counsel mother on 4 rules of home treatment
 - ❖ Give extra fluid
 - ❖ Give Zinc
 - ❖ Continue Feeding
 - ❖ When to return

This is outpatient treatment.

The goal is to prevent dehydration from developing.

Treatment of diarrhea with “no dehydration”

- ❖ Counsel mother on 4 rules of home treatment
 - ❖ Give extra fluid
 - ❖ Tell mother to BF frequently and for longer at each feed, & give ORS or clean water in addition to breastmilk
 - ❖ Give 2 packets ORS & teach how to give ORS at home
 - ❖ Give frequent small sips from a cup. If vomits, wait 10 min, then continue more slowly
 - ❖ How much fluid to give in addition to usual fluid intake (just a guide):
 - ❖ Up to 2 years --- 50-100ml after each stool
 - ❖ 2 years or more --- 100-200ml after each stool
 - ❖ Continue giving extra fluid until the diarrhea stops
 - ❖ Give Zinc
 - ❖ Continue Feeding
 - ❖ When to return



Treatment of diarrhea with “no dehydration”

- ❖ Counsel mother on 4 rules of home treatment
 - ❖ Give extra fluid
 - ❖ Give Zinc (ZnSO₄, comes in 20mg scored tab, 20mg/5ml susp)
 - ❖ Up to 6 months – 10mg per day for 10-14 days
 - ❖ 6mos & older -- 20mg per day for 10-14 days
 - ❖ Continue Feeding
 - ❖ When to return

Treatment of Diarrhea with “no dehydration”

- ❖ Counsel mother on 4 rules of home treatment
 - ❖ Give extra fluid
 - ❖ Give Zinc
 - ❖ Continue Feeding
 - ❖ Maintain feeding at home
 - ❖ Multivitamins for 2 weeks (incl Folate, Vit A, Iron, Copper, Mg)
 - ❖ When to return

Treatment of Diarrhea with “no dehydration”

- Counsel mother on 4 rules of home treatment
 - Give extra fluid
 - Give Zinc
 - Continue Feeding
 - When to return
 - Return immediately if becomes more sick, unable to drink or breastfeed, drinks poorly, develops fever, or has blood in stool
 - Return after 5 days if none of these signs but still not improving

Case 2

- ❖ 18mo old girl brought in by mother for non-bloody diarrhea for 9 days. She is irritable but drinks eagerly when given a bottle. Decreased skin turgor (skin pinch <2sec).

Treatment of Diarrhea with “some dehydration”^(Plan B)

Treat initially in the clinic, by repleting fluid deficit with ORS

Give in clinic recommended amount of ORS over 4-hour period

➤DETERMINE AMOUNT OF ORS TO GIVE DURING FIRST 4 HOURS.

AGE*	Up to 4 months	4 months up to 12 months	12 months up to 2 years	2 years up to 5 years
WEIGHT	< 6 kg	6 - < 10 kg	10 - < 12 kg	12 - 19 kg
In ml	200 - 400	400 - 700	700 - 900	900 - 1400

** Use the child's age only when you do not know the weight. The approximate amount of ORS required (in ml) can also be calculated by multiplying the child's weight (in kg) times 75.*

Treatment of Diarrhea with “some dehydration”

- ❖ Teach mother how to give ORS (frequent small sips, if vomits wait 10min and restart more slowly, etc)
- ❖ Reassess the child after this 4 hour period
 - ❖ If in class A (“no dehydration”), treat accordingly
 - ❖ If in class B (“some dehydration”), re-treat as above, and start to offer food, milk, breastfeeding ad lib
 - ❖ If now in class C (severe dehydration”)...

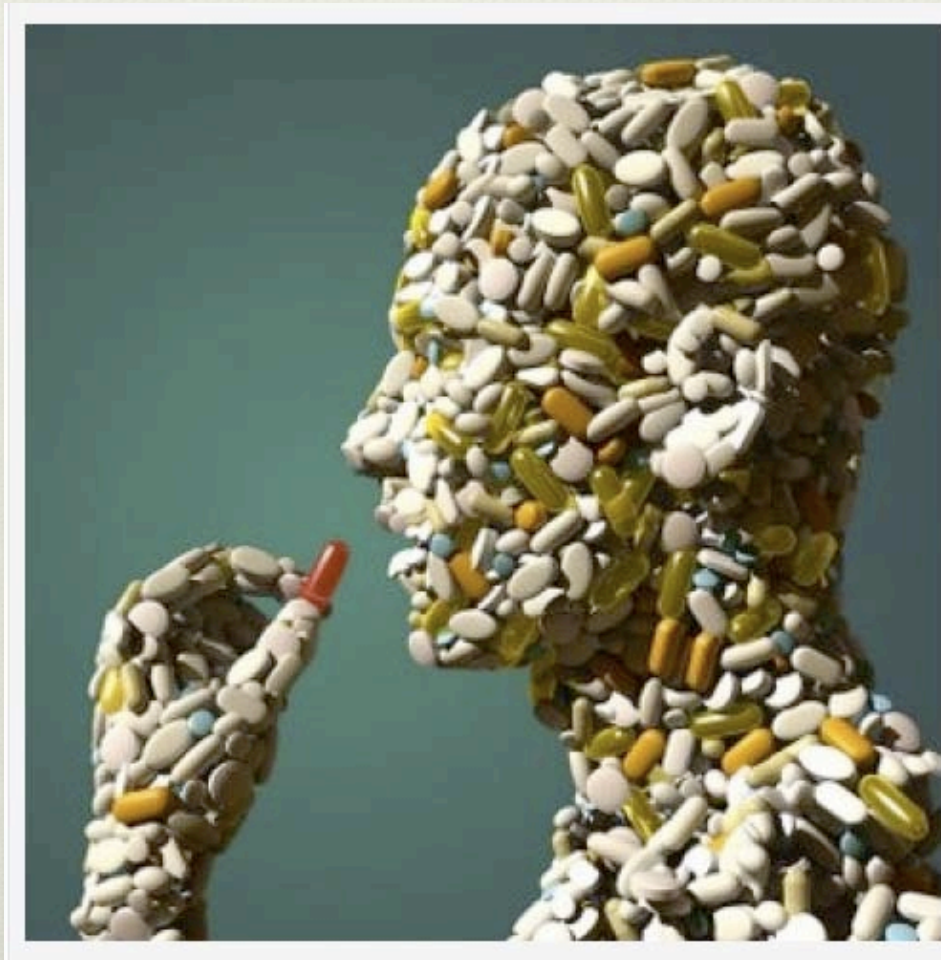
Treatment of Diarrhea with “severe dehydration” (Plan C)

- ❖ Give ORS while setting up the IV
- ❖ Give 100ml/kg of isotonic fluids
 - ❖ <1yr: 30ml/kg 1st hr 70ml/kg over 5hrs
 - ❖ >1yr: 30ml/kg 1st 30m 70ml/kg over 2.5hrs
- ❖ If no IV, may give ORS via NGT (120ml/kg over 6h)
- ❖ Monitor closely, reassess after infusion and re-classify (Plan A, B, C)
- ❖ Begin ORS as soon as can drink

Treatment of Diarrhea in Malnourished Children

- ❖ “ReSoMal” instead of standard ORS (lower sodium in ReSoMal, higher potassium), and give at a slower rate
- ❖ Do *not* use IV rehydration unless in shock
 - ❖ If necessary, slower rate (15ml/kg/hr)
- ❖ Watch for signs of fluid overload (development of tachypnea, periorbital edema, tachycardia, rales) during rehydration

Pharmacologic Rx



Pharmacologic Therapy

Zinc

- ❖ Zinc deficiency widespread in developing countries. Pathophysiology uncertain, but has critical role in metallo-enzymes, polyribosomes, cell membrane, and likely the immune system
- ❖ Zinc supplementation improves outcomes in acute and persistent diarrhea (multiple studies)
 - ❖ 18% reduction in stool frequency, 15% shortened duration of acute diarrhea vs placebo (Lukacik, Pediatrics 2008)
 - ❖ Estimated 23% reduction in diarrhea-associated mortality (Walker, Int J Epidemiol 2010)
 - ❖ Short course (10-14d) reduces incidence of diarrhea for 2-3 months (WHO Treatment of Diarrhea, 2009)

Pharmacologic Therapy

Zinc

- ❖ Zinc Sulfate 10mg qday x 10-14 days if <6mo
- ❖ Zinc Sulfate 20mg qday x 10-14 days if >6mo

Pharmacologic Therapy

Antibiotics

- ❖ Antibiotics are *not* routinely indicated
 - ❖ Frequent inability to clinically distinguish viral, bacterial, parasitic
 - ❖ Frequent lack of knowledge re: sensitivity patterns
 - ❖ Side effects
 - ❖ Cost
 - ❖ Breeds resistance

Pharmacologic Therapy

Antibiotics

When to use antibiotics?

- ❖ Dysentery (probably shigellosis)
 - ❖ Ciprofloxacin. Ceftriaxone.
 - ❖ If not responding to either of these, assume amoebic dysentery (rare, 3%) and treat with metronidazole
- ❖ Suspected cholera with severe dehydration
 - ❖ Tetracycline or Erythromycin
- ❖ *Giardia confirmed* by microscopy (often unavailable, and vast majority infections asx, so don't usually use it)
 - ❖ Metronidazole
- ❖ Severe non-GI infxn (PNA, etc)

Pharmacologic Therapy

Other drugs?

- ❖ Antidiarrheals and antiemetics should not be used in children. They have not been shown to prevent dehydration or improve nutrition, & some of them can be dangerous (e.g. antiemetics -> somnolence, poor PO; ant motility drugs may not even work well in kids, plus paralytic ileus, ?sedation; epinephrine, steroids)

Continued Feeding

- ❖ Especially important for persistent diarrhea
- ❖ Goal 110cal/kg or more
- ❖ <6mos, encourage exclusive breastfeeding
- ❖ >6mos, either a low-lactose or lactose-free diet
- ❖ Main criterion for effective tx is weight gain
- ❖ All kids w/ persistent diarrhea warrant MVI & min supplementation (folate, zinc, VitA, iron, copper, mg)



Education, Prevention

- ❖ Provision for clean water source and sanitation in the community is paramount
- ❖ Education about safe water practices, handwashing, boiling water if fuel available, food handling, benefits of breastfeeding in preventing diarrhea

Conclusion

- Epidemiology
- Determining type of diarrhea and level of dehydration
- Overview of management
 - Rehydration
 - WHO Guidelines for Dx & Rx of dehydration
 - Pharmacologic Therapy
 - Zinc
 - +/- antibiotics
 - Continued Feeding, micronutrients, education