

Cholera- Recent Haiti Experience

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- Information
 - Cholera presentation and treatment
- DART Infomercial
 - God's provision in Chardonnières
 - Rendel

What is Cholera

- Vibrio Cholerae- gram negative bacterium
 - 200 serotypes, two cause epidemics- O1 O139
 - O1 Serogroups: Ogawa or Inaba

Biotypes: El Tor, and Classical

- O139 emerged 1992, prominent for 10 years currently not common
- Africa, Asia, the Middle East, South and Central America, and the Caribbean
- Pathogenesis via Cholera Toxin

Cholera Toxin

- Cholera toxin
 - Endocytosed, processed, increases cAMP
 - Activates cystic fibrosis transmembrane conductance regulator
 - ATP mediated Cl efflux and secretion of H₂O, Na, K, HCO₃
 - Secretory Diarrhea- up to 2 L per hour

Cholera in Haiti

- O1 Serotype Ogawa Biotype El Tor
- Introduced October 2010
 - Now endemic
 - >7000 have died
- In 2012 the Inaba biotype was identified as well

Transmission

- Via infected food or water
- Can live on chitinous plankton
 - Simple straining of water may decrease transmission
- $10^{10} - 10^{12}$ Organisms per liter of stool
- Environmental and Person to Person thought significant in epidemics
- Large inoculum required 10^8 ? organisms

Risk Factors

- Lack of clean water
- Endemic areas-
 - Seasonal distribution based on moisture
 - More common in children- lack of immunity
- Epidemic
 - Naive population, flooding
- Blood type O
- Elevated gastric pH
- Breast feeding is protective

Presentation

- Incubation- hours to 5 days
 - 1-2 days typical
- Severity- from asymptomatic carrier to life threatening dehydration
- Diarrhea
- Vomiting
- Hypovolemia
- Altered mental status

Presentation



Washerwoman's Hands



Diarrhea

- Diarrhea- initially may be yellow or brown
 - Progresses to clear with mucus “rice water”
 - No blood
 - Adults up to 1 L/ hour
 - Children 10-20 ml/kg/hr
- Vomiting- white/clear

Diarrhea



Clinical Manifestations

- Symptoms of Dehydration
 - Sunken eyes
 - Poor turgor, washerwoman hands
 - Decreased mental status, hypotension
- Muscle Cramps
- Fever unlikely

Diagnosis

- Suspect if watery diarrhea with severe dehydration
- Stool culture
- Dark field microscopy to look for vibro
- Rapid diagnostic tests (Crystal VC)
 - Detect O1 or O139 antigen in stool
 - 95% sensitive 65-85% specific

Prevention

- Education
 - Latrines, hand washing, water source
- Clean Water
 - Filters, aquatabs, clorox, boiling
- Breast feeding

Vaccines

- Bivalent killed whole cell vaccine (Shanchol)
 - Includes several serotypes of O1 and o139
 - 2-3 doses
 - Single dose 53-67% effective
 - Two doses 87% effective
 - 5 year persistence
 - Less effective, shorter duration < 5 years old
 - Some herd immunity

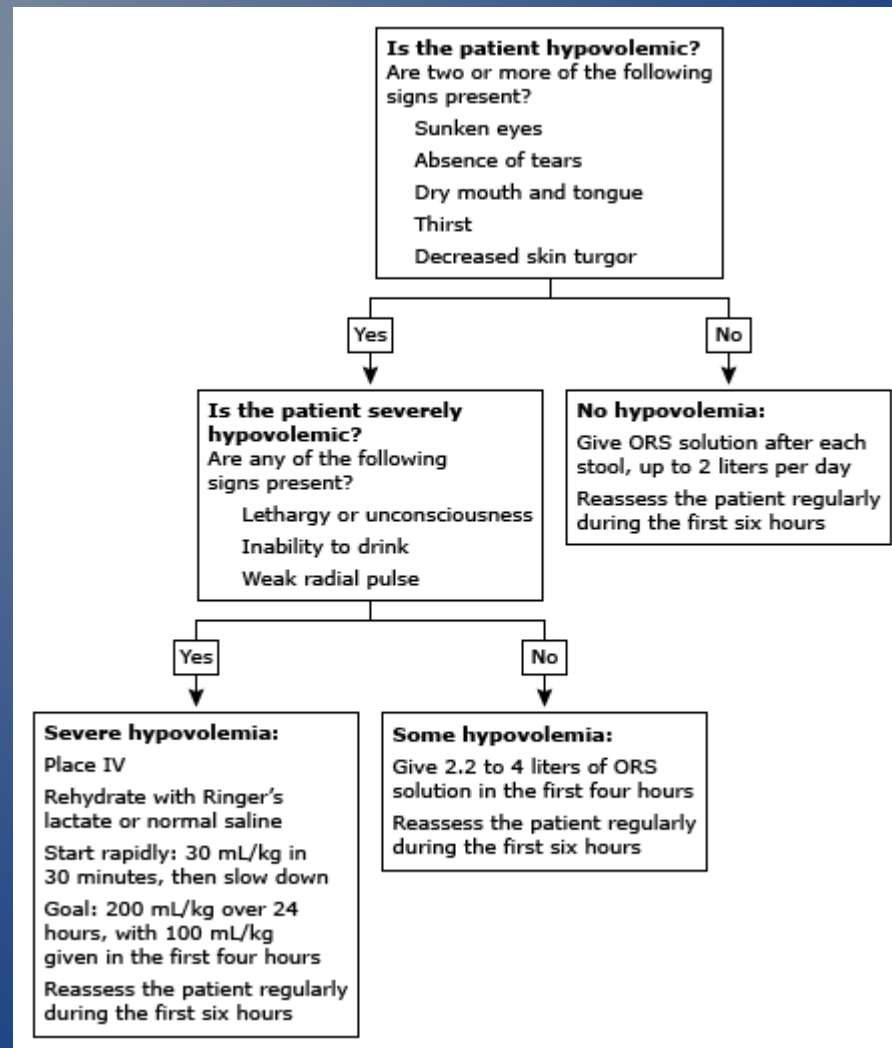
Vaccines

- WC-rBS (Dukoral)
 - Killed whole cells several serotypes O1
 - Recombinant Cholera toxin B subunit
 - One or more doses 78% efficacy
 - 60% efficacy at 2-3 years for >5 year olds
 - Not protective against O139
 - Some herd immunity

Treatment

- Can reduce mortality from over 10% to less than 0.5%
- Rehydration
- Antibiotics
- Zinc, Vitamin A

Rehydration



Oral Rehydration

- Oral Rehydration Solution/salts
 - Contain electrolytes to replete losses
 - Preferred if tolerating oral fluids and able to keep up with losses



IV Solution- use LR- Due to K^+ HCO_3^-

Estimated electrolyte content of cholera stool and therapeutic fluids for cholera

	Millimoles/liter					Comment
	Na+	K+	Cl-	HCO3-	Carbohydrate	
Electrolyte losses in stools						
Cholera stool, adult	130	20	100	45	--	Stool sodium losses in cholera are higher than in other diarrheal illnesses.
Cholera stool, child	100	30	90	30	--	
Non-cholera stool, child (ETEC)	50	35	25	20	--	
Intravenous therapy						
Lactated Ringer's solution	130	4	109	28	--	Lactated Ringer's (LR) solution is preferred over normal saline because it contains potassium and bicarbonate. 'Dhaka solution' contains more potassium and bicarbonate than LR, and also contains dextrose.
Normal saline	154	0	154	0	--	
Cholera saline (Dhaka solution)	133	13	154	48	140	
Oral rehydration therapy						
ORS (WHO 2002)	75	20	65	10 (citrate)	75 (glucose)	WHO ORS utilizes glucose as a carbohydrate source. Rice based ORS formulation have been found in randomized trials to reduce the duration of diarrhea and stool losses in severe cholera. A homemade preparation of ORS could be used in an emergency scenario.
Rice based ORS (eg, CeraORS 75®)	75	20	65	10 (citrate)	27 grams rice syrup solids	
Homemade ORS: ■ Half (1/2) teaspoon salt ■ Six (6) teaspoons sugar ■ 1 liter of clean water	~75	0	~75	0	~75	

Steve's Approach

- Unconscious? Lethargic? Pulseless?
 - You get an IV
- Sitting up? Look good?
 - You get a cup of ORS
 - 4 hours of observation
 - Early antibiotics
 - If no vomiting- discharge with ORS and Zinc
 - Vomit? IV and admit for observation
- Clinical Judgment rules

Steve's Approach

- Unconscious or Lethargic-
 - Adult- 2 liter bolus, reassess
 - Watch mental status, eyes
 - Track vomiting, diarrhea, urine output
 - Bolus for each episode of diarrhea or vomiting
 - IV choices:
 - 250 cc/hr
 - Bolus 1 liter
 - Hep lock

Steve's Approach- Kids

- Initial IV bolus 30 cc/kg
- Track vomiting/diarrhea/urine output
- Bolus for vomiting/ diarrhea 5-10 cc/kg
- Follow mental status, eyes
- IV Fluids:
 - 2-3x maintenance
 - Bolus 20 cc/kg
 - Hep Lock

Fluid Volumes

- Patients may require 200 cc/kg over first 24 hours
 - 14 liters for 70 kg patient
 - 3.2 liters for 4 year old
 - 2.4 liters for 2 year old
- Massive amounts may be required over days
 - 25-30 L typical up to 80+ in some cases
- Follow mental status, eyes, urine output
 - Watch for edema and bloating in kids

Antibiotics

- May decrease fluid losses by 50%
- Multiple choices
 - Doxycycline 300 mg x 1 (4-6 mg/kg kids)
 - Resistance common
 - Cipro 1 gm x 1 (20 mg/kg kids, not under 8)
 - Resistance in Africa and Asia seen
 - Azithro 1 gm x 1 (20 mg/kg kids)
- Early administration helpful- as soon as not vomiting

Zinc

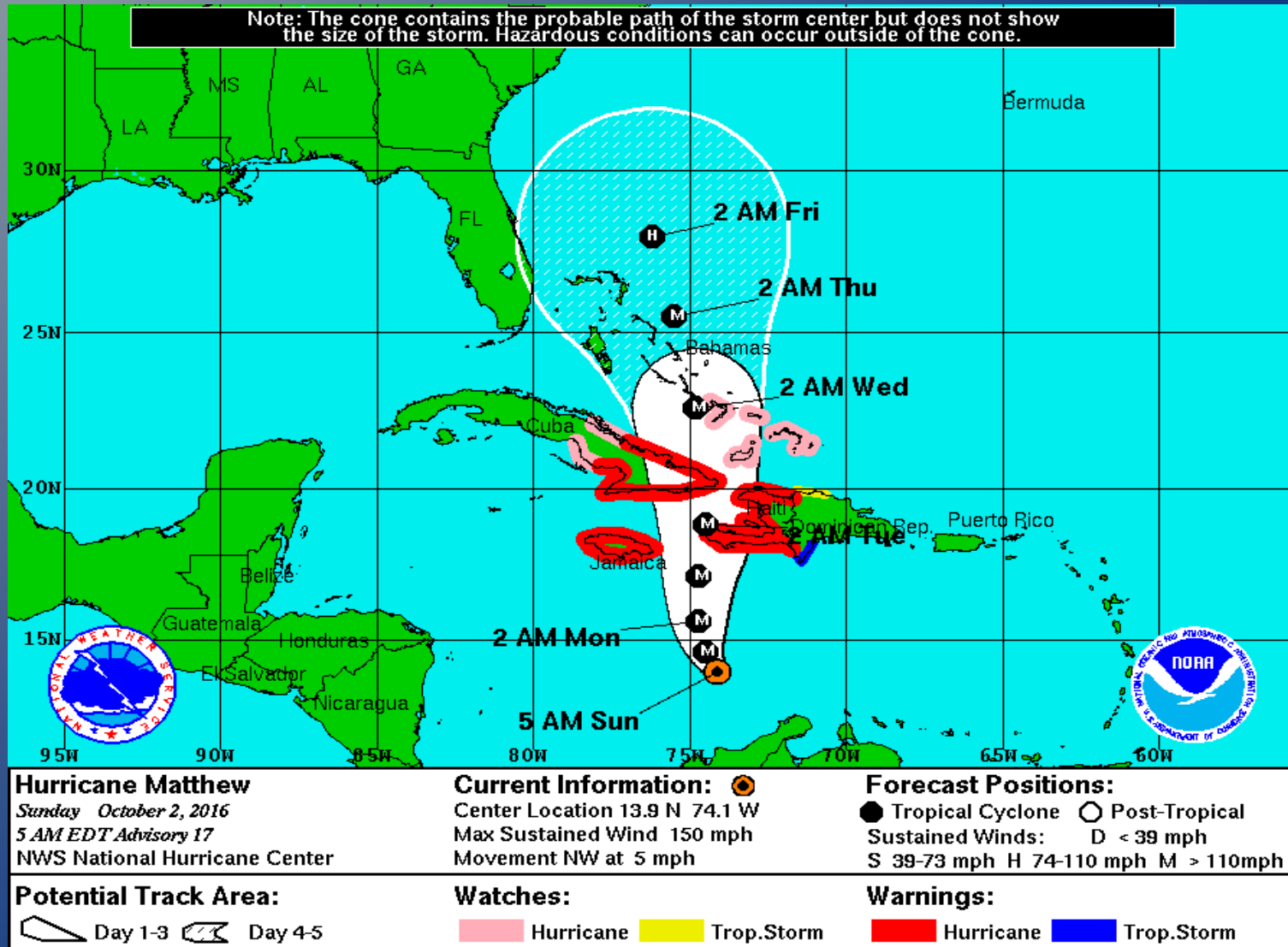
- Zinc- shown to reduce severity and duration of diarrhea in children, reduces recurrence
 - 10 mg/day < 6 months for 10 days
 - 20 mg/day 6 mos to 5 yrs for 10 days
- Adults?
 - Not studied, ?20-40 mg/day x 10 days?
- Vitamin A?

Prevention

- Education
- Aquatabs, clorox bleach
- Long term water source

Hurricane Matthew

Category 5 10/04/16



Initial Days



Initial Days



Chardonnières



God's Provision



A Field for a Field Hospital



Bathrooms?



Water?



Cell Service?



God's Provision



What's in those containers?



What's in those containers?



Tarps



Stretchers



Ritch



Rondelle, Rendelle, Rendel?



The Hike Begins



River Crossing



Tim



The House that Tim Built



Supplies and Personnel



Rendel Team



Growing



Rendel CTC



Summary

- Cholera- bad disease, rewarding to treat
- DART- opportunity to see God's provision
 - Be a part of what He is doing
 - See the body of Christ work
- What about where I am now? Today?

The End

