

CHOLERA



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Cholera

- Cholera is an acute diarrheal illness caused by infection of the intestine with the bacteria *Vibrio cholerae*.



Pathophysiology

- *V cholerae* is
 - comma-shaped,
 - gram-negative aerobic or facultative anaerobic bacillus
 - bacillus that varies in size from 1-3 μm in length by 0.5-0.8 μm in diameter

Pathophysiology

- Its antigenic structure consists of
 - flagellar H antigen
 - somatic O antigen.

virulence & pathogenicity

Ingestion of *V. cholerae*



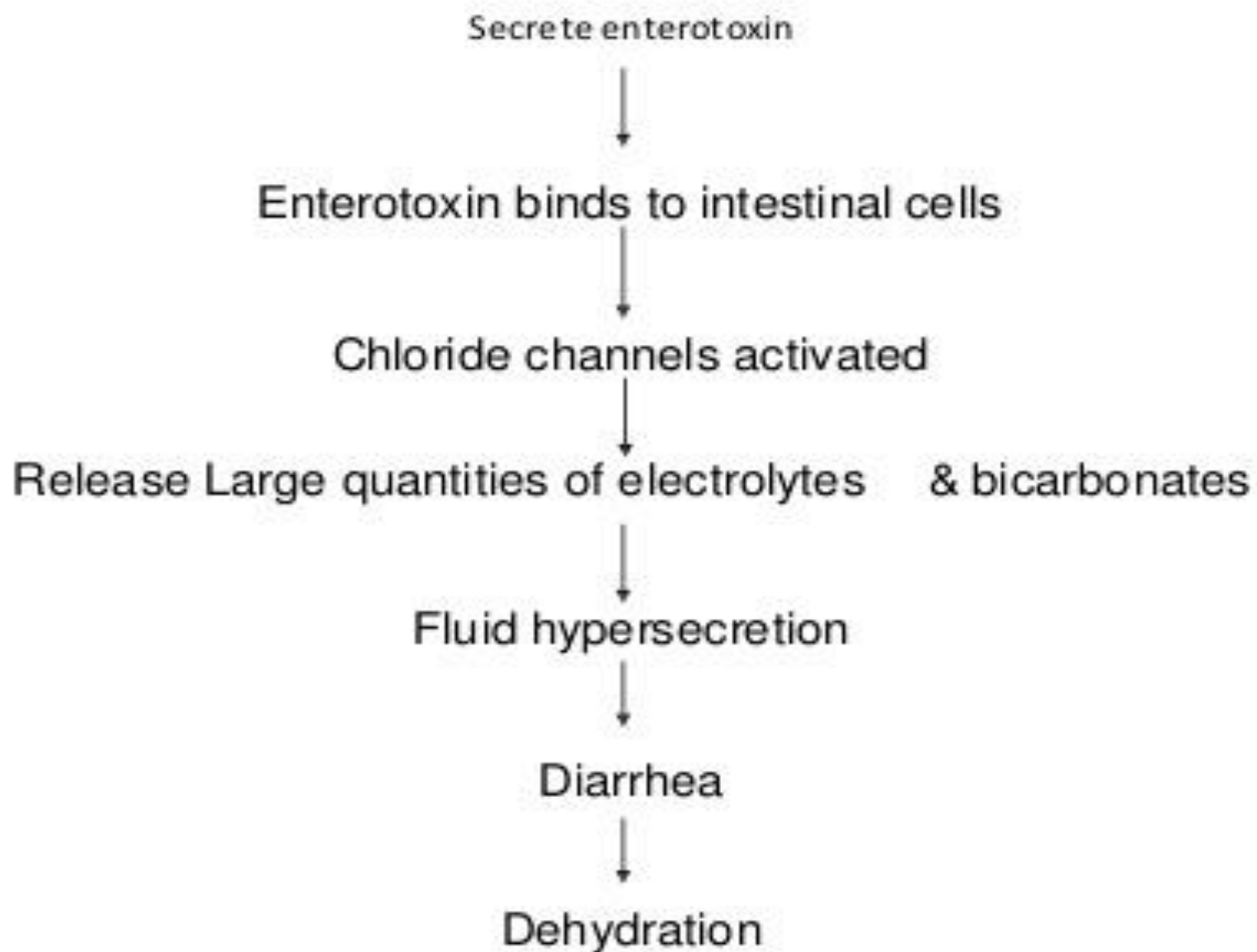
Resistant to gastric acid



Colonize small intestine



Virulence of Non-toxigenic *V. cholera* O1 strain not well understood



HOST FACTORS

1. **Age:** Children: 10x more susceptible than adults, And Elderly also higher susceptible.
2. **Sex:** Equal in both male and female.
3. **Immunity:** Less immune higher risk.
4. People with low gastric acid levels
5. Blood types
 - O >> B > A > AB

RISK FACTORS

Poor sanitary conditions

- Rare in developed countries
- Common in Asia, Africa, & Latin America

Raw or undercooked food

- Contaminated seafood, even in developed countries.
- Especially shellfish.

Hypochlorhydria

- People with low levels of stomach acid
- Such as children, older adults, and some medications.

Type O blood

- Reasons aren't entirely clear
- Twice more likely

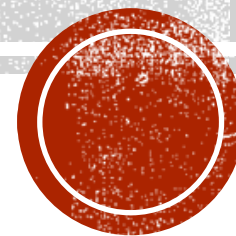
Transmission

- Humans only reservoirs
- *Contaminated food or water*
 - *Inadequate sewage treatment*
 - *Lack of water treatment*
 - *Improperly cooked shellfish*
- *Transmission by casual contact unlikely*

Period of Communicability

- *During acute stage*
- *A few days after recovery*
- *By end of week, 70% of patients non-infectious*
- *By end of third week, 98% non-infectious*

THANK YOU



Incubation

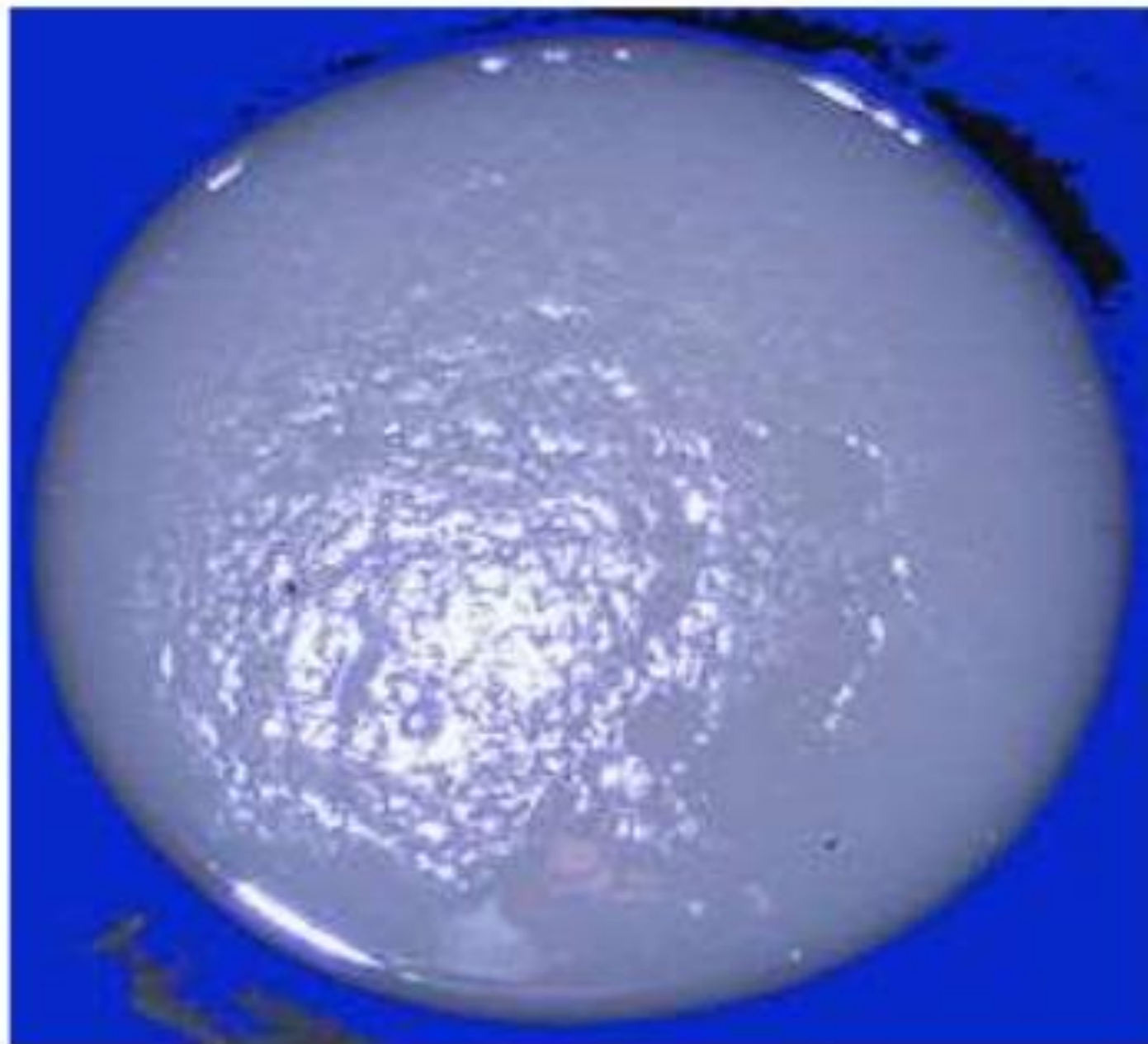
- Ranges from a few hours to 5 days
- Average is 1-3 days
- Shorter incubation period:
 - High gastric pH (from use of antacids)
 - Consumption of high dosage of cholera

Infectious Dose

- water, the infectious dose is 10^3 - 10^6 organisms.
- ingested with food, fewer organisms (10^2 - 10^4)

Symptoms

- Usually mild, or no symptoms at all
 - 75% asymptomatic
 - 20% mild disease
 - 2-5% severe
- Vomiting
- Cramps
- profuse, painless diarrhea and vomiting of clear fluid.
- "rice water" (1L/hour) >20 mL/kg during a 4-hour observation period
- Without treatment, death in 18 hours-several days



- Typical "rice water" diarrhea

Cholera Gravis

- More severe symptoms
- Rapid loss of body fluids
 - produce 10 to 20 litres
 - 10⁷ vibrios/mL
- Rapidly lose more than 10% of body weight
- Dehydration and shock
- patient's skin turning a bluish-gray hue from extreme loss of fluids.
- Death within 12 hours or less
- Death can occur within 2-3 hours



Cholera sicca

- Cholera sicca is an old term describing a rare, severe form of cholera that occurs in epidemic cholera.
- This form of cholera manifests as ileus and abdominal distention from massive outpouring of fluid and electrolytes into dilated intestinal loops.
- Mortality is high, with death resulting from toxemia before the onset of diarrhea and vomiting.
- The mortality in this condition is high.
 - Because of the unusual presentation, failure to recognize the condition as a form of cholera is common.

CHOLERA IN CHILDREN

- **Breast-fed infants are protected.**
- **Symptoms are severe & fever is frequent.**
- **Shock, drowsiness & coma are common.**
- **Hypoglycemia is a recognized complication, which may lead to convulsions.**
- **Rotavirus infection may give similar picture & need to be excluded.**

Consequences of Severe Dehydration

1. Intravascular volume depletion
2. Severe metabolic acidosis
3. Hypokalemia → cardiac arrest
4. low blood sugar (hypoglycemia)
 1. Seizures
 2. coma, especially in the young
5. Cardiac and renal failure
6. Sunken eyes, decreased skin turgor
7. Almost no urine production



DIAGNOSIS

Clinical diagnosis

Cholera should be considered in all cases with severe watery diarrhea and vomiting.

Traveling to affected areas and eating shellfish

No distinguishing clinical manifestations for cholera.

Differential diagnosis

Enterotoxigenic *e. Coli*

Bacterial food poisoning

Viral gastroenteritis
(**Rotavirus**)

Diagnosis

- Stool culture
- Confirm presence of cholera toxin
- Cholera Rapid Test Dipsticks

OTHER LAB FINDINGS

- Dehydration leads to high blood urea & serum creatinine. Hematocrit & WBC will also be high due to hemoconcentration.
- Dehydration & bicarbonate loss in stool leads to metabolic acidosis with wide-anion gap.
- Total body potassium is depleted, but serum level may be normal due to effect of acidosis.

Treatment



REHYDRATION

- Oral
- Intravenous



ANTIMICROBIAL THERAPY

WHO Guidelines for Cholera Management

Steps in the treatment of a patient with suspected cholera are as follows:

1. Assess for dehydration (see Table 1)
2. Rehydrate the patient and monitor frequently, then reassess hydration status
3. Maintain hydration; replace ongoing fluid losses until diarrhea stops
4. Administer an oral antibiotic to the patient with severe dehydration
5. Feed the patient

More detailed guidelines for the treatment of cholera are as follows:

- Evaluate the degree of dehydration upon arrival
- Rehydrate the patient in 2 phases; these include rehydration (for 2-4 h) and maintenance (until diarrhea abates)
- Register output and intake volumes on predesigned charts and periodically review these data
- Use the intravenous route only (1) during the rehydration phase for severely dehydrated patients for whom an infusion rate of 50-100 mL/kg/h is advised, (2) for moderately dehydrated patients who do not tolerate the oral route, and (3) during the maintenance phase in patients considered high stool purgers (ie, >10 mL/kg/h)
- During the maintenance phase, use oral rehydration solution at a rate of 800-1000 mL/h; match ongoing losses with ORS administration
- Discharge patients to the treatment center if oral tolerance is greater than or equal to 1000 mL/h, urine volume is greater than or equal to 40 mL/h, and stool volume is less than or equal to 400 mL/h.

Assessment of the Patient With Diarrhea for Dehydration (based on WHO classification)

Clinical feature	Predicted degree of dehydration		
	None (<5 percent)	Some dehydration (5-10 percent)	Severe dehydration (>10 percent)
Decision	Patient has no dehydration	If the patient has 2 or more signs, some dehydration is present	If the patient has 2 or more of these signs, severe dehydration is present

treatment of cholera

- Rehydration is accomplished in 2 phases:
 - A. Rehydration
 - B. Maintenance.

treatment of cholera; rehydration

- The goal of the rehydration phase is to restore normal hydration status, which should take no more than 4 hours.
- Set the rate of intravenous infusion in severely dehydrated patients at 50-100 mL/kg/hr.
- Lactated Ringer solution is preferred over isotonic sodium chloride solution because saline does not correct metabolic acidosis

treatment of cholera; maintenance

- The goal of the maintenance phase is to maintain normal hydration status by replacing ongoing losses.
- The oral route is preferred, and the use of oral rehydration solution (ORS) at a rate of 500-1000 mL/hr is recommended
- **Fluids should never be restricted**

SIGN OF DEHYDRATION

2 or more of the following signs?

1. sunken eyes
2. absence of tears
3. dry mouth and tongue
4. thirsty and drinks eagerly
5. Goes back slowly (< 2 sec)

If NO

No dehydration
(<5 percent)

Oral Rehydration

Age	Amount After Loose Stool
< 24 mo	50-100 mL
2-9 y	100-200 mL
>10 y	As much as is wanted

If YES

2 or more of the following signs?
1. lethargic, unconscious or floppy
2. unable to drink
3. radial pulse is weak
4. Goes back very slowly (>2 sec)

If NO

Some dehydration
(5-10 percent)

ORS solution to give in the first 4 hours

If improv



Age	< 4 mo	4-11 mo	12-23 mo	2-4 y	5-14 y	>15 y
Weight	< 5 kg	5-7.9 kg	8-10.9 kg	11-15.9 kg	16-29.9 kg	>30 kg
ORS solution in mL	200-400	400-600	600-800	800-1200	1200-2200	2200-4000

If YES

Severe
dehydration
(>10 percent)

Treat Severe dehydration in choleraFluids should never be restricted.

younger than 1 year

100 mL/kg IV in 6 hours

30 mL/kg in the first hour then 70 mL/kg in the next 5 hours.

maintained intravenously with RL

Total amount per day RL+ORS = 200 ml/kg during the first 24 hours + Administer ORS solution (about 5 mL/kg/h) as soon as the patient can drink, in addition to IV fluid.

Continue to reassess at least every 4 hours; radial pulse should be strong and Bld pressur should be normal.

goal of the rehydration phase is to restore normal hydration status, must be less than 4 hours

The goal of maintenance phase is to maintain normal hydration by replacing ongoing losses.

Continue
monitor

older than 1 year + adult

100 mL/kg IV in 6 hours

30 mL/kg as rapidly as possible (within 30 min) then 70 mL/kg in the next 2 hours.

Criteria for hospital discharge

- After receiving therapy of adequate hydration, patients that fulfill these three criteria can be discharged of the hospital:
 1. Adequate oral intake
 2. Normal urinary flow (40-50 cc by hour)
 3. Maximum diarrhea flow of 400 cc per hour

Antibiotic treatment

- Antimicrobial therapy is useful for
 1. prompt eradication of the vibrio
 2. diminish the duration of diarrhea
 3. decrease the fluid loss.
- Antibiotics should be administered to moderate or severe cases

Antibiotic treatment

	Option
Adults	Doxycycline, 300 mg po single dose ,Ciprofloxacin, 1g po single dose OR Azithromycin 1g po single dose.
Pregnant	Erythromycin 500 mg/ 6 hours for 3 days OR azithromycin, 1g po single dose
Children> 3yrs	Erythromycin 12.5mg/kg/ 6 hours for 3dys OR azithromycin 20 mg/kg, in a single dose, without exceeding 1 g
Children < 3yrs	Erythromycin 12.5mg/kg/ 6 hours for 3dys OR azithromycin 20 mg/kg, in a single dose

Prevention

- Comprehensive Multidisciplinary Approach: water, sanitation, education, and communication
- Basic health education and hygiene
- Mass chemoprophylaxis
- Provision of safe water and sanitation