



# Diarrhea Acute & Sub-acute

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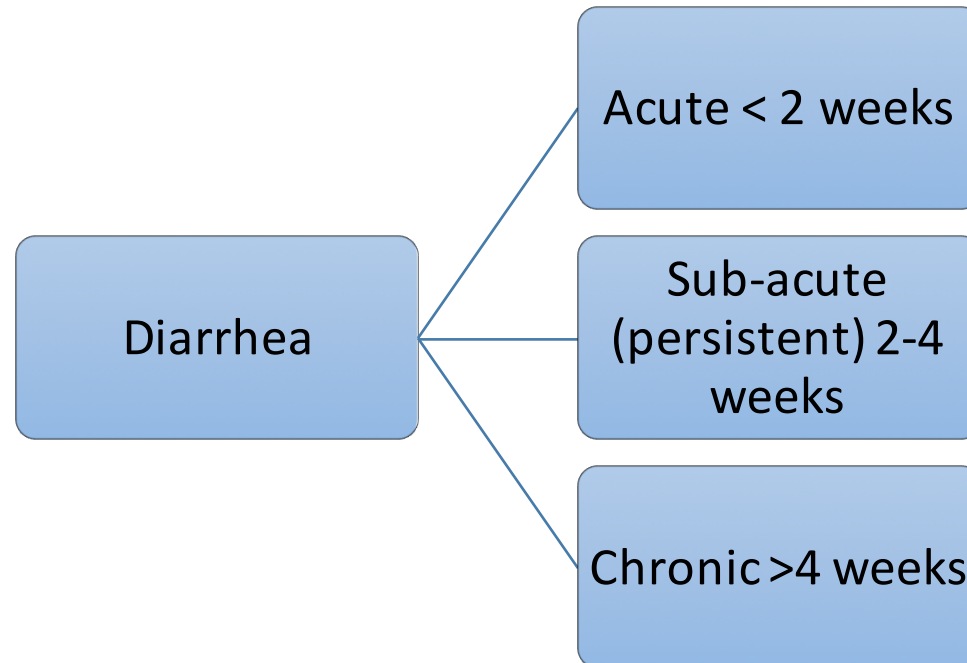
# Outline

- Diarrhea general principles and classifications:
  - Community-acquired.
  - Hospital-acquired.
- Common pathogens and presentations.
- Sub-acute diarrhea
- Diagnosis and management.

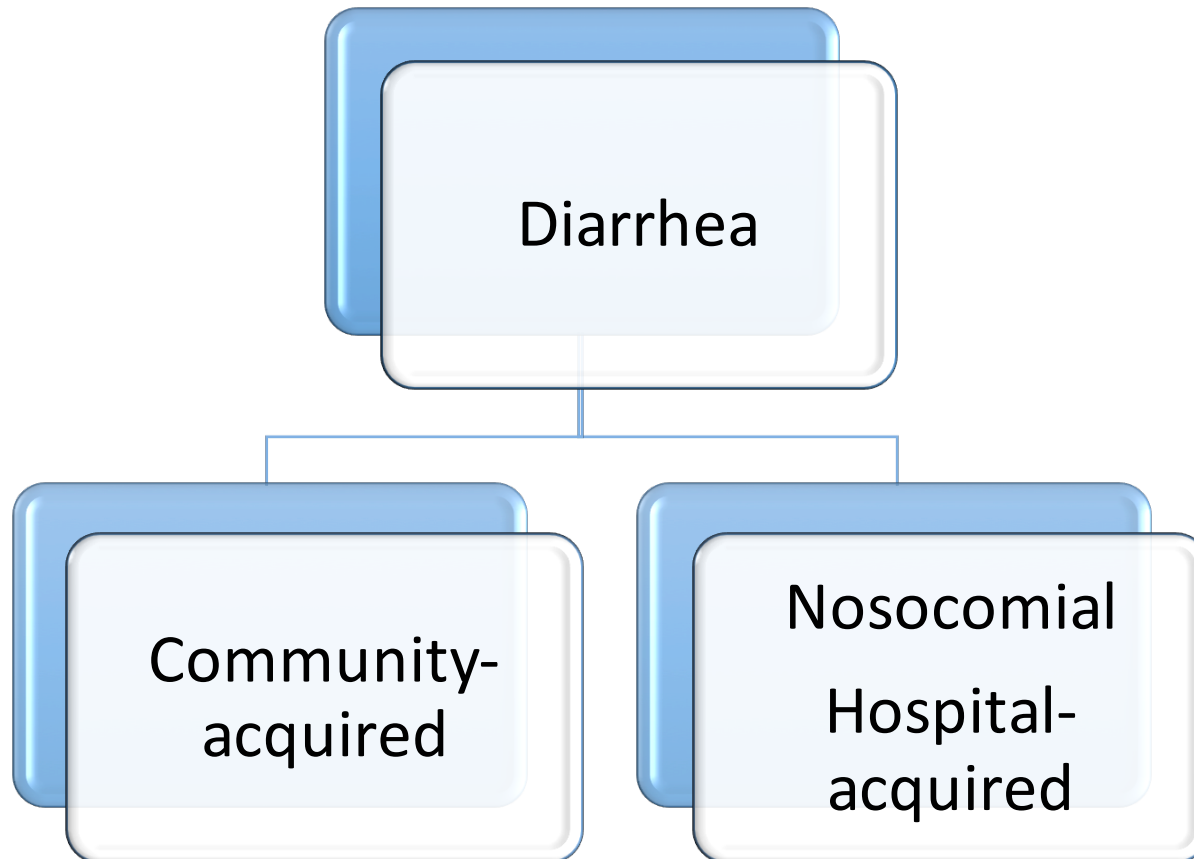


# General Principles

- Diarrhea:
  - Passage of loose\watery stool **at least 3 (mes per 24 hours (>200ml))**.
- Diarrhea classification based on **duration**:

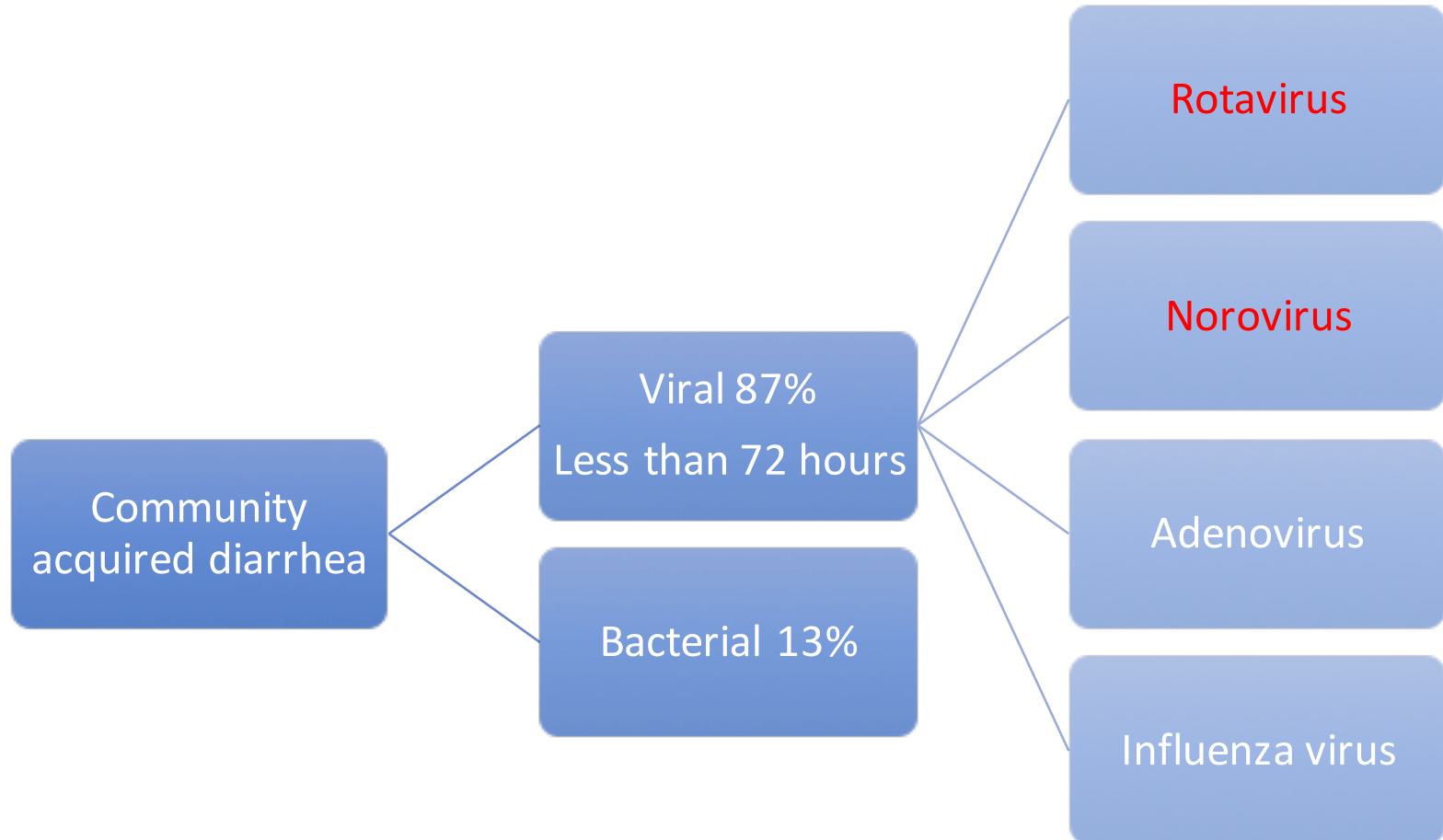


- Classification of diarrhea based on the **etiology**:



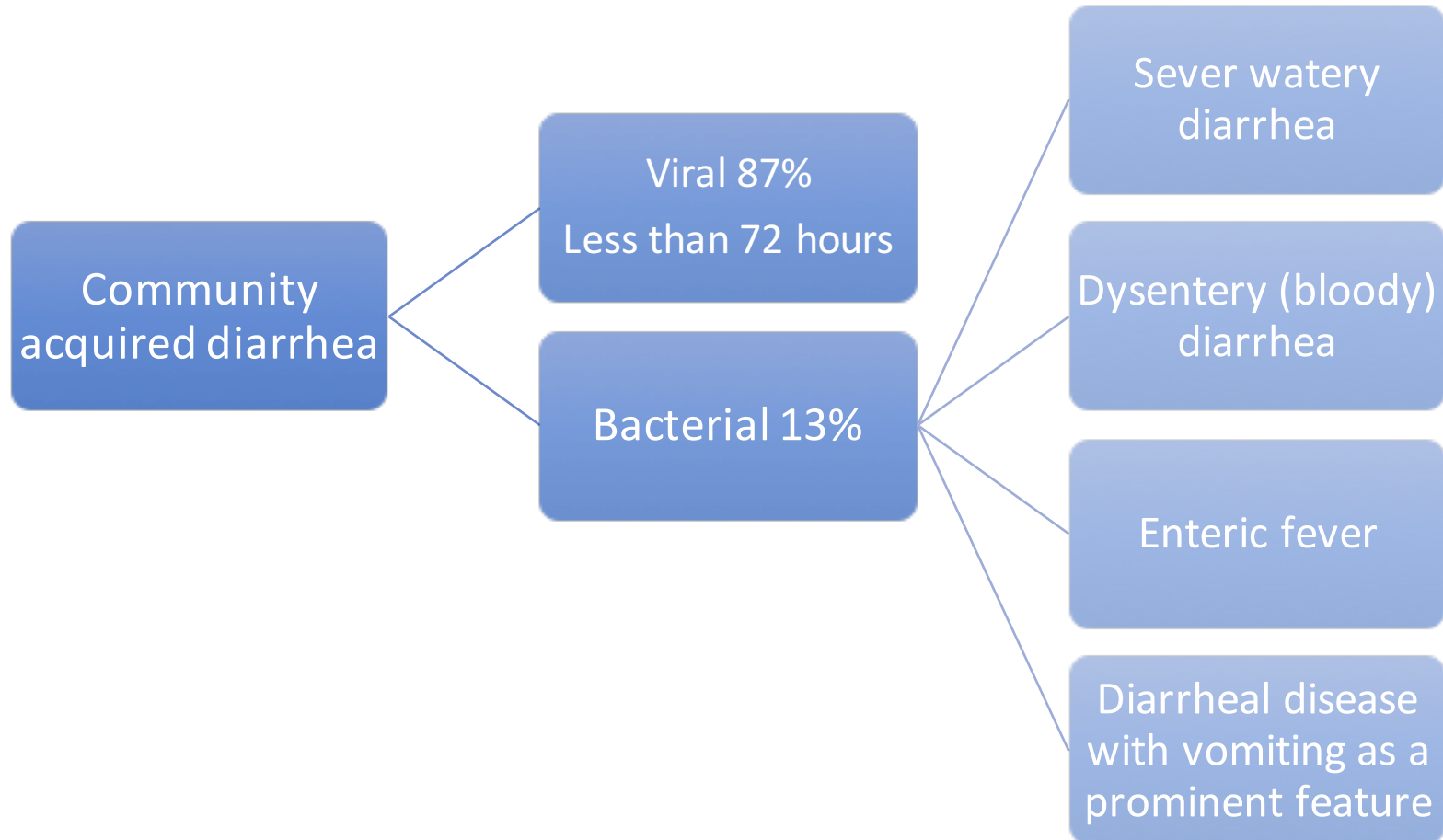


# 1. Community-acquired Diarrhea





# 1. Community-acquired Diarrhea



# Community-acquired Diarrhea (Bacterial)



## 1. Severe Watery Diarrhea:

- Fluid loss from **the proximal small intestine without cellular injury** is the primary mechanism!
- Common microorganisms:
  - **Vibrio cholera**
  - Enterotoxigenic E.coli (ETEC)
  - Salmonella
  - Listeria
- run an acute brief **1-3 days**, self limited course



# Vibrio Cholera

- Vibrio group, gram negative rod, and curved.
- Long filamentous Pili.
- Highly motile with a single polar flagellum.
- Found in salty water:
  - Sources of infection: untreated water supply (poor sanitation), undercooked shellfish.
- Cholera toxin: aggregates of multiple polypeptides has 2 A (toxic) subunits and 5 B subunits.

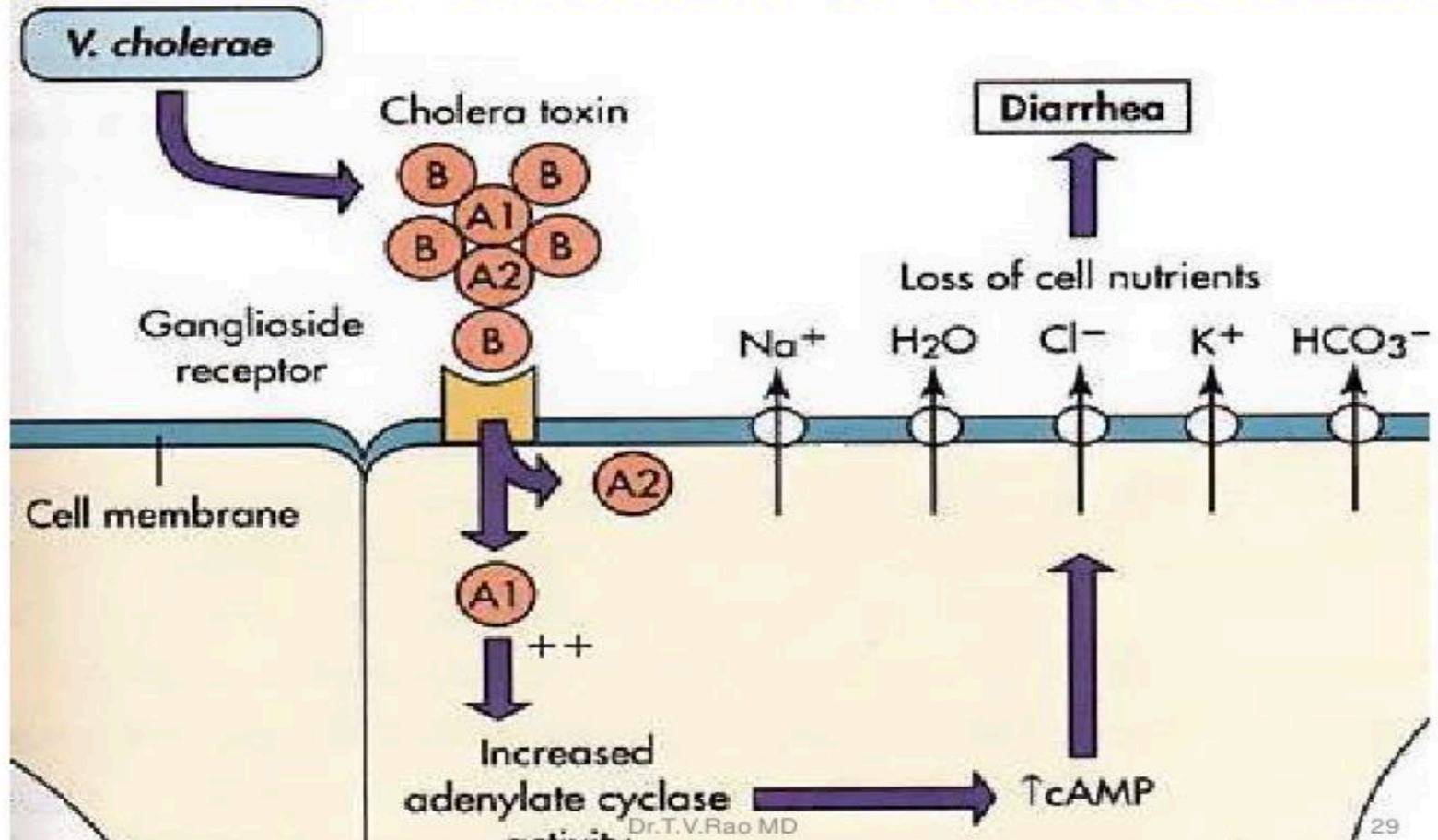




# Vibrio Cholera

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## Mechanism of Action of Cholera Toxin





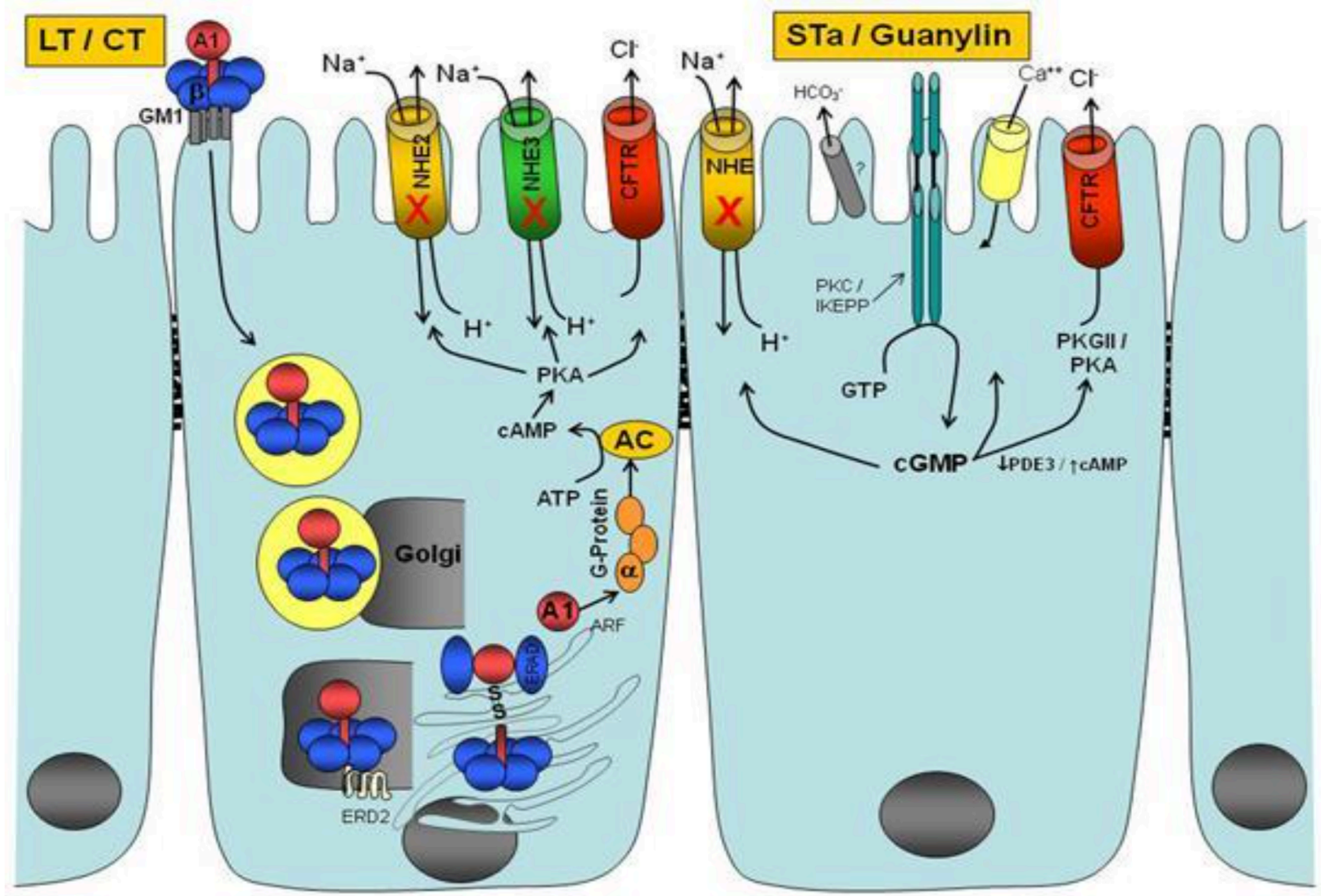
# Vibrio Cholera Cont .

- The fluid loss-> diarrhea  
**“Rice water stool”**
- Can cause dehydration(Isotonic dehydration).
- Hypovolemic shock.
- Loss of Potassium ->Hypokalemia S&S (arrhythmias, muscle weakness or cramps).
- Loss of bicarbonate →Metabolic acidosis.
- **no inflammation or damage to the mucosa!**
- **No fever**
- Only dehydration and electrolyte disturbances.
- High index of clinical suspicion.

# Eterotoxigenic E.coli ETEC

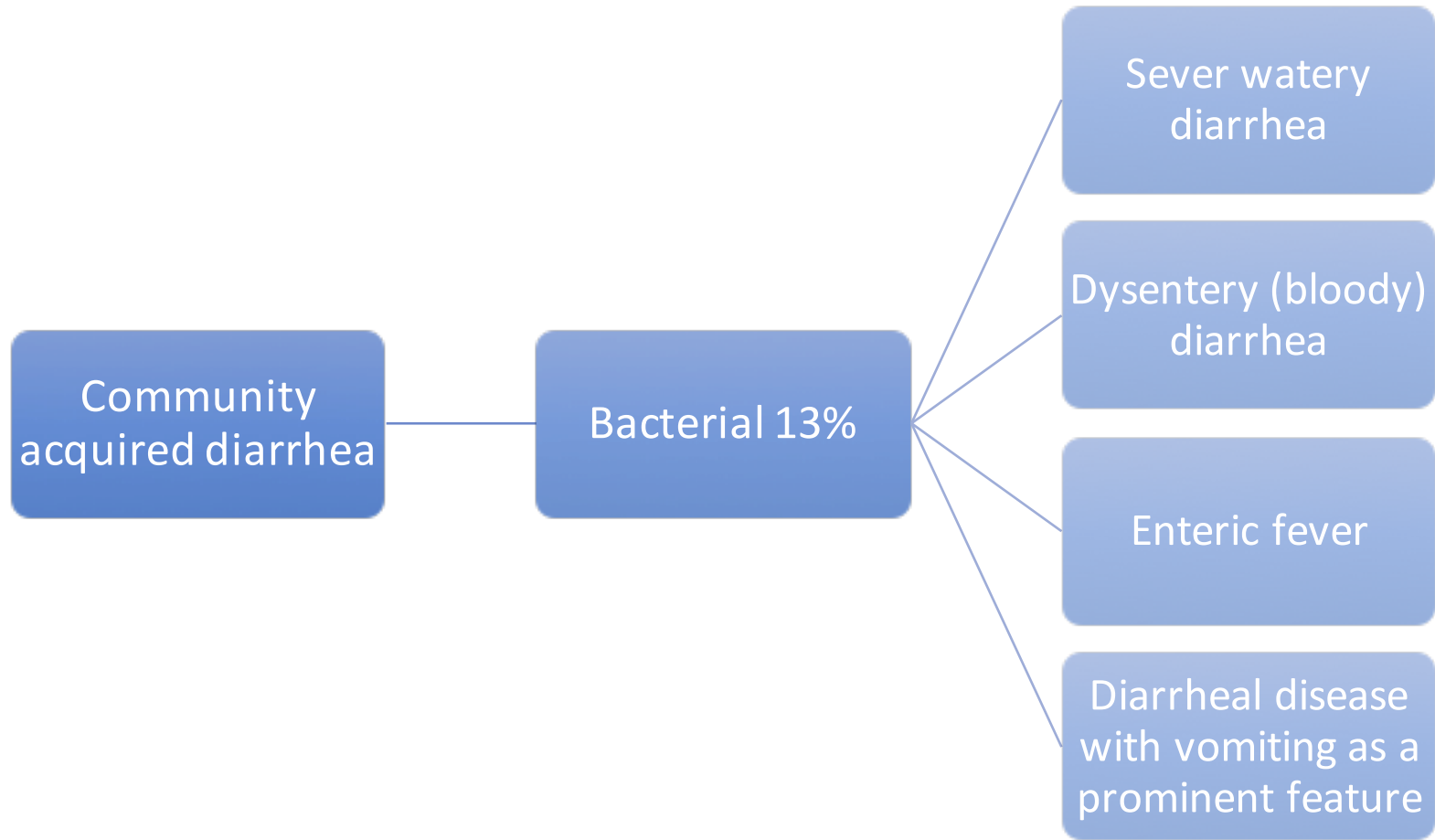


- Gram negative rods, enterobactrae group.
- Normal colonizer of the lower GIT.
- Mechanism of diarrhea is same as cholera but instead of the cholera toxin it produces:
  - **Labile toxin (LT)**
  - Stable toxin (ST)





# 1. Community-acquired Diarrhea





## 2. Dysentery:

- **Colon** is the primary site:
  - Stool is in smaller volume than in watery diarrhea.
- Diarrhea contains **BLOOD & PUS.**
- Organisms that cause dysentery can produce inflammation and/or distinctive changes in the colonic mucosa by either:
  - – Invasion
  - Production of cytokines
- Generally, lasts longer than watery diarrhea.
- Most cases resolve spontaneously in **2-7 days.**
- **Fever, abdominal pain and cramps, and tenesmus are prominent symptoms.**
- Vomiting occurs less often.

# Dysentery Common Pathogens:



Organism	Notes
<b>Shigella</b>	Transmitted mainly through contaminated water and food ( direct person-person spread)
<b>Campylobacter</b>	Associated with poultry, eggs, and milk.
<b>Salmonella</b>	
<b>Enterohemorrhagic E.coli</b>	Associated with the development of hemorrhagic colitis.
<b>E.coli 0157:H7</b>	Associated with the development of hemolytic uremic syndrome.
<b>Enteroinvasive E.coli</b>	Dysentery
<b>Vibrio parahemolyticus</b>	Associated with shellfish consumption.
<b>Vibrio vulnificus</b>	Increased incidence in ptx with liver disease or high iron states.
<b>Yerisia Enterocolitica</b>	_____





# Which Infectious Agents are Common Causes of Bloody Stool?

- **CHES:**
  - **C**ampylobacter
  - **H**emorrhagic E.coli O157:H7 – E.hitolytica
  - **S**almonella
  - **S**higella



# Shigellosis

- Eneurobactrae.
- Mechanism of dysentery:
  - Invasion of enterocytes and escape the phagocytosis
  - Invasion of adjacent enterocytes directly by forming finger like projections that will eventually pinch off placing the bacteria into the adjacent cell.
  - Cell-by-cell extension which destroys the enterocyte and creates an ulcer

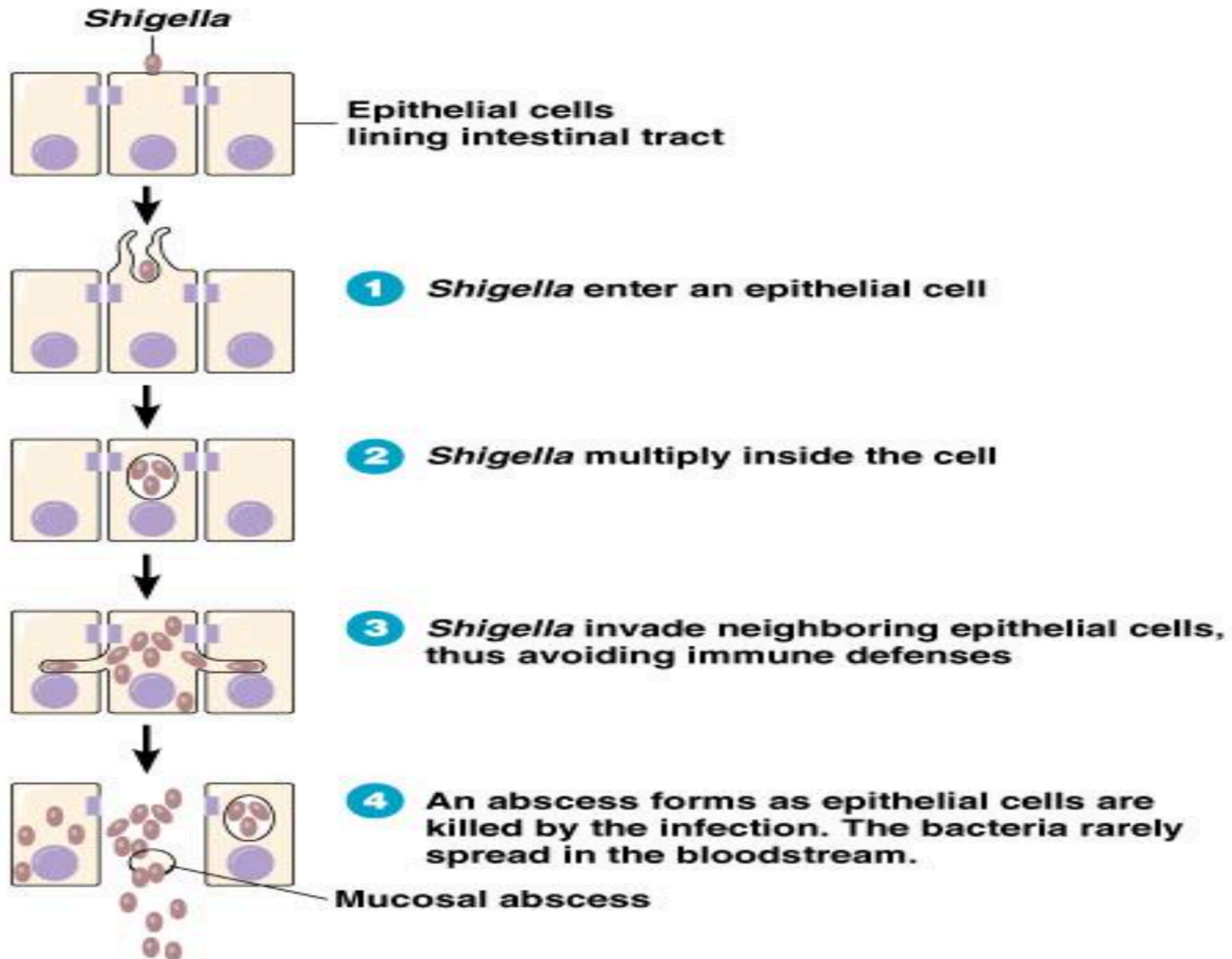


# Shigellosis Cont.

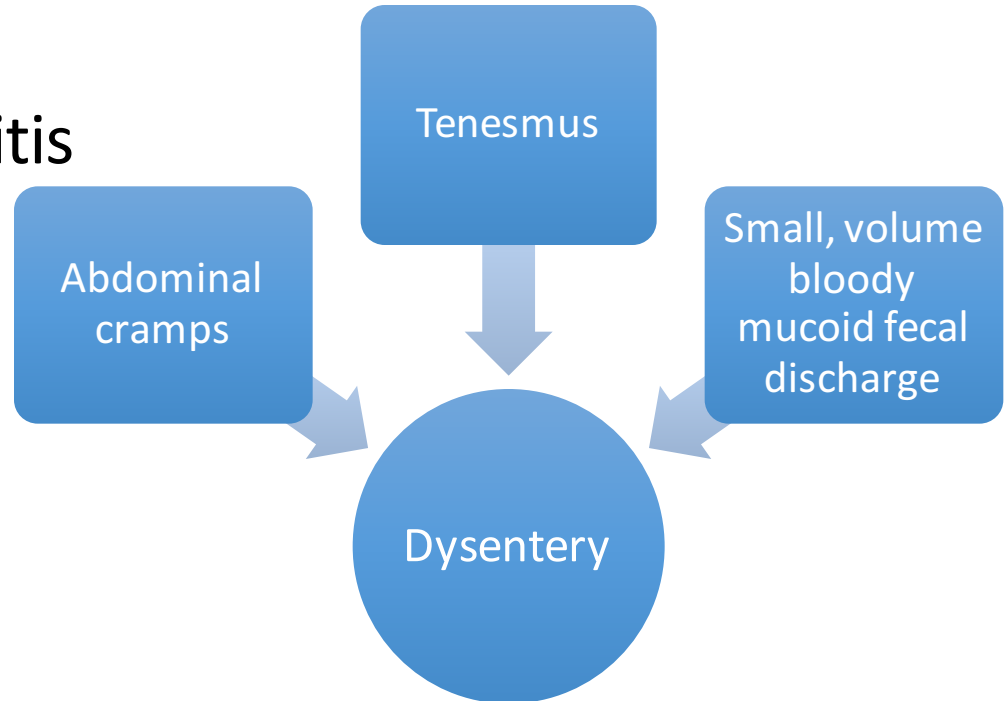
- The ulcers:
  - Add a hemorrhagic component to the colon mucosa -> blood in stool.
  - Shigella will reach lamina propria where it will produce acute inflammatory response ->white blood cells in stool or pus.
  - Disruption of the colon mucosa -> diarrhea.

**Diarrhea + RBCs + WBCs = Dysentery**

- Shigella toxin:
  - Capillary thrombosis
  - Inflammation of the colonic mucosa >>>hemorrhagic colitis



- Manifestations:
  - Hemorrhagic colitis
  - Dysentery **triad**:



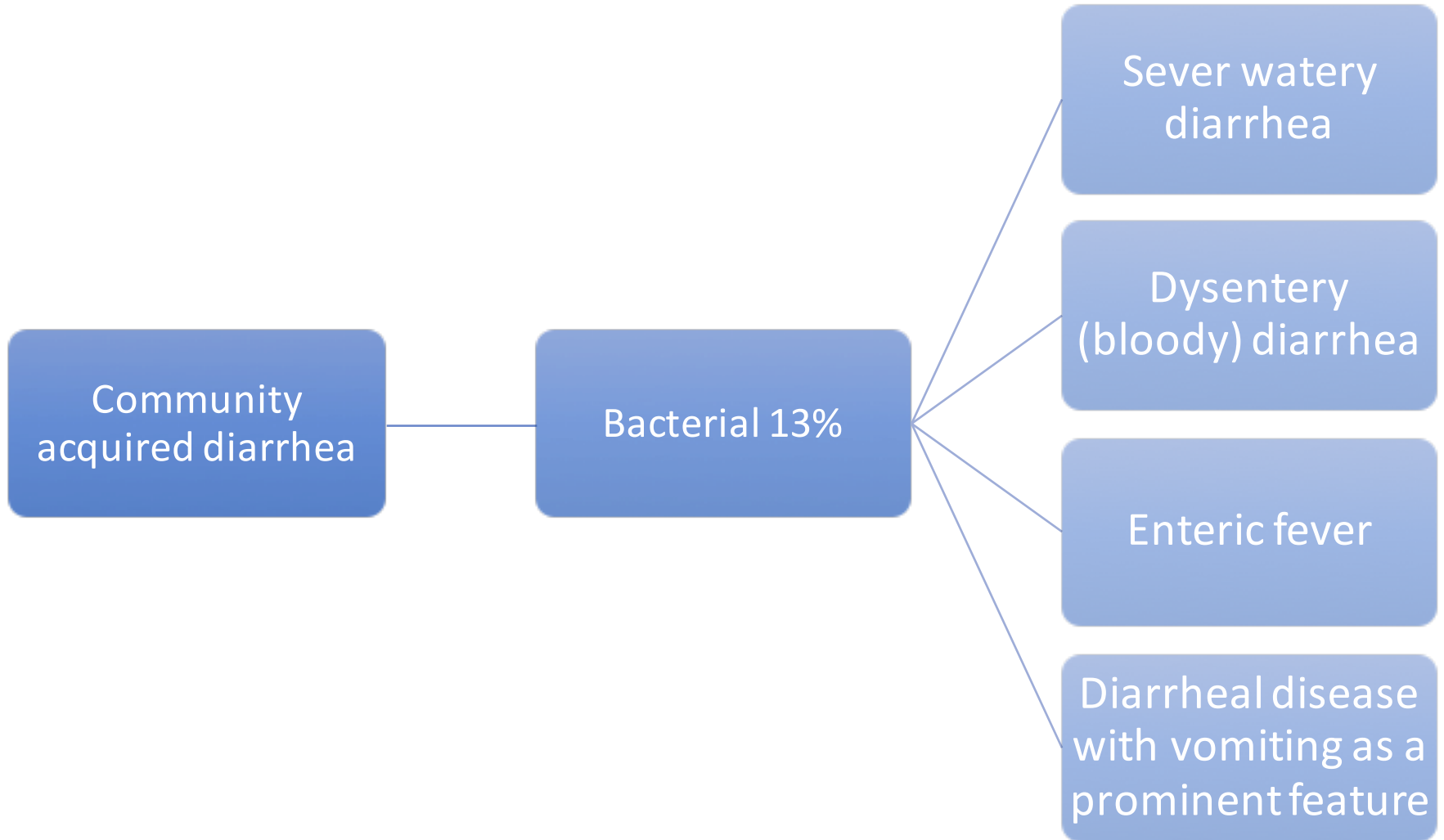
- infection begins with Fever, and systemic manifestations like malaise, anorexia, myalgia

# Community-acquired Diarrhea (Bacterial) Cont.



## 3. Enteric (Typhoid) Fever

- Salmonella enterica serovar typhi.
- Systemic infection.
- Fever & abdominal pain.
  - Diarrhea is not a constant feature
- **Gradual** onset.
- Urinary Tract, bone and joints are metastatic sites.



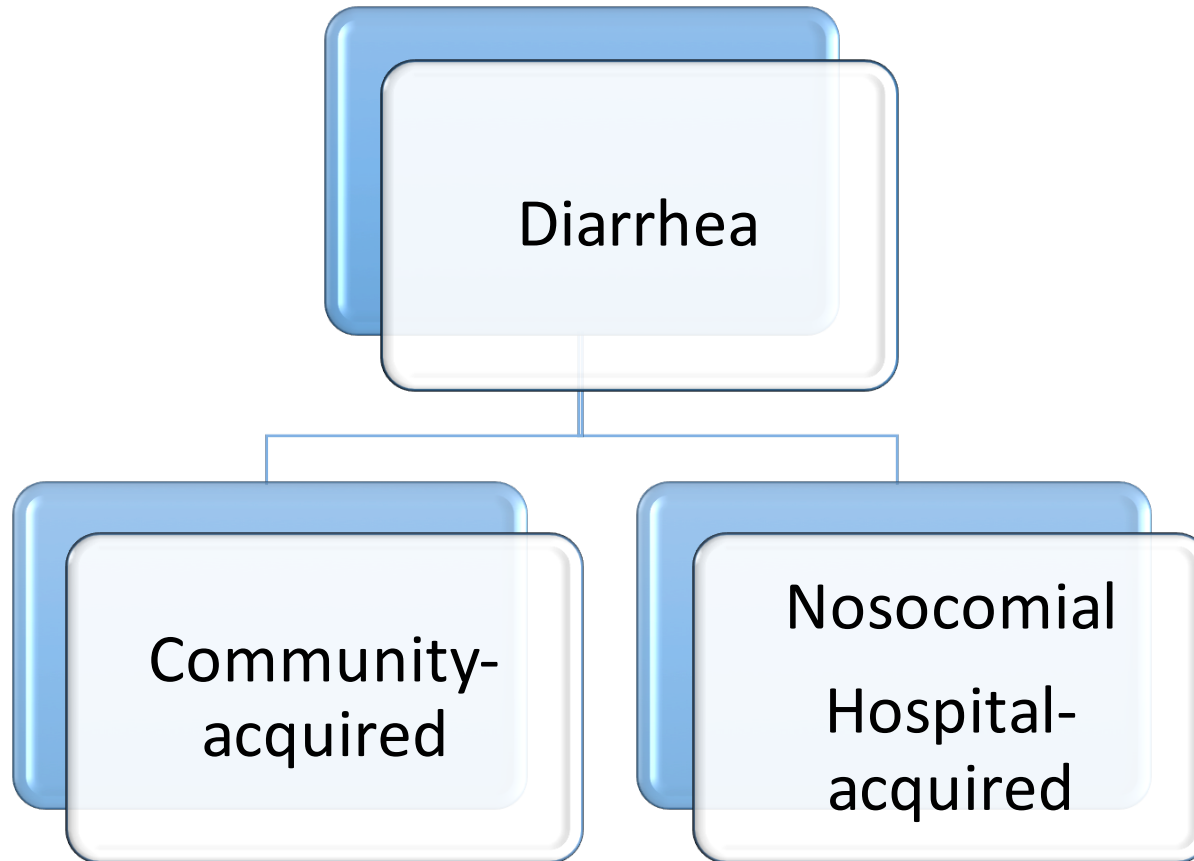
# Community-acquired Diarrhea (Bacterial) Cont.



- **3. Vomiting as a Prominent Feature:**
  - Usually <24hours after ingestion.

Organism	Notes
Bacillus cereus	Chinese food and reheated rice.
Staphylococcus aureus	Dairy, coleslaw, picnics.
Clostridium perfringens	Meat that has been sitting out for long time.



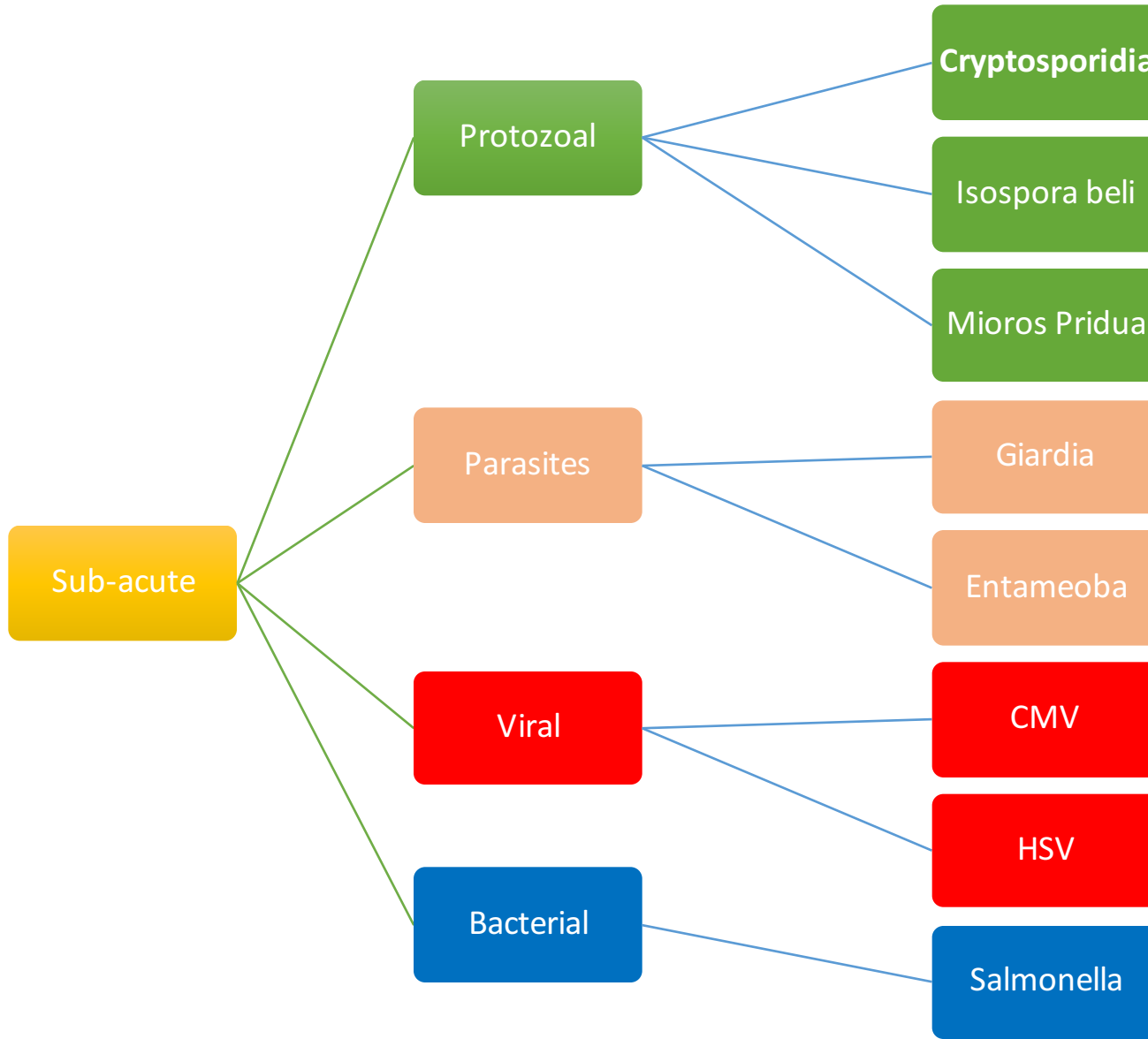




## 2. Hospital Acquired Diarrhea

- **Infants:**
  - Rotavirus: winter time, breakouts.
  - Enteropathogenic E.coli EPEC: infantile diarrhea.
- **Adults:**
  - Antibiotic associated diarrhea:
    - S\E of antibiotics (erythromycin, augmentin, cephalexin,)
    - C.difficile overgrowth (minimum of 3 days to happen).
    - can be caused by any antibiotic but mostly associated with **Clindamycin**
  - Non- antibiotic associated diarrhea
    - CT contrast.(osmotic effect)
    - Laxatives, magnesium, and sorbitol.
    - Tube feed diarrhea. .(osmotic effect)

# 3. Sub-acute Diarrhea



# Travellers' Diarrhea



- Acquired through ingestion of fecally contaminated food, water, and ice.
- Causes:
  - 80% is bacterial cause.
  - 50% of all cases: **Enterotoxigenic E.coli.**
  - 10%-20% of cases: **Shigella.**
  - Other common causes: campylobacter jejuni.

# Diagnosis



- When you have acute diarrhea the first thing you do is check for infection
- IF the stool studies came out negative then do endoscopy
- **Best test: Stool Exam for acute diarrhea:**
  - Mucus,blood,leukocytes.

Stool exam	Notes
Stool lactoferrin	+ive :bloody diarrhea and mostly by gram negative rods. -ive: non-bloody diarrhea
Cause of non bloody diarrhea: Bacteria	Mostly causes food poisoning
Parasites	To check for ova, and gradia antigen
Protozoa	To check for cysts and trophozoites.
Viruses	By exclusion of other causes. Enzyme Immunoassay for Rotavirus.



# Management



Diarrhea	Management	Antibiotic	Notes
<p><b>Bloody</b></p>		<p>In severe cases.</p> <ul style="list-style-type: none"> <li>• Ciprofloxacin (fluroquinilones) +\- metronidazole.</li> <li>• V.vulnificus: doxycycline.</li> </ul>	
<p><b>Non-Bloody</b></p>	<p>If stable, observe. Adequate fluid replacement.</p>	<ul style="list-style-type: none"> <li>• In severe cases.</li> <li>• Ciprofloxacin (fluroquinilones) +\- metronidazole.</li> </ul> <p>For AIDS ptxs:</p> <ul style="list-style-type: none"> <li>• Cryptosporidiosis: paromomycin or metronidazole.</li> <li>• Isospora: trimethoprim</li> </ul>	<ul style="list-style-type: none"> <li>• Most cases are self-limited.</li> <li>• Do not wait for culture.</li> </ul>
<p><b>C.difficile: Pseudomemb - ranous colitis</b></p>		<ul style="list-style-type: none"> <li>• Metronidazole</li> <li>• If symptoms abate and recur: Metronidazole</li> <li>• If symptoms don't abate after 2days: vancomycin</li> </ul>	<p>C.difficile toxin positive in stool exam.</p>



# References:

- Sherris Medical Microbiology 5th edition by K. Ryan.
- Merk's Manual.
- Medicine Recall 4th edition by James Bergin.
- Kumar and Clark's Medicine.
- <https://www.youtube.com/watch?v=f4a3-Fg6ziY>
- <https://www.youtube.com/watch?v=4StwzAm8ltw>
- <https://www.youtube.com/watch?v=ywxYNmieglE>





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