Detection and Control of Epidemic Cholera

Epidemiology

CDC
Cholera

- Diarrhea disease caused by *Vibrio cholerae*

- Since 1800, cholera has spread through world in 7 large waves (pandemics)

- Transmitted though fecally contaminated water or food

- Treated with rapid oral or intravenous fluid and electrolyte replacement
Cholera Map
Cholera in Africa

- 7th pandemic began in Indonesia in 1961, reached Africa in 1970

- 1971: 25 African countries reported cholera
  - (> 72,000 cases and 11,000 deaths)
  - overall CFR of 16%, as high as 35%

- 3,000-43,000 cases / year since 1971

- 1991: large epidemic
  - 14 countries
  - (>100,000 cases and 10,000 deaths)
Epidemic vs. Endemic Cholera

- **Epidemic cholera**
  - sudden increase in the number of cases of cholera over usual number
  - may be imported

- **Endemic cholera**
  - persistent, recurrent problem, occasional cases
  - public health officials should be aware of the usual rate of cholera in the area
  - an epidemic (increase in # of cases) may also occur in area where cholera is endemic
Clinical Presentation of Cholera

- Symptomatic cholera
  - acute watery diarrhea
  - profuse, "rice water" stools
  - no fever, no abdominal cramps
  - vomiting and leg cramps common

- Dehydration
  - can lose up to 10% of body weight
  - fluid losses up to 1 liter / hour
  - must replace fluids and electrolytes to avoid hypovolemic shock, renal failure and death
Clinical Spectrum of Cholera

- Diarrhea: 20.0%
- Severe Diarrhea: 5.0%
- No symptoms: 75.0%
Modes of Transmission

- Fecal-oral route
  - dose of >1,000,000 organisms required
  - direct person-to-person transmission rare

- Contaminated Water

- Contaminated Food
Common Sources of Infection
- Water -

- Contaminated at its source
  - shallow wells, surface water
  - *V. cholerae* can live for years in some aquatic environments

- Contaminated in the home / after storage
  - when inadequately washed hands come in contact with stored water
  - if wash utensils in contaminated water
  - if bathe in contaminated water
Common Sources of Infection
Food contaminated during or after preparation

- Moist grains served at room temperature or lightly heated

- Moist food is excellent environment for growth of *V. cholerae*

- Acidifying foods inhibits growth of *V. cholerae*
  - with lemons, tomatoes, yogurt or fermented milk
Common Sources of Infection
Fruits and Vegetables

- Grown at or near ground level and
  - fertilized with night-soil
  - irrigated with water containing human waste
  - "freshened" with contaminated water
  - eaten raw
Factors Favoring Epidemic Cholera

- Environmental factors
- Host factors
- Serogroup
Factors Favoring Epidemic Cholera

- Environmental Factors
  - High Risk
    - areas without safe water supply
    - areas without good sanitation
  - Seasonality not well understood
    - near equator, may be rainy or dry
    - in a given locale, may be predictable
Factors Favoring Epidemic Cholera

- **Host Factors**
  - Protection against cholera:
    - immunity due to previous infection
    - breast-feeding (in endemic areas)
  - Higher risk
    - persons taking antacids or with reduced gastric acid
Factors Favoring Epidemic Cholera

■ The organism
  - Only serogroups 01 and 0139 cause epidemics
    ▶ other serogroups can cause diarrhea, but not epidemics