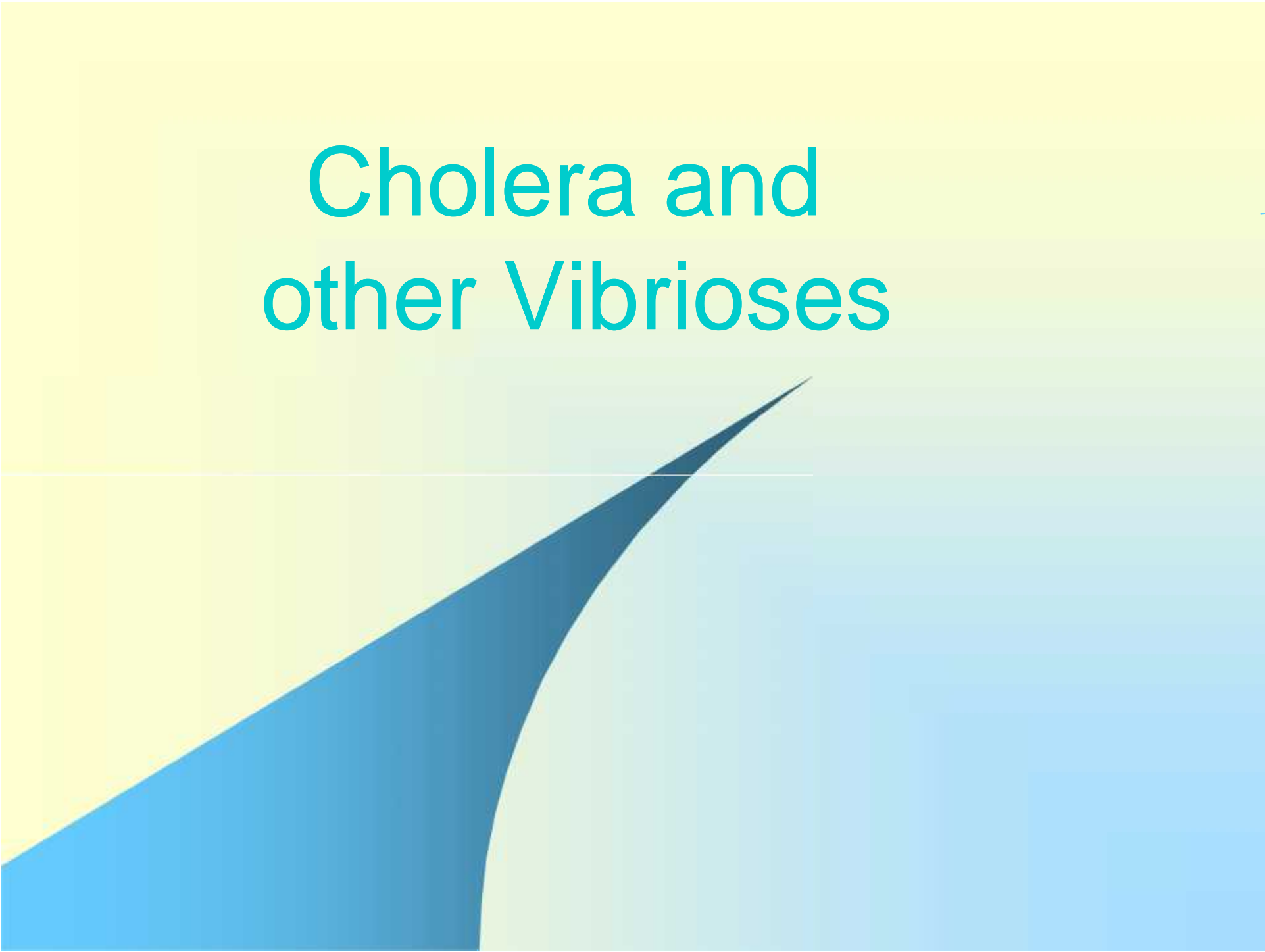


# Cholera and other Vibrioses



# *Vibrio Cholerae* Serogroups O1 and O139

## **Key facts:**

- Cholera is an acute diarrheal disease that can kill within hours if left untreated.
- There are an estimated 3–5 million cholera cases and 100 000–120 000 deaths due to cholera every year.
- Up to 80% of cases can be successfully treated with oral rehydration salts.
- Provision of safe water and sanitation is critical in reducing the impact of cholera and other waterborne diseases.
- Oral cholera vaccines are considered an additional means to control cholera, but should not replace conventional control measures.

# 1. Identification:

Cholera is an extremely virulent disease. It affects both children and adults. It is characterized in its severe form by sudden onset, profuse painless watery stools (rice-water stool), nausea and profuse vomiting early in the disease. In untreated cases, rapid dehydration, acidosis, circulatory collapse, renal failure and rapid death.

In most cases asymptomatic or mild diarrhea  
[El Tor biotype]

Proper rehydration      CFR < 1%

## Clinical

Asymptomatic (75%)



Severe form

## Pathogenesis

Not invasive mo

enterotoxin liberation

stimulate adenyl-cyclase in gut

massive

fluid out put +poor absorption.

# **Dx**

- **Clinical**

- **Stool exam**      transmitted by sea-water tubes  
(alkaline peptone water) PH 9

**Stool culture on TCBS media      yellow colony**

- **Dark field microscopy      vibrios moving like  
“shooting stars”**

- **Serological test**

# History

- In 19<sup>th</sup> century 6 pandemic waves from the gulf of Bengal to most of the world.
- Current seventh pandemic started in South Asia in 1961 O1- El Tor biotype:

Started in Indonesia in 1961 spread to the Asian mainland from 1963 to 1969 and reached Africa in 1970 and reached the Latin America in 1991 after a century of absence; where in 1994 1 million cases reported in different Latin American countries.

**Cholera is now endemic in many countries.**

## 2. Infectious agents:

*V. cholerae* O1 & O139

*Vibrio cholerae* (O1)

2 biotypes:

{  
Classical  
El Tor

each biotype

3 serotypes

→ Inaba  
→ Ogawa  
→ Hikojima

- In 1992, new strain identified in Bangladesh (O139 Bengal) caused epidemic in a population immune to *V. cholerae* O1.
- O139 new organism but same clinical pictures [same toxin]. This also spread to other Asian countries.

## **Cholera due to El Tor differs from classical cholera in following aspects:**

- 1. Large number of mild & asymptomatic cases 1/100.**
- 2. Hardier & remain viable for longer period in water.**
- 3. Longer period of shedding by patient & carriers (possibility of chronic carriers).**



## Survival of vibrios:

**Temp                    55 C°                    kill in 15 min**

**stand freezing                    UV.                    Kill bacteria**

**cold climate                    1 Week**

**0 C°                    several weeks**

### 3. Occurrence:

Cholera is one of the oldest epidemic diseases. Epidemics and pandemics are strongly linked to the consumption of unsafe water, poor hygiene and crowded living conditions.

- The number of cholera cases reported to WHO continues to rise.
- For **2008** alone, a total of **190 130** cases were notified from 56 countries, including **5143** deaths. Many more cases were unaccounted for due to limitations in surveillance systems and fear of trade and travel sanctions.
- The true burden of the disease is estimated to be **3–5 million cases and 100 000–120 000 deaths annually.**

**In Zimbabwe epidemic 2008-2009 around 60 000 cases and 3100 deaths reported.**

## **In Iraq:**

Cholera is considered to be an endemic disease in many parts of Iraq since 1966 when the first cholera cases appeared.

Trends of cholera in the last 40 years show that each epidemic lasted several months followed by a second wave in the next year.

### **Recent outbreaks occurred in Iraq:**

**August 2007 – February 2008      4500 cases**

**August 2008 – December 2008      1000 cases**

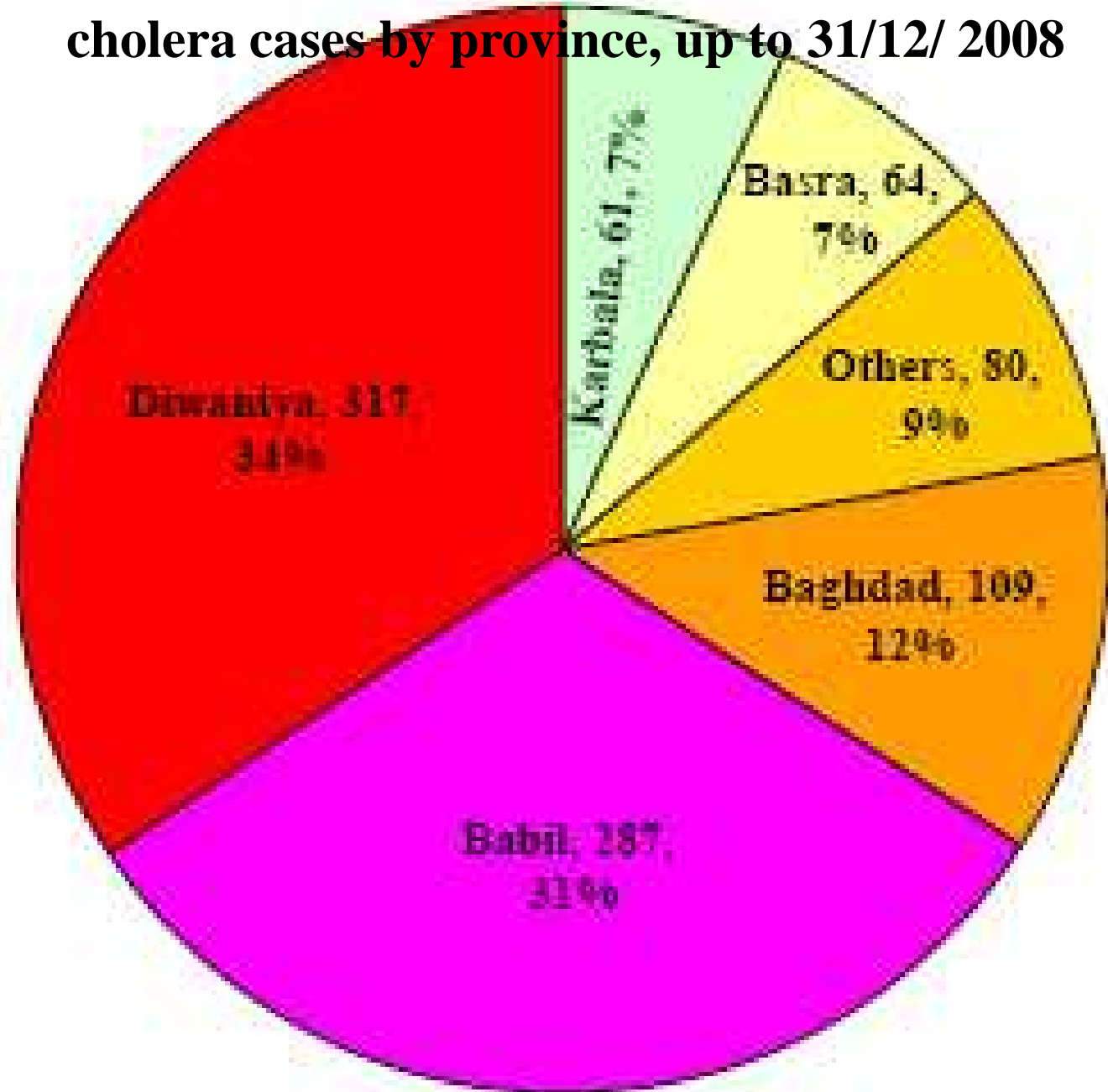
**2009      \_      Only 6 sporadic cases**

## Laboratory-confirmed cholera cases—Iraq, 14/08/2007– 24/02/2008 (first outbreak)

Province	No. districts affected	Date first case reported	Date most recent case reported	No. deaths reported	No. laboratory-confirmed cholera cases
<b>Kirkuk</b>	5	14/08/2007	1/12/2007	<b>5</b>	<b>3007</b>
<b>Sulaymaniyah</b>	13	23/08/2007	17/11/2007	<b>14</b>	<b>1238</b>
<b>Erbil</b>	6	5/9/2007	22/11/2007	<b>0</b>	<b>275</b>
<b>Dahuk</b>	4	7/9/2007	28/10/2007	<b>0</b>	<b>6</b>
<b>Tikrit</b>	3	12/9/2007	7/10/2007	<b>0</b>	<b>5</b>
<b>Ninewa</b>	3	15/9/2007	15/11/2007	<b>1</b>	<b>7</b>
<b>Baghdad</b>	5	19/9/2007	13/12/2007	<b>3</b>	<b>138</b>
<b>Basra</b>	2	19/9/2007	2/10/2007	<b>0</b>	<b>2</b>
<b>Wasit</b>	1	20/9/2007	20/9/2007	<b>0</b>	<b>3</b>
<b>Anbar</b>	1	3/10/2007	3/10/2007	<b>1</b>	<b>2</b>
<b>Diyala</b>	3	3/10/2007	3/10/2007	<b>0</b>	<b>15</b>
<b>Total</b>	46			<b>24</b>	<b>4696</b> <b>CFR 0.5%</b>

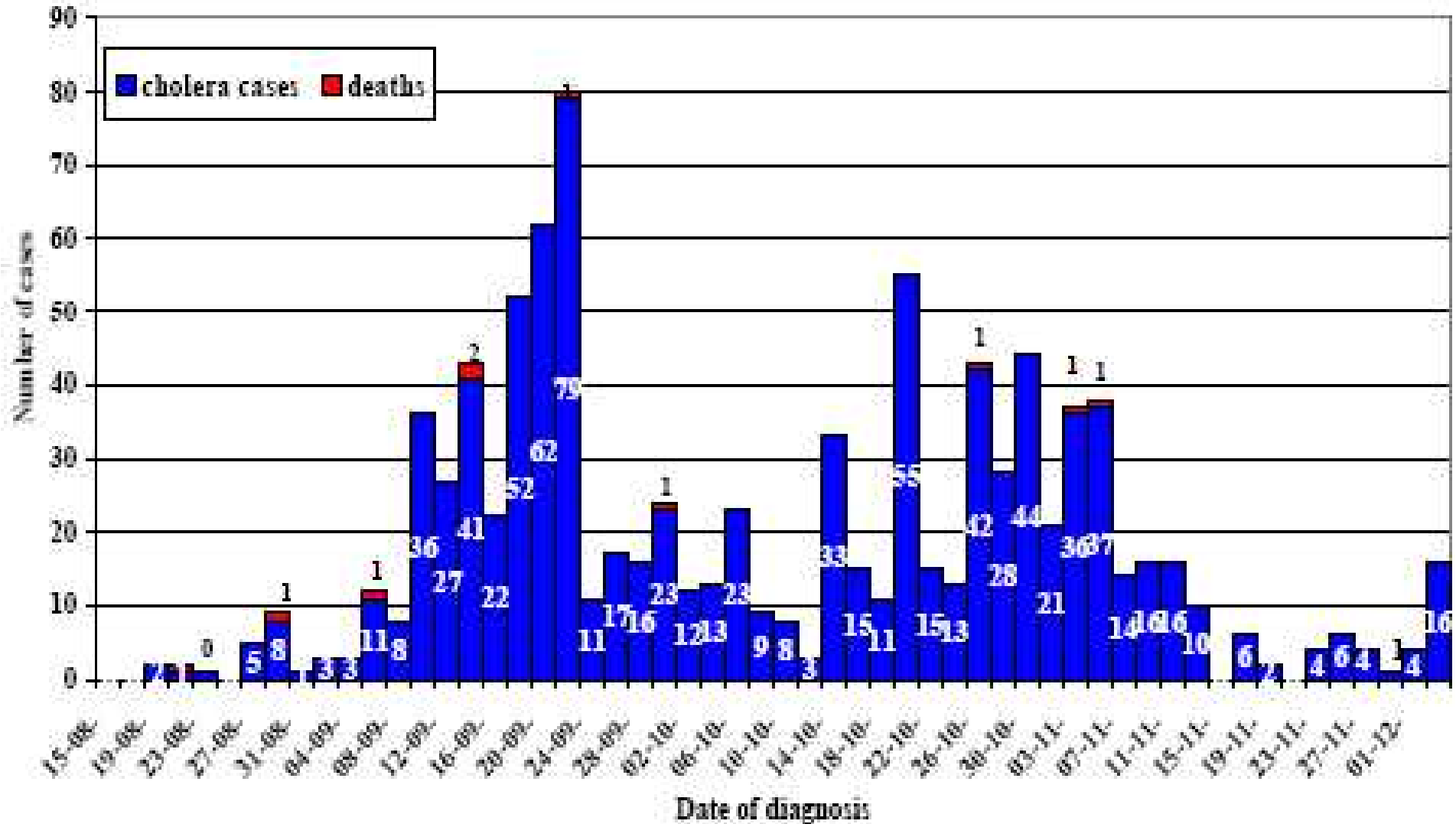
**Second outbreak: % Distribution of confirmed cholera cases by province, up to 31/12/ 2008**

**Confirmed cholera cases = 925**  
**Deaths = 11**  
**CFR = 1.2%**  
**Inaba serotype**

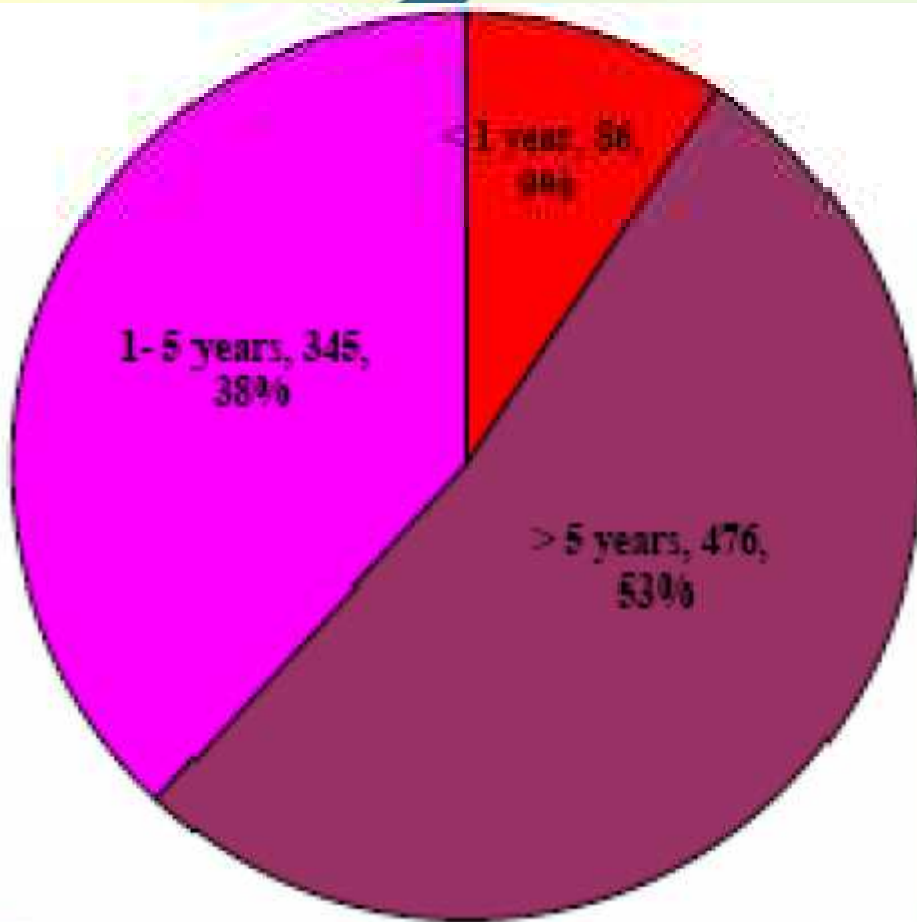


# Reported cholera cases and deaths by date of diagnosis, Iraq, 14/08-31/12/ 2008

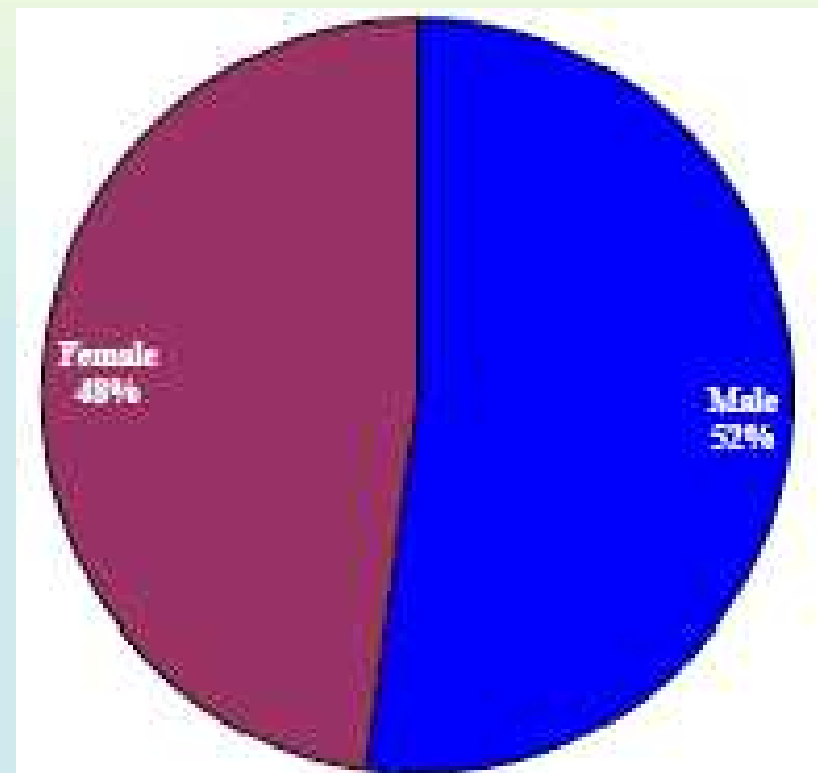
## Epidemic curve



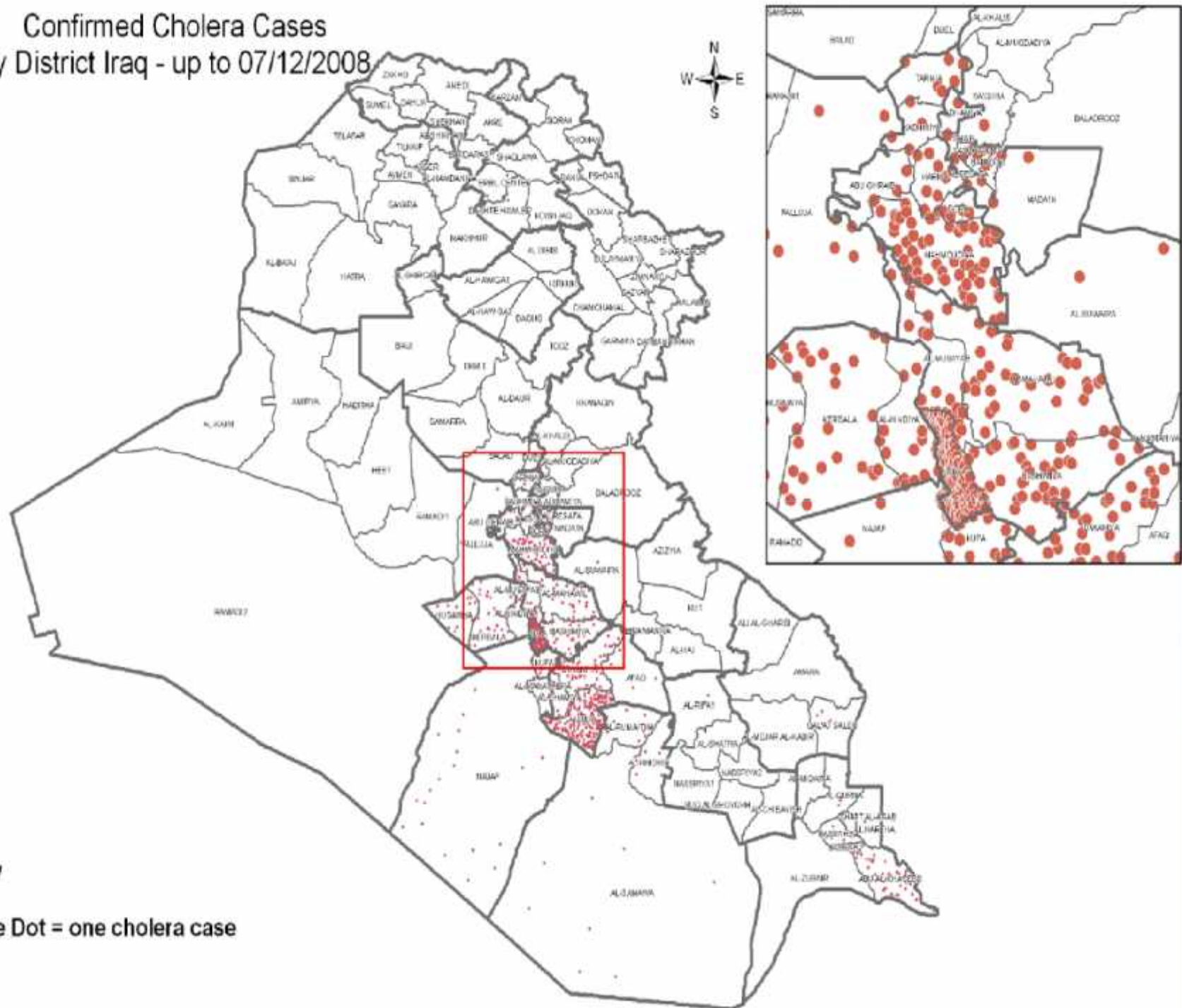
**Distribution of confirmed cholera cases by age group up to 31/12/ 2008**



**Distribution of confirmed cholera cases by sex up to 31/12/ 2008**



# Confirmed Cholera Cases by District Iraq - up to 07/12/2008





## 4. Reservoir:

Main reservoir is humans

**Sick person**  
**Convalescent patient**  
**Carriers**

## 5. Mode of transmission

Man

5-20%

rare ??

Man

Infected faeces

water & food

Man

## 5. Mode of transmission

Ingestion of an infective dose of contaminated food or water and can be transmitted through many mechanisms.

Drinking water contaminated: at source, during transportation or during storage at home.

Beverages, ice ...etc.

**6. Incubation period: few hours – 5 days,  
usually 2 – 3 days**

**7- Period of communicability:**

**as long as stools are positive, usually  
only a few days after recovery.  
Occasionally the carrier state may persist  
for several months.**

**Tetracycline shorten the period of  
communicability.**

## **8- Susceptibility:** variable

**Immunity:** O1 classical biotype infection provides protection against classical or El Tor biotype long lasting or permanent; in contrast an initial clinical infection with El Tor provides modest immunity limited to El Tor.

Infection with O1 affords no protection against O139 infection and vice-versa.

→ Typical settings periurban slums

→ Nutritional status poor nutrition

→ Gastric acidity –(host factor) protective

Normal person +  $10^{11}$  M.O infection

Normal person + antacid +  $10^6$  M.O infection

Other clinical conditions (host factors)

cholecystitis

hook worms

Ascaris ?

Bd group O

→ Breast feeding protective

## 9. Method of control:

### A- Preventive measures:

- I. Educate the public ...
  1. Personal hygiene particularly food handlers.
  2. Sanitary sewage disposal.
  3. Provide, protect, purify and chlorinate public water.
  4. Control flies.
  5. Use of sanitary practices for food preparation, handling and storage and pasteurization of milk.
- II. Vaccination
- III. Measures that inhibit the movement of people, foods or other goods are not provide effective to control cholera.

## Vaccination:

Two oral cholera vaccines (OCV):

Safe and provide significant protection (>50%) for 2 years against O1. Used by travelers to endemic areas.

1. live vaccine, single-dose.

2. killed vaccine, 2-dose regime.

**None is fully useful to be adopted as public health tool**

The use of the parenteral cholera vaccine has never been recommended by WHO due to its low protective efficacy and the high occurrence of severe adverse reactions.

## B- Control of patients, contacts and environment:

- 1) Reporting: obligatory (internationally), Class I reporting
- 2) Isolation: severely ill patients      Hospitalization  
+ enteric precautions  
Less severe cases      out patient (oral rehydration + antimicrobial).  
Cholera wards can be operated.
- 3) Disinfection of feces, vomit, linens and articles used by the patients by heat or carbonic acid.
- 4) Quarantine: not applicable.



## **5. Management of contacts:**

**1) Surveillance of persons who shared food and drink with a cholera patient for 5 days from last exposure.**

**2) Households contacts      **chemoprophylaxis:****

**Adults      tetracycline 500mg x 4/ day for 3 days  
or doxycycline 300 mg single dose.**

**Children > 9 years      tetracycline 50mg/Kg/day  
for 3 days**

**Children < 9 years      erythromycin 40mg/Kg/day  
for 3 days.**

**Mass chemoprophylaxis of whole communities is never indicated (waste of resources and can lead to antibiotics resistance).**

**3) Immunization of contacts is not indicated.**

6) **Investigation of contacts and source of infection:**

- **Investigate: polluted drinking water and contaminated food.**
- **Stool culture is recommended only for household contacts.**

# 7) Specific treatment:

## Objectives :

- Rapid fluid replacement [the cornerstone of cholera treatment is timely and adequate rehydration].
- Antibiotic (tetracycline) — secondary to rehydration:
  - Shorten duration of diarrhea
  - Reduce the volume of rehydration fluids required
  - Shorten the duration of vibrio excretion

## 7) Specific treatment: cont.,

- **Mild to moderate dehydration**      **ORS**

new formula of **ORS [WHO-2002]:**

Nacl	75 mmol/L
Trisodium citrate dihydrate	10 mmol/L
Kcl	20 mmol/L
glucose	75 mmol/L
H <sub>2</sub> O	1 L

- **Severe dehydration**      **rapid I.V. fluid**

### Types of fluid

- ❁ **Best Ringer-lactate (WHO IV formula)**
- ❁ **“Dacca solution” can be prepared locally.**
- ❁ **or what ever IV available**

# Antimicrobials:

Adults tetracycline 500 mg x 4/ day for 3 day  
or doxycycline 300 mg single dose.

Children tetracycline 12.5 mg/Kg/day for 3  
days

If resistant to tetracycline erythromycin 250  
mg x 4 for adults and 30mg/Kg/day for  
children, for 3 days.

or ciprofloxacin 250 mg once daily for 3 days.

## C- Epidemic measures:

1. Educate the population at risk.
2. Provide effective treatment facilities and establishment of treatment centers (CTCs).
3. Ensure a safe water supply. Chlorinate public water supplies (1.3 ppm) .Boil drinking; cooking water.
4. Food sanitation.
5. Discourage congregations and close swimming pools.
6. Safe sewage disposal.
7. Investigate to find source of infection (Time, place, person).
8. OCV (optional) but if used in conjunction with the usual preventive and control measures.

# Vibrio Cholerae

## Serogroups other than O1 and O139

> 200 V. cholerae serogroups sporadic cases of food borne gastroenteritis, not spread in epidemics.

# **Anthrax**

**It is an acute bacterial disease that usually affects skin but may very rarely involve oropharynx, mediastinum, or intestinal tract.**



## A/Cutaneous Anthrax

Presented with itching of an exposed skin followed by papular then vesicular lesion which within **(2-6)days** proceed into a depressed black Escher with extensive edema. **usually it is painless.**



# Cutaneous Anthrax



## **B/Inhalation Anthrax**

**Presented initially with mild nonspecific symptoms (flulike) followed by acute symptoms of respiratory distress with **x-ray** evidence of mediastinal widening, fever and shock within **(3-5)days** with death shortly thereafter.**

## **C/Intestinal Anthrax**

**It is rare and difficult to recognize. Abdominal distress followed by fever, signs of septicemia and death.**

\* **Diagnosis:** is made by determination of the causative agent in blood , lesions or discharges by **direct polychrome methylene blue stained smears** or by **culture or inoculation** of mice, guinea pigs or rabbits. **ELISA may be available in certain laboratories .**

\* **Infectious agent:** ***Bacillus Anthracis***

**(gram positive, encapsulate, spore forming non motile rods).**

## **Occurrence :**

**Human is an incidental host.**

**Sporadic infrequent human infections in most industrialized countries.**

**Endemic in agricultural regions.**

**\*It is an occupational hazards primarily of :-**

**1. Workers with animal hair, bone, and wool processing.**

**2. Veterinarians and agriculture and wild life workers.**

**\*Anthrax is considered a leading potential agent in biowarfare and as such could present in epidemiologically unusual circumstances .**

**Reservoir:**

**Animals shed bacilli in terminal hemorrhages or blood at death.**

**On exposure to air, vegetative cells sporulate, the spores are resistant to adverse environmental conditions and disinfections.**

**It may remain viable in soil for many years.**

## **Mode of transmission :**

**\*Cutaneous infection is by :**

**1.Contact with tissues of animals dying of the disease .Possibly by fly bite.**

**2.Contact with hair, and wool or products.**

**3.Contact with contaminated soil .**

**\*Inhalational type through inhalation of spores in risky industrial processes (wool).**

**\*Intestinal and or pharyngeal is through ingestion of undercooked contaminated meat.**

### **Incubation period :**

**(1-7) days** ( may be up to 60 days).

### **Period of communicability :**

**Person to person transmission is very rare.**

**Articles and soil contaminated with spores may remain infective for decades.**

### **Susceptibility and resistance:**

**Uncertain ,there is some evidence of inapparant infection among people in frequent contact with infectious agent.**

**Second attack can occur but rare.**



## **Preventive Measures :**

- 1.Immunize high risk persons with a cell – free vaccine containing protective antigen.**
- 2.Eduacte employees about mode of transmission, care of skin abrasions and personal cleanliness.**
- 3.Control dust and properly ventilate work areas.**
- 4.Thoroughly wash, disinfect or sterilize hair, wool, and bone meal.**

**5.If anthrax is suspected in animals aseptically collect blood sample for culture then autoclave, incinerate, or chemical disinfection of all instruments or materials used.**

**6.Promptly immunize and annually re immunize all animals at risk.**

## Control Measures :

1. Report to locate health authority .Obligatory case report.

2. Isolation .Standard precautions for the duration of illness.

3. Concurrent disinfection of discharges from lesions and articles.

4. Investigation of contacts and source of infection.

5. Specific treatment.

*Penicillin is drug of choice for (5-7) days .*

*Alternatives are tetracycline, erythromycin, chloramphenicol, and ciprofloxacin.*