

TYPHOID FEVER (Enteric Fever)

CASE DEFINITION

Clinical case description:

Insidious onset of continued fever, headache, rose spots on the trunk, malaise and loss of appetite usually with gastrointestinal symptoms of more than one week duration having any two or more than two of the following signs:

- Toxic look
- Coated tongue
- Relative bradycardia
- Splenic enlargement
- Non-productive cough

Laboratory criteria for diagnosis:

- Serology – e.g. Widal test
- Isolation of the organism from the clinical specimens especially blood.

Case classification

Suspect case of Typhoid: A case that is compatible with the clinical description.

Probable Typhoid: A case that is compatible with the clinical description and having any one of the following:

- Widal test positive (Titre 1:160) **and /or**
- Exposure to confirmed case/carrier during last three weeks **and/or**
- Clinical presentation with complications e.g. perforation, etc.

Confirmed Typhoid: A suspected case that is laboratory confirmed by

- Isolation of *Salmonella typhi*/ *paratyphi* from blood, stool or other clinical specimens **or**
- Fourfold rise in agglutination titre in paired sera taken 10 days apart.

EPIDEMIOLOGY (SEE FIG 1)

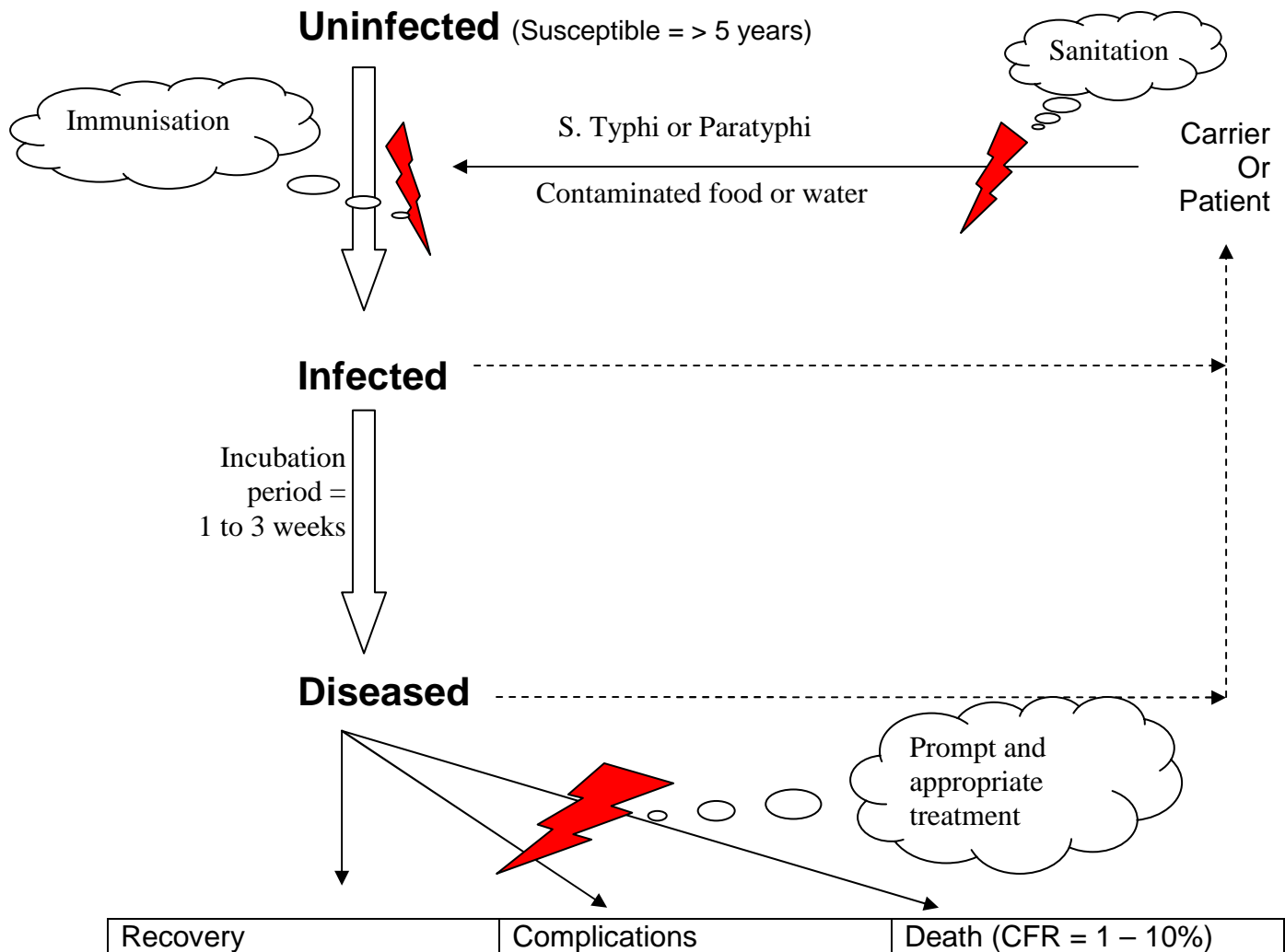
Agent: *Salmonella enterica* serotype Typhi, serotype Paratyphi A, Paratyphi B and Paratyphi C.

Host: In endemic areas, typhoid fever is most common in preschool and school-aged children (5-19 years of age).

Reservoir: Only humans for both typhoid and paratyphoid. Especially gall bladder carriers and rarely urinary carriers.

Mode of transmission: By contaminated food and water with faeces and urine of patients and carriers. Important vehicles include raw fruits, vegetables fertilized by night soil and eaten raw, contaminated milk and milk products (usually by hands of carriers) and missed cases. Flies may infect foods in which the organism then multiplies to achieve an infective dose, which is much lower for typhoid than for paratyphoid bacteria.

Fig 1: Epidemiology of Typhoid fever



Incubation period: the incubation period depends on the size of the infecting dose; from 3 days to 3 months with a usual range of 1-3 weeks. For Paratyphoid fever, it is as low as one to 10 days.

Period of communicability: As long as the bacilli appear in excreta, usually from the first week throughout convalescence; variable thereafter (commonly 1-2 weeks for paratyphoid). About 10% of untreated typhoid fever patients will discharge bacilli for 3 months after onset of symptoms, and 2%-5% become permanent carriers.

Diagnosis: The etiologic organisms can be isolated from the blood early in the disease and from urine and feces after the first week; bone marrow culture provides the best bacteriologic confirmation (90%-95% recovery) even in patients who have already received antibiotics. A fourfold rise in somatic (O) agglutination titers in paired sera appears during the second week in less than 70% of cases of typhoid fever; when it occurs, it supports the diagnosis, provided vaccine had not been given recently.

Clinical manifestations: Disease is characterized by insidious onset of sustained fever, severe headache, malaise, anorexia, a relative bradycardia, splenomegaly, rose spots on the trunk in 25% of white patients, nonproductive cough in the early stage of the illness, and constipation more commonly than diarrhea (in adults). Many mild and atypical infections occur. In typhoid fever, ulceration of Peyer patches in the ileum can produce intestinal hemorrhage or perforation (about 1% of cases), especially late in untreated cases. Severe forms have been described with cerebral dysfunction. Non sweating fever, mental dullness, slight deafness and parotitis may occur. Mild and inapparent illnesses occur, especially in endemic areas.

Paratyphoid fever presents a similar clinical picture, but tends to be milder, and the case-fatality rate is much lower. The ratio of disease caused by *Salmonella typhi* to that caused by *S. paratyphi* is about 10:1. Relapses may occur in approximately 3%-4% of cases.

Case fatality ratio: The usual case-fatality rate of 10% can be reduced to <1% with prompt antibiotic therapy. It is much lower in Paratyphoid fevers.

Complications: Intestinal perforation, Typhoid encephalopathy and chronic carrier states are some of the complications. Relapses occur in 5%-10% of untreated cases and may be more common (15%-20%) following therapy with appropriate antibiotics.

DIFFERENTIAL DIAGNOSIS

Any fever ranging from viral fevers, to malaria, to ARI and UTI.

CASE MANAGEMENT

For enteric fever, chloramphenicol, amoxicillin or TMP-SMX (particularly in children) have comparable high efficacy for acute infections. Quinolone derivatives especially Ciprofloxacin are quite effective, as are the third-generation cephalosporins. All isolates should be checked for drug resistance.

PREVENTION

The best method of prevention is consume food that is safe e.g. food and water that is either boiled, cooked or can be peeled.

Vaccines (both oral and injectable) are available and are effective.

Vaccine	Dosage	Minimum age for vaccination	Booster dose	Efficacy of vaccine
Ty21 a	One capsule orally every 3 rd day for a total of 3 doses	6 years	Every 3 years	50 – 70% in the age group > 5 years
ViCPS	One injection given i.m	2 years	Every 3 years	50 – 70% in the age group > 5 years

SURVEILLANCE GOALS

- To detect and respond promptly and appropriately to cases of typhoid and paratyphoid fever in the community to reduce mortality.

- Immediate case-based reporting of cases and deaths when an outbreak is suspected.

Threshold levels

- Clustering of cases in a geographical region
- Sudden increase in the number of cases as compared to previous weeks / months / years.

RESPONSE TO AN OUTBREAK

- Report suspected cases to the next level.
- Field investigation in the area of residence of the patient to check for factors responsible for the outbreak.
- Conduct community education for detection of cases and access to district health facilities for appropriate medicare to prevent morbidity and mortality due to complications.
- Provision of safe drinking water to reduce the spread of the outbreak.

INVESTIGATION OF AN OUTBREAK

The investigation of an outbreak of Typhoid is similar to the investigation of other epidemic prone diseases. The first principle is to receive early warning signals, confirm diagnosis and to take prompt measures for control of the outbreak. Control measures are most effective when selective measures are applied early.

- Report suspected case to the next level. Also verify the case diagnosis by a clinician.
- Collect blood samples from five cases for confirming the outbreak. Send the material to the nearest lab which does cultures e.g. District Hospital labs or Medical college labs.
- Do an epidemiological investigation
 - Active search for cases of fever – identify all cases by age, sex and immunization status. Also date of onset of illness and complications if any. Get the support of the community for this search.
 - Draw the epidemic curve and understand the dynamics of the outbreak, including the index case, the transmission and direction of spread and the susceptible population.
 - Analyse the data by time, place and person.
 - Calculate the attack rate and the case fatality ratio.
- Simultaneously institute control mechanism
- On confirmation of an outbreak, take precautionary measures in other potentially high-risk pockets in the district.
- After the outbreak is over, a detailed report of the outbreak must be written.

CONTROL MEASURES

SANITARY MEASURES

- Sanitary disposal of human feces and maintain fly-proof latrines.
- Provision of safe chlorinated water and avoid possible back-flow connections between water and sewer systems.

- Educate the community regarding the importance of handwashing especially after defaecating. Provide suitable handwashing facilities; this is particularly important for food handlers and attendants involved in the care of patients and children.
 - Control of flies by screening, spraying with insecticides, and use of insecticidal baits and traps. Control fly breeding by frequent collection and disposal of garbage, and fly-control measures in latrine construction and maintenance.
- Use scrupulous cleanliness in food preparation and handling; refrigerate as appropriate. Particular attention should be directed to the proper storage of salads and other foods served cold. These provisions apply equally to home and public eating places. If uncertain about sanitary practices, select foods that are cooked and served hot, and fruits peeled by the consumer.
- Pasteurize or boil all milk and dairy products. Supervise the sanitary aspects of commercial milk production, storage and delivery.
- Enforce suitable quality-control procedures in industries that prepare food and drink for human consumption.
- Instruct patients, convalescents and carriers in personal hygiene. Emphasize handwashing as a routine practice after defecation and before preparing and serving food.
- Exclude typhoid carriers from handling food and from providing patient care. Chronic carriers should not be released from supervision and restriction of occupation until local or state regulations are met, often not until 3 consecutive negative cultures are obtained from authenticated fecal specimens taken at least 1 month apart and at least 48 hours after antibiotic therapy has stopped.

EARLY DIAGNOSIS AND APPROPRIATE TREATMENT

- Diagnosis and treatment with the appropriate antibiotics.
- Hospital care is desirable during acute illness. Patient should be isolated and enteric precautions to be taken while admitted. Release from supervision by local health authority should be based on not fewer than 3 consecutive negative cultures of feces taken at least 24 hours apart and at least 48 hours after any antibiotic, and not earlier than 1 month after onset; if any one of these is positive, repeat cultures at intervals of 1 month during the 12-month period following onset until at least 3 consecutive negative cultures are obtained.
- Concurrent disinfection of feces, urine and soiled articles with a suitable disinfectant.

IMMUNISATION

- Immunization is not routinely recommended during an outbreak as it takes at least 7 days for immunity to develop.

Fig 2: Surveillance and Response

