

# Typhoid fever

**Background and epidemiology:** Typhoid fever is a systemic bacterial infection caused by *Salmonella typhi*. Typhoid is usually acquired through ingestion of water or food contaminated by the urine or feces of infected carriers and, as such, is a common illness in areas where sanitation is poor. One of the most famous carriers was Typhoid Mary, a cook who infected at least 51 people.<sup>1</sup> Today, outbreaks of typhoid fever occur most often in developing countries, in refugee camps and in overwhelmed areas with a high population density. In some areas the annual incidence is as high as 198 cases per 100 000<sup>2</sup> and, contrary to a previously held view, the disease causes considerable morbidity in children.<sup>3</sup> Worldwide, at least 17 million new cases and up to 600 000 deaths are reported annually.<sup>4</sup> The disease is less common in North America: an estimated 400 cases are reported each year in the United States, 70% occurring in travellers returning from endemic areas.<sup>5</sup>

The case-fatality rate of typhoid fever is 10%, but it can be reduced to 1% with appropriate antibiotic treatment.<sup>4</sup>

Infections with other *Salmonella* bacteria also occur. Paratyphoid fever is also a systemic disease, caused by *Salmonella paratyphi*. Its presenting symptoms are similar to those of typhoid fever, but they are milder and the case-fatality rate is much lower.

The other pattern of *Salmonella* infection is primarily enteric ("food poisoning") and can occur with exposure to one of hundreds of different *Salmonella* species.

**Clinical management:** Although in most cases a transient and mild episode of diarrhea develops shortly after ingesting *S. typhi* bacteria, most cases are asymptomatic during an incubation period of 7–14 days. The disease manifests most often a week or so after ingestion and begins with an intermittent fever that becomes high and sustained, severe headache, poorly localized abdominal discomfort, malaise and anorexia. There may also be a nonproductive cough. Al-

though the focus of the infection is the intestine, constipation is more common than diarrhea in adults. The reverse is true in AIDS patients and children.

Physical signs are few. Bradycardia in the presence of high fever, once considered a hallmark of typhoid fever, is not common. The abdomen may be tender to palpation, with poorly localized discomfort. Rose-coloured spots (small maculopapular blanching lesions) appear on the trunk of about 25% of patients with light skin. The spots are less frequent and more difficult to locate in people with darker skin. Laboratory screening may reveal a normal hemoglobin level, normal leukocyte and platelet counts, and elevated liver enzyme levels.<sup>6</sup>

Complications occur in 10%–15% of cases; gastrointestinal bleeding, perforation and typhoid encephalopathy are the most serious. Gastrointestinal bleeding can occur in up to 10% of cases, most likely from intestinal erosion, but it is clinically significant in only 2% of cases.<sup>6</sup>

Typhoid fever is diagnosed by means of bacterial culture. Blood culture is usually done and is most sensitive in the first week of illness. Bone marrow culture is more sensitive than blood culture, regardless of the duration of illness or treatment with antibiotics, but it is technically more difficult to perform. Fecal culture yields positive results in only one-third of cases. Serologic testing for *Salmonella* antibodies (Widal's test) is possible but shows cross-reactivity with some other *Salmonella* species and has a sensitivity of only 70%.

Treatment of typhoid fever is with antibiotics, usually fluoroquinolones. Chloramphenicol, amoxicillin and trimethoprim-sulfamethoxazole remain reasonable choices when quinolones are unavailable. Unfortunately, resistance of *S. typhi* strains to all of these drugs is becoming more common, particularly in Asia, the Middle East and Latin America. As such, appropriate treatment varies with geographic distribution of resistant strains. In resistant

cases, consideration is given to a longer duration of quinolone therapy or to treatment with azithromycin or a third-generation cephalosporin.<sup>6</sup>

**Prevention and control:** Prevention measures target handwashing, sanitary disposal of human feces, provision of safe public water supplies, controlling of flies, scrupulous food preparation, and pasteurization of milk and other dairy products. In addition, because many seafood beds are contaminated with sewage, attention is given to limiting the collection and marketing of shellfish to approved sources, and to steaming or boiling shellfish for at least 10 minutes.

Immunity is conferred after infection or through vaccination. In either case, it is only temporary. Typhoid fever vaccine can be given orally or parenterally, and the efficacy of, and adverse reactions to, each type differ.<sup>7</sup> Vaccination is often recommended for people travelling to endemic regions, although the cost-effectiveness of this strategy has been questioned.<sup>7</sup> The effectiveness of mass vaccination in endemic regions is undergoing further study but should be considered in high-risk situations, such as disaster relief sites and refugee camps.

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## References

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