

CHANGING BELIEFS AND REDUCING DISEASE: 1890 LOWELL TYPHOID EPIDEMIC

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Every Public Health student knows the story of John Snow. In 1854, John Snow conducted pioneering investigations on cholera epidemics in England and particularly in London in which he demonstrated that contaminated water was the key source of the epidemics. His thorough investigation of an epidemic in the Soho district of London led to his conclusion that contaminated water from the Broad Street pump was the source of the disease and, consequently, the removal of the handle led to cessation of the epidemic. The water was still contaminated, but people could not access it.

Lowell has a very similar story with typhoid. Typhoid is spread by eating or drinking food or water contaminated with the feces of an infected person. Typhoid fever is caused by the bacterium *Salmonella enterica* serotype typhi (*S. typhi*). Prior to 1890, it was illegal to dump industrial or human waste in Massachusetts streams, lakes, or ponds, but legal to dump in the Connecticut and Merrimack rivers, and the section of the Concord River in Lowell. What was the thinking to allow dumping in these rivers? At the time it was believed that these rivers were too large and swift to contain contamination. This belief that Mother Nature will naturally purify contaminants and kill viruses and bacteria was common. What really happened was that corporate special interests convinced legislators and the general public that this belief was true, but there was no scientific evidence to support it. This was compounded by the fact that these once raging rivers were slowly being tamed by locks and canals, creating large areas of standing or slow-moving water for contamination to intensify and concentrate.

In the fall of 1890, there was an alarming increase in the number of Typhoid cases and related deaths. The state Board of Health was informed of the large number of cases. The purity of the water was regularly tested by the state. A state biologist and professor at the Massachusetts Institute of Technology, William Sedgewick, went to Lowell to determine if some change in the river could be the cause of this increase in typhoid. A chemical analysis, however, was not as thorough as a bacterial analysis. Further tests were taken to determine if *S. typhi* was present.

Professor Sedgewick determined that the source of the contamination came from up river- that it had passed down the river, and probably over the falls, with a danger that it may have contaminated water drawn through an inlet pipe. Citizens were directed to boil all city water for at least 15 minutes before using. Later it was also discovered that the sewage from the main wards of the corporation hospital on Pawtucket Street (where many typhoid patients had been treated), was entering the Northern Canal. Water from this canal was pumped into service pipes in mills throughout the city. Even though this water was not supposed to be used for drinking purposes, many mill workers did use it because it was cold and accessible. Almost 1% of the city's population was affected by the disease.

In January 1891, a special meeting of the Board of Health was called, where it "was voted that the Lowell Hospital Association be notified to connect all sewerage from their premises with the public sewer within 30 days from the time of notice." It was also "voted that the agents of the different corporations be notified to place a placard over each faucet on their premises where canal water is drawn saying that it is canal water and unfit for drinking purposes."

With these measures, typhoid disease returned to pre-epidemic levels. Also, people began to reject theory that water purified itself and understand that typhoid was from microbes in the sewage, not from the sewage itself. But, similar to what John Snow did with cholera, the water source was identified and actions taken to mitigate consumption.

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