FIGHTING TUBERCULOSIS: Lessons on inexpensive life-saving strategies from Denmark in the pre-antibiotic era

The emergence of drug-resistant strains of tuberculosis (TB) is a global health crisis. But research by Casper Worm Hansen, Peter Sandholt Jensen and Peter Egedeso Madsen suggests that, historically, antibiotics were not the only successful way to counteract the spread of TB. Their study, to be presented at the annual congress of the European Economic Association in Geneva in August 2016, finds that a public health initiative to create 39 ‘dispensaries’ in pre-war Denmark was both highly effective and extremely cheap.

Before the Second World War, Denmark had the lowest TB mortality rates in Europe, with 34 deaths per 100,000. The network of dispensaries, which were established across the country, consisted of simple rooms to which patients were referred by their doctors. Once there, a specialist nurse could examine the patient and the patient's family, discover where TB was contracted and find out other data useful for combating the disease.

Analysing data from 1907-1939, the study estimates the dispensaries saved 6,400 lives, or 250,000 life years, at a cost equivalent in today's money of $76 per life year. This contrasts with the cost of introducing clean water to the United States during the same period of $500 for every life-year saved.

‘Our findings demonstrate the importance of public health interventions for the decline in TB mortality’, say the authors. ‘We also document quantitatively the importance of information and prevention for the decline in tuberculosis before the advent of modern medicine.’

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According to the World Health Organization, tuberculosis (TB) is a major global health problem and ranks alongside HIV as a leading cause of death. As of 2014, there were 9.6 million new TB cases, and even though TB has been treatable by antibiotics since the 1940s, there are now drug-resistant strains. It is therefore unsurprising that eliminating TB mortality is part of the UN's third sustainable development goal.

Today, TB cases are mainly found in developing countries, though this was not always the case. Before the advent of modern medicine, European countries also suffered high rates of TB incidences and deaths. Moreover, there was considerable variation within Europe with some countries being able to reduce TB in the pre-modern medicine era. TB death rates fell in many European countries from above 200 deaths per 100,000 in 1885 to below 100 deaths in 1935.

Using data for England and Wales, social historian Thomas McKeown noted, along similar lines, that 80% of the reduction in TB mortality happened before there was any effective treatment. He argued that the decline was unrelated to any public health measure. This view has more recently been supported by Nobel laureate Robert Fogel, while other scholars, who are more sceptical, highlight the role of public health measures that were set in motion by the germ theory of disease in the 1880s.
This new research is the first to evaluate quantitatively the effect of introducing TB dispensaries on TB mortality. The analysis is conducted using data from Denmark, which has been singled out as particularly successful in combating TB. Denmark had the lowest TB mortality prior to World War II: 34 deaths per 100,000.

This development has been ascribed to the policies pursued in Denmark, which were instigated by the National Foundation for the Fight against Tuberculosis. Among other public health measures, the National Foundation established TB dispensaries locally, which were rolled out across time and cities differentially.

The role of the dispensaries was to prevent the spread of the disease. Doctors would refer TB-infected patients to the dispensaries, which would provide help, support and examination of the infected individual and his or her family. They also attempted to ascertain how the patient contracted the disease and whether others had contracted the disease because of contact with the patient.

The dispensaries themselves were little more than a room used for linen, towels, disinfectants and spittoons. All doctors were able to refer patients to the dispensary, which was led either by a specialised doctor or nurse.

The analysis estimates the impacts of 39 dispensaries on TB mortality for Danish cities over the period 1907-1939. The researchers find that the dispensaries saved 6,400 lives, which at that point in time corresponds to about 250,000 saved life years.

The cost of saving one year of life is in the region of $76, measured in present-day money, which makes this type of health intervention extremely cheap. Previous research has shown that the cost of saving one life-year by introducing clean water in the United States during the same period amounts to $500.

These findings demonstrate the importance of public health interventions for the mortality decline, which happened over the long run. They also quantitatively document the importance of information and prevention for the decline in tuberculosis before the advent of modern medicine.

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