

Essay on Impact of Antibiotics on Public Health from (1890-1939)

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Introduction

Antibiotics were introduced as a means of treating infectious diseases and, thus, public health had to come up with new solutions to the problem of antibiotic resistance, which was already a serious issue. In those days, medical practices were still very simple, e.g. herbs, surgery, and isolation, which had little to no effect. Nevertheless, antibiotics have a different approach as a new method of dealing with bacteria. This essay talks about antibiotics from 1890 to 1939. It says they helped boost public health. There were fewer deaths, better treatments, and new medical ways of caring. *The use of antibiotics from 1890 to 1939 changed medicine and they saved lives by treating diseases by opening new ways of healing possible.*

Research Question

- How did the development and introduction of antibiotics from 1890 to 1939 impact public health, particularly in terms of mortality rates, treatment of infectious diseases, and overall medical practices?

The Pre-Antibiotic Era

In the past, before antibiotics were discovered, sicknesses from infections used to cause many deaths worldwide¹. Such conditions included pneumonia, tuberculosis, syphilis, and sepsis. Many people often died from these diseases. Even small infections would sometimes become serious because there were no efficacious treatments available. At that time, there was a poor understanding of how these disorders spread, and there was no access to clean water or proper sanitation measures.

¹ Sanchari Sinha Dutta, "The History of Antibiotics," News-Medical.net, June 21, 2022, <https://www.news-medical.net/health/The-History-of-Antibiotics.aspx>.

The treatments back then were inadequate as doctors relied on leeches, herbs, and simple operations without success. Quinine treated malaria in this period while mercury was toxic for syphilis cases as well. Though carbolic acid reduced perils during surgery, it could not fight off through the bloodstream infections. Most infections remained untreated resulting in many deaths.

Infectious diseases like tuberculosis caused one in every seven deaths in Europe and USA around the late 1800's to early 1900's². Young children or old individuals besides those whose immunity was weak suffered pneumonia and influenza very frequently. During childbirth, puerperal fever caused high maternal death rates. The 1918 flu pandemic killed about fifty million people globally.

Discovery and Development of Antibiotics (1890-1939)

Between 1890 and 1939, medical science was a period of great change with the discovery and development of antibiotics that changed totally the approach used for treating infectious diseases. This period was characterized by discoveries and great strides that opened the way to the modern antibiotic therapy.

Key Discoveries Leading to Antibiotics

The antibiotic invention can be attributed to a series of important scientific discoveries. One of the first in 1928 when Alexander Fleming, a Scottish bacteriologist, saw the mold's antibacterial properties "Penicillium notatum"³. Fleming observed that the mold gave out a substance known as penicillin which stopped the growth of "Staphylococcus" bacteria. The accidental occurrence of this discovery was Fleming's leaving a petri dish of bacteria exposed, thus, mold contamination happened, and the surrounding bacteria were murdered.

² CDC, "History of World TB Day," CDC, 2023, <https://www.cdc.gov/tb/worldtbdays/history.htm>.

³ American Chemical Society, "Alexander Fleming Discovery and Development of Penicillin - Landmark," American Chemical Society, 2023, <https://www.acs.org/education/whatischemistry/landmarks/flemingpenicillin.html>.

Timeline of Significant Developments

The very first invention of antibiotics was already supplemented by new antibiotics, thanks to the work of Fleming. At the Determining point of two-zeroes, The German Chemist Prontosil came into the picture, when Gerhard Domagk discovered the action of sulfonamides against bacteria Prontosil in the early 30s⁴. Although they are not antibiotics today, sulfonamides helped treat bacterial infections and prompted later research.

By 1939, a bunch of wizards at the University of Oxford, with the help of Howard Florey, Ernst Boris Chain, and Norman Heatley, perfectly isolated penicillin and showed its therapeutic effect on the treatment of bacterial infections. The research conducted extensive experiments. They developed a method to make penicillin in large quantities. During World War II, the Oxford team made penicillin. It saved many soldiers from infected wounds.

Early Experiments and Challenges in Antibiotic Production

The pototypical penicillin trials went through a great deal of fuss on the stability and production mainly. The initial discovery of Fleming indicating the use of penicillin was a promising start, but the production of the drug in enough quantities for practical use was quite a challenge for him. However, through the cooperation of the Oxford group, who applied novel technologies such as constructing penicillin in bedpans and milk churns, production became feasible. Along with that, they verified that the fermentation liquor produced corn staling, a byproduct of oil production, facilitated the high yields so that large-scale production could be achieved.

⁴ WILLIAM STORK, Acs.org, 2023, <https://cen.acs.org/articles/83/i25/Prontosil.html>.

Introduction and Early Use of Antibiotics

Antibiotics changed medicine forever. People were very excited and worried at first. Alexander Fleming found penicillin in 1928⁵. In the early 1940s, Howard Florey and Ernst Boris Chain made penicillin available to many people.

Initial Uses of Antibiotics in Medical Practice

Penicillin was first introduced for the treatment of bacterial infections that were thought to be only fatal or debilitating diseases. Penicillin was used extensively since World War II on the treatment of infections of the supervening gunshot wounds in soldiers, thus minimizing deaths and amputations due to infected wounds.

In the very beginning, penicillin's great performance in these examples enabled it to be applied to a wider spectrum of bacterial infections. Doctors began using penicillin to cure streptococcal infections that were very common and serious to people in the days before antibiotics such as strep throat and rheumatic fever⁶. It was also used to syphilis, which was a major public health issue at the time, where penicillin was remarkably successful.

Case Studies of Early Antibiotic Treatments

One of an eminent early example was a police officer named Albert Alexander who had a difficult time in 1941. Alexander was inflicted with a critical infection from a zinnia thorn scratch. Within a few days, he developed abscesses and a life-threatening systemic infection. Doctors used penicillin, which brought a miracle when traditional methods failed. The penicillin

⁵ Science Museum, "How Was Penicillin Developed?," Science Museum (Science Museum, February 23, 2021), <https://www.sciencemuseum.org.uk/objects-and-stories/how-was-penicillin-developed#:~:text=In%201928%20Dr%20Alexander%20Fleming>.

⁶ Joseph Ferretti and Werner Köhler, "History of Streptococcal Research," Nih.gov (University of Oklahoma Health Sciences Center, February 10, 2016), <https://www.ncbi.nlm.nih.gov/books/NBK333430/>.

was not enough, thus, the infection returning and finally Alexander dying. The case was a demonstration of the pros and cons of antibiotic therapy.

In 1942, Anne Miller was the first civilian in America to get penicillin⁷. She had a bad infection after a miscarriage. The infection was very dangerous but, penicillin made it go away. Anne got better.

Impact on Specific Infectious Diseases

The innovation of antibiotics was a game changer in the therapy of particular infectious diseases. The situation of TB which was at its peak in the early 20th century, had evident improvement in the rush of antibiotics as streptomycin in the late 1940s became available. Initially, the anti-TB medical approach was solely focused on sanatoriums providing strict rest and nutrition, which were often the only options left for a patient.

Pneumonia was a major killer before antibiotics were created⁸. Penicillin was first used for treatment but soon new antibiotics became available. Research shows that these antibiotics reduced pneumonia deaths by over half in just a few years.

Reduction in Mortality Rates

Antibiotics had a very strong impact on the population of diseases dying out in the past, making it possible for public health to be more successful than ever before in the world. Statistical analysis of mortality rates' variations along the time period between 1890 and 1939 reveals this significant effect. Prior to antibiotics, the average rate of deaths due to infectious diseases ranked first in the list of the causes of death.

⁷ Wolfgang Saxon, "Anne Miller, 90, First Patient Who Was Saved by Penicillin," *The New York Times*, June 9, 1999, <https://www.nytimes.com/1999/06/09/us/anne-miller-90-first-patient-who-was-saved-by-penicillin.html>.

⁸ Alexa Heathorn and Sara Slagle, "Penicillin & Pneumonia," *Pressbooks.pub*, July 29, 2020, <https://pressbooks.pub/anne1/chapter/penicillin-and-pneumonia/>.

Statistical Analysis of Mortality Rate Changes

Pneumonia was already a silent killer with some populations recording as high as 30% of mortality rate before antibiotics became popular⁹. As for tuberculosis, it was one of the major causes of death in the United States during the early 20th century, with a rate of around 194 per 100,000 people.

Septicemia, usually caused by infected wounds, had an even more fatal line-up. The invention of penicillin in 1928 by Alexander Fleming ushered a new age. In the late 1930s, the antibiotics' got more widespread the mortality rates dropped dramatically to those diseases. In the 1930s antibiotics began saving lives. Sulfa drugs reduced pneumonia deaths to 18% in 1939. These drugs also lowered streptococcal infection deaths that caused rheumatic fever and heart disease.

Comparison of Pre- and Post-Antibiotic Eras

DA sharp comparison of the periods premised on antibiotics and the time when antibiotics were introduced can be made. In the past, there were no strong medicines. Infectious sickening germs made people ill. They used simple things to help. They isolated, took care of, and cleaned. These did not work well. The death rate was persistently high, and the outbreaks of diseases such as scarlet fever, meningitis, and syphilis were common.

Antibiotics were introduced at the time when the majority of them were no longer able to be effectively treated. Before antibiotics, for instance, bacterial meningitis was a threat with mortality of over 70%¹⁰. However, the figure declined to below 30%, due to the effectiveness of sulfonamides and later, penicillin, after antibiotics. The death rate from tuberculosis, which had

⁹ SAMY AHMAR, "Pneumonia: The Silent Killer," www.savethechildren.org.uk, April 7, 2017, <https://www.savethechildren.org.uk/blogs/2017/pneumonia-silent-killer>.

¹⁰ World Health Organization, "Meningitis," www.who.int (World Health Organization, April 17, 2023), <https://www.who.int/news-room/fact-sheets/detail/meningitis>.

been a problem for a long time, fell significantly by the end of the 1930s, and thus, the stage for even more great reductions in the following decades with the creation of more effective antibiotics was laid.

Specific Examples of Diseases with Reduced Mortality Due to Antibiotics

One of the most striking examples of reduced mortality is seen in the treatment of syphilis. Syphilis, before the advent of antibiotics, used to be a long-term and very serious illness that often ended up with dangerous complications and death. The late 1930s diffusion of penicillin constitutes a breakthrough therapy for this condition by eliminating it and bringing mortality rates down to nearly zero.

Pneumonia used to kill many people. Then sulfonamides came along. They made death rates drop very much. Later penicillin was found. In 1939, bacterial pneumonia deaths were down by almost half¹¹. Likewise, the healing of puerperal fever, a usual and frequently deadly illness after childbirth, was changed due to antibiotics. Before their use, puerperal fever had a mortality rate of 20-30%. The death rate dropped dramatically with the introduction of sulfa drugs, thus saving millions.

Public Health Policies and Antibiotic Distribution

Government policies played a vital role in the production and distribution of antibiotics. Considering the life-saving potential of antibiotics, governments worldwide resolved to implement policies to support the mass production and distribution of these drugs. For instance, the U.S. government allied with pharmaceutical companies during World War II to increase the

¹¹ Scott H. Podolsky, "The Changing Fate of Pneumonia as a Public Health Concern in 20th-Century America and Beyond," *American Journal of Public Health* 95, no. 12 (December 2005): 2144–54, <https://doi.org/10.2105/ajph.2004.048397>.

production of penicillin, ensuring that both military and civilian populations had the life-saving drug¹².

Public health campaigns pressed the antibiotic use overwhelmingly. Governments and health organizations have also launched extensive education campaigns to inform the public about the benefits of antibiotics and the necessity of following the prescribed treatments. These campaigns aimed first to abolish myths and misinformation, then to encourage people to seek medical advice for infections instead of undertaking home treatments which are usually ineffective.

The access to antibiotics was different virtually all across the regions and populations. In developed countries, antibiotics were easily available through healthcare systems and pharmacies¹³. When it comes to developing regions, however, access was more limited due to logistical, economic, and infrastructural challenges. The strategies used to improve the global access ranged from international aid programs to collaborations with non-governmental organizations to distribute antibiotics in the under served areas. These initiatives aimed to the global infectious diseases burden reduction by the antibiotics accessibility increase in all populations.

¹² Roswell Quinn, “Rethinking Antibiotic Research and Development: World War II and the Penicillin Collaborative,” *American Journal of Public Health* 103, no. 3 (March 2013): 426–34, <https://doi.org/10.2105/ajph.2012.300693>.

¹³ Dominique Lescure et al., “Determinants of Self-Medication with Antibiotics in European and Anglo-Saxon Countries: A Systematic Review of the Literature,” *Frontiers in Public Health* 6 (December 17, 2018), <https://doi.org/10.3389/fpubh.2018.00370>.

Societal Impact and Public Perception

Public awareness of infectious diseases suffered a shift due to the introduction of avoidant drugs¹⁴. The antibiotic drugs becoming the miracle of healers, treating even those diseases that were beyond treatments became the view in society. Health science gained such immense popularity that it resulted in the positive changes of health and illness attitudes in society, with people taking the initiative in going to healthcare professionals to seek medical assistance.

Medicinally, these drugs shaped the social practices and behaviors of the society. The anxiety of being infected by bacterial germs faded away, hence some changes in hygiene practices and health behaviors were recorded. Nevertheless, this development of the non-discrimination phenomenon in relation to some diseases was not the only positive achievement, as people expected antibiotics to be the instant cure for minor diseases causing their overuse of these medicines.

Changes in Medical Practices

Antibiotics ushering in the medical domain has been the most significant change so far, and it has resulted in treatment protocols and hospital routines becoming an indispensable part of the hospital environment. In the pre-antibiotic era, the infections were the reason for prolonged hospitalization and were usually the cause of death¹⁵. Antibiotics transformed the hospitals

¹⁴ Megan Oaten, Richard J. Stevenson, and Trevor I. Case, "Disease Avoidance as a Functional Basis for Stigmatization," *Philosophical Transactions of the Royal Society B: Biological Sciences* 366, no. 1583 (December 12, 2011): 3433–52, <https://doi.org/10.1098/rstb.2011.0095>.

¹⁵ N.D. Friedman, E. Temkin, and Y. Carmeli, "The Negative Impact of Antibiotic Resistance," *Clinical Microbiology and Infection* 22, no. 5 (May 2016): 416–22, <https://doi.org/10.1016/j.cmi.2015.12.002>.

because new treatment protocols that halved recovery times and doubled patient survival rates were implemented.

The fact that the problem of bacterial infections was easily managed meant that the hospitals were more efficient in discharging patients and expanding the patient turnover, which in turn, increased the profits and the savings for the healthcare system. In surgeries, antibiotics stop infections. Before antibiotics, many got infections after surgery. Some died. Doctors now do harder surgeries. Patients are safe with antibiotics. Doctors and nurses learn how to use antibiotics correctly. They teach patients how to take them right.

Conclusion

The introduction of antibiotics from 1890 to 1939 has altered human health enormously. The main results show the decrease in mortality rates, the improvement in medical practices and the general acceptance of antibiotics. These breakthroughs formed the cornerstone of today's healthcare and remain at the heart of medical practices and policies. Subsequently, a vital advancement has to be made over time to complement the proper use of antibiotics with preventive means, thus ensuring that their important job would be very long-lasting and efficient.

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