Penicillin: How World War II Affected the Public Reception of The World's Most Influential Drug

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Abstract

The Humanities and Arts requirement was fulfilled with depth courses in history, and breadth courses in English and communications studies. The final requirement for humanities and arts was a seminar on the history of technology. The final product for this class was a research paper on how World War II impacted the public reception of penicillin. In the research paper I argue that the positive news reports and propaganda about penicillin during World War II fueled the public acceptance of the drug. Additionally, findings published in science journals and medical journals about penicillin, as well as the dangers of the alternative to penicillin, sulfa drugs, led to a positive reception of the new miracle cure.

Introduction –

An advertisement for penicillin published in *Life* magazine in 1945 at the end of World War II (Figure 1) states, “Thanks to penicillin… he will come home!” This powerful message reflects the impact penicillin had on the world a little over a decade after its discovery at Scottish scientist Alexander Fleming’s lab in 1928. Before penicillin during World War I, 16.5 of every 1000 men at war died from disease, as well as 8.1 of every 100 wounded died from their wounds. In contrast during World War II, only 0.6 of 1000 died from disease and 4.5 out of 100 died from their wounds on the battlefield (Gilchrist, 1998). This resulted from medical advancements made during this time including advancements in sceptics, DDT, and penicillin. The advertisement described penicillin as, “the most potent weapon ever developed against many of the deadliest infections known to man” (Life Magazine 1945). The advertisement depicted the Pacific theatre where fighting still raged in 1945 showing a medical soldier injecting penicillin, the new miracle drug, into the wounded soldiers’ arm. American war propaganda published by American pharmaceutical corporations against the Japanese Empire doubled as an advertisement for penicillin.

Figure 1: An Advertisement for penicillin production from Life Magazine

Penicillin was well received by the public in the 1940s because of the influence it had during World War II. Over the course of the war Americans read glowing reports of the penicillin miracle in the news, through advertisements and war production board propaganda. Cementing enthusiasm was the reports of penicillin therapeutic advantages over sulfa drugs

and the continuous studies of penicillin efficacy in medical journals. The war was the crucial classroom where Americans learned to trust penicillin.

Links between technology and patriotism during World War II

To understand why the advertisements during World War II were so successful, it is important to understand the relationship between technology and patriotism in the United States. Three revolutionary technologies help lead the United States and allies to victory during World War II: DDT, the atomic bomb, and penicillin.

DDT is an organochlorine insecticide that could be used on crops, infrastructure, and people to fend off against insects, commonly mosquitoes, flies, and lice. DDT was used during World War II to protect soldiers against malaria, typhus, body lice, and the bubonic plague. The success of DDT brought malaria cases from 400,000 in 1946 to nearly zero in 1950 (Russell 1999). DDT was advertised as a miracle technology that could potentially affect every American life. The atomic bomb brought an abrupt end to World War II with the largest and most energy dense explosion in the history of warfare. To the American people, it was advancement in American technology that had won the war against the axis powers. The American government's role in developing these revolutionary scientific advancements generated faith and trust in science.

Penicillin Advertisement during World War II

Due to the war, many companies including General Motors and Bell Telephone Systems were unable to supply civilian consumers with goods as resources were sent to the war effort

instead of civilians. Even though civilians couldn't buy the products, these companies continued to advertise. The idea was to "keep their brand names in the public conscious" (Stole 2021). Often, these ads would recommend civilians spend their money on war bonds rather than the product whose stock was being sent to the front lines in Europe or the Pacific. These patriotic ads requesting civilians purchase war bonds often featured soldiers and American propaganda against the Nazis or the Japanese empire.

DDT is an example of a similar technology to Penicillin in terms of its impact on World War II and its presence in advertisement. In figure 2 we see a woman using a DDT spray on an insect in her "victory garden" (*Woman's Home Companion* 1944*)*. We see a tie of patriotism to the new technology with the advertisement making subtle nods to both the violence in Europe and the supply struggles in the US requiring "Victory Gardens" DDT is no exception to the rule advertisers took in roping in new technology with patriotism in winning the war.

Figure 2: DDT advertisement 1944

Patriotism was a driving force behind the public acceptance of penicillin. During World War II, the United States government released thousands of various public advertisements and service announcements about the war. These advertisements varied from requesting enlistment in the US military to requesting people grow “victory gardens” to help support domestic food production. These advertisements often featured an American flag, or some allegory to US nationalism. Nationalism in a state tends to rise during periods of economic prosperity (Woods 1989). From 1939 to 1995, the United States government saw massive increasing in federal spending, surpassing New Deal levels of government economic intervention which led to growth in the US economy, and growth in US nationalism.

Figure 3: 1943 World War II Industrial Advertisement

Art had and influence on the public acceptance of penicillin in the 1940s and 1960s. In Figure 4, a painting by Robert A. Thom from the 1950s was released in the novel “A History of Pharmacy in Pictures” in association with the University of Wisconsin. In the painting a woman can be seen culturing penicillium mold in a petri dish, while a man in the background is operating the fermentation

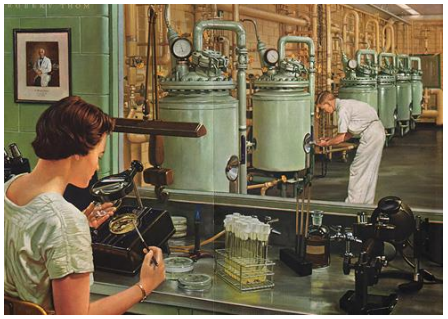
Figure 4: "The Era of Antibiotics" by Robert A. Thom

tanks to mass produce the penicillin. Analyzing the Thom advertisement further, we can see the heavily industrialized aesthetic of the painting hold parallels to Figure 3, an ally war propaganda poster urging civilians to perform factory work (Thomson 1940). Both feature large metal industrial equipment, and factory workers performing manual labor. The idea of technological advancement being a western value and playing an active part in the advancement of science became a prominent part of American culture.

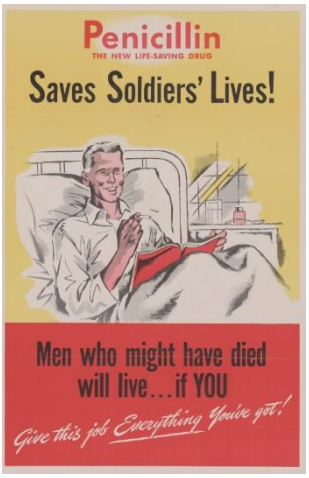

Figure 5: WW2 Poster promoting the war effort and

Public advertisements funded by the war production board also influenced the public acceptance of penicillin by associating the medicine with patriotism and empathy. Figure 5 is a penicillin advertisement; a World War II poster encouraging soldiers on the ally's side. In this poster we see a soldier in a hospital bed reading a book. The poster links the life saving effects of penicillin to the war effort saying, "Men who might have died will live… if YOU Give this job everything you've got" (Brives 2021). This type of propaganda linking success in the war to penicillin would have been in the public's mind after the war ended. The idea of keeping a brand in a public's conscience during the war so that they remember it afterwards was key to penicillin success. This poster also associates patriotism with penicillin, in a time when US patriotism and unity was particularly strong.

Figure 6: WW2 Poster promoting the war effort and penicillin

War propaganda posters also used darker images and stronger emotions to advertise penicillin. In figure 6 the poster states, "The Faster this building is completed, the quicker our wounded men get Penicillin (The new life-saving drug)" (*World War II Posters* 1943). Above this

message is a cross indicating a soldier who died with the name “John Doe”, indicating it could be anyone. The poster says at the top that, “Every minute Lost on this job may mean…”, implying effort lost towards the war effort could mean the loss of allied life. This political propaganda poster encourages the war effort in the United States, and at the same time promotes penicillin as a lifesaving drug.

In addition to advertisements, the popularization of penicillin can be attributed to the role the media played in providing an alternative to Sulfa drugs.

The Media Played a Role in Turning People Away from Sulfa Drugs

Advertisers of penicillin in the late 1930s and early 1940s published findings that turned the public away from sulfa drugs, the predecessor antibiotic to penicillin. Sulfa drugs are a group of synthetic antibiotics made of sulfanilamide molecules. Discovered by German bacteriologist and pathologist Gerhard Domagk who found its effectiveness on Streptococcus infections in mice, it became a widely used drug and was often found as a white powder in first aid kits for treating wounds during World War II.

Sulfa drugs were considered part of a pharmaceutical revolution because they were the first drug to be industrially manufactured largely with chemicals. Before the popularization of sulfa drugs, most medicines were derived from plants, animals, minerals, or other natural products (Lesch 2007). The United States realized they became overly reliant on Germany for the chemicals used for Sulfa drugs when they were cut off from the supply of those chemicals during World War I. This was one of many factors that led the War Production Board of the United States to prioritize penicillin production in the United States during World War II.

Additionally, Sulfa drugs were often toxic, and would commonly cause skin rashes, fever, nausea, vomiting, and mental confusion (Britannica, T. Editors of Encyclopaedia, 2017).

In August of 1937, *Time* magazine published an article describing the dangers of the side effects of sulfa drugs, including that they result in a deficiency in white blood cells. In late 1937, *Time* termed sulfa drugs a "fatal remedy" after nearly 100 patients died from what was originally thought to be sulfa drugs (it turned out that the sulfa drugs were dissolved in a chemical similar to antifreeze which was more likely the cause of death) (Adams 1984). The *Journal of American Medical Association* and the *New England Journal of Medicine* both updated the potential dangers of sulfa drugs after the deaths. In 1938, *Time* reported on the journal saying, "Untoward reactions, even death, may result from the administration of sulfanilamide… As much as ten percent of the population is unable to tolerate the drug at all" (Adams 1984).

The response the media had to sulfa drugs had a similar effect to the war propaganda in terms of popularizing penicillin. Penicillin, in contrast to sulfa drugs, had virtually no reported side effects by the media covering it including *Time, Newsweek, Reader's Digest, Better Homes and Gardens, Good Housekeeping, Woman's Home Companion, Parent's Magazine, Coronet, Hygeia, and Consumer Reports* (Adams 1984). The contrast the media made between sulfa drugs and penicillin led the public to accept penicillin.

Lastly, during World War II, a large volume of literature was published on penicillin that normalized the drug to the public.

Literature Was Published So Doctors and Educators could Learn More About Penicillin

The rise of penicillin may be attributed to the scientific literature published on the subject that reached doctors, educators, and science enthusiasts, and was reported on in popular newspapers and magazines. In 1942 there were just 7 articles pertaining to penicillin in *The Times* (A major national newspaper at the time, different from the *New York Times*). By 1944 *The Times* published 93 articles about penicillin, before dropping slightly to 84 articles in 1945 (Gilbert, 2015) . The increasing popularity of the topic of penicillin would've led to the public's awareness on the issue and would've led to its acceptance of the drug.

We can see an example of this literature in *The American Journal of Nursing. The American Journal of Nursing* is a monthly issued nursing journal that was established in 1900. This journal was highly influential winning a spot in "100 Most Influential Journals in Biology and Medicine in the Last 100 Years" by the Biomedical and Life Sciences Division of the Special Libraries Association (Special Libraries Association 2009). The article by Donald G. Anderson titled *penicillin* published during World War II, "summarize[s] our present knowledge concerning the nature of penicillin, how it acts, in what conditions it is indicated, how it is administered, and what toxic reactions should be looked for in patients who are receiving penicillin therapy" (Anderson 1945). These types of medical journal articles were important not only for educating medical personal at the war front, but for educating nurses and doctors domestically on the uses of penicillin.

Another article, published in *The Scientific Monthly* by Albert L. Elder in 1944 describes the new processes taking place by American pharmaceuticals to ferment the penicillium mold to mass produce the drug (Elder 1944). *The Scientific Monthly* would have catered not only to doctors, but to science enthusiasts and educators as well. By this point, many articles would've been published on the difficulties in manufacturing penicillin (Gilbert, 2015), so making the public aware of the breakthroughs in manufacturing technology related to penicillin was important in the drugs popularization.

Conclusion – The Fall of the Axis Powers and The Rise of Penicillin

Penicillin was widely praised in the 1940s because of its role in World War II. During the war, the press, marketing, and propaganda from the war production board published positive reports of the impact penicillin was making on the war. Brightly colored illustrative advertisements educated the public and associated penicillin with patriotism. Additionally, studies on penicillin's efficacy and the reports of penicillin's therapeutic advantages over sulfa drugs in medical journals continued to fuel the enthusiasm for the innovation. Articles published during the war in scientific journals educated doctors and science enthusiasts on the benefits of penicillin. During the war, Americans came to trust penicillin, which was a crucial lesson.

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