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FINAL REPORT

A Historical Assessment of Nonpharmaceutical Disease Containment Strategies Employed by Selected U.S. Communities During the Second Wave of the 1918-1920 Influenza Pandemic

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SECTION I – Executive Summary

In the absence of adequate stocks of an effective vaccine and/or antiviral drugs, the United States may have to rely on nonpharmaceutical interventions (NPI) to contain the spread of an infectious disease outbreak until pharmacological means become available. Because many of these NPI are costly and socially disruptive, their effectiveness and practicality need to be understood before their implementation or incorporation into a response plan.

We undertook a historical evaluation of these NPI as employed by American communities during the second wave (September-December 1918) of the 1918-1920 influenza pandemic. A team of medical historians from the University of Michigan Medical School's Center for the History of Medicine visited these communities to access and collect available primary source material from libraries, archives, and other private and public holdings. We selected 7 communities that reported relatively few if any cases of influenza, and no more than one influenza-related death while NPI were enforced during the second wave of the 1918-1920 influenza pandemic: San Francisco Naval Training Station, Yerba Buena Island, California; Gunnison, Colorado; Princeton University, Princeton, New Jersey; Western Pennsylvania Institution for the Blind, Pittsburgh, Pennsylvania; Trudeau Tuberculosis Sanatorium, Saranac Lake, New York; Bryn Mawr College, Bryn Mawr, Pennsylvania; and Fletcher, Vermont. Because of the apparently reduced morbidity and low mortality these communities experienced during the second wave of the pandemic, we have labeled them "provisional influenza escape communities." "Provisional" means that we cannot definitively determine on the basis of the historical evidence available to us if these communities sustained their low morbidity and mortality rates because of policy decisions made by their community leaders and public health officials, because the virus skipped some communities altogether and varied in its behavior in

other communities (viral normalization patterns), or because of other factors such as population density, geography, and good fortune.

Historical research is fraught with all the problems and limitations of retrospective studies. The researcher may be helped or hindered by numerous investigators, recorders, and collectors of information who preceded him or her and generally performed their work without a common reference framework or even sets of uniform definitions and concepts. The historian must also rely upon archivists who may or may not have preserved this material and cataloged it in a way that aids retrieval. These issues are some, but hardly the only, limitations of any historical study, including this one. Nevertheless, history represents an essential arrow in the quiver of human inquiry.

One would like to think that the 7 communities we identified fared better than others because of the NPI they enacted. We cannot prove that for any of them, although the case is, perhaps, strongest for the Naval Training Station at Yerba Buena Island and, possibly, Gunnison, Colorado. Further complicating our task, in addition to the quality and quantity of information available for study, is the fact that some of these communities were sparsely populated and geographically isolated, and all of them were subject to the vagaries of how the influenza virus normalized in affected populations.

Limited by these factors, we have reached two major conclusions:

(1) Protective sequestration (the shielding of a defined and still healthy group of people from the risk of infection from outsiders), if enacted early enough in the pandemic, crafted so as to encourage the compliance of the population involved without draconian enforcement measures, and continued for the lengthy period of time at which the area is at risk, stands the best chance of protection against infection. When implemented successfully, protective sequestration

also involves quarantine of any outsider who seeks entry, self-sufficiency in the supplies necessary for daily living, enforcement of regulations when necessary (including fining and jailing), and the ability of those sequestered to entertain themselves and maintain some semblance of a normal life.

(2) Available data from the second wave of the 1918-1920 influenza pandemic fail to show that any other NPI (apart from protective sequestration) was, or was not, effective in helping to contain the spread of the virus. American communities engaged in virtually the same menu of measures, including: 1) the isolation of ill persons; 2) the quarantine of those suspected of having direct contact with the ill; 3) social distancing measures, such as the cancellation of schools and mass gatherings; 4) reducing an individual's risk for infection, (e.g., face masks, hand washing, respiratory etiquette); and 5) public health information campaigns and risk communications to the public. Despite these measures, most communities sustained significant illness and death; whether these NPI lessened what might have been even higher rates had these measures not been in place is impossible to say on the basis of available historical data. Moreover, we could not locate any consistent, reliable data that would support the conclusion that face masks, as available and as worn during the 1918-1920 influenza pandemic, conferred any protection to the populations that wore them.

However inconclusive are the data from 1918, the collective experiences of American communities from the pandemic are truly noteworthy, especially in light of the fact that faced with a pandemic today we would likely rely on many of these same NPI to attempt to contain the spread of the infection until pharmacological supplies of vaccine and antivirals were available.

SECTION II - Purpose and Methods

A. Specific Aims and Methods of Study

The purpose of this study is to assess historically various NPI implemented to prevent or contain pandemic influenza in the continental United States from 1918 to 1920. These measures included: 1) the isolation of ill persons; 2) the quarantine of those suspected of having direct contact with the ill; 3) social distancing measures, such as the cancellation of schools and mass gatherings; 4) protective sequestration measures, including the prevention of healthy communities from interacting with anyone from outside that community; 5) reducing an individual's risk for infection (e.g., face masks, hand washing, respiratory etiquette); and 6) public health information campaigns and risk communications to the public. Our historical research has alerted us to several communities that appeared to have been more successful than others in achieving these goals, with a resulting low morbidity and mortality from pandemic influenza.

During the course of our research, we identified and studied 7 provisional influenza escape communities or institutions in the continental United States during the 1918-1920 period. For this historical study, we define a “provisional influenza escape community” as a community or institution where there were relatively few reported cases of influenza (compared to surrounding areas or analogous communities, towns, cities) and zero to one deaths resulting from influenza or pneumonia-related illnesses while NPI were enforced during the second wave of the 1918-1920 influenza pandemic, September-December 1918.¹ We use the word *provisional*

¹ Using the World Health Organization's influenza pandemic phase definitions, the second wave of the 1918 influenza would be considered Phase 6, Pandemic Period – increased and sustained transmission in the general population. It is important to note that there were 4 major waves of pandemic influenza, which notably were described as a demographic event *post facto* by historians rather than by public health officials at the time. The first wave occurred from February to May 1918. The second and most serious wave, which is the focus of this study, occurred from September to December 1918; the third wave was January to April 1919, which was interesting because communities that seemed to have had success attenuating the second wave seemed to have experienced

decidedly, because on the basis of the historical evidence available to us we cannot definitively determine if these communities sustained their low morbidity and mortality rates because of policy decisions made and NPI enacted by their community leaders and public health officials, because the virus skipped some communities altogether and varied in its behavior in other communities (viral normalization patterns), or because of other factors such as population density, geography, and good fortune. Given the extant historical data, which in many cases are rather sparse, we are unable to rank the importance of these factors in each of the communities we examined.

The diagnosis of influenza at this time was largely empirical, without definite culture methodologies or supportive laboratory findings. Mortality statistics of this era were typically derived from reported data of those who died during this period from respiratory symptoms associated with influenza or pneumonia. This suggests that under or over reporting of influenza cases was likely during the 1918-1920 pandemic. Although greater diagnostic precision at the time would have enhanced the use of this historical information in our current pandemic planning, diagnoses made then were based neither on laboratory evidence nor on a standard case reporting definition.

These 7 communities differed from one another in location, population density, demographic mix, community or institutional organization (e.g., civilian, military, institutions for the blind and for those with tuberculosis). As a result, they cannot offer a universal or monolithic template for developing public health policy for today. Conversely, one of the great strengths of our study is the diversity of our 7 communities. Consequently, we believe that

milder morbidity and mortality during this wave. The fourth wave occurred approximately from December 1919 to March 1920. See World Health Organization. WHO global influenza preparedness plan: the role of WHO and recommendations for national measures before and during pandemics. Switzerland: 2005.

important historical lessons can and should be extracted from a careful and close examination of the communities profiled in this study.

The identification of these 7 provisional influenza escape communities was determined by both a review of the contemporary medical literature, circa 1918-1920, and our own review of several national, 40 state, and numerous local public health annual, monthly, or special reports produced during that period. This extensive literature review enabled our research team to identify several provisional influenza escape communities that had not been recognized until now, as well as to disqualify several supposed provisional influenza escape communities discussed in standard references on the pandemic. For example, the New York State Training School for Girls; Lake City, Colorado; and Darien, Connecticut, were identified in standard and respected texts on the influenza pandemic as provisional influenza escape communities, but upon further analysis could not be verified because of contradictory or insufficient historical evidence. Conversely, Fletcher, Vermont, and Bryn Mawr College were not identified in these standard sources, yet additional sources that we uncovered during our archival research suggested they might be provisional influenza escape communities and contained much intriguing information.

The historian's task generally involves the consultation and analysis of hundreds or even thousands of pertinent documents. In ideal situations this work is supported by a foundation of reading and analysis and interpretation of the extant secondary historical literature (e.g., the history of American public health, the history of medicine and epidemics in America and the world, and the history of the American political process especially with respect to acts, statutes, laws, and institutions designed to protect the public health). The lead researchers in this study have extensive knowledge and experience in the fields noted above, and they have published more than one hundred and fifty peer-reviewed articles and books on these topics.

We began our research for this report by reviewing the contemporary medical and historical literature of the 1918-1920 pandemic and the references cited in those papers to compile an exhaustive bibliography of the events. We then proceeded to a systematic review of the annual and monthly reports of virtually all public health agencies in the continental United States during that period. Further, we conducted a combination of searches using 1) electronic databases related to current medical and public health sources (e.g., MEDLINE, PUBMED, and Lexis/Nexis); 2) electronic databases related to historical, medical, and public health sources (e.g., Hist-Med-Sci-Tech, OCLC, WORLDCAT, Library of Congress, CATNYP, National Union Catalog of Manuscript Collections, and ProQuest), and 3) hard copy sources such as card catalogs in medical, state, and local libraries. Card catalog information is typically available only *in situ* and in the majority of instances is not digitized or freely available on the Internet. This is critical because some of the richest and most informative sources pertaining to NPI taken during the 1918-1920 pandemic reside in these repositories.

Shortly after our initial stage of data collection, we conducted archival site visits at more than 30 archives, museums, libraries, town halls, and public health departments. For those materials that we could not locate in the University of Michigan library system, we conducted an extensive inter-library loan search, acquiring books, articles, photographs, reports, maps, and pamphlets. We also made an extensive search and analysis of the newspapers and popular periodicals published during the era under study, using both microfilm and hard copy editions of newspapers. This vast collection of government reports, personal papers such as correspondence and diaries, newspapers and popular periodicals, medical and public health journals, and a host of other materials is detailed in Appendix I: References.

These primary source materials were then read and abstracted by each member of the CHM Influenza Research Team, discussed and analyzed to weigh their historical significance, cross-checked with other sources to determine their veracity, and synthesized into the narratives you are about to read. It is important to note that this interpretation of historical materials involved a great deal of negative research; in other words, we reviewed a large number of materials that were ultimately not included in the text of this report but that were essential to its compilation and our conclusions. A Table of the Negative Research conducted for this study, including both military and civilian sites, is included in Appendix I.

Beyond the acquisition of paper documents, our site visits were extremely important in helping us to better understand the topography, geography, and spatial organization of the communities. Of course, we made these observations from a distance of 80-plus years. Nevertheless, the site visits did allow us to better reconstruct what NPI were taken and how they were enacted. For example, the Western Pennsylvania Institution for the Blind still stands in its original location in a residential area of Pittsburgh, with the facilities intact and in use (digital photographs were taken of this location; see Appendix II: Images and Maps).

This report systematically discusses the principal measures implemented in the various and distinct provisional influenza escape communities. The 7 provisional influenza escape communities that constitute our case studies are:

1. San Francisco Naval Training Station, Yerba Buena Island, San Francisco Bay, California
2. Gunnison, Colorado
3. Princeton University, Princeton, New Jersey
4. Western Pennsylvania Institution for the Blind, Pittsburgh, Pennsylvania

5. Trudeau Tuberculosis Sanatorium, Lake Saranac, New York
6. Bryn Mawr College, Bryn Mawr, Pennsylvania
7. Fletcher, Vermont

These 7 communities stand out as remarkable exceptions to the devastating impact of the 1918-1920 influenza pandemic in the continental United States. Indeed, virtually every town, city, and state in the United States during this period applied the same menu of NPI. Although these provisional influenza escape communities might have been geographically or socially isolated, they did not exist in a vacuum. As medical historians attuned to the significance of historical context, we examine the larger environment in which each provisional influenza escape community was situated. For example, our discussion of the Yerba Buena Island Naval Training Station places its successful preventive public health measures within the context of the greater San Francisco Bay Area and, furthermore, compares it to the analogous, yet not nearly as effective, NPI implemented at Mare Island Naval Yard, located about 35 miles to the east in Vallejo, California.²

What we do not include in this study, but recommend for future studies, is the analysis of so-called less successful communities. Such communities should be historically evaluated to help us better understand what combination of NPI worked or did not work because of uncontrollable circumstances (see Section VIII: Suggested Future Research). Ultimately, further research in such communities might elucidate a helpful continuum of NPI for policy makers, including their implementation, efficacy, limitations, and salient external factors.

² We looked closely at several other communities or military sites that instituted many of the same NPI but did not achieve the same level of success. These include Fort Custer in Battle Creek, Michigan; Camp Crane in Allentown, Pennsylvania; Camp Kearney in San Diego, California; and certain naval ships in the 11th District of the Pacific Fleet, based in San Diego, California, under the command of Rear Admiral William F. Fullam. These sources are cited in the Bibliography section of the report. (See Appendix II.)

Our study considers a set of 5 major questions about the 1918-20 influenza pandemic and the 7 provisional influenza escape communities. We developed these questions based upon the framework of existing scholarship and public health challenges likely to arise in a potential future pandemic.

Central Study Questions:

1. How did these communities attempt to limit the spread of a highly virulent virus easily transmitted from person to person via droplet and/or aerosol in order to protect their human, social, and economic assets from the impending pandemic?
2. What methods of public health preparedness, prevention, and administration (i.e., NPI) were successful in these provisional influenza escape communities? How were they executed? What applications from these examples might be of use in contemporary planning?
3. What lessons might be learned from communities that implemented more restrictive NPI early in the proceeding pandemic, and how did public health and local officials recruit their populations to comply with what might be interpreted as draconian measures? Did these NPI work to contain the spread? What political, economic, and social costs came with these NPI?
4. How does one ratchet up measures of pandemic prevention and containment? How and when do you ratchet them down? What was the tolerable time period for a population to be ordered into protective sequestration, isolation, and/or quarantine? What social measures were taken to facilitate cooperation among the quarantined and isolated people? Were there rebound cases of influenza because of an early lifting of the preventive measures?
5. To what extent did mitigating, uncontrollable, or immutable forces contribute to a particular community's either escaping or succumbing to the influenza pandemic (e.g., geography, viral normalization patterns, population density, transportation access, politics, social structure, weather, and even luck or fortunate circumstances beyond human control)?

B. Caveats of Applying Historical Research to Present-Day Public Health Concerns

When asked to explain the power of historical research for contemporary policy making, we are decidedly enthusiastic but are obligated to begin with some caveats. To be sure, there are many themes and continuities that the study of pandemics in the past can offer to those of us concerned about their containment and prevention in the present and the future. Nevertheless, this approach can be carried only so far. It would be wonderful if every past event adhered to the oft-quoted axiom of George Santayana (“those who cannot remember the past are condemned to repeat it”), in point of fact, history does not serve as an exact roadmap of what is to come or even what necessarily happened in the past.³ Much of our knowledge of the past depends on the supporting archival materials that were actually saved; other archival materials may not be entirely reliable; and some lacunae are so great that we can only hypothesize or speculate about what may actually have occurred.

A good way to think about archival research in general is to imagine that your life was being recorded by a historian. Every day, the scholar would file a report and store that document in a bank of file cabinets that, by the end of your life, would presumably amount to many reams of paper. Then imagine that a fire destroyed most of that room, with only occasional file folders from discrete periods of your life surviving. With few exceptions, especially when it comes to the history of ordinary, everyday people, such spotty records are what the historian deals with in his or her inquiry.

Moreover, because the sites analyzed in our study are far from identical, varying in size, location, social organization, and a host of other factors, we need to be cautious in offering universal precautions that might be more widely applied under the potentially misapplied banner

³ Santayana G. The life of reason or the phases of human progress. (One volume edition revised by the author in collaboration with Daniel Cory). New York: Charles Scribner’s Sons; 1954. p. 82.

of “historical precedent.” It is also critical to note how epidemiological data, surveillance, microbiological knowledge (specifically the etiology of influenza), and vital statistics were recorded in 1918. Frequently, critical numerical population data were not recorded or were recorded in a less than consistent manner during this period of American history; such gaps constitute significant roadblocks in the present historical report.

The continental United States of 1918 contained many features of the modern era we currently enjoy, such as rapid transportation in the form of trains and, on a much more limited basis when compared to today, automobiles; rapid means of communication in the form of telegraph and telephone; large, heterogeneous populations with substantial urban concentrations (although many more Americans lived in rural environments in 1918 when compared to the present); a widely circulated distribution of news and information on the pandemic in the media, and the existence, in many cases, of public health agencies at various levels of government.

Yet there are many striking contrasts between this era and our own. For example, legal understandings of privacy and civil and constitutional rights as related to public health and governmentally directed measures (such as mass vaccination programs or medications) have changed markedly over the past eight decades. In addition, public support or trust of these measures, and of the medical profession in general, has changed significantly, especially with regard to vaccines and medications. Consider the recent spate of lawsuits tied to vaccine failures or perceptions that vaccines may have significant and dangerous side effects. The speed and mode of travel, principally the development of high-volume commercial aviation; immediate access to information via the Internet and personal computers, and a base-line understanding among the general educated population that the etiological agents of infectious diseases are microbial — not to mention advances in medical technology and therapeutics that have vastly

changed the landscape of how to approach a pandemic in the 21st century – are all formidable changes that need to be considered when applying historical research to contemporary policymaking.

Another important feature of American society circa 1918 that was markedly different from the present has to do with daily commerce and commercial transactions. In 1918 there were no supermarkets, refrigeration was primitive (e.g., ice boxes), and a limited variety of preserved foods were available for purchase. Consequently, daily marketing at multiple locations (e.g., grocers, produce vendors, bakeries, butchers) was often a facet of daily life. Moreover, there were no credit cards, and personal checking accounts were typically employed only by the affluent, so frequent visits to banks for cash were not uncommon. Indeed, for ordinary citizens in 1918 the United States was almost entirely a cash economy. Moreover, during an epidemic the closure of a bank might be explained as a public health measure, but for many Americans in 1918 who had lived through the Depression of 1893, as well as other boom and bust cycles, such an action might be misconstrued as a failure of the bank itself, and had the potential to create civil unrest. As a result, often the last public spaces (after theaters, schools, churches, restaurants, and saloons) to close would be banks and similar financial institutions. This historical difference between 1918 and today reveals a striking change over time. At present, a number of daily functions of life can be accomplished with little or no human interaction. For example, banking and credit transactions, the ordering and delivery of food via the Internet, as well as entertainment and personal or business communication, to name but a few, can all be realized by large numbers of people in a manner that might minimize the degree of human contact and thus the potential spread of contagious disease.⁴ Nevertheless, as recent

⁴ Germain RN. Dollars through the doors: a pre-1930 history of bank marketing in America. Westport, Conn.: Greenwood Press; 1996; Chandler AD. The visible hand: the managerial revolution in American business.

disasters have shown, the tenuous economic safety net that many Americans encounter today suggests that crises related to access to financial resources and even basic needs of living can have a deleterious affect on pandemic containment.

As Alfred Crosby has wisely noted in his classic book, America's Forgotten Pandemic: The Influenza of 1918, in human terms pandemic was not one over-arching story but, instead, “thousands of separate stories” with different origins and outcomes for the influenza victims, their families, and their communities.⁵ Our research strongly confirms that observation. Moreover, it is not surprising that none of our provisional influenza escape communities were large cities. As Crosby and many others have noted, “prospective flu victims were packed much more closely together in the cities than in the countryside: they transmitted the disease to one another much more rapidly.”⁶ Or to re-state the obvious: sparse populations and infrequent human contact are among the best defenses against influenza. Our historical analysis reinforces Crosby's findings and suggests that it is very difficult to completely characterize, let alone apply, the lessons gleaned from the provisional influenza escape communities to U.S. cities, where the vast majority of Americans now live.

Cambridge, Mass.: Belknap Press; 1980; Blackford MG. A history of small business in America. Chapel Hill: University of North Carolina Press; 2003; Rothbard MN. A history of money and banking in the United States: the colonial era to World War II. Auburn, Ala.: Ludwig von Mises Institute; 2002.

⁵ Crosby AW. America's forgotten pandemic: the influenza of 1918. Cambridge: Cambridge University Press; 1989. p. 66.

⁶ Crosby. America's forgotten pandemic. p. 66.

C. Historiography of Epidemics

The scholarship on epidemics and society that the lead researchers of this study have generated over the past decade and a half is based on the conceptual framework that epidemics have distinct social, cultural, economic, and political contours and patterns of progression that can be traced over time.⁷ To identify which mix of social and biological factors dominates in a particular instance, we seek to study societal power relations, aspects of everyday life, class, gender, ethnicity, and the global impact of health problems that neither respect nor are limited to national boundaries. This mode of historical analysis is termed the social construction of disease and is based on the theory that disease is as much shaped by social factors (such as national context, politics, economics, race and gender relations) as it is by biological or physical components. A central aim of this mode of research is to uncover how the interests of particular groups and competing social values are often culturally embedded in the resulting policies developed to address social or public health problems.

The historian Charles Rosenberg has identified four principal phases of an epidemic. He refers to the unfolding of an epidemic as a dramaturgic event, usually in four acts, that has a rather predictable narrative plot line.

⁷ Rosenberg C, Golden J, editors. Framing disease: studies in cultural history. New Brunswick, N.J.: Rutgers University Press; 1992; Aronowitz RA. Making sense of illness: science, society, and disease. Cambridge: Cambridge University Press; 1998; Brieger G. The historiography of medicine. In: Bynum WF, Porter R, editors. Companion encyclopedia of the history of medicine Vol 1. London: Routledge; 1993. p. 24-44; Bynum WF. Health disease and medical care. In: Rosenau GS, Porter R, editors. The ferment of knowledge: studies of the historiography of eighteenth-century science. Cambridge: Cambridge University Press; 1980. p. 211-53; Pelling M. Medicine since 1500. In: Corsi P, Weindling P, editors. Information sources in the history of science and medicine. London: Butterworth Scientific; 1983. p. 379-407; Brieger G. History of medicine. In: Durbin P, editor. A guide to the culture of science, technology, and medicine. New York: Free Press; 1984. p. 121-194; Rosen G. People, disease and emotion: some newer problems for research in medical history. Bull Hist Med. 1967;4:5-23; Porter R. The patient's view: doing medical history from below. Theory Soc. 1985;14:167-74; Porter R, Porter D. In sickness and in health: the British experience 1650-1850. London: Fourth Estate; 1988; Porter D, Porter R. Patient's progress: doctors and doctoring in eighteenth-century England. Cambridge: Polity Press; 1989.

- 1) The first act is one of “Progressive Revelation.”⁸ Specifically, in this period members of a community begin to acknowledge an increasing number of cases and/or deaths resulting from the spread of a particular contagious disease.
- 2) Act two, “Managing Randomness,” is “the creation of a framework within which [the epidemic’s] dismaying arbitrariness can be managed.”⁹ It includes social, political, medical, and economic responses to the epidemic, which are typically framed by how a particular society understands disease, science, and medicine, as well as its social and cultural values.
- 3) The third act is referred to as “Negotiating Public Response.” Once an epidemic is recognized, collective action of some kind soon follows. Yet as Rosenberg notes, “one of the defining characteristics of an epidemic is in fact the pressure it generates for decisive and visible community response.”¹⁰ How these events are understood and how counter-measures are negotiated by all of the stakeholders involved is intimately related to a host of cultural values and attitudes, such as how the poor and socially marginal are considered at a particular time, social hierarchies, the roles science and religion play in a particular society, and so on.
- 4) Act 4, “Subsidence and Retrospection,” is often the most vexing phase of an epidemic for public health management and epidemic preparedness planning. As Rosenberg notes, epidemics often end as ambiguously as they appear. This trend is perhaps most eloquently described in the closing passages of Albert Camus’s novel The Plague.¹¹

⁸ Rosenberg C. What is an epidemic? AIDS in historical perspective. In: Rosenberg C, editor. Explaining epidemics and other studies in the history of medicine. New York: Cambridge University Press; 1992. p. 278-292. Quote is p. 281.

⁹ *Ibid.* p. 285.

¹⁰ *Ibid.* p. 285.

¹¹ *Ibid.* p. 286. Camus A. The plague. Trans. S Gilbert. New York: Modern Library; 1948

Specifically, once an epidemic peters out and susceptible individuals die, recuperate, or escape, and life begins to return to its normal patterns, people begin to place the epidemic in the past. What is most troubling about this phase is that although it can lead to retrospection and action in terms of preparedness for subsequent epidemic events, all too often it leads to complacency or even outright amnesia about the event. This characteristic is of particular importance when planning for emerging pandemics. A critical question, therefore, is how does a community or government maintain credibility in its warning systems, maintain public support for costly preparedness planning, and keep the public on alert but not alarmed?

Howard Markel has articulated 7 *leitmotifs* that appear in most epidemics and pandemics. This construct is based on analysis of numerous pandemics including the Black (bubonic) Plague of the Middle Ages, the cholera pandemics of the 19th century (1832, 1845, 1866, 1892), and the influenza pandemics of 1880, 1918, 1957, and 1968, as well as contemporary pandemics including HIV/AIDS, tuberculosis, SARS, and other newly emerging infectious diseases. To be sure, not all of these themes appear in every epidemic or pandemic.¹² Instead, they should be viewed as essential ingredients to an epidemic, but from era to era and disease to disease, the precise mix of the themes can change. The 7 *leitmotifs* are:

- 1) Epidemics are almost always framed and shaped, sometimes advanced, and sometimes hindered by how a given society understands a particular microbe to travel and infect others. Consequently, people living in an era when microbes were not considered part of the etiology of a particular epidemic disease responded to that threat differently from those living in eras that do. For example, in the cholera epidemics of 1832, 1845, and

¹² Markel H. Quarantine! East European Jewish immigrants and the New York City epidemics of 1892. Baltimore: Johns Hopkins University Press; 1997; Markel H. When germs travel: six major epidemics that have invaded America since 1900 and the fears they have unleashed. New York: Pantheon Books; 2004.

1866 cholera was thought to spread through polluted air, or miasma (from the Greek for defilement or pollution). The term refers to the now outdated theory that toxic emanations come from the soil, earth, or rotting organic material, and cause specific epidemic diseases such as cholera, typhus, and malaria. When this theory was in vogue, public health efforts were often different from those taken today; they were typically centered on the sanitarian pursuits of cleaning up the environment (e.g., streets, sewers, and privies). This trend changed markedly in the late 19th century with the advent of the germ theory of disease. By the 1890s, when cholera was understood to be a water-borne disease, caused by the microbe *Vibrio cholerae* that attacked the gastrointestinal system, public health efforts were more often tied to methods of purifying the food and water chain.¹³

- 2) The economic devastation typically associated with epidemics frequently shapes the public's response to a contagious crisis. The order of quarantine, when one closes a port or a city to foreign travelers or goods, costs communities a great deal of money and creates great hardships for individuals. It is not surprising that during the international sanitary conferences in the mid-19th century, merchants were vocal participants who often opposed the implementation of preventive and containment efforts that might have impeded commercial enterprises and the flow of capital. This concern is particularly salient in today's globalized marketplace.¹⁴
- 3) The movements of people and goods and the speed of travel are essential factors in the spread of pandemic disease. For example, during the cholera pandemics of the 19th century, the main mode of transoceanic travel was steamship. Journeys from Europe or

¹³ Duffy J. The Sanitarians: a history of American public health. Urbana: University of Illinois Press; 1992.

¹⁴ Stern AM, Markel H. International efforts to control infectious diseases, 1851 to the present. JAMA 2004;292:1474-1479.

Asia to North America required a travel time of 7 to 21 days, giving most infectious diseases ample incubation periods, thus facilitating their recognition by health officers at the point of disembarkation. Contrast this scenario to today's main mode of international travel, commercial jet planes: anyone can travel to anywhere in the world in a matter of several hours to just under a day.

- 4) Our fascination with the suddenly appearing microbe that kills relatively few in spectacular fashion too often trumps our approach to infectious scourges that patiently kill millions every year. Compare, for example, social response to SARS in 2003, which affected approximately 8,000 people and killed 800, and tuberculosis, which infected 8,000,000 and killed 3,000,000 that year. Similar comparisons could be made for anthrax in 2001 to the ongoing global pandemic of HIV/AIDS, which kills 2,000,000 people a year. The lack of widespread attention to the common scourges of lower respiratory tract infections and diarrheal diseases which kill millions on an annual basis is an even more egregious example of what can only be called a contagious cognitive dissonance.¹⁵
- 5) Widespread media coverage of epidemics is hardly new and is an essential part of any epidemic. It has the power to both inform and misinform. Therefore, the ways popular communication is framed are of utmost importance. One new wrinkle in the media's coverage of pandemic events today is the technology, speed, and variety with which reports are generated. Compare New York City circa 1918, when consumers relied heavily on an extensive print media, to our current era with its panoply of newspapers, magazines, radio, cable, Internet Web sites, Web logs, and discussion groups. The

¹⁵ Markel H, Doyle S. The epidemic scorecard. The New York Times. 2003 Apr 30; A31; Achenbach J. Can we stop the next killer flu? Washington Post. 2005 Dec 7; W10.

problem is not new, but the breadth of media genres is logarithmically greater and has a far greater potential to provide both useful information and misinformation.

- 6) A dangerous theme of epidemics past is the concealment of the problem from the world at large. Too often, these efforts have been generated by a nation or a state in order to protect economic assets and trade (e.g., the German government's initial response to the 1892 cholera pandemic). At other times, they have been motivated by nationalistic bias, as with HIV in South Africa in the 1990s. Ironically, one of the potential public health benefits of a global marketplace is a greater transparency of the dissemination of information on brewing or developing epidemics. For example, in the post-SARS era, China (which initially concealed its SARS cases) appears to have subsequently been much more open in its influenza surveillance; in contrast, Indonesia has not. Regardless of the reasons for concealment of a public health crisis, secrecy almost always contributes to the further spread of an epidemic and hinders public health management.
- 7) Perhaps the saddest theme of epidemics throughout history has been the tendency to blame or scapegoat particular groups. Frequently these groups have already been deemed "socially undesirable" by the population at large. The result has usually been the development of harsh policies aimed at the scapegoats rather than those specifically exposed to a particular infectious microbe. These lead to a wide menu of oppositional responses by those targeted, which in turn can hinder the prevention or containment of an epidemic. There are many examples of scapegoating; two of the most frequently discussed in the historical literature are 1) the demonization of the Chinese in the 1900 bubonic plague outbreak in San Francisco, and 2) the stigmatization of gay men during

the early years of the AIDS epidemic in the 1980s.¹⁶ To make this point more relevant to policy today, we have included the table below, which highlights many problems associated with scapegoating, social unrest, and what are perceived to be unfair public health practices.¹⁷

¹⁶ Kraut AM. Silent travelers: germs, genes, and the “immigrant menace”. New York: Basic Books; 1994; Grmek MD. History of AIDS: emergence and origin of a modern pandemic. Trans RC Maulitz, J Duffin. Princeton, N.J.: Princeton University Press; 1990.

¹⁷ Mullet CF. A century of English quarantine, 1709-1825. Bull Hist Med. 1949;23:527-45; McDonald JC. The history of quarantine in Britain during the 19th century. Bull Hist Med. 1951;25:22-44; Hardy A. Cholera, quarantine and the English preventive system, 1850-1895. Med Hist. 1993;37:250-60; Rosen G. A history of public health. New York: MD Publications; 1958; Humphreys M. Yellow fever and the South. New Brunswick, N.J.: Rutgers University Press; 1992; Ellis JH. Yellow fever and public health in the New South. Lexington: University Press of Kentucky; 1992; Duffy J. The Sanitarians; Schepin OP, Yermakov WV, editors. International quarantine. Madison, Conn.: International Universities Press; 1991. p. 125-58; Risse, G. Epidemics and history: ecological perspectives and social responses. In: Fee E, Fox D. AIDS: The burdens of history. Berkeley: University of California Press; 1988. p. 33-66; Powell JH. Bring out your dead: the great plague of yellow fever in Philadelphia in 1793. Philadelphia: University of Pennsylvania Press; 1949; Winslow C-EA. The conquest of epidemic disease: A chapter in the history of ideas. New York: Hafner; 1967. For more literary versions of the drama of epidemic disease and quarantine, Boccaccio G. The Decameron, trans. John Payne. New York: Modern Library; 1931; Defoe D. A journal of the plague year. New York: Modern Library; 1948; Camus A. The Plague; Ibsen H. An enemy of the people, trans. James McFarlane. Oxford: Oxford University Press; 1988; Lewis S. Arrowsmith. New York: Harcourt Brace; 1925; Dworet L, Pool RR. Outbreak. Warner Brothers Pictures; 1995. For recent journalistic accounts of contemporary epidemic diseases, Garrett L. The coming plague: newly emerging diseases in a world out of balance. New York: Farrar, Straus, and Giroux; 1994; Preston R. The hot zone. New York: Random House; 1994; Shilts R. And the band played on: politics, people and the AIDS epidemic. New York: St. Martin's; 1987; Shah N. Contagious divides: epidemics and race in San Francisco's Chinatown. Berkeley: University of California Press; 2001; Craddock S. City of plagues: disease, poverty, and deviance in San Francisco. Minneapolis: University of Minnesota Press; 2000.

Social scapegoating	If one social group has a high percentage of quarantined individuals compared to others, there is a risk that the rest of society will designate the quarantined social group as scapegoats, with a wide range of negative effects for both the scapegoated group and society at large.
Misdiagnosis of healthy	Diagnosing healthy people as infected and treating them as such may erode the public health authority's legitimacy.
Mixing ill people with healthy	If healthy people are quarantined with ill persons, the number of cases to be observed may increase.
Business closure	If businesses are closed for extended periods of time, not only will people have difficulty acquiring supplies, the businesses may eventually be forced to fold, seriously hampering post-pandemic recovery efforts. Moreover, individual workers, especially those without large monetary reserves, will likely experience economic hardship. Such a scenario has the potential to create social unrest and non-cooperation in public health efforts.
Infringement of liberties	Quarantine and other NPI can infringe on people's basic freedoms and civil liberties, leading to ostracism, anger, fear, and panic.
Counterproductive Behavior	Pandemics are highly stressful, and they are likely to introduce counterproductive behaviors in a society that may lead to the further spread of disease. The term "panic" can be used to describe behavior that may turn out not to be helpful, yet which many believe is based on rational decisions informed by the knowledge available at the time.
Potential Riots	If the pandemic or the management of pandemic inflames a particular group enough, violence may occur and can even result in riots and/or casualties and injuries.
Legal Entanglements	Unfair public health ordinances can be contested in the courts, typically during the height of a pandemic, often distracting from other public health matters.

Knowledge of past pandemics has informed our study of the 1918 influenza pandemic. In particular, Rosenberg's four phases are relevant for understanding the second wave of the pandemic (September to December 1918). His rise and fall model does not work as well for a multi-phasic pandemic as seen with influenza, however, given that the third and fourth waves appeared from 1919 to 1920. Similarly, Markel's theme of scapegoating does not apply to 1918, because the pandemic spread so rapidly among all sectors of American society (especially among those 20-45 years of age). To date, there has not been a systematic study of the extent to

which specific social groups were affected by the 1918-1920 influenza pandemic. Nevertheless, all of the remaining *leitmotifs* articulated by Markel were present in the 1918 influenza pandemic. For example, during the 1918 pandemic it was very common for local business owners to oppose NPI that seriously affected their economic health. Similarly, the mass media (primarily in the form of newspapers) played an enormous role in delivering accurate and sometimes erroneous information to the population at large.

In order to produce this report, we have carefully operationalized the methods of the social historian of medicine and public health and heeded the guiding principles articulated above. We have done so with the specific aim of elucidating the history and potential lessons that can be extracted from an analysis of the NPI taken by the 7 provisional influenza escape communities profiled in this study. We aim to illuminate, through fine-grained analysis, the dynamics of these 7 provisional influenza escape communities, while not losing sight of the larger social, national, and international context.

SECTION III - Definition of Terms

These definitions were formulated by the CHM research team in consultation with Dr. Cleto DiGiovanni, of the U.S. Department of Defense, and Dr. Arnold S. Monto, of the University of Michigan School of Public Health. The definition of Nonpharmaceutical Interventions (NPI) is derived from the World Health Organization Writing Group of the WHO Global Influenza Programme.¹⁸ The final three definitions that we employ in this report are taken from, *HHS Pandemic Influenza Plan* of November, 2005. The definitions are taken from Part II, Supplement 8, page 14, Box 1. Containment Measures: Terms and Definitions.¹⁹

Nonpharmaceutical Interventions (NPI)	NPI include measures that focus on: 1) limiting international spread of the virus (e.g. travel screening and restrictions); 2) reducing spread within national and local populations (e.g., isolation and treatment of ill persons; monitoring and possible quarantine of exposed persons; protective sequestration of healthy communities; and social distancing measures, such as cancellation of mass gatherings and closures of schools); 3) reducing an individual person's risk for infection (e.g., hand hygiene, face masks, self-monitoring, voluntary quarantine, etc.); and 4) communicating risk and educating the public.
Provisional influenza escape community	A community or institution where there were relatively few reported cases of influenza (compared to surrounding areas or analogous communities, towns, cities) and zero to one deaths resulting from influenza or pneumonia-related illnesses while NPI were enforced during the second wave of the 1918-1920 influenza pandemic, September-December 1918. We use the word <i>provisional</i> decidedly, because on the basis of the historical evidence available to us we cannot definitively determine if these communities sustained their low morbidity and mortality rates because of policy decisions made and NPI enacted by their community leaders and public health officials, because the virus skipped some communities altogether and varied in its behavior in other communities (viral normalization patterns), or because of other factors such as population density, geography, and good fortune. Given the extant historical data, which in many cases

¹⁸ World Health Organization Writing Group. Nonpharmaceutical Interventions for Pandemic Influenza, International Measures. *Emerg Infect Dis.* 2006;12(1):81-87; World Health Organization Writing Group. Nonpharmaceutical interventions for Pandemic Influenza, National and Community Measures. *Emerg Infect Dis.* 2006;12(1):88-94.

¹⁹ United States Department of Health and Human Services. *HHS pandemic influenza plan*. November 2005. Definitions from pages S8-14.

Provisional Influenza Escape Community (cont'd)	are rather sparse, we are unable to rank the importance of these factors in each of the communities we examined. The diagnosis of influenza at this time was largely empirical, without definite culture methodologies or supportive laboratory findings. Mortality statistics of this era were typically derived from reported data of those who died during this period from respiratory symptoms associated with influenza or pneumonia. This suggests that under or over reporting of influenza cases was likely during the 1918-1920 pandemic. Although greater diagnostic precision in 1918 would have enhanced the use of this historical information in our current pandemic planning, diagnoses made then were based neither on laboratory evidence nor on a standard case reporting definition.
Protective Sequestration	Measures taken by local authorities to protect a defined and still healthy population from infection. This term applies to both institutions (e.g., prisons, schools) and communities (e.g., towns, military bases). Measures taken usually include prohibitions on members of the institution or community from leaving the site and prohibitions on outside visitors from entering the site or circumscribed perimeter; when visitors do seek admission, they may be placed in quarantine for a period of time prior to their admission into the community or institution. In the case of communities, protective sequestration measures may take advantage of geographical barriers (e.g., an island community surrounded by water). (<i>N.B., Protective Sequestration is explicitly different from quarantine.</i>)
Quarantine	Separation and restriction placed on the movement of persons who, although not showing signs or symptoms of illness, may have acquired, or are believed to have acquired, an infectious agent through contact with known carriers of the agent. The duration of separation and restriction depends on the incubation period of the agent. Quarantine is typically mandatory.
Isolation	Separation and/or restricted movement of persons who manifest signs and/or symptoms of a contagious disease from the larger population. Isolation may occur anywhere, but it generally occurs at home or in a health care treatment facility. Isolation may also entail a set of procedures that health care providers must follow in their contact with that patient; these procedures vary and depend on the route of transmission of the infective agent, (e.g., respiratory precautions, gowns, face masks, gloves, etc.)
Social Distancing	NPI implemented to discourage or prohibit close social contact between individuals in schools, sports facilities, churches, and other places of public gathering. These measures may be advertised to the public as voluntary, or they may involve the actual closing of places of public gathering or prohibitions of public events and gatherings.

Community-wide Quarantine, including <i>cordon sanitaire</i>	The closing of community borders or the erection of a real or virtual barrier around an area that has experienced contact or suspected contact with infected persons, with prohibition of travel into or out of the area.
Snow Days	Days on which offices, schools, transportation systems are closed or cancelled, as if there were a major snowstorm, in an effort to minimize or eliminate a wide array of public assemblies.

SECTION IV - The 1918-1920 Influenza Pandemic in the Continental United States

A. Historical Overview

The influenza pandemic of 1918-1920 resulted from the confluence of myriad factors. It was in many ways a “perfect storm” of viral contagion brought about by the convergence of a mutated strain of influenza, the social and geographic disruption of the mass mobilization and movement of millions of troops because of World War I. Although this confluence of factors was specific to the fall of 1918, the kind of mass movement of people associated with the spread of that pandemic is certainly not exclusive to that era and has continued to this day, through human migration, social disruption, and extensive travel and tourism. Because of its harrowing impact on the United States and the world, the 1918 pandemic is a common reference point for contemporary discussions about a potential pandemic and how to respond to such a threat.

Carol Byerly observes in The Fever of War, “war *created* the influenza epidemic by producing an ecological environment in the trenches in which the flu virus could thrive and mutate to unprecedented virulence.” In turn, the epidemic “*impacted* the war by striking down millions of soldiers.”²⁰ The processes associated with military preparedness and conducting trench warfare that enveloped much of the globe in 1918 helped to turn the influenza outbreak into a pandemic that, according to several estimates, killed approximately 50 million people worldwide and 675,000 in the United States.

There were four waves of the pandemic between 1918 and 1920. In the United States, the first wave appeared concurrently in Kansas, California, Michigan, New York, and other locations from February until May 1918, sending many able-bodied workers and soldiers to their beds or to the infirmary. This wave did not produce sufficient mortality or morbidity to prompt

²⁰ Byerly CR. Fever of war: the influenza epidemic in the U.S. Army during World War I. New York: New York University Press; 2005. p. 8.

health officials to take action beyond the *status quo* employed for annual bouts of influenza and other acute upper respiratory infections.²¹

For reasons that are still not completely understood by scientists, from June to August the initial strain likely underwent a mutation and/or reassortment that increased its virulence, making it especially destructive not only to the upper respiratory tract but also to the linings and tissues of the lungs. Contrary to the long-sustained hypothesis that this mutated strain of H1N1 jumped from birds to swine to humans or combined with another human influenza strain, Taubenberger et al. have recently demonstrated that it jumped directly from birds to humans: “it is the most bird-like of all mammalian flu viruses.”²² This biological event was propelled and accompanied by the mass movement of millions of American troops around the country and the globe and their close quarters confinement in barracks and camps for weeks or months – not to mention the millions more European soldiers engaged in the war. As Alfred Crosby writes in America’s Forgotten Pandemic,

So at the end of the last summer of World War I some 1.5 million American adults who were most perfectly qualified to cultivate the most dangerously virulent strain of influenza virus in history and its jackal bacteria were living cheek-by-jowl in a small number of military camps all over the nation, and large numbers of them were constantly traveling back and forth between these camps. All that was needed was the proper germ.²³

The second and deadliest wave began in the middle of August 1918, erupting simultaneously in Freetown, Sierra Leone, and Brest, France, and reaching Commonwealth Pier in Boston on August 27, when two soldiers reported sick. Within several days, dozens more men

²¹ Olson DR, Simonsen L, Edelson PJ, Morse SS. Epidemiological evidence of an early wave of the 1918 influenza pandemic in New York City. Proc Natl Acad Sci USA. 2005;102(31):11059-63.

²² Von Bubnoff A. The 1918 flu virus resurrected. Nature 2005;437:794-5; Tumpey TM, Basler CF, Aguilar PV, Zeng H, Solorzano A, Swayne DE, Cox NJ, Katz JM, Taubenberger JK, Palese P, Garcia-Sastre, A. Characterization of the reconstructed 1918 Spanish influenza pandemic virus. Science. 2005;310:77-80; Taubenberger JK, Reid AH, Lourens RM, Wang R, Jin G, Fanning TG. Characterization of the 1918 influenza virus polymerase genes. Nature 2005;437:899-93; Belshe RB. The origins of pandemic influenza – lessons from the 1918 virus. N Engl J Med. 2005;353:2209-11.

²³ Crosby. America’s forgotten pandemic, p. 32.

were falling sick in and around Boston. Camp Devens, 35 miles northwest of Boston, was one of the primary epicenters of the second wave, and its cases revealed the virulence of the mutated strain. Opened in August with 15,000 men, Camp Devens experienced its initial cases in early September, and by September 22, 19.6% of the camp was sick. These young men soon began to die at striking rates. The second wave hit young healthy Americans in the between the ages of 20 to 39 with particular vengeance, to the extent that the overall U.S. life expectancy rate dropped 12 years for men and women between the 1910 and 1920 censuses.

By late September 1918, influenza had spread across the United States, often through military mobilization routes, appearing in Illinois, California, and Texas. Typically, the epidemic began with the town or city newspaper reporting a few cases at the nearest army or naval base; several days or a week later civilian cases began to appear, and the epidemic would begin to spike, peaking two to three weeks later. Traveling in human vectors, its spread tended to follow the transportation arteries of the day – railroads – moving from the northeast to the west and south. Influenza, however, did not spread in a simple linear fashion from east to west but zigzagged across the country in staggered waves that hit communities in a geographically and temporally uneven fashion. For example, influenza struck Camp Dix, New Jersey, on September 18; Camp Funston, Kansas, on September 20; Camp Kearney, California, on September 27; and Camp Dodge, Iowa, on September 29; but it did not arrive at Camp Wheeler in Georgia until October 11.²⁴ (For maps showing the time frame of influenza in the continental United States, see Appendix II: Images and Maps).

How a given community responded to the influenza pandemic was determined by many geographical, biological, economic, social, cultural, and medical factors. In 1918 an irregular

²⁴ Byerly. Fever of war, p. 75.

and in many locations underdeveloped, public health landscape in the United States was becoming increasingly centralized and nationalized. In some locations, such as New York, both state and city agencies were sophisticated and well-developed; in others, such as New Mexico, a state public health department did not exist and in fact would be established in 1919 to rectify the lack of services and coordination revealed during the pandemic.²⁵

The United States of America is a nation guided by the Constitution, a remarkably prescient document that was nevertheless conceived almost a century before the articulation of the germ theory. Written in an era when contagious diseases were believed to be spread by miasma or local pollution, the founders deemed public health to be a state (or they hoped, local) function and prerogative. In the following decades, the federal government's forays into the field were often tentative if at all existent. Indeed, the United States Public Health Service (USPHS) was not officially so designated by Congress until 1912. This federal entity was actually an outgrowth of the U.S. Marine Hospital Service, the nation's oldest federal health agency, founded in 1798 to provide medical care for seamen. During the 20th century, however, along with the Department of Health and Human Services, U.S. Food and Drug Administration, the National Institutes of Health, the Centers for Disease Control and Prevention, and a host of other federal agencies and departments, federal public health officers have played a heroic role in protecting and monitoring the nation's health. Although by law these federal agencies do not hold absolute control over the nation's public health, they have long worked to standardize and connect the country's varied and far-flung public health infrastructure and personnel.²⁶

²⁵ Luckingham B. Epidemic in the southwest, 1918-1919. El Paso: Texas Western Press; 1984. Southwestern Studies, Monograph No. 72.

²⁶ Marcus AI. Disease prevention in America: from a local to a national outlook, 1880-1910. Bull Hist Med 1979;53(2):184-203.

The USPHS issued its first circular about the pandemic on August 16, followed by a request on September 18 that its officers report cases of influenza via telegram. Later that month it issued a circular, “Surgeon General’s Advice to Avoid Influenza.”²⁷ Many city, county, and state health departments incorporated the contents from this circular into the posters, broadsheets, and educational pamphlets they distributed to their communities. Americans in the military followed the orders regarding influenza dictated by the superiors in their particular units, whether in the Army, Navy, Student Army Training Corps, or Student Navy Training Corps. Civilians in the general population were influenced broadly by the federal and military responses to influenza and much more directly by the strategies implemented by city, county, and state health entities. Close examination of responses to the pandemic on the local level demonstrates again and again that tensions over authority and jurisdiction were common during this transitional period in American public health. For example, in California’s capital, Sacramento, a city-mandated face mask ordinance rankled state leaders, including senators who were arrested in the capitol rotunda for appearing in legislative sessions without donning their masks.

The second wave took the heaviest toll, peaking in the last week in October, when nearly 21,000 Americans died from influenza or pneumonia in the country’s 45 biggest cities.²⁸ The pandemic subsided in most parts of the country starting in mid-November, and although deaths never again reached the heights of fall 1918, influenza spiked again in many regions in late December and early January. In the week ending January 25, 1919, for example, 4,199 Americans died of influenza in the country’s 45 biggest cities. Even though the stories of horror and death of the second wave have overshadowed our memory of the third wave, this subsequent

²⁷ United States Public Health Service. Annual report of the Surgeon General of the Public Health Service of the United States for July 1, 1918, to June 30, 1919. Washington, D.C.: Government Printing Office; 1919.

²⁸ Great Britain, Ministry of Health. Reports on public health and medical subjects number 4, report on the pandemic of influenza, 1918-19. London: His Majesty’s Stationery Office; 1920. p. 319-320. Crosby calculated the overall figure of 675,000 in America, in Part VI of America’s forgotten pandemic.

phase of the 1918-1920 influenza pandemic holds important clues for understanding the challenges faced by health authorities as they sought to sustain and/or re-implement NPI when their communities were suffering from what might be termed pandemic fatigue. For instance, many citizens who willingly cooperated with public health orders in October were much less enthusiastic about repeating the same efforts in January and publicly doubted their efficacy.

The third wave spanned early January to April 1919; its unfolding illustrates the multi-phasic nature of the 1918-1920 pandemic. In fact, some communities were hit harder by the third or even the fourth wave, which spanned December 1919 to approximately March 1920. Notably, our study suggests that communities that enacted effective and early protective sequestration may have delayed the entry of the disease for a significant period of time. Moreover, epidemiological data suggest that when influenza did strike Yerba Buena Island, California and Gunnison, Colorado, in a subsequent wave the observed morbidity and mortality rates were lower.²⁹

Although well-trained medical professionals, well-intentioned community leaders, compliant soldiers, and ordinary citizens developed a wide variety of NPI against influenza, they were often both insufficient in their practical enforcement and lacking in scientific understanding of virology and influenza etiology. Ideally, sophisticated global epidemiological surveillance and communication systems, knowledge about the genetic structure of influenza viruses, and the development of antivirals and vaccines will enable us to handle a potential pandemic with much greater foresight and preparedness today.

²⁹ Additional data from Australia's protective sequestration and quarantine measures suggest a similar experience there. Crosby A. The forgotten pandemic. P. 64, 234; Cumpston JHL. Influenza and maritime quarantine in Australia. Report no. 18. Melbourne: Commonwealth of Australia, Quarantine Service; 1919; McQueen H. "Spanish 'flu' – 1919: political, medical and social aspects. Med J Aust. 1975;1:565–70; New South Wales Department of Public Health. Report on the influenza epidemic in New South Wales in 1919. Report on the influenza epidemic in New South Wales, for the year 1919, including a report on the influenza epidemic, 1919, Section V. Sydney: William Applegate Gullick; 1920. p. 139–272.

B. State of Virology

The influenza pandemic occurred during an era in which bacteriology was the dominant scientific framework for identifying and treating diseases. With the discoveries of Louis Pasteur and Robert Koch in the 1870s and 1880s, which demonstrated that the etiologic agents of diseases such as anthrax, tuberculosis, cholera, and typhoid were bacilli, visible under a light microscope, the bacteriological method and mindset became a cornerstone of public health in the United States.³⁰ Nevertheless, scientists had not yet identified viruses or clarified the distinction between viruses and bacteria. Unlike the long list of bacteria identified by scientists around the globe in the early 20th century, viral structure and analysis would have to await electron microscopes to be visible to the human eye. In addition, as Walter Reed demonstrated with yellow fever in 1900 and Thomas Rivers of New York's Rockefeller Hospital with influenza and polio viruses in the 1920s, viruses were so small that they could not be retained by the filters of the day.³¹ Viruses are difficult to culture, especially when compared to many of the pathogenic bacteria that were being studied during the period; it was not until 1949 that John Enders, Thomas Weller, and Frederick Robbins, working on poliomyelitis, developed the pioneering technique of culturing cells on glass surfaces, which then allowed for greater understanding of

³⁰ Markel H. When germs travel.

³¹ Benison S. Tom Rivers: reflections on a life in medicine and science; an oral history memoir. Cambridge, Mass.: MIT Press; 1967; Rivers TM, Stanley WM, Sawyer WA. Problems and trends in virus research. Philadelphia: University of Pennsylvania Press; 1941; Opie EL, Blake FG, Small JC, Rivers TM. Epidemic respiratory disease: the pneumonias and other infections of the respiratory tract accompanying influenza and measles. St. Louis: C.V. Mosby Company; 1921; Rivers TM, editor. Filterable viruses. London: Baillere, Tindall & Cox; 1928; Reed W, Carroll J, Agramonte A, Lazear J. The etiology of yellow fever – A preliminary note. Proceedings of the twenty-eighth annual meeting of the American public health association in Indianapolis; 1900 Oct 22-26; Reed W, Carroll J, Agramonte A. The etiology of yellow fever: an additional note. Proceedings of the Pan-American Medical Congress in Havana, February 4-7, 1901; Reed W, Carroll J, Agramonte A. Experimental yellow fever. American Medicine. 1901 Jul 6:15-23; Reed W, Carroll J. The etiology of yellow fever: A supplemental note. American Medicine. 1902 Feb 22:301-5.

the cytopathogenic effects of viruses, the identification of antibodies in the blood, and the development of effective polio vaccines.³²

Today, we recognize hundreds of strains of both DNA and RNA viruses that affect plants, bacteria, and humans. The influenza virus (types A, B, C) is a RNA virus of the family Orthomyxoviridae arranged in a helical nucleocapsid that includes 8 segments and whose lipoprotein envelope contains 2 glycoproteins, hemagglutinin (H) and neuraminidase (N). Only subtype A is thought capable of causing pandemics. The arrangement and structure of H and N determine the molecular and cytopathogenic features of the influenza virus and can indicate its actual or potential level of virulence in animals. Experts now believe that the 1918 pandemic was caused by a Type A influenza virus, H1N1 denoting its molecular structure.

³² Enders JF, Weller TH, Robbins FC. Cultivation of the Lansing strain of poliomyelitis virus in cultures of various human embryonic tissue. Science 1949;109:85.

C. Influenza Mythologies

The 1918 influenza pandemic may well be the best studied pandemic in history. Scientists and medical historians can benefit greatly from the many books and articles that focus on it. These publications, however, have also helped to promote several “influenza mythologies” that can obfuscate our overall understanding of the pandemic and, more important for this study, the particular character of provisional influenza escape communities.

One of the most valuable historical sources is Edwin O. Jordan’s Epidemic Influenza, published in 1927.³³ This book is essentially an epidemiological survey and literature review replete with quantitative and qualitative data. Written almost one decade after the pandemic, this text possesses an immediacy of perspective that lends it a great deal of historical relevance. Yet Jordan made his conclusions about the efficacy of NPI unaware that a specific virus is the causative agent of influenza.

Despite its limitations, Epidemic Influenza holds up under scrutiny. In fact, Jordan’s list and discussion of NPI provided a useful foundation for this study. In Jordan’s order of importance and using his terminology, these NPI were:

1. Isolation and Quarantine
2. Closures of Schools and Prohibition of Public Gatherings
3. Face Masks
4. Preventive influence of certain gases (germicidal chemicals)
5. Prophylactic inoculation or vaccination
6. General measures of Hygiene and Sanitation (including crowd control, ventilation, hand-washing, sterile drinking receptacles, and good nutrition).

³³ Jordan EO. Epidemic influenza: a survey. Chicago: American Medical Association; 1927.

All of these NPI, except Item #4, are addressed in this report, although they have been regrouped and redefined in accordance with the development of current public health interventions, priorities, and terminology. Since 1918, methods involving the application of germicidal chemicals, such as fumigation with sulfur or other chemical agents or gases, have largely been abandoned in the United States because of their inefficacy and/or their toxicity to organisms and the environment.

Jordan's treatise was also instrumental in helping to determine our list of provisional influenza escape communities, notably Yerba Buena Island, California; Gunnison, Colorado; the Western Pennsylvania Institution for the Blind; and the Trudeau Tuberculosis Sanatorium. Yet we discovered through our research that several of the communities that Jordan defined as provisional influenza escape communities, upon further investigation do not qualify, either because more than 1 death occurred while NPI were enforced during the second wave of the pandemic or insufficient data exist to incontrovertibly prove their status. The most significant of these are Lake City and Hindsdale County, Colorado (for which practically no information could be found), and Camp Custer, Michigan (which reported, from September 16 to November 15, 1918, alone, 7,686 total cases of influenza, 2,365 of pneumonia, and 672 deaths from pneumonia).³⁴ Furthermore, our fine-grained historical research revealed three additional provisional influenza escape communities: Princeton University, Bryn Mawr College, and Fletcher, Vermont, which Jordan does not discuss in any depth.

After Jordan's survey, three decades elapsed before the publication of a historical study of the 1918 pandemic, A. A. Hoehling's The Great Epidemic: When the Spanish Influenza

³⁴ Base Hospital, Camp Custer, Michigan. Admissions at Camp for influenza and pneumonia, Sept. 16th to Nov. 15, 1918. [undated; no cover letter]; Folder 710 "Influenza, Camp Custer, Mich."; Entry 31-C; D (Cantonments); Surgeon General's Office, 1917-1927 (SGO 1917-1927); Records of the Office of the Army Surgeon General Record Group 112 (RG 112); National Archives College Park, Maryland (NACP).

Struck.³⁵ With this book, the influenza pandemic in the United States acquired a book-length historical narrative, told with the melodramatic journalistic flair that continues to underpin (and potentially undermine) the catastrophic story of this disease to the present. Yet as the pandemic became an epic, influenza mythologies began to emerge, like a game of Telephone, where pieces of information become distorted as they move along the lines of communication from source to source. As just one of many examples, Hoehling claimed that on Yerba Buena Island, a total quarantine was imposed and “guards were placed at the docks with orders to shoot to kill anyone embarking or disembarking without authorization,” and that all ferries, tugs, and supplies were kept at bay at gunpoint. After careful analysis of the historical record, it is impossible to confirm Hoehling’s claims of armed sentries; indeed, we have concluded that this was an animated exaggeration of the facts.³⁶

In the retelling of the pandemic, influenza mythologies mutated or re-assorted slightly, usually from one book to next, so that in the next major work on the topic, America’s Forgotten Pandemic (which most historians of medicine and public health still consider the best book on the topic), Crosby echoes misconceptions about Yerba Buena Island. He reports that San Francisco’s health officer, Dr. William Hassler, persuaded the island’s naval commander to enact a quarantine, despite the fact there is no direct or circumstantial evidence to support this specific claim. In addition, Crosby manufactures a mythology of his own, namely that the towns of Darien and Milford, Connecticut, escaped the influenza pandemic with no deaths, an assertion we easily refuted by reviewing that state’s annual board of health reports for 1918 and 1919 as well as the local newspapers.³⁷

³⁵ Hoehling AA. The great epidemic: when the Spanish influenza struck. Boston: Little, Brown; 1961.

³⁶ Hoehling. The great epidemic. p. 35 and 186.

³⁷ Black JT. State of Connecticut thirty-sixth report (42d and 43d years) of the state department of health for two years ending January 30, 1920. 1920. p. 272-311.

The myth that Yerba Buena Island's quarantine was ordered by Dr. Hassler is repeated in John Barry's recent popular history, The Great Influenza.³⁸ Given his interest in telling a gripping story of disease, death, and its consequences in America, Barry provides very little information about provisional influenza escape communities that experienced the pandemic with no deaths and markedly less fanfare. Furthermore, two recent studies challenge a pair of long-standing assumptions, repeated by Barry and reiterated more generally in the scholarship on the 1918-1920 influenza pandemic, that strong circumstantial evidence exists to support the theory that the first wave of H1N1 emerged in or near Camp Funston, Kansas, and that pigs served as the intermediary "mixing bowl" for H1N1 to skip from birds to humans and attain extreme virulence.³⁹ First, an analysis of epidemiological data from New York City in 1918 by Olson et al. shows that morbidity and mortality rates for pneumonia and related respiratory conditions are statistically significant enough to suggest that the first wave struck that city as early as February 1918, before the much-noted and historically heralded Kansas outbreak.⁴⁰ Second, over the past decade, the attempts to tell the biological story of influenza through gene sequencing have resulted in a recent demonstration by Taubenberger et al. (mentioned above) that H1N1, unlike the influenza viruses that caused epidemics in 1957 and 1968, did not rely on pigs as an intermediary. This is a powerful revelation that represents the culmination of a quest undertaken by a handful of dedicated scientists hoping to reconstruct the biological and molecular history of the 1918 influenza pandemic, a journey documented by the journalist Gina Kolata.⁴¹

³⁸ Barry, JM. The great influenza: the epic story of the deadliest plague in history. New York: Viking; 2004.

³⁹ Barry. The great influenza. p. 107-15, 162-66, 176-84.

⁴⁰ Olson DR, Simonsen L, Edelson PJ, Morse SS. Epidemiological evidence of an early wave of the 1918 influenza pandemic in New York City. Proc Natl Acad Sci USA. 2005;102(31):11059-63.

⁴¹ Kolata G. Flu: the story of the great influenza pandemic of 1918 and the search for the virus that caused it. New York: Farrar, Straus and Giroux; 1999; Taubenberger JK, Reid AH, Janczewski TA, Fanning TG. Integrating historical, clinical and molecular genetic data in order to explain the origin and virulence of the 1918 Spanish influenza virus. Philosophical Transactions of the Royal Society of London. 2001; 356: 1829-1839.

All of these widely circulated influenza mythologies point to the importance of seeking out and identifying as many primary source documents (as opposed to secondary source accounts) as possible when attempting to historicize the NPI implemented during the 1918-1920 influenza pandemic. Influenza mythologies are easily repeated when researchers rely heavily on secondary source articles or books and fail to consult primary sources of the era, such as archival materials, public health reports, or newspapers, or simply by over or under interpreting the extant historical record. Our study is the first to systematically examine provisional influenza escape communities in the continental United States preponderantly based on primary source materials.

SECTION V – Provisional Influenza Escape Community Case Studies

A. Introduction:

During the course of our historical research and review of the primary and secondary medical, public health, and popular literature on the 1918-20 influenza pandemic, we identified 7 provisional influenza escape communities, which we define as:

a community or institution where there were relatively few reported cases of influenza (compared to surrounding areas or analogous communities, towns, cities) and zero to one deaths resulting from influenza or pneumonia-related illnesses while NPI were enacted during the second wave of the 1918-1920 influenza pandemic, September-December 1918. We use the word *provisional* decidedly, because on the basis of the historical evidence available to us we cannot definitively determine if these communities sustained their low morbidity and mortality rates because of policy decisions made and NPI enacted by their community leaders and public health officials, because the virus skipped some communities altogether and varied in its behavior in other communities (viral normalization patterns), or because of other factors such as population density, geography, and good fortune. Given the extant historical data, which in many cases are rather sparse, we are unable to rank the importance of these factors in each of the communities we examined. The diagnosis of influenza at this time was largely empirical, without definite culture methodologies or supportive laboratory findings. Mortality statistics of this era were typically derived from reported data of those who died during this pandemic period from respiratory symptoms associated with influenza or pneumonia. This suggests that under or over reporting of influenza cases was likely during the 1918 pandemic. Although greater diagnostic precision in 1918 would have enhanced the use of this historical information in our current pandemic planning, diagnoses made then were based neither on laboratory evidence nor on a standard case reporting definition.

The 7 communities are:

1. San Francisco Naval Training Station, Yerba Buena Island, San Francisco Bay, California
2. Gunnison, Colorado
3. Princeton University, Princeton, New Jersey
4. Western Pennsylvania Institution for the Blind, Pittsburgh, Pennsylvania
5. Trudeau Tuberculosis Sanatorium, Saranac Lake, New York
6. Bryn Mawr College, Bryn Mawr, Pennsylvania
7. Fletcher, Vermont

Each case study is prefaced by a data summary sheet that presents this information in a concise and standardized format. Each summary sheet is then followed by a narrative account of the proceedings of each location during the pandemic, with particular emphasis on the second wave, September to December 1918. Images of each location are included in Appendix II: Images and Maps.

Although we believe that important lessons about NPI can be abstracted from these case studies, it is important to stress that the implementation and execution of protective sequestration was the exception rather than the rule. In each of the cases we studied, the outcome was typically the result of multiple factors, not the least of which included good fortune and geographical separation. We should not be seduced into thinking that we can easily translate these examples into contemporary public health policymaking. Sadly, our conclusions – and for that matter, any historical analysis of the 1918 pandemic – cannot be used as a precise blueprint for future pandemic preparedness planning. That said, we argue that numerous salient lessons can and should inform the present. These lessons, grouped into four categories - Epidemic Preparedness, Benefits and Liabilities of Protective Sequestration, Nonpharmaceutical Interventions During a Pandemic, and Power and Limits of Historical Research - are enumerated in our Section VII: General Conclusions from the Historical Record with Policy Recommendations.

YERBA BUENA ISLAND, CALIFORNIA

Location	San Francisco Bay
Type of Site	Naval Base
Population	Approximately 6,000 (including approximately 1,000 family members)
Population Density	33,103 persons/sq. mi
Geographical Considerations	Yerba Buena is an island in San Francisco Bay. In 1918 no bridges connected it to land; boat travel was the only means of ingress/egress.
Influenza Cases	0 cases during period of protective sequestration; 25 cases after these NPI were lifted on Nov. 21, 1918 to Dec. 31, 1918.
Influenza Deaths	0 during protective sequestration; 3 deaths from influenza and 2 deaths from pneumonia after lifting the NPI (Nov. 21, 1918- Dec. 31, 1918).
First Reported Case	Dec. 6, 1918
Protective Sequestration	Sep. 23, 1918 – Nov. 21, 1918 Stringent travel restrictions between island and mainland.
Quarantine	Rigid inspection of all members of the community and immediate removal of those suspected of being sick into an isolation facility with stringent sterilization measures in place.
Isolation	Early transfer of the sick to base hospital, where they were isolated in small groups. Medical personnel wore face masks and used aseptic techniques.
<i>Cordon Sanitaire</i>	Not applicable to Yerba Buena Island
Social Distancing	N/A
Face Mask Use	Face masks were used by medical personnel
Vaccines	Prophylactic (Pfeiffer's Bacillus) vaccine
Complementary NPI	Daily inspection of personnel. Taking of temperatures. No overcrowding, good ventilation, and muslin screens in wards. Application of nose and throat sprays (containing argyrol). Educational measures. Strict enforcement of all existing sanitary rules and regulations.
Acquisition of Supplies	Tugboats brought supplies from the mainland – strict restrictions on interaction between crew members and YBI sailors. They could not come closer than 20 ft. to one another.
Family members	Several hundred family members of officers lived on the island.
Public Coping with NPI	All indications point to the YBI population coping very well with their protective sequestration.
Disease Reporting	Influenza was reportable in the Navy effective Sep. 20, 1918.
Inter-authority relationships, cooperation	The single authority on the island, the United States Navy, did not show external signs of dissent or contradictory orders.
Public Health Education and Risk Communications	Naval commanders frequently enacted orders regarding face masks, ventilation, floor space, and other issues that directly concerned the health of sailors facing influenza. In addition, circulars were distributed among the sailors.
Economic Impact	Little to none
Undocumented Factors	The availability of mail or telecommunications to those on Yerba Buena Island.
Impact of Subsequent Waves	YBI recorded 3 cases of influenza and 4 of pneumonia in Jan. 1919. No data for Feb.-Apr. 1919 is available.

Case Study**Yerba Buena Island Naval Training Station, San Francisco, CA****[with comparisons to Mare Island Naval Yard, Vallejo, CA]****Historical Background**

Yerba Buena, a small island (116 acres) located approximately one mile on either side from the closest points in present-day San Francisco and Oakland, was discovered in 1775 by Spanish explorers entering San Francisco Bay. Finding an abundance of wild mint growing on the island, they named the land Yerba Buena, or “Good Herb.” The island has at various times also been called Wood Island, Bird Island, and Goat Island (its official name from 1895 to 1931). Use of the island by the U.S. military dates back to 1852, when the government proposed building a line of fortifications in San Francisco Bay to protect northern California and the valuable gold recently discovered there. In 1866, in a preemptory move to prevent the Central Pacific Railroad from gaining possession of the island to use as a terminus, the government ordered the occupation of Yerba Buena Island. From 1871 to 1892, Yerba Buena Island was used as a quartermaster depot for the Army before it was transferred to the U.S. Engineer Department. In 1898, a naval training station was erected on the island. During World War I, Admiral Dewey’s old flagship, the *USS Boston* (which had aided in the American overthrow of the Hawaiian monarchy in 1893 and later served in the Spanish-American War), was moored at Yerba Buena Island as the receiving ship for the facility. When the Bay Bridge was constructed in 1936, engineers designed it as two bridges, with a tunnel through Yerba Buena Island connecting the sections. Shortly after, an artificial island, Treasure Island, was constructed adjacent to Yerba Buena Island and connected by a small isthmus; this artificial island was the

site of the 1939 “Golden Gate Exposition.” During World War II, the government used Treasure Island as a naval electronics and communications training school. In 1996, the naval station was decommissioned, but it continues to serve as a U.S. Coast Guard facility and lighthouse.

Located approximately 35 miles away in Vallejo, California, and at the mouth of the Napa River is Mare Island, in reality a peninsula. Originally part of Rancho Soscol, Mare Island was purchased by the U.S. government in 1852 for use as a naval shipyard. In 1854, Mare Island became the first permanent naval station on the Pacific coast. During World War I it operated as a naval yard and dock. Like Yerba Buena/Treasure Island, it was decommissioned in 1996.

The Navy and the Influenza Pandemic

Officials at Yerba Buena Island and Mare Island, and indeed throughout the Navy, were notified of the impending influenza pandemic in early August 1918. On August 9, the Naval Bureau of Medicine and Surgery (BuMed) issued a bulletin that warned of influenza epidemics in Europe and Hawaii and of the likelihood of the disease spreading to the continental United States. Bureau officials advised that no quarantine be instituted, as it was deemed “impracticable,” and warned that “The disease is highly communicable and during epidemics it spreads with remarkable rapidity. Just what conditions are necessary to start one of the periodic world-wide outbreaks is as unknown in this as in other communicable diseases like plague, which are prone to become pandemic.” They did recommend the bed isolation of patients and the disinfection of mess gear, handkerchiefs, and similar precautions for infectious diseases

spread primarily by respiratory droplets. Where sick bays or isolation wards were not available, the use of sheet screens between patients was advised.⁴²

In early September, the Bureau notified medical aides in all naval districts that abnormally high rates of disease were being reported from naval stations shortly after men returned from rifle range duty. Seeking to confirm this phenomenon, medical officers were asked to note whether this was indeed the case at their stations, and to report their findings to the Bureau.⁴³ On September 20, Bureau officials issued another circular memorandum, informing medical aides that influenza was now included on the list of reportable diseases. Medical personnel were instructed not only to report influenza cases in their weekly telegrams to the Bureau, but also to assist aides of other districts by informing them and the Bureau of the appearance of any communicable disease in epidemic form. To facilitate the gathering, reporting, and sharing of this information, the Bureau drafted and issued an “Epidemiological Report” form to be used.⁴⁴ Four days later, it had become clear to all that an influenza epidemic was well under way in military installations and urban areas. In response, BuMed officials called on naval officers to avoid the exposure and fatigue of their men, to relieve overcrowding, to avoid the quartering of large groups of men in any single compartment, to isolate all cases

⁴² BuMed Bulletin No. 37, Notes on preventive medicine for medical officers, United States Navy, 1918 Aug 9; Folder 130212 D-12 “Flu”; Entry 12 General Correspondence, March 1912-December 1925; RG 52: Headquarters Records Correspondence 1842-1941; National Archive Building, Washington DC (NAB).

⁴³ BuMed to Medical Aide All Naval Districts. 1918 Sep 4; 130107 D-16 to 130212 D-12 Entry 12; General Correspondence, March 1912 - Dec. 1925; RG 52: BuMed Headquarters Records, Correspondence, 1842-1941; NAB. On November 3, the surgeon at Mare Island, John L. Neilson, reported that of the 513 men who returned from rifle range duty in October, 17 were subsequently admitted to sick bay for influenza. See Neilson JL to BuMed. 1918 Nov 3; 130107 D-16 to 130212 D-12 Entry 12; General Correspondence, March 1912 - Dec. 1925; RG 52: BuMed Headquarters Records, Correspondence, 1842-1941; NAB.

⁴⁴ BuMed to Medical Aides of All Naval Districts, 1918 Sep 20; Folder 130212 D-12 “Flu”; Entry 12 General Correspondence, March 1912-December 1925; HQ Corr. 1842-1941; RG 52; NAB.

immediately, to prevent public assembly, and to use screens in barracks and sick quarters.

Patients were also to be masked.⁴⁵

Yerba Buena Island

On September 23, one day before it was reported that influenza had hit San Francisco, Commandant Rossiter of the San Francisco Naval Training Station (Yerba Buena Island) ordered an immediate and strict protective sequestration of the island.⁴⁶ All personnel were required to remain at the station, and no visitors were allowed entry. Approximately 6,000 people were on the island, including officers and their families, a few hundred civilians, approximately 5,000 sailors, and about 30 yeomanettes.⁴⁷ All interactions with others living in the Bay Area were halted except to receive supplies, and in those cases the crews of tugs were prevented from coming any closer than 20 feet from sailors on the dock. Given the wartime circumstances, some recruits were sent from the mainland to Yerba Buena Island. The nasopharynxes of the men were sprayed with a 10 per cent argyrol solution (a topical anti-infective solution prepared by the reaction of silver oxide with gelatin or albumin) and they were required to wear gauze masks before they were allowed to board the ferry bound for Yerba Buena Island. Upon arrival at the island they were placed in a quarantine camp for several days. During this period they were required to wear masks, had their throats sprayed with argyrol solution three times a day, and

⁴⁵ BuMed to Naval Training Station Yerba Buena. 1918 Sep 24; 130212 D-12 “Flu”; Entry 12 General Correspondence, March 1912-December 1925; Correspondence 1842-1941; RG 52: BuMed Headquarters Records, Correspondence, 1842-1941; NAB.

⁴⁶ Influenza is brought to S.F. by Chicagoan. San Francisco Examiner 1918 Sep 24; 11. Reports of the first case hit the press on September 24, 1918. These reports noted one case reported on September 23, 1918. In the retrospective report, Kellogg WH Influenza: a study of measures adopted for the control of the epidemic. Sacramento: California State Printing Office, 1919. California State Board of Health, Special Bulletin No. 31, influenza is noted to have begun in San Francisco the week ending September 21. As this information probably did not surface until the epidemic was in full swing, the first knowledge local and military authorities would have had was the first reported case in the press on September 24, 1918.

⁴⁷ Quarantine proves time of gaiety. San Francisco Examiner. 1918 Oct 5; 7.

maintain a distance of 20 feet from one another. The protective sequestration policy was to remain in force until all danger of the epidemic had passed.⁴⁸

There were no reported cases in the facility yet, and the officers wished to keep it that way. A host of other NPI were also implemented, which included:

quarantine, daily inspection of personnel and the taking of temperatures, early isolation of the sick, the wearing of face masks and gowns and rigid aseptic technique by attendants upon the sick; the early transfer of patients to a base hospital; the retention and isolation of patients in dispensaries where they could be segregated in small groups instead of being brought into immediate or indirect contact with large numbers of other patients; strict attention to ventilation; relief of overcrowding; use of muslin screens between bunks or hammocks in barracks; prevention of gatherings indoors as much as possible; restrictions on travel, particularly by common carriers; the application of nose and throat sprays to those not yet attacked; the use of prophylactic vaccines, the very general and intensive use of educational measures and the very rigid enforcement of sanitary rules and regulations....⁴⁹

In addition, the spigots of all drinking fountains were heated twice daily with the flame of a gas torch, and all telephone transmitters were disinfected.⁵⁰

Although the NPI implemented at Yerba Buena Island may have been effective in preventing an influenza epidemic on the island, they also prevented men from interacting with the wider Bay Area and from seeking entertainment there. Closed off from regular interaction with the outside world, sailors, officers, and civilians on Yerba Buena Island organized their own entertainment, such as circuses and festivals, to keep up morale. In early October, for example, a carnival was held that turned the facility into “a miniature Coney Island.”⁵¹ What we could not

⁴⁸ Annual reports of the Navy Department for the fiscal year 1919. Washington, DC: Government Printing Office, 1920; 2484.

⁴⁹ Annual reports of the Navy Department for the fiscal year 1919. Washington, DC: Government Printing Office, 1920; 2482-2483.

⁵⁰ Annual reports of the Navy Department for the fiscal year 1919. Washington, DC: Government Printing Office, 1920; 2484. The report does not specify the duration of the quarantine for the newly arrived recruits.

⁵¹ Goat Island leaves are denied to prevent invasion of the training school by epidemic. San Francisco Examiner. 1918 Sep 24; 11; Quarantine proves time of gaiety. San Francisco Examiner. 1918 Oct 5; 7; Quarantine sailor boys hold carnival. Yep-Girls and Bluejackets on Goat Island furnish own entertainment. San Francisco Examiner. 1918 Oct 7; 10.

document was the availability of mail or telecommunications to all those sequestered on Yerba Buena Island.

By early November it was being reported that the number of new influenza cases was decreasing among both civilian and military populations in the San Francisco area, and that recent cases were milder in form.⁵² At the end of November it seemed as if the pandemic had passed. On Thursday, November 21, the protective sequestration of Yerba Buena Island was lifted and the facility was re-opened to interact with the outside world. Nevertheless, influenza cases among naval personnel did not return to epidemic proportions after November 21, and those cases that did develop were mild. Yerba Buena Island experienced its first influenza case on December 6. Throughout the rest of December 1918 and into January 1919, Yerba Buena Island continued to experience influenza and pneumonia cases (a total of 28 of the former, and 21 of the latter), with at least 3 deaths from influenza and 2 from pneumonia.⁵³ The table below lists the number of deaths due to influenza (termed “influenzal pneumonia”) and pneumonia experienced at Yerba Buena Island from April 1918 through the end of December 1918, demonstrating that no deaths occurred during the period of protective sequestration (Sept 23-Nov 21, 1918).⁵⁴

⁵² Rothganger G to Braisted WC. 1918 Nov 9; 130212 D-12 “Flu”; Entry 12 General Correspondence, March 1912-Dec. 1925; Correspondence 1842-1941; RG 52: BuMed Headquarters Records, Correspondence, 1842-1941; NAB.

⁵³ Medical Officer to Commandant. 1919 Feb 9; 132570 D-12 to D-14 Entry 12 “San Fran Trg. Sta”; General Correspondence, March 1912-Dec. 1925; RG 52: BuMed Headquarters Records, Correspondence, 1842-1941; NAB.

⁵⁴ Annual reports of the Navy Department for the fiscal year 1919. Washington, DC: Government Printing Office, 1920. 2485.

Week Ending	Deaths from Influenza (Influenzal pneumonia)	Deaths from Pneumonia
April 4	0	1
July 7	0	1
August 21	0	1
August 28	0	1
October 15	0	0
December 4	0	1
December 22	2	1
December 28	1	0

Mare Island

As officials at Yerba Buena Island moved to prevent an influenza epidemic there, medical personnel on nearby Mare Island also prepared to deal with the impending crisis. On September 25, medical personnel at Mare Island went into action. Naval doctors issued an influenza circular (the decision to draft the circular was made two days prior) that provided information on transmission of the disease and methods for control. With news that influenza cases had begun to appear in Southern California as well as in Washington State, Mare Island physicians, along with the health officer of San Francisco and of Sonoma County, decided that daily reports of influenza cases would be submitted.

A conference was held to discuss possible NPI that could be taken, and a set of protocols was developed: no recruits would be sent to the Mare Island station once cases began to appear in the surrounding area; sleeping quarters would be kept from being overcrowded, and the overflow of men would be placed in tents; cubicles in sleeping quarters would be used; and notices of instruction would be publicly posted and distributed to the men. It was suggested that

civilian personnel receive medical care at the Navy Yard, given that most could not afford adequate care on their own. No general quarantine (what we call protective sequestration in this report) would be established, as it was deemed “impracticable and valueless.” Likewise, no separation of civilian and military personnel at the yard would be practiced. Two days later, these recommendations were incorporated into general orders and posted throughout the yard.⁵⁵

In addition to these measures, plans were made to have a special contingent of medical officers, hospital corpsmen, and nurses quickly detailed to Mare Island once the pandemic reached the station. Mare Island medical personnel thought that the coming of the pandemic was inevitable, and therefore believed that the best method of dealing with it was through an augmentation of their medical care staff.

Meanwhile, on that same day – September 25 – Mare Island’s first case of influenza was reported, in a sailor returning from Oklahoma by train. The next day, San Francisco’s health officer notified Commandant Harry George that six cases had appeared in the city. Upon receiving this news, George ended all leave beyond the regular 24-hour liberty and restricted public gatherings for instruction or for amusement to those held in the open air.⁵⁶ On September 27 it was learned that numerous cases were being reported in towns that Mare Island men had visited while on liberty. Two of these cases had appeared in Vallejo, the town adjacent to the naval yard. With the threat so near, additional steps were taken and a partial protective sequestration was established. No liberty was granted until it was decided the pandemic had passed. No bands, athletic teams, orchestras, or other entertainers were allowed to leave Mare

⁵⁵ Williams LL to Bureau of Medicine, Navy Department, Washington, D.C. 1918 Sep 25; 130212 D-12 “Flu”; Entry 12 General Correspondence, March 1912-December 1925; RG 52: BuMed Headquarters Records, Correspondence, 1842-1941; NAB; and Commandant at Mare Island to BuMed, 1918 Sep 27, in Folder 130212 D-12 “Flu”; Entry 12 General Correspondence, March 1912-December 1925; HQ Corr. 1842-1941; RG 52; NAB.

⁵⁶ Neilson JL to BuMed, Influenza Epidemic, Mare Island, Cal. – special report on 1919 Feb 28; 130212 D-12 “Flu”; Entry 12 General Correspondence, March 1912-Dec. 1925; Correspondence 1842-1941; RG 52: BuMed Headquarters Records, Correspondence, 1842-1941; NAB.

Island. Participation in the upcoming Liberty Loan parade, as well as the football schedule, was cancelled. Recent arrivals, all of whom had been placed in detention (quarantine), were carefully observed for four days. The policy was not strict, however, and officers and shipyard workers were allowed to come and go. Only enlistees were restricted in their movements.⁵⁷

For the next several days it seemed as if Mare Island had dodged the bullet. Then, on October 5, three cases appeared, two in hospital personnel and one in the naval training camp. It was the start of Mare Island's epidemic in earnest. Throughout the next day numerous cases appeared in the naval training camp and in ships being fitted out at the yard. On October 7, officials requested that no additional draftees or recruits be sent to the yard. Unfortunately, the Navy Department did not agree, and except for brief and intermittent moments, new draftees and recruits continued to arrive. In an attempt to contain the epidemic, these men were placed in quarantine. Vessels being fitted out at the yard likewise were placed in quarantine to last four days from the development of the last case on the vessel. These measures were hampered by the Navy, however, as the department continued to transfer men and order ships to sea only to have them return shortly thereafter because of the severe number of cases that had developed aboard. With the steady influx of men, and with the need to keep the yard facility running, the ability to contain the epidemic at Mare Island was severely limited. The Marines at Mare Island, for example, had been relatively free of influenza until new recruits began to arrive by train (over the objection of Mare Island medical personnel), when they began to experience high morbidity and mortality rates. Civilian workers in the yard, who came and went from their homes, were also hard hit. Living in Vallejo, many became ill when the epidemic escalated there in late

⁵⁷ Neilson JL to BuMed, Influenza Epidemic, Mare Island, Cal. – special report on 1919 Feb 28; 130212 D-12 "Flu"; Entry 12 General Correspondence, March 1912-Dec. 1925; Correspondence 1842-1941; RG 52: BuMed Headquarters Records, Correspondence, 1842-1941; NAB; Influenza epidemic is on way west. San Francisco Examiner. 1918 Sep 28; 5.

October. A total of 287 civilian patients were cared for, with some 70 occupying beds in the hospital in a single day.⁵⁸

Like other military and civilian populations, Mare Island began to experience a decline in its influenza rates by late 1918. According to a sanitary report for the month of January 1919, the station had an influenza rate of 28.21 per 1,000 in November 1918. This number had dropped to 19.92 for December. On the day that Yerba Buena Island was re-opened – November 21 – the restrictions at Mare Island were also lifted. Masks still had to be worn by all Navy and Marine personnel while at the yard, however, and by all who traveled to the local towns.⁵⁹

The Response to the Third Wave

In January 1919, the epidemic began to spike again in San Francisco and the Bay Area: some 612 influenza cases and 30 deaths occurred on January 10 alone. At this point, quarantine and protective sequestration orders were lifted over both Yerba Buena Island and Mare Island. Mare Island then experienced a slight increase in its influenza rate in January, rising to 20.36 per 1,000. Unlike in the Bay Area, however, where new cases in December and January were more severe, new cases at Mare Island during this period were milder and did not result in death. Interestingly, while the number of cases among military personnel experienced only a slight increase in January, civilian personnel at the navy yard were “seriously affected” by the resurgence of the disease. Some observers thought that the third wave primarily affected

⁵⁸ Neilson JL to BuMed, Influenza Epidemic, Mare Island, Cal. – special report on 1919 Feb 28; 130212 D-12 “Flu”; Entry 12 General Correspondence, March 1912-Dec. 1925; Correspondence 1842-1941; RG 52: BuMed Headquarters Records, Correspondence, 1842-1941; NAB.

⁵⁹ Medical Officer at Mare Island to BuMed, Sanitary report for Mare Island, month of January 1919, 1919 Feb 8; Folder 132570 D-12 “Mare Island,”; Entry 12 General Correspondence, March 1912-Dec. 1925; RG 52: BuMed Headquarters Records, Correspondence, 1842-1941; NAB; Neilson JL to BuMed, Influenza Epidemic, Mare Island, Cal. – special report on 1919 Feb 28; 130212 D-12 “Flu”; Entry 12 General Correspondence, March 1912-Dec. 1925; Correspondence 1842-1941; RG 52: BuMed Headquarters Records, Correspondence, 1842-1941; NAB.

civilians who might have already contracted some type of upper respiratory infection but who had not contracted influenza during the earlier wave. Military personnel were required to wear masks while at the facility, dancing was prohibited, and public education circulars were issued, but no restrictions were placed on contact between military forces and civilians.⁶⁰

In response to the third wave of influenza cases in San Francisco, Charles Fiske of the Twelfth Naval District issued a new directive to have all medical personnel in the Bay Area don gauze masks while in San Francisco or the wider Bay Area, to be removed only to eat or drink. New cases at the latter led authorities to re-open the Mare Island emergency hospital from January 11 to January 28, 1919. A total of 55 patients were treated during this period, with 39 of them admitted on a single day. Although most of the cases became pneumonic, only one death occurred. In this case, however, the patient was near death upon admission, and expired only two hours later. Fiske also arranged for Yerba Buena Island to receive influenza patients who could not be transported to Mare Island. Fiske believed that since the protective sequestration at Yerba Buena Island was over, the transfer of some patients to the island would not result in a greater influenza case rate than already experienced since the island's re-opening.⁶¹

Conclusions

In fact, there were relatively few new cases of influenza at Yerba Buena Island after the protective sequestration there was lifted. Even with the spike in cases in San Francisco, the island experienced a lower rate of influenza than did the city, and the cases that did erupt were generally milder. In December 1918, 25 cases of influenza and 17 of pneumonia (4 lobar

⁶⁰ Medical Officer at Mare Island to BuMed, Sanitary report for Mare Island, month of January 1919, 1919 Feb 8; Folder 132570 D-12 "Mare Island"; Entry 12 General Correspondence, March 1912-December 1925; HQ Corr. 1842-1941; RG 52; NAB.

⁶¹ Fiske C to Navy Surgeon General Braisted WC, 1919 Jan 11; Folder 132570 D-12 "San Fran. Trg. Sta."; Entry 12 General Correspondence, March 1912-December 1925; HQ Corr. 1842-1941; RG 52; NAB.

pneumonia, 13 broncho-pneumonia) were reported on the island. By January 1919, the case rate had diminished: only 3 cases of influenza and 4 of pneumonia were reported. USPHS surgeon L. L. Williams, who made an inspection of Yerba Buena Island in late January, attributed these low numbers to the fact that naval authorities had effectively enacted strict preventive measures at the beginning of the epidemic, thereby protecting seamen from the brunt of the outbreak.

The annual report of the Secretary of the Navy for 1919 called the effort at Yerba Buena Island “an absolute quarantine” (for the purposes of this study, we would refer to Yerba Buena Island’s efforts as a combination of protective sequestration and quarantine). The Secretary’s conclusions are intriguing in light of contemporary pandemic preparedness planning:

To the absolute quarantine efficiently maintained on Goat Island [Yerba Buena] must be attributed to the entire absence of influenza from this training station while all communities in the vicinity were suffering.... The experience at this station seems to show that under exceptional conditions quarantine can be made effective against the introduction of influenza, but that after quarantine is raised the disease will make its appearance with an incidence proportionate to that obtaining at the time in the surrounding territory. Beyond question, life was saved there by the absolute quarantine.⁶²

The island’s geographic isolation also contributed to Yerba Buena Island’s ability to effectively seal itself off from the rest of the Bay Area. As USPHS Surgeon Williams noted, there were few locations “where such a measure [could] be applied with any hope of success.”⁶³ Beyond geographical isolation, however, the foresight of the Navy likely played an important part. In addition to other NPI, Commandant Rossiter’s orders for a strict protective sequestration of the island appears to have been a contributing factor for explaining why his men did not contract

⁶² Annual reports of the Navy Department for the fiscal year 1919. Washington, DC: Government Printing Office; 1920; 2485.

⁶³ Williams LL to Bureau of Medicine and Surgery. 1919 Feb 1; 132570 D-12 to D-14 Entry 12 "San Fran Trg. Sta"; General Correspondence, March 1912-Dec. 1925; RG 52: BuMed Headquarters Records, Correspondence, 1842-1941; NAB. According to a February 9, 1919, report from the Medical Officer at Yerba Buena to the Commandant of the Twelfth Naval District, the number of influenza cases for January 1919 was only 3. See Medical Officer to Commandant. 1919 Feb 9; 132570 D-12 to D-14 Entry 12 "San Fran Trg. Sta"; General Correspondence, March 1912-Dec. 1925; RG 52: BuMed Headquarters Records, Correspondence, 1842-1941; NAB.

influenza until after November 21, 1918. Waiting just a few days longer might have produced in a markedly different outcome.

GUNNISON, COLORADO

Location	Southwestern Colorado, elevation 7,600 feet
Type of Site	Mountain town and county; cultural, economic, and educational center
Population	1,329 in the town of Gunnison; 5,590 in Gunnison county (1920 census)
Population Density	Town: 414 persons/sq. mi.; County: 1.8 persons/sq. mi
Geographical Considerations	Gunnison was a small mountain town, far removed from Colorado's major population centers of the day.
Influenza Cases	0 (in the town); 2 (in the county).
Influenza Deaths	0 (in the town); 1 (in county).
First Reported Case	The first reported case in the state of Colorado was in Boulder, on Sep. 20, 1918; by Oct. 11 some 30 to 40 cases of influenza were reported in Sargents, Colorado, approximately 30 miles from Gunnison.
Protective Sequestration	Oct. 8, 1918 – Jan. 20, 1919 (countywide) On the county level: absolutely no ingress. Residents could leave the county, but could not return unless they submitted to quarantine.
Quarantine	Oct. 31, 1918 – Jan. 20, 1919; 48 hour detention for those entering the county with no exceptions. Arrest and jailing of visitors who failed to heed quarantine. Detention lengthened from 48 hours to 5 days (mid-Nov. to mid-Dec.)
Isolation	Isolation of the sick and self-isolation of those feeling sick.
<i>Cordon Sanitaire</i>	Oct. 31, 1918 – Jan. 20, 1919 (countywide) Barricades erected on main highways with lanterns and warning signs.
Social Distancing	Public gatherings prohibited. Schools and all public institutions closed.
Face Mask Use	Unknown
Vaccines	Unknown
Complementary NPI	Education and warnings in local newspaper. Made illegal to buy or sell train tickets, except to the town of Gunnison.
Acquisition of Supplies	Unknown
Family members	Individuals were not separated from their families in Gunnison city or county during the second wave of the pandemic.
Public Coping with NPI	11 weeks into the NPI, support began to wane. Schools were slowly opened in mid-January.
Disease Reporting	Unknown
Inter-authority relationships, cooperation	County and town officials eventually worked in concert with one another when implementing and enforcing preventive measures.
Public Health Education and Risk Communications	Apart from information that ran in newspapers of the day, there has been no documented evidence of education or risk communication materials from public health authorities.
Economic Impact	Unknown
Impact of Subsequent Waves	Gunnison county suffered at least 140 cases and 5 deaths in March 1919.
Undocumented Factors	Whether or not the barricades erected on the main highways into the county were manned; how Gunnison residents bided their time during the second wave of the pandemic.

Case Study**Gunnison, Colorado****Historical and Demographic Background**

Gunnison, Colorado, was first settled by whites in the 1870s, as the native Ute Indians were forced off of their land. Ranchers, farmers, and miners came to the area to take advantage of the surrounding valley's open land and vast coal deposits. On May 22, 1877, the town of Gunnison became the seat of Gunnison County. Three years later, in 1880, the railroad came to Gunnison. The town takes its name from Captain James W. Gunnison, an army engineer tasked in 1853 with finding a rail route from the Mississippi River through the Rocky Mountains to the Pacific. Capt. Gunnison met his demise at the hands of a band of Ute Indians in Utah, but not before he had passed through the area that would soon become the town to bear his name. By the mid-1880s there were two railroads operating in Gunnison, linking the town with Denver, Salida, Durango, Montrose, Grand Junction, Crested Butte, Lake City, and even Salt Lake City.

Despite its diminutive size, Gunnison's location and natural resources made it an important cultural, educational, and economic center for the area. In 1909 the Colorado Normal School was founded; its name changed to Western State College in 1915. The county was rich in silver and coal deposits, and Gunnison began its early years as something of a boom and bust town. As in other towns in the area, silver mining was an important economic activity. In the early 20th century, however, the dominance of silver mining began to give way to coal mining. In addition, ranching and farming were also widespread in the county's vast valleys. In 1918, most of the area's residents were employed in one of these three sectors.

Gunnison is located in southwest Colorado. It is a mountain town, sitting at approximately 7,600 feet in a high valley at the base of three mountain ranges. According to 1920 census data, the population of the town of Gunnison was 1,329, and that of Gunnison County 5,590. Of this latter number, 3,193 were male, and 2,397 were female. Roughly half (2,813) of the county residents were of native-born American parentage. The age breakdown of county residents was as follows: 895 under 7 years old, 761 between the ages of 7 and 13, and 244 between the ages of 18 and 20. No data are listed for children between 13 and 18 years of age, nor for adults over 20 (presumably the remainder). There were 1,544 families living in 1,493 dwellings in the county in 1920. The population density of the county was one of the lowest (although not *the* lowest) for all Colorado, with only 1.8 people per square mile. The town of Gunnison had a population density of 414 persons per square mile. It is reasonable to assume that, given the low influenza death rate for the county, the change in population from the 1918/1919 period until the 1920 census was taken was minimal. Therefore the numbers above most likely provide an accurate demographic representation of the county and town in 1918.

Colorado's Response to the Influenza Pandemic

According to a State Board of Health report, influenza arrived in Colorado on or about September 20, 1918, when 250 Montana soldiers arrived in Boulder for special training at Colorado University. Thirteen of the soldiers arrived seriously ill, and from them the disease spread quickly across the campus and the town. By the end of the first week 91 cases had developed. At the same time, a small detachment of 200 Montana soldiers arrived in Colorado Springs for training there; 25 of them were ill with influenza. From these two areas, according to the report, influenza spread across Colorado. Vector-specific data for the state are scant, and it

seems likely that other areas – in particular, Denver – inevitably would have developed cases via out-of-state civilians traveling to or through Colorado. Durango, for example, in the far southwest corner of Colorado, reported civilian cases by early October, as did Grand Junction. Silverton, a small mining town in the San Juan Mountains, reported more than 100 cases and 31 deaths by the start of the second week of October.⁶⁴ Given that communities in the East were already being devastated, and that, because of the importance of mining and agriculture, even many of Colorado's smaller towns were on rail lines, it seems likely that Colorado still would have developed cases had those Montana soldiers never arrived. Nevertheless, the wartime mass mobilization of troops from nearly every state and community in the nation likely hastened the rapid spread of the disease across the region.

On October 5, members of the State Board of Health met and agreed to issue a warning about the dangers of influenza. The board resolved to urge local officials to be on their guard and to close places of public assemblage at the first sign of the disease. The next day, Governor Julius C. Gunter called a special meeting (which convened on October 7) of the Board of Health, the heads of all the state's institutions of higher education, the military medical officers in charge of detachments, and the mayor of Denver. It was there decided that an executive order should be issued. This order called upon all health officers and members of the press to advise citizens of the danger of public gatherings, and to urge city and town officials to take appropriate action to halt the spread of the disease by closing public places. It was, in essence, a public reiteration of the Board of Health's October 5 resolution.⁶⁵

⁶⁴ Influenza cases reported here. Durango Evening Herald. 1918 Oct 5; 1; Grand Junction closes schools, churches, theaters and stops all gatherings due to influenza. Montrose Daily Press. 1918 Oct 8; 1; Colorado schools closed. Silverton Standard. 1918 Oct 12; 5.

⁶⁵ Kennedy EF. Report of the Colorado State Board of Health, 1917 and 1918. Folder H Box 26958, Governor Julius C. Gunter Collection, Colorado State Archives, Denver, CO.

A week later, with influenza cases rapidly rising across the state, another meeting was held. On October 14, the conferees adopted a resolution that all public meeting places should be closed forthwith. Two days later, on October 16, Governor Gunter put this resolution into an executive order, proclaiming all public and private gatherings prohibited across the state. In addition to these measures, the Board of Health asked the press to issue requests for physicians and nurses, and the USPHS was called upon for aid. Dr. Erlo Kennedy, Executive Secretary of the State Board of Health, was made the Public Health Service representative for Colorado during the pandemic.⁶⁶

Gunnison's Response

Unlike most other western Colorado towns, Gunnison took a very early and active interest in the spread of influenza across the United States in 1918. If newspaper reportage is any indicator of a more general concern, Gunnison's residents took the threat of the pandemic reaching their county quite seriously. The first article on influenza appeared in the September 27, 1918, issue of the *Gunnison News-Champion*, in advance of the pandemic reaching that part of the state. That article reported that influenza had claimed the life of a Baldwin, Colorado (Gunnison County), soldier training at Fort Dix, New Jersey. It added that another soldier there, also from the town of Gunnison, was sick with the disease. Two weeks later, in the October 11 issue, the *News-Champion* reported that influenza was nearby. The small town of Sargents, a mere thirty miles away in adjacent Saguache County, was reported to have some thirty to forty influenza cases. Some doubtful cases were suspected in Gunnison as well.⁶⁷ From this point

⁶⁶ Kennedy EF. Report of the Colorado State Board of Health, 1917 and 1918. Folder H Box 26958, Governor Julius C. Gunter Collection, Colorado State Archives, Denver, CO.

⁶⁷ David A. Anderson dies at Camp Dix, New Jersey. Gunnison News-Champion. 1918 Sep 27; 1; Spanish flu close by. Gunnison News-Champion. 1918 Oct 11; 1.

until January 1919, the *News-Champion* included at least one front-page article on influenza in each of its weekly issues.

Gunnison took immediate action. Despite the presence of only doubtful cases, the town began taking NPI and went into what it described as a “partial quarantine,” meaning that public places were closed. On October 8, immediately after the first precautionary warning from the State Board of Health, the schools were closed across the county, with the order that they would remain so until at least October 21.⁶⁸

Ten days later, on October 18, the *News-Champion* informed its readers that the State Board of Health and the governor had issued orders to close all public places, as decided at the October 14 meeting. County officials implemented social distancing measures, decreeing places in the county closed for at least four weeks. Lest its readers take the situation too lightly, the *News-Champion* reported on the seriousness of the pandemic, adding that the disease was rapidly spreading to nearby towns. New cases were appearing in Sargents, although on a reduced scale; the *News-Champion* surmised that nearly everyone in the town had already been stricken with influenza. Rail workers reported that Salida, a mountain pass town 65 miles to the east, had 200 cases, with 40 of them appearing on October 15 alone. Two weeks later that number had reached 500. The newspaper acknowledged that this information was merely rumor, but nonetheless added that it indicated just how dangerous the disease was. Under the very telling headline “The Flu Is After Us,” the editor wrote, “We should take every precaution and while nothing in the world can prevent our having it, the measures taken will doubtless distribute it over a longer time so that everybody will not be sick at once, with not one left to care for the

⁶⁸ Spanish flu close by. Gunnison News-Champion. 1918 Oct 11; 1.

dangerously ill.”⁶⁹ The prospect of large numbers of residents falling ill with the disease at once was especially frightening because of the lack of adequate professional health care in the mountainous region of western Colorado: Dr. F. P. Hanson was the only physician affiliated with the State Board of Health practicing on the Western Slope (he was also the Gunnison County physician), and he had his hands full dealing with the severe outbreak at Sargents.

By late October, approximately 9,000 cases had erupted across Colorado, with 311 deaths having occurred by October 25. The situation at Sargents had improved, but influenza was now spreading across the valleys. In Golden, just outside of Denver, schools that had been closed were prematurely re-opened. Returning students brought on another wave of influenza, and 600 new cases were alleged there. The *News-Champion* continued to caution its readers and printed advice on what to do if family members began showing symptoms, asking the ill to remain at home and rest until the disease was fully broken to avoid infecting others and contracting pneumonia.⁷⁰

With news from nearby towns that were being hard hit by the pandemic, Gunnison residents had plenty of reason to worry that the disease might soon wend its way into their county. On November 1, Dr. Hanson, the county physician used the newspaper to print and circulate an open letter on the influenza situation. According to reports he had received from Salida, approximately 75% of the pneumonia cases there were failing to recover. Similar and worse conditions appeared in other nearby towns. Fortunately, Dr. Hanson wrote, despite being surrounded by the disease, Gunnison was the only county in all of Colorado to remain free from influenza. He intended to keep it that way. On October 31, Dr. Hanson enacted a strict protective sequestration of the entire county. We do know, as discussed below, that for the time

⁶⁹ 'Flu' toll is terrific. Gunnison News-Champion. 1918 Nov 1; 1; The 'Flu' is after us. Gunnison News-Champion. 1918 Oct 18; 1.

⁷⁰ Flu epidemic rages everywhere but here. Gunnison News-Champion. 1918 Oct 25; 1.

being rail passengers were allowed to travel to Gunnison, but were required to enter a two-day quarantine period once they disembarked. Barricades (*cordon sanitaire*) were erected on the main highways near the county lines, and lanterns and signs were used to warn automobiles to go through the county without stopping or passengers would be forced to submit to quarantine. Residents were allowed to leave the county freely, but no one was allowed to enter unless he or she first went into quarantine. Travel between points within the county was also temporarily prohibited. Violators, Dr. Hanson added, would face the full force of the law, “and to this we promise our personal attention.”⁷¹

Gunnison, at least, took its protective sequestration very seriously, as two Nebraskan motorists found out when they tried to by pass the barricade and enter Gunnison County en route to Delta. They were promptly arrested and jailed. A Pitkin man was later fined for attempting to evade the quarantine.⁷² It is unknown whether the highway barricades were manned or not, or whether those who attempted to by-pass the quarantine were caught at the point of entry into the county or at some later point.

Local politics and legal matters quickly, if only temporarily, interfered with the effort, however. As part of the protective sequestration/quarantine order, it was arranged that a Gunnison town hall would be used as a 48-hour detention facility for those entering the county from other locations or via the railways. No one would be exempt from the quarantine and isolation policy: Colorado State Senator Sapp had arrived by train the very morning the order had gone into effect, and he and several others aboard had been taken to the Chipeta Hall quarantine facility for the requisite two-day stay. Within three hours of their arrival, however, the quarantine/isolation measure was dissolved and the detainees released, as it was determined

⁷¹ Quarantine proclamation by the county physician. Gunnison News-Champion. 1918 Nov 1; 1.

⁷² Strangers land in jail. Gunnison News-Champion. 1918 Nov 1; 1; Report as to quarantine appeal for cooperation by physician in charge. Gunnison News-Champion. 1918 Dec 13; 1.

that Dr. Hanson's authority as county physician did not extend to the county's incorporated towns, namely Gunnison, Crested Butte, and Pitkin. Fortunately, none of the travelers wished to endanger local residents, and all of them went into voluntary quarantine in their homes. For the moment there was no danger of travelers spreading the disease, but the solution was voluntary and, therefore, fragile. The episode made it clear to officials that a legal remedy was necessary.

Believing in the ability of strict measures to keep Gunnison County safe, on November 1 local officials placed Dr. J. W. Rockefeller of Crested Butte in charge of the protective sequestration/quarantine policy, with full authority to enforce it across the county. It seemed to all a necessary and timely measure, as there were two cases of influenza in the county already, the result of a woman, Mrs. Ellen Gavette, meeting her infected sister at the train station as the latter returned from a recent trip. The two ill sisters had retired to their ranch above the tiny town of Parlin to rest and recover.⁷³ A few days later, on November 4, the 25-year-old Ellen Gavette died of influenza.⁷⁴

With Dr. Rockefeller in charge, and with nearly every other county in Colorado overcome with the pandemic, Gunnison continued to take the situation seriously throughout the rest of autumn and into winter. In mid-November, Dr. Rockefeller announced that he believed that if the situation continued to go well, the prohibition on travel between county points could soon be lifted, perhaps within a week. It was not expected, however, that the situation within the state would improve significantly enough to allow the lifting of the inter-county protective sequestration. The *News-Champion* reported that some cases were appearing in the county, but that they were all reported to be mild. Nevertheless, the editor was quick to point out that "there is danger that at any moment the strange, treacherous disease may appear in virulent cases."

⁷³ Rockefeller in charge. Gunnison News-Champion. 1918 Nov 1; 1.

⁷⁴ Death list still grows. Gunnison News-Champion. 1918 Nov 8; 1.

Residents were therefore urged to continue their vigilance. In smaller Colorado towns and in the East the disease was continuing with the same death toll, wrote the editor, as the crowds that had gathered to celebrate the end of the war had revived it. “So far, Gunnison is about the only place in the United States almost free from the sickness. We are fortunate, so fortunate that we almost fear it cannot last,” he added.⁷⁵

Gunnison County maintained its vigilance, although in a somewhat relaxed form. On November 22, the *News-Champion* announced that county residents had been so successful in keeping “the plague” from reaching Gunnison that the intra-county protective sequestration would be lifted the next day. After more than six weeks of vacation, young children would return to the elementary schools on Monday, November 24. Churches would be allowed to re-open for Sunday service on December 1, and the movie theater was scheduled to re-open that evening.

The inter-county policy would remain in effect, however. This meant that the high school and the normal school would remain closed, as some students came from outside Gunnison County. Railroad and highway travel was still to be restricted, and all who entered the county from outside would be quarantined at the La Veta Hotel, in the town of Gunnison. Dr. Rockefeller warned that the relaxing of these measures was contingent on there being no further outbreaks of influenza. At present there was only one reported case in the county, and the several suspected cases were all very mild. Families were warned that any drop in their vigilance could result in the strict measures being enacted again. As the editor of the *News-*

⁷⁵ Flu situation very encouraging. No Deaths. *Gunnison News-Champion*, 1918 Nov 15; 1. The statement that no flu deaths had yet occurred obviously does not match with the previous report of Gavette’s death November 4.

Champion put it, “This disease is no joke, to be made light of, but a terrible calamity, perhaps as dangerous as small-pox yellow fever or diphtheria [sic] ever were when uncontrolled.”⁷⁶

In the end, Gunnison County and the Town of Gunnison did not relax their guard. Learning from the experiences of other Colorado locales that had relaxed their NPI measures only to face a slew of new cases, officials in Gunnison County decided against re-opening its schools and public places. Montrose, for example, re-opened its public schools on Monday, December 2, with plans for monitoring children and for immediately sending home any students who presented with symptoms. Within the first 5 days of December, 26 new cases appeared there. A week later, an additional 14 new cases appeared. As a result, the schools were closed again for the remainder of the calendar year. The *Montrose Daily Press* openly stated that the influenza situation now looked worse than it had previously, and that it was almost certain that there would be more deaths before the pandemic was over.⁷⁷ Fearing a similar result, Dr. Rockefeller and other Gunnison town and county officials decided against a premature lifting of the closure order and protective sequestration.⁷⁸

Gunnison County maintained its high-level guard against influenza until mid-January. At several times in December the possibility of relaxing the NPI was discussed, but in each instance it was decided to stay the course until the epidemic had abated in the surrounding counties. In fact, the quarantine was tightened. The initial period had been only 48 hours; in late November it was changed to 5 days. In mid-December it was made illegal to buy or sell a train ticket to

⁷⁶ Ban raised tomorrow. *Gunnison News-Champion*. 1918 Nov 22; 1.

⁷⁷ High school closed again due to fear of influenza; will open again on Dec. 30. *Montrose Daily Press*. 1918 Dec 5; 1; Influenza shows gain in city in last few days; looks bad. *Montrose Daily Press*. 1918 Dec 12; 1. Many other mountain towns in western Colorado relaxed their bans and quarantines about the same time. Grand Junction and Durango, for example, also partially lifted their measures. Montrose, however, seemed to fare far worse for doing so. By late December, the *Gunnison News-Champion* was reporting that the quarantine work in Montrose had been done so poorly that nearly every family there was currently affected by influenza, and that there had been some sixty deaths as a result. How the flu progresses in nearby towns. *Gunnison News-Champion*. 1918 Dec 27; 1.

⁷⁸ Quarantine not raised, but no more cases. *Gunnison News-Champion*. 1918 Nov 29; 1.

anywhere in the county except the town of Gunnison itself. In this way officials could monitor more easily all passengers entering the county and quickly escort them to quarantine.⁷⁹

Residents seemed proud of their accomplishment in keeping their county almost completely free of influenza. With perhaps a bit of morbid *amour propre*, the editor of the *News-Champion* reported that the president of the district war board in Montrose – a town in the throes of a renewed wave of influenza – had been aboard a train passing through the town of Gunnison when the conductor announced that any passengers who stepped off the train there would be taken to quarantine immediately.⁸⁰

The protective sequestration, quarantine, and social distancing measures likely kept influenza out of the county, but at a price. By late December Gunnison County residents had started to become restless. After much debate, it was decided that the grammar schools would re-open on January 6, with the high school and normal school opening a week or two later (as these schools accepted students from out of the county). Some parents resisted, fearing their children would soon become ill after coming into contact with others. In the end, however, it was decided that it was safer for the children to be in school than in the streets. In addition, failure to open the schools soon would result in an entire academic year lost, as there would be no way for the students to complete a whole year's curriculum in only half the time.

Not everyone was in agreement with this plan, however. Dr. Rockefeller, arguing that a divided policy would inevitably fail, suddenly resigned in protest. Upon hearing of his action, Dr. J. Hyatt, the health officer for the town of Gunnison, who had previously supported the decision to re-open the schools, quickly changed his mind and forbade the action. Fear of influenza combined with a county-wide feeling of “cabin fever” resulting from having nearly all

⁷⁹ Ban raised tomorrow. Gunnison News-Champion. 1918 Nov 22; 1; Reports to avoid quarantine were useless. Gunnison News-Champion. 1918 Dec 13; 1.

⁸⁰ No flu now in county. Gunnison News-Champion. 1918 Dec 6; 1.

social outlets closed as a result of the public closure order and restrictions on travel was starting to wear down the morale of the residents.⁸¹

In response to Dr. Rockefeller's sudden resignation as the county health officer, it was decided to allow each town that had a physician in charge to develop its own policies for dealing with the pandemic. For the rest of the county, Dr. Hanson and the county sheriff were granted the legal authority to handle the situation. They decided that the county protective sequestration would remain in effect for the time being. In the town of Gunnison, Dr. Hyatt reduced the quarantine period from five days to three. The measures seemed to be working, and the town of Gunnison had thus far escaped the pandemic's reach. Yet, there was need for caution. There were still several suspected cases of influenza around town and in the county, although they were mild and the patients were expected to make a quick recovery. Influenza had almost run its course, but for the time being a policy of cautious optimism seemed to be the best plan. And so Gunnison, the county and the town, remained on alert.⁸²

Finally, in mid-January, after consulting with a State Board of Health physician called to Gunnison to review the situation, the decision was made to re-open all the county's schools on January 20. This time the vote to do so was unanimous. Attendance would not be mandatory, however, to appease those parents who feared for their children's safety. A graduate nurse was to be hired, who, along with teachers, would monitor students for symptoms and make regular reports to the town physician in charge, Dr. Hyatt. Because the quarantine order would remain in effect, all students who had to enter the county to attend school would be required to spend

⁸¹ Schools will open? Gunnison News-Champion. 1918 Dec 27; 1.

⁸² Flu news. Gunnison News-Champion. 1919 Jan 3; 1.

two days in quarantine. This time could be spent in a hotel or in their rooms, provided they were adequately isolated from other guests.⁸³

Finally, on Monday, February 3, 1919, Dr. Hyatt called for an end to the protective sequestration and closure order for the town of Gunnison. On February 4, the town council met and agreed to lift the measures. The rest of the county was kept under the order for an additional two days by Dr. Hanson. The protective sequestration ended across Gunnison County on the morning of Wednesday, February 5. The county's incorporated towns, as well other camps and settlements so desiring, were given the authority to continue the NPI if they saw fit to do so. After almost four months under protective sequestration, Gunnison residents could finally breathe a sigh of relief. The proverbial coast was not entirely clear, however. County authorities were worried about the continued high levels of influenza in surrounding areas. The town of Hotchkiss (80 miles to the northwest) was still suffering some 200 influenza cases and had recently lost 6 residents to pneumonia. At Trinidad, Colorado (209 miles to the southeast), 400 to 500 cases were reported. Salida (65 miles to the east) was suffering yet another wave of influenza, with 248 cases reported there on February 20, 1919. Cimarron (45 miles to the west) reported an outbreak of 30 cases as late as early April 1919.⁸⁴ (See Map of Gunnison County and surrounding areas in Appendix II: Images and Maps)

In mid-March 1919, the third wave of the influenza pandemic did reach Gunnison County. The local newspaper reported that there were approximately 100 cases in or around the town, with an additional 40 cases in Pitkin and an unknown number of cases in other parts of the county. All of the cases were mild, however, and everyone was expected to recover as long as

⁸³ All schools to open again January 20th. Gunnison News-Champion. 1919 Jan 10; 1.

⁸⁴ Quarantine is lifted. Gunnison News-Champion. 1919 Feb 7; 1; Flu bad in Salida. Gunnison News-Champion. 1919 Feb 21; 1; Outbreak of flu at Cimarron again. Gunnison News-Champion. 1919 Apr 4; 1.

they rested properly. No additional NPI were enacted.⁸⁵ In the end, however, at least 5 young residents of Gunnison County did die from pneumonia.⁸⁶ It is impossible to know how exactly the disease made its way into Gunnison County. The fact that the county had very few cases during the period of protective sequestration and then reported at least 140 influenza cases after the policy was lifted suggests that the NPI played a role in keeping Gunnison County relatively safe in the autumn and early winter of 1918-19.

Conclusions

Gunnison's management of the influenza situation, one hallmarked by the application of protective sequestration, is particularly impressive when one considers that nearly every nearby town and county was severely affected by the pandemic. Silverton, for example, a silver mining community high in the San Juan Mountains, was extremely hard hit. Neighboring San Juan County's influenza and pneumonia rate during the period exceeded the state average by a factor of twelve.⁸⁷ Nearby towns, such as Montrose, took many of the same NPI as Gunnison but did not execute them nearly as effectively or completely. The result was that Montrose, too, suffered greatly.

The town of Gunnison was exceptional when compared to many other small communities in the American West and, probably, throughout the nation during the 1918-1920 pandemic. It may well be that Gunnison was so fortunate because nearby towns were not. Had the disease not appeared with such virulence in the nearby communities, Gunnison might not have responded as extensively as it did. With the constant reminder of what the disease was doing to the nearby

⁸⁵ Flu gets us at last. Gunnison News-Champion. 1919 Mar 14; 1.

⁸⁶ Grim hand of death clutches our community. Gunnison News-Champion. 1919 Mar 21; 1.

⁸⁷ Official reports from San Juan County list 833 influenza cases and 415 pneumonia cases for 1918. See Leonard SJ. The 1918 influenza epidemic in Denver and Colorado. Essays in Colorado History. 1989;9:9.

mountain towns of western Colorado, both the town and county of Gunnison remained motivated to maintain their NPI over the course of several months. When county officials did contemplate partially lifting the quarantine measures in December, they had the examples of other towns that had done just that and had courted renewed disaster. The result was that while the protective sequestration quarantine, school closures, and other NPI remained in place into the pandemic's third wave, Gunnison remained safe from the pandemic.

Gunnison was quick to enact NPI to reduce if not outright prevent the spread of influenza within county lines, and its public officials, medical officers, and residents should be commended posthumously for their boldness in action and cooperation in following these NPI. Moreover, given the town's location as the county seat and on two major rail routes, the town may have "lucked out" by not having had any infected persons enter before the quarantine and public meeting ban were enacted. The strict measures and a heightened public awareness of the national and regional pandemic may have also helped to keep the disease at bay in Gunnison County. Other communities across the wider region, however, had enacted similar prohibitions on public meetings (as required by Governor Gunter's executive order) and had also instituted quarantine and isolation measures. None of these other towns, with the possible exception of the extremely small community of Lake City in adjacent Hinsdale County (for which we could not find any documentary evidence), was fortunate enough to have escaped the pandemic, though.

Part of this "fortune factor" undoubtedly had to do with the relatively small population in Gunnison County and its concomitant low population density. (As noted, the population density for the county was 1.8 persons per square mile, and the population density for the town was approximately 414 persons per square mile). A small population is certainly easier to control, through both legal means and social pressure. In addition, outside of the towns of Gunnison,

Crested Butte, and Pitkin, Gunnison County was a rural, wide-open area for the most part. Once the quarantine and closure orders went into effect, it was much easier to monitor the flow of people within the county than it would have been for a larger metropolitan area, such as Denver. The few influenza victims in the county were able to rest and recuperate on their isolated farms or ranches, far from other residents. Gunnison County's low population density may have been an asset as influenza started to spread across Colorado. Once they dodged the initial bullet, residents could more easily isolate themselves from each other and from the rest of the state.

The town of Gunnison's experience with influenza raises several important and relevant questions for NPI today. Although it was a moderate-sized town for the region and period, Gunnison was strikingly smaller than any of the nation's major cities. Nestled in a high mountain valley in a remote part of the country, Gunnison was able to protectively sequester itself fairly quickly and easily. Automobile traffic in 1918 was nowhere near what it is today, and the majority of goods were transported via rail, a much more easily controlled mode of transportation. Goods could continue to move into, out of, and through the county, while passengers on those trains could be kept from stepping off the train at the designated stops or immediately escorted to quarantine if they did. Indeed, the system of quarantine for train travelers mirrored a long established and successful means of infectious disease control employed along major immigrant pathways in Eastern and Southern Europe (most notably at Hamburg and Naples).⁸⁸ Our national situation today is much more complex, with a larger population, increased population densities in most locations, greater tourism and undocumented immigration, and a larger network of entry points, roads, and air routes, making for a far more mobile citizenry.

⁸⁸ Markel H. *Quarantine!*; Markel H. "The eyes have it": trachoma, the perception of disease, the United States Public Health Service, and the American Jewish immigration experience, 1897-1924. *Bull Hist Med* 2000;74;525-560; Antin M. *The promised land*. Boston: Houghton Mifflin; 1912.

Yet as small, rural, and isolated town as it was, Gunnison was not immune from the stresses and problems that naturally accompany such a prolonged effort to restrict the movement of human beings. With children at home and with few social outlets, residents eventually grew impatient with the imposed isolation. The need for effective NPI was quite high, as evidenced by the striking number of influenza cases and pneumonia deaths in adjacent areas. But so too was the need for social interaction, entertainment, and mobility. With little documentation of how Gunnison residents actually spent their days and nights during the protective sequestration, it is difficult to ascertain how its attendant stresses actually affected their daily lives. Certainly, though, it had an effect, as evidenced by the school re-opening debate and Dr. Rockefeller's resignation. If protective sequestration is determined to be effective in dealing with an influenza pandemic, and if it can be translated efficiently to larger populations, the issue still remains of how to keep up morale and cooperation at a time of heightened stress.

PRINCETON UNIVERSITY, PRINCETON, NEW JERSEY

Location	Princeton, New Jersey
Type of Site	University with Student Army Training Corps (SATC) and Student Naval Training Corps (SNTC)
Population	1,142 men at the university; 92% enrolled in SATC and SNTC.
Population Density	Town: 3,176 persons/sq. mi
Geographical Considerations	Princeton University is adjacent to the borough of Princeton.
Influenza Cases	Approximately 400 cases in town; 68 cases in SATC as of Dec. 1918; 192 cases campus-wide for the 1918-1919 academic year.
Influenza Deaths	32 deaths in town; 1 on campus (a professor); 0 in the student body.
First Reported Case	Sep. 5, 1918
Protective Sequestration	Students forbidden to cross the street or enter off-campus buildings. Out-of-town passes withheld.
Quarantine	Removal and segregation of all “droopy or suspected cases” to Athletic Club Isolation Hospital.
Isolation	Isolation of the sick.
<i>Cordon Sanitaire</i>	N/A
Social Distancing	All public institutions and gatherings banned.
Face Mask Use	Unknown
Vaccines	N/A
Complementary NPI	Disinfecting plant treated all persons entering the Princeton campus. Rigid inspections every morning by medical officer. Thorough ventilation of barracks and bedding.
Acquisition of Supplies	Unknown
Family members	Visits by parents were strongly discouraged, yet a few parents did not yield to the directions of the military and visited their sons.
Public Coping with NPI	Students lamented the prohibitions on travel and recreation, but had little time for such activities, as their lives were controlled to the minute by the military.
Disease Reporting	SATC and SNTC disease reporting standards appear to have been based on Army and Navy regulations at the time.
Inter-authority relationships, cooperation	Military and collegiate authorities clashed on multiple issues, though in regard to the influenza pandemic, military authorities were given deference.
Public Health Education and Risk Communications	As the corps was a military unit, circulars may have been distributed at Princeton. As at Yerba Buena Island, military orders during this period often concerned the prevention of influenza.
Economic Impact	Unknown
Impact of Subsequent Waves	There were 192 cases campus-wide during the 2nd and 3rd waves of the pandemic; at least 68 of these cases occurred in SATC men by Dec. 1918.
Undocumented Factors	The precise number of parents who visited student soldiers; how supplies were acquired; and the economic impact on the town of Princeton due to the restriction of students from crossing Nassau St.
Other Factors	Compared to Harvard SATC (2 deaths with a partial quarantine), University of Michigan SATC (at least 59 deaths), and Dartmouth SATC (5 deaths as of Oct. 7, 1918).

Case Study**Princeton University, Princeton, New Jersey**

In 1918, Princeton, New Jersey, had a population of approximately 5,700, not including 1,142 university students. Geographically, Princeton is located between the nearby industrial cities of New Brunswick to the northeast and Trenton to the southwest. In 1927, the markers for Route 1 – the main highway between Jersey City (across the Hudson River from New York City) and Trenton – were laid out, placing Princeton directly on this path. At the time of the influenza pandemic, however, Princeton was a quiet town, where social life typically centered on the university. President Woodrow Wilson, the wartime leader of the nation, was an undergraduate student (1874-1879) and professor (1890-1902) at Princeton University before serving as president of the university from 1902 to 1910.

On October 1, 1918, in response to the influenza pandemic, the Princeton Board of Health ordered closed all places of public gathering, including schools, churches, movie theaters, and pool halls. The action was taken as a precaution; although influenza-related pneumonia had claimed two lives in Princeton, the area was not yet widely affected by the pandemic. Interestingly, the USPHS formed a military sanitation board for the town, consisting of the local health officer and several military and merchant marine officers. This board was given “unlimited authority to enforce all federal and state sanitary codes, and to regulation [sic] of conditions through the town.”⁸⁹ The board promised to deal severely with any violations of public health measures.

⁸⁹ Health board stops public gatherings. Princeton Packet. 1918 Oct 4; 1; Two Spanish influenza victims here. Princeton Packet. 1918 Oct 4; 1.

As a further precautionary measure, the Board of Health asked for a voluntary protective sequestration of sorts, advising the public to avoid travel out of town when possible. It also discouraged visits to and from Camp Dix, approximately 30 miles to the south. Camp Dix was a major training and staging installation during World War I, and it was in the throes of a severe influenza epidemic.⁹⁰ In the second week of October, Princeton designated an influenza hospital – the former Orange Inn – to deal with the many cases of influenza now presenting in the town.⁹¹ The Board of Health also cancelled the Liberty Parade that was to be held on October 11.⁹²

By October 18, influenza had reached epidemic status in the town of Princeton. The local newspaper reported that more than 300 cases of influenza and 50 cases of pneumonia had been reported, with 15 of these cases resulting in death. The town influenza hospital, opened only a week earlier, was now full.⁹³ With places of public amusement, churches, and schools closed, the Board of Health now requested that all stores stop selling prepared foods in places where they would be consumed on the premises. Restaurants were requested to serve meals in their dining rooms only, and then only to a small number of guests, to prevent crowding. Proprietors were notified that members of the board would be making inspections of their premises.⁹⁴

On Sunday, November 3, the town lifted its closure order. It was one of the last towns or cities in New Jersey to do so. Although the number of new cases was declining, and fewer than 16 people had died in the town from influenza-related pneumonia, the epidemic was still raging in nearby cities, especially New York City. Local authorities therefore urged residents to

⁹⁰ The local influenza situation. Princeton Packet. 1918 Oct 4; 1.

⁹¹ Princeton now has a town hospital. Princeton Packet. 1918 Oct 11; 1; Selden WK. The heritage of Isabella McCosh: a history of the health services at Princeton University. Princeton, N.J.: Princeton University Press; 1991. p. 34.

⁹² Liberty programme cancelled by health board. Princeton Packet. 1918 Oct 11; 1.

⁹³ Local hospital filled since opening. Princeton Packet. 1918 Oct 18; 1.

⁹⁴ Health board's more stringent restriction. Princeton Packet. 1918 Oct 18; 1.

continue to exercise caution. Those suffering from suspected cases of influenza were urged to keep out of contact with others, and families were advised to maintain a separate room for members who were sick. Church services were resumed on the same day, and schools re-opened on Monday, November 4.⁹⁵ In December influenza again appeared in the town, causing 75 influenza cases and 10 cases of pneumonia by late December. No closure order was re-instituted, however.⁹⁶ All told, the town of Princeton recorded 32 deaths from influenza during the second wave of the 1918-1920 pandemic.⁹⁷

Princeton University and the Various Student Military Training Corps

Like many universities at the time, in fall of 1918 Princeton University was temporarily transformed into a mobilization and training camp for U.S. military troops to be sent to fight on the European front. Indeed, in 1918 the vast majority (1,047 or 92 percent) of Princeton University's student body of 1,142 students, entered into the various branches of the military training corps, including the Army, Navy, Aeronautical, and Paymaster's School. Of this number, 706 were inducted into the Student Army Training Corps (SATC) and 341 into the Student Navy Training Corps (SNTC). Only 95 of the school's student body – those graduate students, those not of age 18 upon enrollment, or those physically disqualified – were not in one of the military training corps.⁹⁸ It is reasonable to assume that the majority of these 1,142 men were single and without children.

⁹⁵ Quarantine to be lifted this Sunday. Princeton Packet. 1918 Nov 1; 1; All churches to be opened Sunday. Princeton Packet. 1918 Nov 1; 1; Back to school. Princeton Packet. 1918 Nov 1; 1.

⁹⁶ Health board holds meeting. Princeton Packet. 1918 Dec 20; 1.

⁹⁷ Forty-second annual report of the State department of health of New Jersey – 1919. Trenton, N.J.: Published by the State; 1920. p. 369.

⁹⁸ Catalogue of Princeton University, 1918-1919. Princeton, New Jersey: Princeton University; 1918. p. 412-413.

The military ran the program in such a way that the universities involved, Princeton included, did not incur any additional expenses for housing or training the corps. Cadets were housed in regular dormitories, two to four students per room. With the increased enrollment, however, some dormitories became very overcrowded.⁹⁹ We are unable to document the specific plans for the separation of students in classes, athletic activities, and dining halls at Princeton University as a whole, nor can we document the level of concern and involvement of these students' parents.

The first influenza case in the university appeared on September 5 in the Navy Paymaster's School. With that case, the University immediately began to isolate all those presenting with symptoms of upper respiratory infection. Perhaps because of these isolation measures mixed with a healthy dose of good fortune, only five cases appeared in September. On October 1, 200 men from the Naval Training Camp at Pelham Bay Park in New York arrived at the Paymaster's School by rail. The Pelham camp experienced very high influenza and mortality rates during the pandemic, and it is therefore not surprising that the Princeton training corps' first cases appeared among the men from Pelham Bay Park. Several measures were taken to prevent the spread of pandemic influenza. Upon their arrival at Princeton, each man was medically examined for influenza symptoms and all were treated with a nasopharyngeal spray consisting of chlorazene solution and menthol. Suspected cases were sent to sick quarters for isolation and observation.

In addition, students of the Paymaster's School were separated from other Princeton students by geography and practice. First, the Paymaster Corps was housed at Princeton University's graduate school. Second, each of the two battalions had its own instructor and four

⁹⁹ The daily life of the student-sailor. Princeton Alumni Weekly. 1918 Oct 16;19:59-60.

assistants, occupied its own lecture and reading rooms, and slept in its own dormitory building. Much of daily life for the Paymaster Corps, therefore, was kept separate from other Princeton University student trainees. This separation was not absolute, however, as Paymaster cadets had a daily evening recreation period from 5:00 pm to 6:20 pm. Evidence also suggests that some students may have been given weekend leave, although given the protective sequestration measures taken during this period, it is unclear if such leave allowed for off-campus travel.¹⁰⁰

Regardless, more cases among the Pelham arrivals appeared suddenly in the first week of October, but appeared to be on the wane by the second week: only three new cases appeared between October 14 and October 18. Given the sudden onset of influenza after these Pelham cadets arrived, the commanding officer of the Paymaster's Corps recommended that the Navy send the next batch of recruits by truck instead of rail, to help keep these men separate from the public and, therefore, from the disease.¹⁰¹

Starting in October, with the onset of the epidemic in the town of Princeton, all student trainees transferred to Princeton University from other locations were disinfected at a specially constructed disinfecting plant. Rigid inspections were carried out each morning by an attending physician or by another designated officer to detect and isolate all cases or suspected cases. University President James Hibben designated the Princeton Athletic Club field house as an isolation hospital, which only admitted what were deemed to be "serious cases." Two medical assistants from the Paymaster's School were detailed to help at the field house, along with an

¹⁰⁰ Report of Admiral Albert Ross to Secretary of the Navy on Princeton Naval Unit. 1918 Nov 18. in Historical Subject Files: Wars and Princeton, Folder: Military History Naval Training Unit, Box 41, Mudd Archive, Princeton University, Princeton, New Jersey.

¹⁰¹ Officer, Material School for the Pay Corps, Princeton, to Navy Surgeon General Braisted WC, 1918 Oct 18, Folder 130212 D-4 "Princeton"; Entry 12 General Correspondence March 1912-December 1925; Headquarters Records, Correspondence 1842-1941; Record Group 52, NAB. According to a later Navy report, the station at Pelham Bay, despite its relatively isolated location and its modified quarantine, inexplicably experienced a higher attack and disease rate than other facilities located in the heart of densely populated urban areas. See Annual report of the Navy Department for the fiscal year 1919. Washington, DC: Government Printing Office; 1920. p. 2486.

orderly and an extra day and extra night nurse. For several weeks after the Board of Health ordered Princeton's public places closed, university students were prohibited from crossing Nassau Street (*cordon sanitaire*) or entering any off-campus buildings. Passes for travel out of town were strictly withheld, and only allowed "where exceptional circumstances of great weight render such furloughs very necessary."¹⁰² Barracks were kept well ventilated and bedding was aired out regularly.¹⁰³ In the Paymaster's School, cots in the dormitories were separated by at least five feet of space. Intense training requirements were relaxed so as not to overexert the cadets, and wherever possible training was done either outdoors or in a way to reduce crowding.¹⁰⁴

As influenza and pneumonia cases mounted in the town of Princeton, student trainees came under more restrictions. The various student military training units posted a line of sentries, mostly freshmen, around each dormitory every evening, forbidding student cadets to enter or leave without a proper pass. Members of the training corps were forbidden to patronize ice cream parlors or to loiter on Nassau Street, the main thoroughfare through Princeton. Handkerchiefs were worn around the arms of these sentries to distinguish them from other students, and to indicate that they had the authority to stop student trainees.¹⁰⁵ Although students

¹⁰² O'Connor C to Senior army officer, S.A.T.C., Princeton University, Princeton, N.J. 1918 Oct 8; Folder 720.4 Health - quarantine; Records of the Student Army Training Corps Units, 1918-19, Princeton University, NJ Entry 412; Committee on Education and Special Training; War College Division and War Plans Division Subordinate Offices – Education and Recreation Branch; RG 165: Records of the War Department General and Special Staffs, NACP.

¹⁰³ Address given by Rear Admiral Goodrich to Ladies Auxiliary, Document 1, McCosh Infirmary Reports 1919, Historical Subject Files, Box 280; W. L. Collins, Acting Secretary, WWI Student Army Training Corps report on SATC, December 1918. Historical Subject Files: Military History, Box 413; and Miss Gross' report, June 14, 1919. Selden Collection Health Services, Folder 1911-1920, Box 1, all in Seeley G. Mudd Archive, Princeton University, Princeton, New Jersey.

¹⁰⁴ O'Connor C to Senior army officer, S.A.T.C., Princeton University, Princeton, N.J. 1918 Oct 8; Folder 720.4 Health - quarantine; Records of the Student Army Training Corps Units, 1918-19, Princeton University, NJ Entry 412; Committee on Education and Special Training; War College Division and War Plans Division Subordinate Offices – Education and Recreation Branch; RG 165: Records of the War Department General and Special Staffs, NACP.

¹⁰⁵ Guards on the campus. Princeton Packet. 1918 Oct 18; 6.

were kept on campus, however, there is no indication that faculty were restricted in their movements. Neither were parents, several of whom, on at least one occasion, visited their children, much to the chagrin of the officers.¹⁰⁶

Conclusions

According to Princeton President Hibben, the foresight and quick action of the Navy and Army allowed the university to handle the epidemic much better than it would have otherwise.¹⁰⁷ Relations between the military and the university were not entirely smooth, however. Some members of the university administration and faculty were annoyed by the way in which the military issued public health orders. They complained that special orders were frequently issued overnight, without proper notice to academic authorities. These orders often pre-empted “carefully planned schedules and appointments of long standing,” such as large lectures and other special events. Special details would be assigned during study periods, thereby preventing students from studying. Cadets were called out of their classes and ordered to report to headquarters immediately, only to “await the convenience of the military authorities...”¹⁰⁸ Even President Hibben complained that although the withdrawal of cadets from the university each month for military service may have been a wartime necessity, it had the negative effect of “destroying all interest among the students in their academic studies.”¹⁰⁹ Whether these

¹⁰⁶ Bennet EL to Dad. 1918 Oct 27. Historical Subject Files: Wars and Princeton Box 413, Folder Military History WWI Student Army Training Corps, Letter from E. Lansing Bennett to Dad, 1918 Oct 27. Seeley G. Mudd Archive, Princeton University, Princeton, New Jersey

¹⁰⁷ Hibben J to Commanding Officer. 1919 Mar 8. President’s Papers Box 71, Folder 4 Letter from President Hibben to Commanding Officer, Bureau of Navigation. Seeley G. Mudd Archive, Princeton University, Princeton, New Jersey

¹⁰⁸ Collins VL. Report on students army training corps. Princeton, N.J.: Princeton University, December 1918. Historical Subject Files: Wars and Princeton Box 413, Folder Military History WWI Student Army Training Corps. Seeley G. Mudd Archive, Princeton University, Princeton, New Jersey.

¹⁰⁹ According to Hibben, the original plan as told to the colleges and universities was that they would have 12 weeks’ leeway for academic and military work. From the military’s standpoint, the need for officers was greater than the number that could be supplied once per quarter. Therefore staggering the withdrawal was necessary. See Hibben JG to MacLaurin R. 1918 Oct 19. Office of President Hibben, AC#117, Folder 3, Box 71, Mudd Archive,

complaints were valid or not, they point to some of the tensions that can erupt between civilian and military authorities in times of contagious crisis.

Due in part to these measures, there were “a minimum number of cases of influenza and of pneumonia, with not a single death” among the student body, although one faculty member died of pneumonia. We do know that as of December 1918, there were 68 cases of influenza reported among the SATC men.¹¹⁰ No morbidity data exists for the SNTC men. All the military corps were demobilized on Dec 21, 1918. Moreover, the report from the Princeton University Infirmary, which treated the entire student body, recorded 192 cases of influenza, 21 cases of pneumonia, and 49 cases of gripe treated during the 1918-1919 academic year, a period that combines the second and third waves of the pandemic.¹¹¹ These numbers compare quite favorably to the experience of other universities with military training corps. For example, the 2,570-member SATC at the University of Michigan (the largest SATC united in the United States at this time) experienced 1,207 cases of influenza and at least 59 deaths. Dartmouth experienced 325 cases and at least five deaths. Harvard experienced 136 influenza cases and two deaths out of its 1,450-member SATC.¹¹²

Princeton University, Princeton, New Jersey; and MacLaurin's response in MacLaurin to Hibben, 1918 Oct 24. Office of President Hibben, AC#117, Folder 3, Box 71, Mudd Archive, Princeton University, Princeton, New Jersey.

¹¹⁰ Collins VL. Report on Student Army Training Corps December 1918. Historical Subject Files, Military History: WWI Student Army Training Corps, Box 413, Mudd Archive, Princeton University, Princeton, New Jersey.

¹¹¹ Miss Gross' report, June 14, 1919. Selden Collection Health Services, Folder 1911-1920, Box 1, all in Seeley G. Mudd Archive, Princeton University, Princeton, New Jersey.

¹¹² 2,570 students attend induction rites of soldiers. Michigan Daily. 1918 Oct 2; Influenza total 117; 59 Men in service die. Michigan Daily. 1918 Nov 5. For a report on the SATC at Harvard, see Minot GR, Loeb RF. An attempt to prevent influenza at Harvard College. Boston Med Surg J. 1918;179(22):665-669; for a report on two groups of the University of Chicago SATC, see Jordan EO, Reed DB, Fink EB. Influenza in three Chicago groups. Journal of Infectious Disease. 1919;25(1):74-95. Pages 74-77 explicitly deal with the University of Chicago SATC two sections, Section A and Section B, and the similarities and differences between them and their rate of infection. Comparing Section A, in which men received frequent instructions to report illness and all ill persons with “simple colds” or suspected influenza were immediately isolated or sent home, with “Section B, in which the case incidence was about six times as great, indicates the importance of early detection and isolation of influenza cases as a preventive measure.”

The military official in charge of the Princeton training centers, Rear Admiral Caspar F. Goodrich declared that this result was possible only because of the advance preparation and the cooperation of all involved. He noted that such measures could be successful because the town of Princeton and the university were so closely interconnected and the entire community so small. Rear Admiral Goodrich also concluded that what was done in Princeton probably would not have been as successful in a larger community, especially one that was centered on commerce or manufacturing, where social distancing policies would have been much more difficult to carry out effectively.¹¹³ In addition, demobilization and the Christmas holidays shortened the duration of the epidemic at Princeton University, as students were sent home before the epidemic was fully over.¹¹⁴

¹¹³ Address Given by Rear Admiral Goodrich to Ladies Auxiliary, Document 1, McCosh Infirmary Reports 1919, Historical Subject Files, Box 280; and Collins VL. Acting Secretary, WWI Student Army Training Corps Report on SATC, December 1918. Historical Subject Files: Military History, Box 413: Military History, in Mudd Archive, Princeton University, Princeton, New Jersey.

¹¹⁴ This fact was acknowledged in a later report. Gross M. Infirmary report Princeton University, 1919 Jun 14. Selden Collection Health Services Box 1 Folder 1911-1920, Miss Gross' report, June 14, 1919. Mudd Archive, Princeton University, Princeton, New Jersey.

**WESTERN PENNSYLVANIA INSTITUTION FOR THE BLIND,
PITTSBURGH, PENNSYLVANIA**

Location	Pittsburgh, PA
Type of Site	Co-ed state institution for blind minors
Population	179 students; faculty and staff also lived on site
Population Density	N/A
Geographical Considerations	WPIB was an enclave restricted to faculty, students, and known visitors. Visitors were prohibited during the second wave of the pandemic.
Influenza Cases	12
Influenza Deaths	0
First Reported Case	Late Nov. 1918
Protective Sequestration	No visitors permitted. Children not allowed to leave facility over the weekends; stayed on premises. Some faculty and staff remained on site, but we cannot ascertain that all were confined to WPIB.
Quarantine	N/A
Isolation	N/A
<i>Cordon Sanitaire</i>	N/A
Social Distancing	N/A
Face Mask Use	N/A
Vaccines	N/A
Complementary NPI	After several children returned with influenza after Thanksgiving; school closed for one month including the Christmas holidays.
Acquisition of Supplies	Unknown, but a cold storage plant was in operation for the year 1918. Whether or not it was fully stocked in October when the school went into protective sequestration is unknown.
Family members	Family members could not visit the school; nor could students go home during the protective sequestration.
Public Coping with NPI	Unknown
Disease Reporting	Influenza was reportable on Sep. 21, 1918, in Pennsylvania.
Inter-authority relationships, cooperation	Authority was linear in WPIB. No conflicts were discovered.
Public Health Education and Risk Communications	Unknown
Economic Impact	Unknown
Impact of Subsequent Waves	After the children returned from Thanksgiving, 12 cases of influenza presented in the school, prompting authorities to adjourn until the new year.
Undocumented Factors	How supplies were acquired; what percentage of faculty/staff lived on site; number of influenza cases contracted when students were home in Dec. 1918.

Case Study

The Western Pennsylvania Institution for the Blind, Pittsburgh, Pennsylvania

The Western Pennsylvania Institution for the Blind (WPIB) was chartered in 1887. In 1894 the school moved to its permanent home in the Oakland section of Pittsburgh, a thriving commercial and residential district and the cultural and educational center of the city. In keeping with the school's mission, WPIB offered academic as well as commercial and industrial training to its students. Now called the Western Pennsylvania School for Blind Children, this facility remains open today.

The cloistered nature of the institution itself, its relatively small size, and a swiftly enacted protective sequestration policy, all contributed to WPIB's escape of the influenza pandemic, even as the disease ravaged Pittsburgh. Early in the pandemic, school officials announced that visitors would not be allowed to enter the school nor students allowed to go home for weekends. As a result of being effectively shut off from the rest of the city, no cases of influenza appeared in the school during the period of protective sequestration.

Although there is no recorded documentation, we learned from our tour of the extant building and meeting with the facility's current Executive Director, Dr. Janet Simon, that there were on-site living facilities for the headmaster and his family. In addition, there were living quarters for the faculty and staff members, many of whom, as was the custom of the day, were probably unmarried women and men.¹¹⁵ It seems likely that the majority of the faculty and staff were placed in protective sequestration along with the students. We did uncover evidence that in

¹¹⁵ Koestler FA. The unseen minority: a social history of blindness in America. New York: D. McKay Co; 1976; Baynton DC. Forbidden signs: American culture and the campaign against sign language. Chicago: The University of Chicago Press; 1996; Trent Jr. JW. Inventing the feeble mind: a history of mental retardation in the United States. Berkeley: University of California Press; 1994; Keller H. The story of my life. New York: Bantam Classic; 1990; Keller H, Shattuck R. The world I live in. New York: New York Review of Books; 2004.

the summer of 1918 the school installed a cold storage and refrigeration plant, allowing for the storage of large quantities of food.¹¹⁶ This may have played an important role in the institution's ability to seal itself off from the rest of Pittsburgh.

By late November, as the epidemic in the city appeared to abate, the protective sequestration of WPIB was lifted and students were allowed to travel home for the Thanksgiving holiday. Upon their return in early December, however, 12 cases of influenza were diagnosed among the WPIB students. As a result, officials immediately closed the school for one month and scheduled the re-opening for after the Christmas holiday. When students finally returned to school in early January 1919, the epidemic was almost over in the Pittsburgh area and no new cases appeared at WPIB. There were no influenza-related deaths at the school during the second wave of the pandemic.¹¹⁷

Pittsburgh and the Influenza Pandemic

At the time of the influenza pandemic, Pittsburgh was a major American city. With a population of more than 580,000, the city ranked ninth in population of all US cities. Covering 40 square miles, Pittsburgh had a population density approaching 15,000 people per square mile, making it one of the nation's most densely populated urban areas. It was also one of the nation's industrial centers. Andrew Carnegie, Henry Clay Frick, Andrew Mellon, George Westinghouse, H. J. Heinz, and other industrialists all set up shop in Pittsburgh. Glass, aluminum, electrical dynamos and equipment, food products, and, of course, steel were just a few of the products Pittsburgh produced during the period.

¹¹⁶ Western Pennsylvania Institution for the Blind. Annual report 1918: presented at the May 5, 1919, annual meeting. 1919: 21, 38. From Western Pennsylvania School for Blind Children library, Pittsburgh, Pennsylvania.

¹¹⁷ *Ibid.*

Like nearly every other major American city, Pittsburgh suffered extensively during the 1918 influenza pandemic. On October 3, 1918, the director of the Pennsylvania State Department of Health, Dr. F. B. Royer, ordered closure of “all places of public entertainment including theatres, moving picture establishments, saloons and dance halls” and prohibited all “meetings of every description” until further notice by the Health Department. For the time being, the closure of schools and churches was left to the discretion of local health officials. That same day, Pittsburgh city officials met to discuss the influenza epidemic and Boyer’s state board of health closure order. Mayor Edward V. Babcock only begrudgingly accepted the ban, primarily because his legal counsel reminded him that the state board of health had full power to make such orders. Nevertheless, Mayor Babcock complained to the press that “in the absence of any epidemic of influenza, that the orders of the department are too drastic.”¹¹⁸

By nightfall of October 3, Pittsburgh’s Public Health Director, Major W. H. Davis, publicly announced that Pittsburgh would follow the order strictly. As a result, he enacted a series of social distancing measures prescribed by the state and ordered that all public assemblages were to be stopped immediately, including scheduled Liberty Loan drives. Similarly, Pittsburgh’s theaters, dance halls, saloons, and other public places were closed. Ironically, restaurants, even those connected to saloons, were permitted to remain open, but no one was allowed to loiter on the premises. Schools initially did remain open during this period, but children were to be closely monitored and sent home if they presented with any symptoms. Similarly, parents were requested to keep sick children at home and to ensure that they received plenty of fresh air. Football games and other events were postponed, and the question of canceling church service and Sunday school was to be determined at a later time. Visiting sick

¹¹⁸ Influenza sweeping nation: Pittsburgh under quarantine. Pittsburgh Gazette. 1918 Oct 5; 1.

patients was prohibited except in cases of severe illness. Funerals, irrespective of the cause of death, were mandated to be small and private.¹¹⁹

One of the immediate problems was reporting of cases. By order of the State Board of Health, influenza became a reportable disease on September 21. By early October, however, when the public assembly ban went into effect, only a few cases of influenza had actually been reported in Pittsburgh, despite its widespread dissemination in that city. The reason, according to the *Pittsburgh Sun*, was that few doctors realized that they were now legally required to report their cases. The superintendent of the bureau of infectious diseases for Pittsburgh, Dr. Philip Marks, issued a circular letter to all area physicians on October 4, informing them of the new requirements.¹²⁰

By the time the Dr. Marks' circular had been distributed and the social distancing measures put in place, however, there were already approximately 50,000 cases of influenza in the state of Pennsylvania. In an attempt to halt the further spread of the disease, the Board of Health began fining violators of the closure order \$100. Residents across the state were urged not to ride streetcars, sporting events were put on hold, and indoor church services were temporarily suspended. Locally, the Carnegie Institute of Technology and the University of Pittsburgh were closed. Still, however, the public closure order was not as strict as it could have been. Clubs, county fairs, and public sales were not included in the order. Nor were schools systematically closed; the final decision to close them was left up to local school boards.¹²¹

¹¹⁹ All theaters and saloons here closed in fight against Spanish influenza epidemic. *Pittsburgh Sun*. 1918 Oct 4; 1.

¹²⁰ Physicians ordered to report cases. *Pittsburgh Sun*. 1918 Oct 4; 1.

¹²¹ Influenza sweeping nation; Pittsburgh under quarantine. *Pittsburgh Gazette*. 1918 Oct 5; 1; 70 Soldiers in barracks here stricken with influenza; Situation here does not alarm. *Pittsburgh Sun*. 1918 Oct 5; 1; Churches are closed under health order. *Pittsburgh Sun*. 1918 Oct 7; 1; Hospitals in fight against the influenza. *Pittsburgh Sun*. 1918 Oct 8; 8; Closing order being obeyed, reports show. *Pittsburgh Sun*. 1918 Oct 4; 2. On the same day that the *Sun* reported that the University of Pittsburgh had closed, it also reported that the Red Cross had supplied the University of Pittsburgh with 8,000 face masks, and that students would be required to wear them. See Red Cross supplies face masks to Pitt. *Pittsburgh Sun*. 1918 Oct 8; 9.

Alas, Pittsburgh's epidemic only worsened in the days to come, despite the efforts of health officials. By October 12, an additional 2,636 influenza cases and 231 cases of pneumonia were officially reported. More than 600 of those cases had appeared in the previous two days. Despite the local newspaper's sanguine headline "Epidemic Here Not Alarming, Figures Show," Pittsburgh's hospital superintendents were concerned enough to designate the local Kingsley recreation building as a 500-bed emergency hospital and scrambled to staff it with qualified health professionals and ancillary workers. Pittsburgh, like many other communities across the nation, was in dire need of doctors and nurses to care for influenza patients. The local chapter of the Red Cross had a particularly difficult time recruiting nurses. Married women were especially hesitant to volunteer for service that might endanger not only themselves but their families as well. The Red Cross nursing director implored physically able women to step forward and perform their patriotic duty, even if it meant taking certain risks. Further, large numbers of transient laborers who had arrived in Pittsburgh for war work, some of whom were ill with influenza, others of whom were laid off, and all of whom had little or no money to cover medical or living expenses, strained city services. The city dispensary was pressed into service to take care of the needs of this large segment of the population. Yet despite the steady growth in the number of cases, health department officials stated that there was no need for alarm, and that the peak of the epidemic would be reached shortly. Few Pittsburghers believed their calming words and complained vociferously about the health department's inadequate efforts to stem the tide of the epidemic.¹²²

Throughout October, state health commissioner Dr. Royer was barraged with pleas from local officials and business interests to rescind the closure orders. Understandably, saloon and

¹²² Epidemic here not alarming, figures show. Pittsburgh Sun. 1918 Oct 11; 14; Larger death toll is taken by pneumonia. Pittsburgh Gazette. October 11, 1918; p. 1.

theater owners complained that they were losing too much money. Pittsburgh's Mayor Babcock agreed and insisted that the closing of amusements had "thrown a pall over the community."¹²³ Dr. Royer, however, stood firm, declaring that the order would continue and that rescinding it would "at this time be criminal." Whether continuing with the public assemblage prohibition had any salubrious effect is difficult to prove; by the end of October the number of reported influenza cases amounted to almost 15,000, with approximately 1,000 patients diagnosed with pneumonia. In the 24-hour period from October 21 to October 22 alone, the city witnessed 77 pneumonia deaths.¹²⁴ Although we can ascertain from the Pittsburgh newspaper accounts that many Pittsburghers did go to work during the epidemic, we cannot determine the precise percentages of those who worked versus those who stayed home, nor does the available documentation allow us to determine accurately the economic impact of the pandemic on individuals.

On November 7, Dr. Royer and the State Board of Health announced that the ban would be lifted at noon on Saturday, November 9, with the proviso that local health departments could continue to enforce restrictions if they saw fit. The following Monday, November 11, the University of Pittsburgh re-opened its doors, although public schools, which were finally closed on October 24, would not re-open until November 18.¹²⁵ Nevertheless, the pandemic continued well into February 1919. According to Public Health Director Davis, by the third week of November the city had suffered a total of 20,873 influenza cases. And this was only the number of cases that had been officially reported; Davis believed that the actual number was five times as great. Davis added that since the start of the pandemic, Pittsburgh had more than 4,000 of its

¹²³ Mayor Babcock favors lifting epidemic bans. Pittsburgh Sun. 1918 Oct 28; 8.

¹²⁴ Schools close as deaths from epidemic grow. Pittsburgh Sun. 1918 Oct 24; 2; Epidemic now waning here officials think. Pittsburgh Sun. 1918 Oct 22; 3.

¹²⁵ City schools are closed by grip fighters. Pittsburgh Gazette. 1918 Oct 24; 1; Board decides schools open next Monday. Pittsburgh Gazette. 1918 Nov 12; 3.

residents die from pneumonia, some ten times the normal rate for the same period. Davis also feared that the disease might still be on the rise.¹²⁶

He had reason to worry. Although the worst had passed, new cases continued to mount. Over the next two months the daily influenza case rate slowly declined, but the aggregate number of city-wide cases rose by 25%, bringing the epidemic total to 25,161 cases of influenza.¹²⁷ In the end, nearly 4.3% of Pittsburgh's residents contracted influenza between late September 1918 and early February 1919, and approximately 4,500 people, or 0.8% of the population died of pneumonia.¹²⁸

Conclusions

It is not surprising that the Western Pennsylvania Institution for the Blind saw very few influenza cases and no deaths among its students. Despite its location in the heart of a residential neighborhood of Pittsburgh, where influenza was raging during this period, the WPIB students and staff already constituted a socially segregated community. During the Progressive Era, the physically and mentally handicapped, people with chronic contagious diseases, the mentally ill, and those considered to be of inferior moral stock (e.g., "wayward girls") were often shunned and/or placed in specially designed institutions.¹²⁹ Social interaction with the outside world was, as a result, minimal for these groups. The students at WPIB likely spent the vast majority of their time on school grounds. Once the epidemic began, therefore, the school was easily sealed off from outsiders and had the ability to prevent students from leaving the facility for any reason.

¹²⁶ Influenza reports indicate increase. Pittsburgh Sun. 1918 Oct 21; 8.

¹²⁷ 'Flu' and pneumonia cases show decrease. Pittsburgh Sun. 1919 Feb 3; 1.

¹²⁸ White KA. Pittsburgh in the great epidemic of 1918. The Western Pennsylvania Historical Magazine. 1985;68(3):221-42.

¹²⁹ Wiebe RH. The search for order, 1877 – 1920. New York: Hill and Wang; 1967.

TRUDEAU TUBERCULOSIS SANATORIUM, SARANAC LAKE, NEW YORK

Location	Saranac Lake, New York – upstate logging town
Type of Site	Tuberculosis sanatorium (approximately 3 miles from the town of Saranac Lake)
Population	356 patients admitted in 1918; 259 discharged; with an average daily patient census of 150.
Population Density	N/A
Geographical Considerations	The Trudeau Sanatorium was located deep in the Adirondack Mountains of upstate New York. Access was difficult even in the warm-weather months.
Influenza Cases	0
Influenza Deaths	0
First Reported Case	Unknown
Protective Sequestration	A <i>de facto</i> protective sequestration of Trudeau Tuberculosis Sanatorium existed preceding and during the pandemic because of its geographic and institutional isolation.
Quarantine	N/A
Isolation	N/A
<i>Cordon Sanitaire</i>	N/A
Social Distancing	N/A
Face Mask Use	N/A
Vaccines	A large percentage of patients received Pfeiffer's bacillus vaccine.
Complementary NPI	Isolation as practiced at the time for actively ill TB patients.
Acquisition of Supplies	Unknown
Family members	It is unknown if family members were allowed to visit during the influenza pandemic.
Public Coping with NPI	Regular, scheduled entertainments were provided for the TB patients.
Disease Reporting	N/A
Inter-authority relationships, cooperation	Authority was linear at Trudeau Tuberculosis Sanatorium. No conflicts were discovered.
Public Health Education and Risk Communications	Unknown
Economic Impact	Unknown
Impact of Subsequent Waves	Influenza struck 27 residents in Feb. 1919 and 1 orderly died.
Undocumented Factors	The acquisition of supplies; other measures taken to keep influenza out of the institutions; movement of visitors and/or patients to and from the sanatorium during the pandemic.

Case Study**Trudeau Tuberculosis Sanatorium, Saranac Lake, New York**

Dr. Edward Trudeau's tuberculosis sanatorium was located on the shores of Saranac Lake in the Adirondack Mountain Range of upstate New York. A sufferer of tuberculosis himself, Dr. Trudeau ventured to the area in an attempt to regain strength and health.¹³⁰ The cold air treatment appeared to have worked and inspired the physician to establish a sanatorium in the hope that other tuberculosis sufferers might benefit. After his death in 1915, the sanatorium that bore his name continued with great clinical distinction. Indeed, it was one of the most famous tuberculosis hospitals in the world at the time of the 1918 influenza pandemic. That year, 356 patients were treated at Saranac Lake. Approximately 150 patients were resident at any given time during the year. Many of the physicians and staff members at the Trudeau Tuberculosis Sanatorium were at one time active tuberculosis patients themselves, but by the time they were appointed to the staff (as at other tuberculosis sanatoria of the era), their cases were considered quiescent or healed before they were allowed to have contact with patients.

This small, remote community of tuberculosis patients escaped influenza in the fall of 1918. With the threat of influenza looming, the physicians vaccinated most of the patients. The efficacy of vaccination, with what turned out to be the wrong microbial agent (Pfeiffer's bacillus), was considered doubtful even by the physicians in charge at the time.¹³¹ Nevertheless, as of October 29, 1918, there were no cases of influenza at the sanatorium.¹³² One explanation for this striking statistic may have been the *de facto* protective sequestration that already existed

¹³⁰ Trudeau EL. An Autobiography. Garden City, NY; 1936.

¹³¹ James WB. and Baldwin ER. Thirty-fourth annual report of the Trudeau Sanatorium formerly Adirondack Cottage Sanatorium, November 1918; 6. Trudeau Sanatorium Collection, Adirondack Room, Saranac Lake Free Library, Saranac Lake, New York.

¹³² James WB to Baldwin ER. 1918 Oct 29. Trudeau Sanatorium Collection, Adirondack Room, Saranac Lake Free Library, Saranac Lake, New York.

at the sanatorium because of the pre-existing and consistent isolation of the tuberculosis patients and staff from the community at large. Tuberculosis sanatoria of this era were deliberately removed from society, and traffic into and out of them was strictly regulated.¹³³ Such isolation likely assisted in the defense against influenza.

In addition, tuberculosis sanatoria benefited because they already paid scrupulous attention to contemporary sanitary measures and methods, procedures that likely placed the patients of Trudeau Tuberculosis Sanatorium at an advantage. It is reasonable to surmise that the caretakers of the sanatorium took every precaution in attempting to prevent the introduction and spread of influenza – as well as any other contagious disease – among the patients.

The town of Saranac Lake itself experienced a few cases of influenza in the late fall and early winter of 1918, although the actual number of cases is not known. By December 13, 1918, there were seven cases in town, as documented by a public health survey taken by a New York City physician. Even though it seems Saranac Lake was only lightly affected by influenza in the fall, it is hard to tell with specificity, as records of the town are scarce and as the only influenza statistics available for the town come from a tattered news clipping.¹³⁴

During what would be considered the third wave of the influenza pandemic (January to April 1919), 27 cases were recorded at the Trudeau Tuberculosis Sanatorium. They included a number of nurses as well as one orderly (who subsequently died).¹³⁵ According to Dr. Walter James, President of the Sanatorium, the arrival of influenza was not unexpected. In a letter to

¹³³ Dormandy T. The white plague: a history of tuberculosis. New York: New York University Press; 2000; Lerner B. Contagion and confinement: controlling tuberculosis along the skid road. Baltimore: Johns Hopkins University Press; 1998; Bates B. Bargaining for life: a social history of tuberculosis, 1887-1938. Philadelphia: University of Pennsylvania Press; 1992; Ott K. Fevered lives: tuberculosis in American culture since 1870. Cambridge: Harvard University Press; 1996.

¹³⁴ Getting statistics on the epidemic. Adirondack Enterprise. 1918 Dec 13; 1.

¹³⁵ James WB Baldwin ER. Thirty-fifth annual report of the Trudeau Sanatorium formerly Adirondack Cottage Sanatorium, November 1919; 6. Trudeau Sanatorium Collection, Adirondack Room, Saranac Lake Free Library, Saranac Lake, New York.

Vice-President Dr. Edward Baldwin, Dr. James wrote, “I am sorry that the influenza has descended upon you, but, after all, it is only what you had a right to expect, and I am glad that you are not getting it very severely.”¹³⁶ If additional NPI were taken at the sanatorium in February, we have been unable to find documentary evidence of them.

With the patient population isolated from the small community of Saranac Lake, the sanatorium regularly had to deal with social issues related to extended periods of isolation. To help entertain the residents, many activities were held at the facility. For example, motion pictures were shown regularly, and an “Evening Club,” run by the patients themselves, was held weekly. The club hosted live entertainers and lecturers on a variety of topics throughout each year.¹³⁷ Additional live entertainment events, featuring high profile, out-of-town guests, were scheduled from time to time as well.¹³⁸ It seems highly unlikely, however, that outside entertainers were invited to the facility during the course of the influenza pandemic, and most likely, instead that entertainment was self-generated by the patients and staff during this period.

Conclusions

The Trudeau Sanatorium in Saranac Lake, New York, escaped influenza in fall 1918. Although it emerged from the second wave unscathed, there were 27 cases of influenza at the sanatorium in February 1919 during the third wave, with no patient deaths. Unfortunately, one orderly died. One lesson to be taken from this example is that of entertainment for an isolated

¹³⁶ James WB to Baldwin ER. 1919 Feb 25. Trudeau Sanatorium Collection, Adirondack Room, Saranac Lake Free Library, Saranac Lake, New York.

¹³⁷ James WB Baldwin ER. Thirty-fifth annual report of the Trudeau Sanatorium formerly Adirondack Cottage Sanatorium, November 1919; James WB and Baldwin ER. Thirty-fourth annual report of the Trudeau Sanatorium formerly Adirondack Cottage Sanatorium, November 1918. Trudeau Sanatorium Collection, Adirondack Room, Saranac Lake Free Library, Saranac Lake, New York.

¹³⁸ For a dramatic narration of social life in tuberculosis sanatoria during this period, see O’Neill, E. The Emperor Jones, Different, The Straw. New York: Boni and Liveright; 1921.

population, in this instance planned by the isolated persons themselves. In addition to providing entertainment or intellectually stimulating material, the process of planning and coordinating social events could take the residents' minds off of the forced isolation. Without specific documentary evidence, it is impossible to comment on precisely which NPI were taken by the sanatorium's medical staff to prevent the ingress of influenza. Apart from its geographic isolation from major population centers, the *de facto* segregation of the people living in the facility, and the modern sanitary and hygiene protocols then routinely applied for tuberculosis patients, no other piece of evidence explains why the patients of the Trudeau Tuberculosis Sanatorium were minimally affected by the 1918 influenza pandemic.

BRYN MAWR COLLEGE, BRYN MAWR, PENNSYLVANIA

Location	Bryn Mawr, Pennsylvania
Type of Site	Women's college
Population	465
Population Density	N/A
Geographical Considerations	Located in Bryn Mawr, Pennsylvania, outside of Philadelphia, the college housed most of the students.
Influenza Cases	110
Influenza Deaths	0
First Reported Case	Sep. 26, 1918
Protective Sequestration	Surveillance of ingress and egress. Students not on campus before protective sequestration enacted and those who left after it was in force were not allowed to return until Nov. 7, 1918.
Quarantine	N/A
Isolation	Removal of cases to infirmary; some cases traveled home upon taking ill but were not allowed to return until after campus-wide restrictions were lifted on Nov. 7, 1918
<i>Cordon Sanitaire</i>	N/A
Social Distancing	Students were prohibited from attending theaters and assembly places.
Face Mask Use	Unknown
Vaccines	Pfeiffer's bacillus vaccination of faculty, staff, students.
Complementary NPI	N/A
Acquisition of Supplies	Unknown
Family members	Some mothers stayed at the College Inn, though interaction with their daughters was prohibited during the second wave of the pandemic.
Public Coping with NPI	Academic and religious meetings continued throughout the pandemic, so BMC students had diversions.
Disease Reporting	Unknown
Inter-authority relationships, cooperation	President M. Carey Thomas had strict control over the college during the second wave of the pandemic.
Public Health Education and Risk Communications	One documented method of communication with students regarding preventive measures during the pandemic was the weekly campus newspaper.
Economic Impact	Unknown
Impact of Subsequent Waves	Unknown
Undocumented Factors	The potential spread of influenza among the guests at the College Inn and its' Tea Room, which professors, mothers, students all used, albeit never at the same time.

Case Study

Bryn Mawr College, Bryn Mawr, Pennsylvania

Introduction

In many ways, Bryn Mawr College is among the most provisional of the provisional influenza escape communities we studied. This is because while there were zero deaths resulting from influenza during the second wave of the pandemic, there were 110 cases of influenza (a case rate of 23.6% of the campus student population, which is on par or above that seen in harder hit communities). Nevertheless, because this case study raises a number of pertinent issues related to the wide spectrum of NPI taken in 1918, we include it in this report.

Historical Background

In 1918 Bryn Mawr College was (and remains) a small women's college in southeast Pennsylvania, located approximately 10 miles west of Philadelphia on the famous "Main Line" of wealthy towns extending westward along the rail lines from Philadelphia. The college was founded in 1885 by Joseph Taylor, a New Jersey physician and a member of the Society of Friends (Quakers) who sought to provide the same high-quality education traditionally provided to men. Located in the town of Bryn Mawr on a 135-acre campus designed by Frederick Law Olmstead and Calvert Vaux, the college was the first in the United States to offer graduate education to women.

Much of Bryn Mawr College's success as a leading educational institution can be attributed to the leadership of Martha Carey Thomas. Thomas, who earned her doctorate at the University of Zurich and who was later instrumental in having women admitted to the medical

school at the Johns Hopkins University, joined the Bryn Mawr faculty as professor of English and as dean in 1885. She served as president of the college from 1894 to 1922. As president, Thomas was determined to make Bryn Mawr the equal of the male-only colleges and universities in the United States.

President Thomas was knowledgeable about the state of contemporary medicine. Although she did place, in retrospect, too great a faith in the influenza vaccine of the day, she also had a very good understanding of the host of measures that could be taken to prevent or contain an epidemic. She knew from reading articles in the medical journals of the day, for example, that influenza germs could be carried 10 feet from a sneezing or coughing person.¹³⁹ She was also the sister-in-law of one of the nation's leading infectious disease researchers, Simon Flexner, who directed the elite Rockefeller Institute for Medical Research in New York City, with whom she conversed with quite frequently.¹⁴⁰ Although impossible to quantify, Thomas's medical knowledge may have played a role in both the preparedness planning and the results of the influenza epidemic at Bryn Mawr College.

Bryn Mawr's Response to the Influenza Pandemic

The first reported case of influenza at Bryn Mawr College occurred in late September 1918 in a student staying at the College Inn. The possibility of the spread of the disease was quickly made apparent, as the patient received regular student visitors. President Thomas

¹³⁹ Thomas MC to Applebee, 1918 Oct 14. Official Papers, Letterbook #63, Oct. 7, 1918 – June 22, 1919 Reel No. 139.

¹⁴⁰ Flexner JT. An American Saga: The story of Helen Thomas and Simon Flexner. Boston: Little, Brown; 1984.

therefore immediately attempted to have the patient moved either to the Bryn Mawr hospital or to the campus infirmary, where she could be effectively isolated.¹⁴¹

By October 1, campus administrators had begun to enact an “absolutely strict quarantine” – by which was meant a series of NPI designed to mitigate the spread of influenza – in an attempt to deal with the “very serious outbreak of Spanish influenza” that had erupted on campus.¹⁴² Thomas had a strong belief in the efficacy of influenza vaccination (which, as noted elsewhere in this report, turned out to be based on an entirely different microbe than the virus that causes influenza and, hence, not efficacious), and quickly ordered its widespread use on campus. All members of Bryn Mawr’s teaching and executive staff who commuted from Philadelphia via train, along with all managers, wardens, and housekeepers, were vaccinated at the college’s expense. Students and on-campus faculty and staff were offered the vaccine at the cost of \$1.00. All staying at the College Inn were also offered the vaccine for cash payment.¹⁴³ On October 7 the overcrowded College Inn was closed to further boarders, and the inn’s tea room was closed to outsiders for the duration of the quarantine.¹⁴⁴ President Thomas was adamant that all public health measures be scrupulously followed. “We must be very strict in punishing the breaking of quarantine,” she wrote the manager of the College Inn, “or we will not be able to enforce it at all.”¹⁴⁵

Students faced a series of even more restrictive measures. They were advised to avoid crowds (yet they were also expected to go to chapel and association meetings) and to get plenty

¹⁴¹ Thomas MC to Miss Taft, 1918 Sep 26, p.1. Official Papers, Letterbook #63, Jan. 2, 1918 - Oct. 7, 1918 Reel No. 138.

¹⁴² Thomas MC to M. Aubert of the French High Commission, 1918 Oct 1, p.1. Official Papers, Letterbook #63, Jan. 2, 1918 - Oct. 7, 1918 Reel No. 138.

¹⁴³ Thomas MC to M. Aubert of the French High Commission, 1918 Oct 1, p.1. Official Papers, Letterbook #63, Jan. 2, 1918 - Oct. 7, 1918 Reel No. 138; Quarantined again. The College News 1918 Oct 2: 6.

¹⁴⁴ Thomas MC to McGroarty, 1918 Oct 7. Official Papers, Letterbook #63, Jan. 2, 1918 - Oct. 7, 1918 Reel No. 138.

¹⁴⁵ Thomas MC to McGroarty, 1918 Oct 7. Official Papers, Letterbook #63, Oct. 7, 1918 – June 22, 1919 Reel No. 138.

of both exercise and rest. Students were forbidden to enter theaters and other places of public assembly and were prohibited from crossing Montgomery Avenue, the main street separating campus from town. Whereas college staff were advised to stay off the trains unless they were commuting to and from the campus, students were prohibited outright from riding public transportation. Furthermore, non-resident students were excluded from the college unless they lived near enough to campus to walk.¹⁴⁶ On October 5, several more regulations were added to these measures. Off-campus visitors, including mothers, were henceforth prohibited from entering residence halls; mothers were allowed to see their daughters only if the daughters were ill and being cared for at the infirmary.¹⁴⁷ Students were likewise forbidden to visit private homes (even those on the campus side of Montgomery Avenue) without the express permission of the dean. All gatherings save those of an academic or religious purpose were prohibited.¹⁴⁸ In late October, in response to a new regulation from the Pennsylvania Board of Health calling for an end to public gatherings and recommending the closure of schools, Thomas ordered the four-day quarantine of all students returning to campus from home. College officials feared that unless they enacted a strict quarantine of arrivals they would run the risk of having the school closed by the state board of health.¹⁴⁹

Throughout the epidemic, parents had the option of keeping students home if they wished. Students who were ill at home were not permitted to return to campus until after November 7, 1918, however, by which time the second wave of the pandemic had ended. It is unknown how many students were kept from the college by their parents, although it was noted

¹⁴⁶ Enlist now. The College News 1918 Oct 2:2; Quarantined again. The College News 1918 Oct 2; 6.

¹⁴⁷ Thomas MC to Orlady E 1918 Oct 12, p. 1. Official Papers, Letterbook #63, Oct. 7, 1918 – June 22, 1919 Reel No. 139.

¹⁴⁸ Quarantine rules extended. The College News 1918 Oct 10.

¹⁴⁹ Thomas, MC to Miss Chambers, 1918 Oct 26, p.1. Official Papers, Letterbook #63, Oct. 7, 1918 – June 22, 1919 Reel No. 139.

in a 1919 report that 25 students had “suffered from influenza in their homes” during the epidemic.¹⁵⁰ These students were likely either non-residents (girls who lived within walking distance of campus but who did not live in the residence halls) or students who remained in their homes because of illness.

Despite the campus newspaper’s claim that the college had been “violently cut off from all infusions of outside life,” and that campus activities were “practically at a standstill,” life at Bryn Mawr seemed to continue in a fairly regular fashion, and the various NPI to prevent the spread of influenza do not appear to have been as strict as they could have been.¹⁵¹ In the first week of October the college held its thirty-fourth annual opening ceremony in Bryn Mawr’s overflowing chapel. Liberty Loan rallies, tennis tournaments, hockey games, and chapel services continued throughout the semester.¹⁵² In early November, the traditional “Lantern Night” event (a ritual in which freshmen are handed colored lanterns by sophomores while singing “Pallas Athena”) was held before “a quarantine audience of Faculty and upperclassmen.”¹⁵³ Some students were also allowed to sleep in residence halls other than their own, a violation of the campus health department orders.¹⁵⁴ At least one student, apparently unaware of the protective sequestration and the ban on leaving campus, was discovered to be regularly wandering the aisles of Wanamaker’s department store in downtown Philadelphia.¹⁵⁵

There were additional problems with Bryn Mawr College’s institution of NPI. One issue was overcrowding in campus housing. The dormitories were reported to be “full to the attics,”

¹⁵⁰ Johnston JJ. History and epidemiology of influenza. In: Studies on epidemic influenza comprising clinical and laboratory investigations by members of the faculty of the School of Medicine. Pittsburgh: University of Pittsburgh; 1919. p.23.

¹⁵¹ College well isolated. The College News 1918 Oct 24: 1.

¹⁵² Bryn Mawr opens fifth war year with stand for liberal studies. The College News 1918 Oct 10: 1; Calendar. The College News 1918 Oct 10: 6.

¹⁵³ Lantern night proves freshmen’s power of song. The College News 1918 Nov 7: 1.

¹⁵⁴ Thomas MC to Ehlers 1918 Nov 2. Official Papers, Letterbook #63, Oct. 7, 1918 – June 22, 1919 Reel No. 139.

¹⁵⁵ Found. The College News 1918 Oct 17: 3.

and two cottages adjacent to campus had to be rented and filled with students. The college tea room, initially made off-limits to students wishing to dine with their parents, was pressed into meal service for those who could not take their meals in the dining halls. It also continued to act as a locus of interaction between on-campus students and faculty and to serve visitors who arrived on campus on official business.¹⁵⁶ The late-October order to begin a strict quarantine of incoming students indicates that there was either no provision for one before that time, or that the enforcement of any previous quarantine was lax. President Thomas herself was not as scrupulous in adhering to the spirit of the protective sequestration as she could have been. Although she turned down outside visitors on account of the epidemic and reduced the amount of traveling she did, Thomas appears to have taken trips to Philadelphia, New York, and Washington, DC. Thomas traveled in her personal automobile, rather than the trains, leading her to believe that she was in less danger of contracting or spreading influenza.¹⁵⁷

By early November it appeared as if the influenza pandemic was well on the wane. In response, restrictions were gradually removed. Parents were allowed once again to visit their student children, and students were allowed to travel via car to their homes, to visit the College Inn, or to use the tea room. On November 7, throngs of students traveled to Philadelphia to celebrate the lifting of the protective sequestration and other NPI.¹⁵⁸

Whether as a result of lax measures or from other causes, influenza did spread throughout the campus. On October 17 the school newspaper reported 42 cases of influenza, four of which

¹⁵⁶ Bryn Mawr opens fifth war year with stand for liberal studies. The College News 1918 Oct 10: 1. See also Thomas MC to Miss Mary F. McGroarty, 1918 Oct 7. Official Papers, Letterbook #63, Jan. 2, 1918 - Oct. 7, 1918 Reel No. 138; Thomas MC to Miss Mary F. McGroarty, 1918 Oct 23. Official Papers, Letterbook #63, Jan. 2, 1918 - Oct. 7, 1918 Reel No. 139.

¹⁵⁷ See Thomas MC to President Woolley, 1918 Oct 14, p. 1; Thomas MC to Mrs. E.R. Settermus, October 16 1918, p. 1; Thomas MC to Mrs. Stone, 1918 Oct 15, p. 1. Official Papers, Letterbook #63, Oct. 7, 1918 – June 22, 1919 Reel No. 139.

¹⁵⁸ Classes give way to peace celebration. The College News 1918 Nov 14: 1.

had developed into bronchial pneumonia.¹⁵⁹ By the end of the second wave of the pandemic in mid-November, the college had experienced some 110 influenza cases (not including those infected at home) out of a total population of 465 students (or 23.6% of the campus population). Several faculty members, including Dean Helen Taft (daughter of former President and Chief Justice William Howard Taft), also became ill. No deaths, however, were recorded as a result of these infections.¹⁶⁰

Even though the epidemic appeared to be receding, there was still a high level of concern about the possible contagiousness of recuperating students. Given misinformation and general lack of knowledge about the pathogenesis and natural history of influenza, many of Bryn Mawr's professors thought that recently ill students who had returned to class but who continued to cough were still infectious. In an attempt to impose proper respiratory etiquette on her students and to prevent another influenza outbreak, President Thomas imposed a \$5 fine on all students who did not use a handkerchief when coughing or sneezing. The measure had a "magical effect," as Thomas described it, as not a single cough was heard in the morning chapel services. Some professors, however, wanted more to be done to prevent a possible a recrudescence of influenza. In late October, as the epidemic was beginning to draw to a close, several professors made a request that the college be closed for four days, "because of the incessant coughing" and because so many students appeared "too weak to do their work." Thomas rejected the idea of

¹⁵⁹ Flu Rumors Exaggerated. The College News 1918 Oct 17: 6.

¹⁶⁰ Thomas MC to Miss Chambers, 1918 Oct 26. Official Papers, Letterbook #63, Oct. 7, 1918 – June 22, 1919 Reel No. 139; Johnston JJ. History and epidemiology of influenza. In: Studies on epidemic influenza comprising clinical and laboratory investigations by members of the faculty of the School of Medicine. Pittsburgh: University of Pittsburgh; 1919 p. 23; News in brief. The College News 1918 Oct 24: 6.

closing the campus, and instead proposed to keep convalescents out of class for one week, a compromise to which the professors agreed.¹⁶¹

Despite a very high attack rate, no deaths were reported at the college during the influenza pandemic. On-campus students were treated in the 30-bed-capacity infirmary.¹⁶² Patients were kept there until they recovered from the main bout, and then were moved to a convalescent ward in Merion Hall.¹⁶³ In mid-November, the emergency hospital was converted to a convalescent home for two months. Both the infirmary and convalescent ward were well staffed, and some Bryn Mawr alumnae even volunteered for service.¹⁶⁴

Conclusions

It is difficult to draw instructive lessons from Bryn Mawr College's response to the 1918 influenza pandemic. An attempt at protective sequestration of the campus was made, although it was probably too porous to have had much effect on the containment of influenza. Bryn Mawr College's student body was small enough to be easily monitored and lessened the strain on college health services when the influenza pandemic reached the campus. Nearly a quarter of the school's student population contracted influenza during the course of the pandemic, which ran from early September to early November. Yet somewhat surprisingly, Bryn Mawr College experienced no influenza-related deaths, despite its rather high case level (23.6%), which is on

¹⁶¹ Thomas MC to Dr. Branson, 1918 Oct 23, p.1. Official Papers, Letterbook #63, Oct. 7, 1918 – June 22, 1919 Reel No. 139.

¹⁶² Thomas MC to Mrs. Cope, 1918 Oct 10, p. 1. Official Papers, Letterbook #63, Oct. 7, 1918 – June 22, 1919 Reel No. 139.

¹⁶³ Thomas MC to Mr. Hurst, 1918 Dec 21, p.1. Official Papers, Letterbook #63, Oct. 7, 1918 – June 22, 1919 Reel No. 139.

¹⁶⁴ Emergency hospital becomes convalescent home. The College News 1918 Nov 14: 5; Influenza hospital gets ward and diet pantry. The College News 1918 Oct 24: 1.

par or above that seen in harder hit communities. For these reasons, Bryn Mawr College is among the most provisional of the provisional influenza escape communities we studied.

FLETCHER, VERMONT

Location	Fletcher, Vermont
Type of Site	Rural town
Population	737
Population Density	19.4 persons/sq. mile
Geographical Considerations	Rural agrarian town 15 miles away from a population center of more than 1,000.
Influenza Cases	2 cases
Influenza Deaths	0
First Reported Case	Oct. 30, 1918
Protective Sequestration	N/A
Quarantine	Anyone suspected of having contact with persons ill with respiratory disease (primarily family members of ill persons) was quarantined. The houses of victims were placarded with a sign, and they were required to stay in their home for a period of observation.
Isolation	In accord with state health law, influenza patients were isolated in their homes.
<i>Cordon Sanitaire</i>	N/A
Social Distancing	Schools and churches were closed from Oct. 4, 1918 to Nov. 3, 1918. Public gatherings prohibited by state order. Parsons school closed in January by local officials.
Face Mask Use	Unknown
Vaccines	Unknown
Complementary NPI	Unknown
Acquisition of Supplies	Unknown
Family members	If family lived in same residence, when quarantined or isolated, family was present and under the same restrictions.
Public Coping with NPI	Unknown
Disease Reporting	Vermont declared influenza reportable on or about Sep. 23, 1918.
Inter-authority relationships, cooperation	Unknown
Public Health Education and Risk Communications	Unknown
Economic Impact	Unknown
Impact of Subsequent Waves	At least 2 cases in Jan, 1919
Undocumented Factors	Unknown

Case Study

Fletcher, Vermont

Historical and Demographic Background

Fletcher, Vermont, is a small, rural, remote village located in Franklin County, approximately 35 miles northeast of Burlington.¹⁶⁵ In 1918, only 737 people lived in the 38 square miles composing the town of Fletcher, (a population density of 19.4 persons per square mile). In comparison, the population density of the entire state of Vermont (with just over 350,000 residents) was 37 people per square mile. The tiny village of Fletcher was chartered in 1781 from land granted to a group of influential state political and military leaders. The leader of this group and the town's namesake, General Samuel Fletcher, was a former French and Indian War veteran and member of the Continental Army during the Revolutionary War.

Response to Influenza in Vermont

Vermont health officials took early action to monitor and prevent the spread of pandemic influenza across the state. In late September, ahead of most other states, Vermont health authorities declared influenza a “contagious and infectious disease,” thereby adding it to the list of reportable diseases and giving local health officers authority to visit and placard the homes of

¹⁶⁵ The decision to examine Fletcher, Vermont, as a potential influenza escape community was made in consideration of a combination of its size, its very low number of influenza cases, and the fact that no deaths were reported during the epidemic. While other communities in Vermont also reported no influenza or pneumonia deaths for the year of 1918, they ranged in population from 4 to under 500. These communities were deemed too small to investigate. Population data in the Vermont State Board of Health report uses 1910 census population numbers. While not large villages by any means, they were large enough to have warranted serious questions as to how they may have escaped influenza. See Vermont state board of health. Twenty-second [twelfth biennial] report of the state board of health of the state of Vermont from January 1, 1918, to December 31, 1919. Rutland, Vermont: The Turtle Company, Marble City Press Publishers VT Public Documents; 1920.

patients.¹⁶⁶ In the set of instructions to local health officers, the state Board of Health also advised the home isolation of the ill and the use of handkerchiefs or napkins by patients.

Although it was not made a public decree, the ill as well as their families were advised to refrain from attending public gatherings, movies, or other forms of entertainment, and were asked to keep their children out of school.¹⁶⁷ Health officers were advised to isolate patients for at least one week, and to ask those who had been in contact with the ill to quarantine themselves for four days from the time of exposure. Public funerals were allowed, but with the provision that those who had been in close contact with the deceased or who were ill themselves would not be allowed to attend. For the time being no further action was recommended or required. In fact, the director of the state Board of Health, Dr. Charles Dalton, notified local health officers that no general closure order for schools or public places was likely, though he did make it clear that state law allowed local officers to order closures and enact other NPI.¹⁶⁸

By the last week of September it had become clear that several areas of Vermont were in the midst of an influenza epidemic. According to the Board of Health, practically all of the cases at this point were among those who had traveled to Camp Devens, Massachusetts, to visit ill family members there. The Vermont cases, however, appeared to have been milder than those observed at Camp Devens, and as a result, the Board of Health did not believe that any wider action was required as yet.¹⁶⁹ Meanwhile, several towns had taken independent action to prevent

¹⁶⁶ St. Albans free of influenza. St. Albans Daily Messenger. 1918 Sep 23. States with much larger populations, such as Massachusetts and New York, did not make influenza a reportable disease until September 30 and October 14, respectively. See Fourth annual report of the State Department of Health of Massachusetts – 1918. Boston: Wright and Potter Printing Co., State Printers; 1919. p. 4; Rickards BR, editor, Official Bulletin of the New York State Department of Health. 1918 Oct 15;3(10):1.

¹⁶⁷ Dalton CF. Spanish influenza (instructions to Vermont health officers). (undated) From Governor Graham Papers, Reel S-3162, Vermont State Archives, Montpelier, Vermont.

¹⁶⁸ Dalton CF. Spanish influenza further instructions to health officers. 1918 Sept 27, From Governor Graham Papers, Reel S-3162, Vermont State Archives, Montpelier, Vermont.

¹⁶⁹ Dalton CF[?] to Governor Graham, 1918 Sept 27, From Governor Graham Papers, Reel S-3162, Vermont State Archives, Montpelier, Vermont.

or mitigate the spread of pandemic influenza. Stowe, Rutland, and Shelbourne, for example, enacted public closure orders, closed schools, cancelled church services, and prohibited public gatherings.¹⁷⁰ Other areas that had begun to experience influenza cases followed suit.¹⁷¹

By the first week of October, the influenza situation in Vermont had grown serious enough to warrant more centralized and decisive action. On October 4, Governor Horace F. Graham, like many other governors across the U.S., enacted a statewide ban on public gatherings. All schools, churches, movie theaters, and places of public entertainment and gathering were closed, and public assemblies were prohibited. Local health officers were directed to enforce the order until further notice from the Board of Health.¹⁷² That notice came one month later, on November 3, when Governor Graham ended the closure order.¹⁷³

In the end, Vermont experienced 43,735 reported cases of influenza between mid-September 1918 and February 1919. Of this number, 1,772 deaths occurred in 1918 alone. Given the likelihood of underreporting, the number of actual cases may have been more than 50,000.¹⁷⁴ Despite the state's rural nature and the geographic isolation of many of its towns and villages, more than 12 per cent of Vermont's residents contracted influenza during the second wave of the 1918-1920 pandemic, and 0.5 per cent of its population died as a result of influenza complications.

¹⁷⁰ Grip shows no let up in state. St. Albans Daily Messenger. 1918 Oct 3; 1.

¹⁷¹ Dalton CF [?] to Governor Graham, 1918 Sept 27; From Governor Graham Papers, Reel S-3162, Vermont State Archives, Montpelier, Vermont.

¹⁷² Dalton CF. Order relating to the control of influenza, October 4, 1918. From Governor Graham Papers, Reel S-3162, Vermont State Archives, Montpelier, Vermont.

¹⁷³ Dalton CF. Closing order vacated November 3, 1918. From Governor Graham Papers, Reel S-3162, Vermont State Archives, Montpelier, Vermont.

¹⁷⁴ Vermont state board of health. Twenty-second [twelfth biennial] report of the state board of health of the state of Vermont from January 1, 1918, to December 31, 1919. Rutland, Vermont: The Turtle Company, Marble City Press Publishers VT Public Documents; 1920. p. 11.

Fletcher and the Influenza Pandemic

Information regarding Fletcher's specific experience during the influenza pandemic is scant. The pandemic certainly did reach the general area, as St. Alban's – the nearest town of significant size (15 miles away; population 7,588 in 1920) – had experienced enough influenza cases by September 27 to close its schools, have its hospital overcrowded with patients, and require extra lay nurses.¹⁷⁵

Meanwhile, Fletcher residents engaged in activities that increased their contact with others and from the wider region. For example, in mid-September, as the disease was spreading across the area, a Red Cross dance was held in Fletcher. A few days later, many Fletcher residents attended the county fair in the neighboring and larger town of Essex.¹⁷⁶ On September 18 a soldier from Camp Devens, Massachusetts, arrived in Fletcher for his wedding and 120-guest reception.¹⁷⁷ By this time Camp Devens was in the midst of a major influenza epidemic: more than 14,000 cases (28 per cent of the camp's population) and 757 deaths occurred in the month of September alone.¹⁷⁸ With a good amount of fortune, Fletcher did not suffer an outbreak of influenza as a result of these potentially risky social interactions.

Fletcher did experience at least a few individual influenza cases, however. On October 30, the St. Alban's newspaper reported that one Fletcher woman was ill and that another, Mrs. L.H. Scott, had recuperated enough to leave her home. The Scott household had been

¹⁷⁵ Epidemic still rages in state. St. Albans Daily Messenger. 1918 Sep 27; 1.

¹⁷⁶ Fletcher. The Burlington Free Press. 1918 Sep 19; 9.

¹⁷⁷ Fletcher. St. Albans Daily Messenger. 1918 Sep 24.

¹⁷⁸ Byerly. The fever of war. p. 74-75.

quarantined, the only recorded case of quarantine in the town.¹⁷⁹ In early January 1919 the newspaper reported that two Fletcher residents had fallen ill, and that one school had been closed on account of influenza. Yet it appears that no deaths resulted from these few cases.

Conclusions

It is very difficult to draw conclusions from the case of Fletcher, a geographically remote and sparsely populated hamlet, and its response to the 1918 influenza pandemic. Vermont's early classification of influenza as a reportable and quarantinable disease may have alerted local officials to the spread of the disease and to the need for increased monitoring. It is impossible to ascertain whether this had any direct impact on Fletcher, however. Even without official decrees from state boards of health, local officials and private physicians across the nation either required or strongly advised influenza patients to remain at home while they recovered. Thus it seems likely that Fletcher's health officer would have required Mrs. Scott (the one quarantined case) to remain at home even if the state Board of Health had not issued such an order. The decentralized nature of Vermont's public health structure may have allowed for and perhaps even encouraged independent local action, as evidenced by the measures taken by Stowe, Rutland, and Shelbourne. Yet the governor and state Board of Health did not move to close public places until approximately three weeks after the start of the influenza epidemic in Vermont. This is analogous to the delay experienced in Colorado, another rural state with areas of very low population density.

A very small, rural town located 15 miles from the closest population center of significant size, St. Alban's, and 35 miles from Burlington, Fletcher likely had little interaction

¹⁷⁹ Fletcher. St. Albans Daily Messenger. 1918 Oct 30; 2. Gillilan AW, Harvey CO, Lamb WA. Town of Fletcher annual report of the town officers for the year ending January 31, 1919. Cambridge Transcript Press 1919. p. 30-31.

with the larger region, aside from the few Camp Devens soldiers who came home on occasion.

While the pandemic was spreading across Vermont in the middle of September, Fletcher's residents attended the county fair, a Red Cross Dance, and a wedding, and they welcomed home soldiers from Camp Devens on multiple occasions throughout the fall of 1918. Fletcher's experience with the influenza pandemic (2 cases and no deaths during the second wave) may have been influenced by the NPI taken but was, more likely, shaped by good fortune, remote location, and viral normalization patterns.

SECTION VI – Additional Factors Related to the Attempted Containment of the 1918-1920 Influenza Pandemic

A. Introduction

The following section describes in greater detail additional factors related to the attempted containment of the 1918-1920 influenza pandemic that we identified during our research. These factors include the use of face masks and public health risk communications/education, two NPI that were frequently implemented. Additionally, we review how military bases and installations responded to the pandemic, with a discussion of their theoretical advantages and disadvantages. Finally, we examine the state and relative inefficacy of influenza vaccines during the 1918-1920 pandemic. Although all of these measures were often integrated into the narratives of the 7 case studies, they are of sufficient historical and public health policy importance to warrant further analysis.

B. Use of Face Masks in San Francisco, CA, Seattle, WA, and Tucson, AZ

During the second and third waves of the 1918 pandemic, many health officials in communities across the United States proposed that wearing face masks could help slow and control the pandemic and developed policies based on this conviction. The majority of these communities were in the Southwest and along the Pacific Coast. Typically, mask orders were first issued for health workers, such as physicians, nurses, and orderlies, staffing hospitals and clinics with influenza patients. As the epidemic worsened, mask wearing was often recommended for the general population, especially when residents ventured outside, on to the streets and in public places. Finally, as the pandemic further intensified, mask ordinances were passed by city, county, and state authorities and the violation of such ordinances made punishable by fines ranging from \$5 to \$10 and jail sentences ranging from several days to weeks. (For images related to face masks in 1918 see Appendix II: Images and Maps).

We are now aware that the material used in the 1918 masks (gauze or buttercloth) was not tightly woven enough to offer much protection against the spread of influenza.¹⁸⁰ But in 1918 several studies published in medical journals had hypothesized that masking patients and health care workers could mitigate the contagiousness of respiratory diseases.¹⁸¹ It is still instructive to review briefly the role of face masks in attempts to control the spread of influenza in 1918. Our review demonstrates that:

- Initially, many people wore face masks willingly and voluntarily, in deference to both the importance of public health and patriotism during World War I.

¹⁸⁰ Derrick JL, Gomersall CD. Protecting healthcare staff from severe acute respiratory syndrome: filtration capacity of multiple surgical masks. *J Hosp Infection*. 2005;59:365-8; Lau JTF, Tsui H, Lau M, Yang X. SARS transmission, risk factors, and prevention in Hong Kong. *Emerg Infect Dis*. 2004;10:587-92; Chen YC, Chen PJ, Chang SC, Kao CL, Wang SH, Wang LH, Yang PC. Infection control and SARS transmission among healthcare workers, Taiwan. *Emerg Infect Dis*. 2004;10:895-8.

¹⁸¹ See, for example, Doust BC, Lyon AB. Face masks in infections of the respiratory tract. *JAMA* 1918 Oct 12;71(15):1216-9.

- As time went on, however, especially in areas where mandatory face mask laws were enacted, political and legislative debate and grassroots resistance often developed.
- From the epidemiological evidence related to the 1918 pandemic, it is not possible to prove or infer that the wearing of face masks affected the infectivity rate in either a positive or negative way in the communities where ordered.
- Communities were much less likely to support disruptive NPI when ordered a second time. For example, when community-wide social distancing measures were lifted and then reinstated and then followed by further restrictions or ratcheting-up, the historical record suggests that non-compliance and resistance were likely to follow.

San Francisco, California

San Francisco led the continental United States in the development and articulation of the mandatory face mask ordinance. The city's health officer, Dr. William Hassler, strongly believed that if worn properly and universally, face masks could be instrumental in containing the influenza pandemic. As one of Dr. Hassler's colleagues, Dr. William Ophuls, the Dean of Stanford's Medical School, explained, "as far as experiments show, the influenza bacillus cannot get through a properly made gauze mask."¹⁸² On October 20, 1918, about one month after San Francisco's first influenza case (reported on September 23), Dr. Hassler recommended that, in addition to health workers, all people working in public service jobs don masks. Several days later San Francisco's mayor, James Rolph, endorsed Dr. Hassler's recommendation, and at their joint behest the San Francisco Board of Supervisors passed a mask ordinance on October 24 for all San Franciscans. The epidemiological record reveals that San Francisco's mask ordinance

¹⁸² Influenza bug cannot pass through mask, Dean asserts. San Francisco Chronicle. 1918 Oct 27; 7.

was passed at the height of the epidemic, which occurred on October 25, a day with 1,407 new cases and 82 deaths reported.

The mask ordinance, which relied upon thousands of masks fabricated by the American Red Cross volunteer workers and distributed at kiosks throughout the city, was formally enacted on October 28. Its violation carried a fine of \$5-10 or up to 10 days imprisonment. According to Dr. Hassler and other health authorities, approximately 90% of San Franciscans complied with the mask order. Some, however, bucked the law. The day the ordinance went into effect 110 people were arrested; on October 30, seven violators were fined \$10 each, and the following day, sixty-nine people were arrested. In one instance, one policeman's attempt to apprehend a "slacker" – as both war and mask resisters were called – resulted in a three-person melee with shots fired. Furthermore, despite the proclamations made by Dr. Hassler and Mayor Rolph about the efficacy of the masks and high rates of compliance, on at least one occasion each of them was caught in public with his mask dangling from his chin.¹⁸³ With cases on the wane and the designation of November 11 as Armistice Day, San Francisco officials decided to rescind the mask ordinance on November 21. The next day, Dr. Hassler proudly claimed that the wearing of masks had prevented 20,000 cases of illness and saved 1,500 lives.

Nevertheless, the epidemic was not yet over in San Francisco. As in many other parts of the country, the city was hit in early January by the third wave of the pandemic: 473 new cases and 34 deaths were reported on January 5, 1919. On January 11, the San Francisco Board of Supervisors passed a second mask ordinance. This time, however, citizens were much less willing to comply. During mid-January, Mayor Rolph received several strongly worded letters

¹⁸³ Influenza, as well as Huns, is defeated. San Francisco Examiner. 1918 Nov 12; 9. Photograph of Mayor James Rolph on the shoulders of fellow San Franciscans with his mask dangling from his ear. All S.F. to unmask at noon today. San Francisco Examiner 1918 Nov 21; 11. Dr. William C. Hassler was photographed without his mask at the Meehan-Fulton Saturday night fight; when confronted, Dr. Hassler promptly paid the fine.

of complaint; thousands assembled at the Dreamland Ice Rink to participate in a protest organized by the vociferous Anti-Mask League, and hundreds of arrests were made. Dr. Hassler continued to tout the efficacy of the mask ordinance, warned against throwing caution to the wind, and correlated a drop of approximately 75% in cases by January 25 to compulsory mask wearing. As the third wave subsided in San Francisco, the second mask ordinance was finally rescinded on February 2.

With hindsight, we can see that the implementation of the mask ordinance on October 28 coincided with the peak of the second wave of the pandemic, which began to decline slowly but steadily over the next four weeks. This conclusion was reached by California's state health commissioner, Dr. William K. Kellogg, in a special 1919 report that evaluated the NPI implemented in the state during the second wave and compared graphs of infection and death rates in various American cities. Dr. Kellogg demonstrated that infection and death rates were similar in Boston and Buffalo, neither of which passed a mask ordinance, that Los Angeles had lower rates without a mask law, and that Stockton suffered even higher rates than San Francisco despite a more consistent and stringent mask policy. Crosby corroborates this conclusion, noting that the number of deaths in San Francisco was similar to deaths in non-masked cities – in the end, about 50,000 cases and about 3,700 deaths in a city with a population of approximately 500,000.¹⁸⁴ Although Dr. Kellogg disagreed with his colleague Dr. Hassler and wrote that the mask was “ineffective,” he added that this did not “necessarily disqualify the mask as a useful agent for application by the intelligent individual as a means of personal protection.”¹⁸⁵

Dr. Kellogg's report, other contemporary discussions of face masks, and the broader historical record suggest that masks have the potential to cause a false sense of security, even as

¹⁸⁴ Crosby. America's forgotten pandemic. p. 91-120.

¹⁸⁵ Kellogg WH. Influenza: a study of measures adopted for the control of the epidemic. Sacramento: California State Printing Office; 1919. California State Board of Health Special Bulletin No. 31, p. 12.

many people wore their masks haphazardly and improperly. A masked person could become convinced that he or she could not transmit nor contract influenza, a mistaken mind-set that could inadvertently harm the public health. The United States Navy came to a similar conclusion.

No evidence was presented which would justify compelling persons at large to wear masks during an epidemic. The mask is designed only to afford protection against a direct spray from the mouth of a carrier of pathogenic microorganisms; and assuming that it affords such protection, the probability that the microorganisms will eventually be carried into the mouth or nose by the fingers is very great if the mask is worn for more than a brief period of time. Masks of improper design, made of wide-mesh gauze, which rest against the mouth and nose, become wet with saliva, soiled with the fingers, and are changed infrequently, may lead to infection rather than prevent it, especially when worn by persons who have not even a rudimentary knowledge of the modes of transmission of the causative agents of communicable diseases.¹⁸⁶

The San Francisco case is also important because it illustrates the influence that a city with well-respected and well-organized health authorities can have on other cities and towns. The combination of Dr. Hassler's professional stature, his proclamations of the success of the mask ordinance, and similar statements and communications by Mayor Rolph prompted many communities in California and throughout the West to enact face mask laws. Two of the cities that followed San Francisco's model are discussed below.

Seattle, Washington

Influenza first appeared in the state of Washington at Camp Lewis on September 23, and in Seattle on October 4. Seattle's health commissioner, Dr. J. S. McBride, responded only tentatively to the pandemic, initially requesting that public gatherings be forbidden. He gradually ratcheted up, mandating closures and implementing social distancing measures. In addition, Dr. McBride worked with physicians from the Puget Sound Navy Yard to develop a

¹⁸⁶ Annual reports of the Navy Department for the fiscal year 1919. Washington, DC: GPO; 1920. p. 2490.

heat-killed bacterial vaccine, which was used to inoculate over 10,000 residents. Despite the efforts, infection and death rates continued to increase. Taking its cue from San Francisco, on October 29, Seattle ordered the mandatory wearing of six-ply gauze masks, and the following day the state health department issued a similar order. Thus the entire state was under a mask order. As in San Francisco, the majority of Seattle residents complied with the mask order, although a minority refused for personal, political, or religious reasons. On November 12, the mask ordinance was rescinded and not reinstated.¹⁸⁷ Given Seattle's short-lived experimentation with mask wearing, it is unlikely that this ordinance had much of an impact on the course of the epidemic there. In the end, approximately 1,440 people died from influenza or pneumonia during the second and third waves in Seattle, a city with a population of about 360,000 at the time.

Tucson, Arizona

Influenza did not appear in Tucson until October 10, 1918, when twenty-four cases were reported. In response, the city health officer, Dr. Meade Clyne, distributed the USPHS influenza pamphlet "Spanish Influenza, Three-Day Fever, the Flu," and the mayor issued closing orders for schools, theaters, and other sites where people might congregate. Given that influenza arrived relatively late in Tucson, the epidemic was still cresting on Armistice Day, November 11; indeed, eighteen new cases were reported the day after a large armistice parade. In light of these new cases, the *Tucson Star* suggested that the city emulate San Francisco and issue a mask ordinance.

¹⁸⁷ Rockafeller N. 'In Gauze We Trust' public health and Spanish influenza on the home front, Seattle, 1918-1919. *Pacific Northwest Quarterly*. 1986; 77(3):104-13.

On November 17, Dr. Clyne and the city board of health passed a mask ordinance requiring that masks of at least four thicknesses of butter cloth or at least seven thicknesses of ordinary gauze, covering the nose and mouth, be worn in places of business. By November 20, Tucson authorities had started to arrest violators of the mask ordinance. Believing that the initial order was not strict enough, on November 22, the board of health added an amendment to the original order stating that no person could appear anywhere in the city without a mask. Wearing the mask became mandatory and universal; the only exceptions were private homes.

With cases on a gradual decline in late November, anxious merchants convinced authorities to allow businesses to open. Although residents were instructed to continue to wear masks as they went about their daily business, many did not comply. On December 13, the Tucson city council passed another ordinance reiterating the mask law and giving the city more power to enforce the edict. Not surprisingly, scores of arrests followed, many by the twenty-five non-uniformed officers commissioned for the task. For instance, on December 18, forty-six people were apprehended for failing to wear masks and fined \$10 each. Tucson residents did not comply as willingly with the mask ordinance as their San Francisco and Seattle counterparts. The *Tucson Citizen* estimated that 90% of the city's residents were non-compliant.¹⁸⁸ Outraged by the mask ordinance, John Metts, a local businessman, sued the city, and won, prompting Tucson residents to doff their masks on December 24. The city was lucky insofar as it was spared the third wave, which struck the nearby and bigger city of Phoenix with a vengeance.¹⁸⁹ Tucson, a small city of 18,000, and the surrounding region comprising Pima County (total

¹⁸⁸ Luckingham B. To mask or not to mask: A note on the 1918 Spanish influenza epidemic in Tucson. *J Ariz Hist.* 1984;24(2):191-204, see p. 199.

¹⁸⁹ Luckingham. Epidemic in the southwest.

population of city and county, 34,680) recorded 209 influenza-related deaths in the fall of 1918.¹⁹⁰

Conclusions

These three cases demonstrate that city and state officials applied mask ordinances as the pandemic was peaking in their communities. Of the three, San Francisco had the greatest degree of compliance, at least during the weeks following the first declaration of the ordinance. In all three, however, the materials and the wearing of masks were not standardized. Although specific instructions on mask composition were disseminated and the American Red Cross fabricated many of the masks based on the four-to-eight layer gauze model, a person could just as easily don a home-made mask constructed of medium to thick gauze or butter cloth. In some places, handkerchiefs were accepted as substitutes, and many women chose to wear chic masks made of chiffon lest they appear unfashionable. In many instances masks were not tied correctly around the nose and mouth or worn consistently in all required public places. Moreover, in San Francisco, Seattle, and Tucson, there were “slackers” who refused to wear the masks at all, some of whom were arrested and temporarily incarcerated in the city or county jail.

In these three cases, the mandatory mask law was controversial. Its passage required legislative or municipal debates or sessions in which agreement was reached despite opposition from business leaders who were worried about lost revenue or from citizens who found the mask to be impractical, annoying, or a violation of their privacy. Mayor Rolph responded to one such critic in a January 1919 Board of Supervisors meeting by claiming the higher moral and medical

¹⁹⁰ The influenza epidemic: review of the conditions as they presented themselves at the beginning of 1919. Bulletin of the Arizona State Board of Health. 1919 Apr 19;7(9):5-6. According to the 1920 census, Tucson’s population was 20,292 and Pima County, where the city is located, was 34,680. We do not know how many of the 209 influenza-related deaths were in the city versus the county.

authority, “We should give our minds to serious matters instead of fighting the little inconvenience occasioned by the wearing of a mask for the protection of the general public.”¹⁹¹

The historical record suggests that the institution of a mandatory face mask ordinance has the potential to produce social conflict. Although at present it is not uncommon for people in Asia to don masks voluntarily because of perceived health threats, in the United States, the values of civil liberties, individual freedom, and privacy, as well as the litigious nature of American society, suggest the potential for legal action and civil disobedience. Notably, public health law today is much more oriented toward individual rights than it was in 1918.¹⁹² Furthermore, the coordination and manpower needed by police authorities to enforce a mask law could monopolize precious human resources during a health crisis when they might be better spent on other initiatives.

Currently there is great debate among public health experts on the efficacy of face masks. Indeed, we could not locate any consistent, reliable data that face masks, as available and worn in 1918, conferred any protection to the populations that wore them. Yet, learning a lesson from the past, we should not let masks engender a false sense of security. Instructing people on the proper use of face masks (if they are to be worn at all in an upcoming pandemic), as well as their limitations, is important to public health education efforts.

¹⁹¹ City and County of San Francisco. Journal of proceedings Board of Supervisors. San Francisco: The Recorder Printing and Publishing Company; 1919. Mayor James Rolph, quoted in meeting of 1919 Jan 27; p. 50.

¹⁹² Gostin LO. Public health law: power, duty, restraint. Berkeley: University of California Press; 2000; Malone KM, Hinman AR. Vaccination mandates: the public health imperative and individual rights. In: Goodman RA, Rothstein MA, Hoffman RE, Lopez W, Matthews GW, editors. Law in public health practice. Oxford: Oxford University Press; 2003.

C. Public Health Risk Communications/Education

An essential aspect of the management of any pandemic is the educational campaign directed by public health officials and other medical authorities to the public at large. In the case of the 1918 pandemic, it was generally the policy of the USPHS to send out such information to state and local health authorities, often by telegram and circular. Moreover, these materials were widely transmitted to the press.¹⁹³

During the 1918-1920 pandemic, the U.S. Surgeon General's news releases contained some of the most accurate and comprehensive public health messages of the day. These articles and pamphlets were typically supplemented with cartoons and posters that appealed to the literate and non-literate alike. Local and state officials had the option to use and modify these educational materials for localized public health campaigns. In addition, these materials were widely reprinted in newspapers across the nation. As noted earlier in this report, while the role of media in American society was certainly smaller in 1918 than that seen today, there were thousands of newspapers with many editions per day, covering every detail of the pandemic and reaching a huge readership of Americans.

A pandemic in the 21st century will, undoubtedly, demand and encourage the rapid dissemination of clear and concise messages articulating what is known and unknown about the disease, the level of risk, and effective methods of disease prevention. These materials will be distributed to newspapers and broadcast media as well as across the Internet and emergent forms of public media.

It is instructive to review some examples of the public health educational materials that circulated during the pandemic. In Appendix II, you will find a series of reproductions of such

¹⁹³ The only USPHS communication to physicians or health officers exclusively was sent to medical officers of quarantine stations at various ports on August 16, 1918. See Crosby. [America's forgotten pandemic](#). p. 31.

images from the newspapers of the day. These documents demonstrate how public health authorities, public utilities, local agencies, and commercial producers of health products or pharmaceuticals disseminated both written and visual messages pertaining to the prevention and containment of the influenza pandemic. These materials range from expert health advice distributed by the federal government (i.e., the USPHS or the Surgeon General of the U.S. Army) to Macy's Department Store advertisements selling sanitary cloth window ventilators and nostrums against influenza. Among the most widely circulating materials were the rules formulated by the USPHS on how to avoid respiratory disease; not only did newspapers publish these rules as public service announcements, but companies (including Colgate and many others) integrated them into announcements that advertised their products. In those places where mask ordinances were passed, health officials often placed notices in newspapers encouraging their use. Conversely, those opposed to the wearing of masks published advertisements discouraging their use. Although the media for the dissemination of public health education have changed over time, they are still common to Americans in the 21st century, as, for example, the myriad of health related websites on the internet, and they remain critically important.

Without scrupulous attention to the informational materials distributed to the public about the pandemic itself, vaccine issues, prevention efforts, and other measures, there is an increased risk of the circulation of misinformation and, worse, responses to the pandemic that may be detrimental to the public's health. For example, during the 1918 influenza pandemic, Americans across the nation read newspaper advertisements for drugs and remedies that were disguised as official announcements with authoritative language and sly mentions of products.¹⁹⁴ These shrewd marketing tactics may have increased sales of medicines, but undoubtedly they also created confusion and, potentially, harm. Authorities need to present clear, accurate, and

¹⁹⁴ Spanish influenza is epidemic here. Pittsburgh Gazette Times. 1918 Nov 1; 9.

consistent information in times of crisis. Public health officials and health care professionals must also be prepared to refute misinformation and investigate or expose nefarious entities selling bogus drugs, vaccines, nostrums, and putative cures for pandemic disease as well as provide expert explanations on the relative value of non-Western and alternative medical therapies that might be recommended in a 21st century American public health crisis.

A major goal of public health education messages is to ensure that the public has the knowledge to protect itself. Prevention methods and infection control practices are the first line of defense, but there are other education topics as well. Dismantling rumors keeps the public properly informed and less prone to panic due to misinformation. Public health education has the responsibility to explain the rationale behind the NPI and encourage popular consensus, while minimizing the potential for the stigmatization of those infected or of particular groups.¹⁹⁵ This education also needs to account for linguistic, literacy level, ethnic, cultural, religious, and other community differences that affect how information is distributed and used in diverse communities. Moreover, those charged with the responsibility of educating the public must ensure that their information is current and that messages do not contradict one another.

Finally, the importance of early, accurate, and consistent reporting of disease risk and incidence cannot be overstated. Governments, hospitals, physicians, and even families have a responsibility to the public to be honest and transparent in such tasks, as evidenced by the negative consequences of concealing the initial SARS outbreak of 2003 in Guangdong, China.¹⁹⁶ One could also argue that Indonesia's reluctance to declare its problem with the spread of H5N1 influenza among domestic poultry flocks in 2003-4 has increased the spread of that

¹⁹⁵ US Department of Health and Human Services. HHS pandemic influenza plan. November 2005, Part 2, Supplement 10, p. S10-9.

¹⁹⁶ Mazzulli T, Farcas GA, Poutanen SM, Willey BM, Low DE, Butany J, Asa SL, Kain KC. Severe acute respiratory syndrome-associated coronavirus in lung tissue. Emerg Infect Dis [serial online] 2004 Jan [12/06/05]. Available from: URL: <http://www.cdc.gov/ncidod/EID/vol10no1/03-0404.htm>

disease in bird populations and may increase the risk of its spread to humans. Consistent and early epidemiological tracking and surveillance can guide and advance containment strategies along with public health education efforts, travel advisories, and other NPI.

In sum, public health educational and communication efforts are central components to any pandemic preparedness or response. Many public health authorities during the 1918 pandemic on the federal, state, and local level did a superb job of disseminating critical information to the populations they served. The visual educational materials developed in 1918 that appear in Appendix II (and a host of additional documents we did not include in this report) could be of great value to authorities charged with developing public health educational programs today.

D. Military Communal Responses to the 1918-1920 Influenza Pandemic

Many factors influenced individual communal responses to the 1918-1920 influenza pandemic. Two of the more critical, as demonstrated in our profile of the 7 provisional influenza escape communities, were: 1) population, population density, and the varied patterns of viral normalization in the affected communities; and 2) whether protective sequestration was established, whether it was established early enough, and whether it was strictly enforced. When considering the value of protective sequestration and other NPI, military communities might have had a distinct advantage over civilian communities. Theoretically, military communities might have had the ability to enact NPI swiftly and completely, as the chain of command and the lines of authority were more clearly defined than in civilian communities. In the case of Yerba Buena Island, for example, the commandant was able to order all personnel to remain on the island and to prohibit any outsiders from entering the base. As may be recalled, not a single case of influenza appeared at Yerba Buena Island until after November 21, 1918, when the protective sequestration order was lifted.

Given the context of World War I, however, any conclusions about the ease with which NPI can be implemented in a military community are tenuous. Indeed, as the historical record for the 1918 pandemic illustrates, sealing off military facilities during times of war or crisis can be difficult if not impossible. The small training station at Yerba Buena Island was able to enact strict protective sequestration, whereas nearby Mare Island was not nor were any of the larger military facilities we studied (e.g., Camp Kearney, San Diego, CA; Fort Custer, Battle Creek, MI; 11th and 12th Naval Fleets, in California). Our appendix includes a list of all of the military sites that we examined for potential inclusion in this study, most of which constitutes a body of negative research in that the various camps, garrisons, forts, army bases, naval installations or ships reviewed either were not provisional influenza escape communities, suffered extensive

morbidity and mortality during the pandemic, or were simply too small to generate meaningful data and interpretation. (See Negative Research Table in Appendix I.)

One of the more interesting military installations identified during our research that had moderate success in implementing NPI was Camp Crane, located in the city limits of Allentown, PA. In fact, when compared to the dozens of army bases, army forts, national guard units, and naval installations that we examined during the course of our study, Camp Crane was among the most successful in terms of disease containment and mortality rates, albeit not nearly as successful as the provisional influenza escape communities. In light of this history, it appears that a more in-depth analysis of Camp Crane, and the surrounding city of Allentown, might be instructive for pandemic preparedness planning today.¹⁹⁷

¹⁹⁷ Camp Crane shared many of the characteristics of the larger military installations, it was more successful in maintaining influenza prevention measures, partly because it was a small camp that had seen the bulk of its mobilization come before the autumn of 1918. By that time, the average camp strength was approximately 2,200 men. Ultimately, 355 influenza cases developed in Camp Crane between September 26 and the end of December, resulting in a total of 62 cases of pneumonia and 13 deaths. While less than 4% of the cases resulted in death, approximately 0.5% of the total camp died as a result of complicated pneumonia. The first preventive measures were instituted in Camp Crane on September 24, 1918, before the epidemic reached the area, with a general order that random inspections be conducted to determine who was sick, and that mild and suspected influenza cases be isolated in the infirmary. Serious cases were to be sent to the city hospital, across the street from the camp, to be isolated in a special influenza ward. The commanding officer also ordered that the barracks be properly ventilated, with cots placed in the same direction with a canopy overhead. Once cases appeared in recent arrivals, additional measures were ordered. Each man was afforded 100 square feet of space in the barracks as well as in the hospital isolation annex (with cubicles). In the mess hall, men sat on one side of the tables only. There were mandatory orders for soldiers to wash their mess kits after each meal in running hot water for several minutes, a subtle way of also enforcing vigorous hand washing at least three times a day. In the hospital, all dishes, utensils, and cups were boiled. In an attempt to partially confine the camp, all new troops and officers were placed in 72-hour quarantine, under guard. Officers and enlisted men were prohibited from entering places of amusement or from gathering in crowds. Civilians were prohibited from entering the camp unless on official business. Barracks sweepers and medical personnel were required to wear gauze masks. As more cases developed, men with temperatures below 100 degrees were treated temporarily in special isolation barracks while those with temperatures over 100 and all confirmed cases were taken to the isolation annex at the city hospital. These measures were imperfect, however. For one, the social distancing order applied only to officers and men living at the camp, not to officers who lived off-base. In addition, doctors from the camp were sent across Pennsylvania to help fight the epidemic. It is unknown if they returned to Camp Crane during the epidemic, or if the 72-hour quarantine was sufficient to prevent their introducing new cases to camp. Last, “official business” could be broadly interpreted: civilians frequently came onto the camp grounds to play in sporting events and to entertain the troops, and some of the troops likewise traveled to nearby towns for recreational purposes. From this brief overview, we can conditionally conclude that Camp Crane’s preventive measures were not entirely successful. It should be added, however, that a strict and impenetrable protective sequestration of such a facility would have been very difficult, or impossible to achieve, given that it was an active military facility that had incoming and outgoing personnel throughout the epidemic, and given that it was surrounded on all sides by residential areas of Allentown. (For more information on Camp Crane

The majority of military installations of the era witnessed a substantial ingress and egress of men and workers. Clearly the movement of so many people posed a potential risk for the spread of influenza. Nevertheless, protective sequestration may have been easier to enact in some military communities in 1918, such as Yerba Buena Island, when compared to today because those populations were more easily controlled and because command and authority structures had already been established. In today's military, officers and enlisted men and their families often live off-base in the civilian community that can extend into several counties or even states.

see the following documents: Slee R. An old report. Mil Surg. 1923;42:203-6; 1st. Lt. Ellison Capers, Acting Adjutant, by order of Lt. Col. Slee. Memo. The early detection and treatment of mild illness among the men of your command, 1918 Sep 24; Folder 710.1 Influenza Camp Crane; Entry 31-C; C (Camps) Crane; SGO1917-1927; RG 112, NACP; Lt. Col. Richard Slee to Col. Charles Lynch, Medical Corps, 1920 May 18; Folder 710.1 "Influenza Camp Crane,"; Entry 31-C; Camps (Crane); SGO 1917-1927; RG 112, NACP; Martin D to Department Surgeon, Eastern Department, Governors Island, NY. 1918 Nov 12. Folder 710.-1 "Influenza Camp Crane", Entry 31-C Surgeon General's Office, 1917-27 C (camps) Crane; RG 112: Records of the Army Surgeon General, NACP; Many Camp Crane doctors fighting epidemic. Allentown Morning Call. 1918 Oct 15; 5; Camp Crane doctors working at Harrisburg. Allentown Morning Call. 1918 Oct 16; 11; Slee R. An old report. Mil Surg. 1923;42:203-6).

E. Vaccines

Even though vaccines are clearly not NPI, the vaccine issue is especially interesting to the cultural historian of the germ theory era. It is critical to recall that this pandemic came at the zenith of the bacteriological revolution. New germs were being discovered like, as the famed neurosurgeon Harvey Cushing once described it, “corn popping out of a pan.”¹⁹⁸ As a result, positive faith by laymen in medical researchers’ abilities to develop effective vaccines went a long way in the support of mass influenza vaccination programs, no matter how crudely developed these vaccines were and, as it turned out, mistakenly based on a germ that had nothing to do with the influenza virus.

For example, many of the 1918 influenza vaccines were based on the erroneous assumption that Pfeiffer’s bacillus, the bacteria that is now called *Haemophilis influenzae*, was the cause of influenza. Other vaccines contained a veritable witch’s brew of bacteria, including strains of *Staphylococcus aureus*, *Streptococcus hemolyticus*, and other bacteria unrelated to the viral pandemic. Moreover, there was little uniformity in the production of vaccines themselves. In some parts of the country, they were produced by local hospitals, medical laboratories, and health departments. In others, they were produced by state boards of health and occasionally by pharmaceutical companies. Given the disparity of vaccines, there was also great disagreement about dosage and how many doses to administer. Similarly, with respect to the importance of conducting research during the course of a pandemic itself, it is helpful to recall the words of Surgeon General Rupert Blue, who, when commenting on the influenza vaccine experiments carried out during the 1918 pandemic: “it must be remembered that several different vaccines are being tried. The reports so far received, however, do not permit any conclusion whatsoever

¹⁹⁸ Cushing H. The life of Sir William Osler, volume I. Oxford: Oxford University Press; 1925. p. 215-6.

regarding the efficacy of these vaccines or their relative merits.”¹⁹⁹ Similarly, as Edwin O. Jordan concluded in the preventive measures section of his treatise on the 1918-20 flu pandemic: “Protection against influenza by vaccine inoculation is evidently a broken reed on which to lean. It is not surprising that this is so, since the nature of the causal organism of influenza is still in question.”²⁰⁰ From the distance of almost 90 years, it is difficult to ascertain if these vaccines were protective against specific bacteria, but we know there is little chance that they were effective in preventing *bona fide* influenza. Ironically such vaccination programs had the potential to spread influenza as people packed together to wait in line for their vaccines.

But wherever these vaccines were available, vaccine distribution centers and clinics were typically crowded by people willing to roll up their sleeves. It is difficult to estimate the hundreds of thousands of doses of essentially useless (and in some cases harmful) vaccine that were distributed, but mass vaccination programs did exist in almost every American military installation, large city, and health facility that we came across during the course of this research.

What we cannot measure from the historical data gathered (and can only speculate) is the extent to which the 1918 vaccines helped to create a false of security that might have worsened the pandemic’s spread. In other words, how many people assumed they were protected, because of submitting to an ersatz influenza vaccine, only to contract influenza because of careless, reckless, or close contact with those who were infected. Another intriguing question is how do failures or shortages of a particular vaccine (because of contamination, production errors, or its efficacy) contribute to or detract from public health containment, prevention and treatment efforts? A particularly instructive case of this paradigm and its effects on the public trust of

¹⁹⁹ Beware of ‘sure cures’. Vaccines only in experimental stage, says Surgeon Gen. Blue. New York Times. 1918 Oct 27; 14.

²⁰⁰ Jordan EO. Epidemic influenza. p. 473.

governmental health agencies can be found in the example of the swine flu vaccine campaign of 1976.²⁰¹

²⁰¹ Neustadt RE, Fineberg HV. The epidemic that never was: policy-making and the swine flu scare. New York: Vintage Books; 1983; Gaydos JC, Top FH, Hodder RA, Russell PK. Swine Influenza A Outbreak, Fort Dix, New Jersey, 1976. Emerg Infect Dis. 2006; 12:1; 23-26; Sencer DJ, Millar, JD. Reflections on the 1976 Swine Flue Vaccination Program. Emerging Infectious Diseases. 2006; 12:1; 29-33; Krause R. The Swine Flu Episode and the Fog of Epidemics. Emerging Infectious Diseases. 2006; 12:1; 40-43; McKenna, M.A.J. “Ghosts of Vaccines Past”. Atlanta Journal Constitution. December 18, 2005, p. 1C.

SECTION VII – General Conclusions from the Historical Record with Policy Recommendations

Listed below are the general conclusions we were able to make from our historical study of 7 provisional influenza escape communities in the 1918-1920 influenza pandemic in the continental United States.

Pandemic Preparedness

- Swift, agile, decisive, and coordinated action based on accurate information and advanced preparedness planning, *before the appearance of influenza in the local area*, is critical.
- Standardized case definitions for suspected, probable, and confirmed diagnoses promote clarity and consistency in disease tracking and play a positive role in disease containment.

Benefits and Liabilities of Protective Sequestration

- Successful protective sequestration was the exception to the rule in the 1918-1920 pandemic. The escape of a community from the brunt of the pandemic was likely the result of multiple factors in the cases we studied, not least of which included good fortune, viral normalization patterns, and geographical separation. We should not be seduced into thinking we can easily translate these historical examples into contemporary situations.
- Protective sequestration (the shielding of a defined and still healthy group of people from the risk of infection from outsiders), if enacted early enough in the pandemic, crafted so as to encourage the compliance of the population involved without draconian enforcement measures, and continued for the lengthy period of time during which the area is at risk, stands the best chance of protection against infection. When implemented

successfully, protective sequestration also involves quarantine of any outsider who seeks entry, self-sufficiency in the supplies necessary for daily living, enforcement of regulations when necessary (including fining and jailing), and the ability of those sequestered to entertain themselves and maintain some semblance of a normal life. It also involves a brand of bold leadership which may not be common.

- It is likely that once an outbreak of a highly virulent virus easily transmitted from person to person via aerosol or respiratory droplets occurs, larger communities will not be able to escape pandemic influenza completely. For this reason, plans for the protective sequestration of sub-communities within these areas should be considered. For example, personnel and facilities critical to the maintenance of national security and universities should consider formulating plans for the rapid protective sequestration of their populations at the first onset of cases in the wider region and before cases develop locally.
- It is important to recall that the most successful protective sequestrations were maintained for a period of months to ensure that the pandemic was well on the wane. Measures to ensure the integrity of the protective sequestration (as well as concomitant NPI) while preventing alienation, depression, loneliness, stigmatization, resentment, and hostility among the confined population should be developed as a central part of a pandemic preparedness plan.
- Protective sequestration employed during the second wave may have prevented influenza cases during this period and may have been a factor in these communities experiencing milder morbidity and mortality rates in successive waves once the measures were lifted. Conversely, these measures have the potential to create susceptible populations affected

by subsequent waves of influenza.²⁰² At the very least, in current pandemic planning, protective sequestration could shield selected populations from infection until vaccines and antiviral agents become available.

Nonpharmaceutical Interventions (NPI) During a Pandemic

- Available data from the second wave of the 1918 influenza pandemic fail to show that any other NPI (apart from protective sequestration) was, or was not, effective in helping to contain the spread of the virus. American communities engaged in virtually the same menu of measures, including: 1) the isolation of ill persons; 2) the quarantine of those suspected of having direct contact with the ill; 3) social distancing measures, such as the cancellation of schools and mass gatherings; 4) reducing an individual's risk for infection, (e.g., face masks, hand washing, respiratory etiquette); and 5) public health information campaigns and risk communications to the public. Despite these measures, most communities sustained significant illness and death; whether these NPI lessened what might have been even higher rates had these measures not been in place is impossible to say on the basis of available historical data.
- If other NPI stand a chance of working, the lines of political and legal authority must be transparent. The harmonious cooperation of trusted and competent local, state and federal health officials, backed by the letter of the law, is critical. Internecine rivalries or disagreements between local, state, and federal agencies have a strong potential to detract from pandemic influenza prevention and containment. More broadly, this is one of the strongest themes in the history of epidemics and disasters in the United States over the past two centuries.

²⁰² World Health Organization Writing Group. Nonpharmaceutical interventions for Pandemic Influenza, National and Community Measures. Emerg Infect Dis. 2006;12(1):88-94.

- At present there is great debate among public health experts on the efficacy of face masks. Learning a lesson from the past, we should not let masks engender a false sense of protection. Indeed, we could not locate any consistent, reliable data that would support the conclusion that face masks, as available and as worn during the 1918-1920 influenza pandemic, conferred any protection to the populations that wore them. Furthermore, recommendations and laws regarding face masks during this period often incited political and legislative controversies as well as outright resistance. In addition, when public health authorities relaxed these measures because they believed the pandemic had passed, only to confront new cases of influenza in their communities, they frequently found that the reinstitution of a face mask ordinance was met with a much lower degree of support and compliance when compared to its initial implementation. We also found numerous examples of people wearing face masks incorrectly during the 1918-1920 pandemic. Instructing people on the proper use of face masks (if they are to be worn at all in an upcoming pandemic), as well as their limitations, is important to public health education efforts.
- Our study uncovered repeated examples of social concerns and anxieties associated with the mandated delay of funeral arrangements and/or the reduction of attendance at funerals in order to cut down on human contact during the crisis. An influenza pandemic has the potential to cause large numbers of deaths. The emotional strain of not being able to dispose of the dead promptly, and in accordance with cultural and religious customs, has the power to create social distress and unrest and needs to be considered in contemporary pandemic preparedness planning.

The Power and Limits of Historical Research

- Historical research is fraught with all the problems and limitations of retrospective studies. It should not be viewed as a controlled study. It is only an approximate, and not always applicable, guide to the modeling of contemporary or future pandemic preparedness planning. The researcher may be helped or hindered by numerous investigators, recorders, and collectors of information who preceded him or her and generally performed their work without a common reference framework or even sets of uniform definitions and concepts. The historian must also rely upon archivists who may or may not have preserved this material and cataloged it in a way that aids retrieval. These issues are some, but hardly the only, limitations of any historical study, including this one. Nevertheless, history represents an essential arrow in the quiver of human inquiry.
- Our historical study leaves unanswered several tantalizing questions about the leakiness of preventive measures in the 1918 influenza pandemic. For example, how tight or porous could NPI be and still retain a level of efficacy?²⁰³ Another understudied and remarkably undocumented aspect we have encountered in our historical research is the relationship of the social and psychological effects of NPI discussed in this study, especially the impact of separation on families and couples with the attendant stress, fear, and unrest that are typically experienced during a pandemic. A final question for which we wish we had more data is how to calculate the substantial economic anxieties and costs placed on those under protective sequestration, which has the potential to result in negative social behaviors that might be counterproductive to pandemic containment.

²⁰³ World Health Organization Writing Group. Nonpharmaceutical interventions for Pandemic Influenza, National and Community Measures. Emerg Infect Dis. 2006;12(1):88-94.

SECTION VIII – Suggested Future Research

All of the successful provisional influenza escape communities identified in this study were small and somewhat isolated places. This, of course, is no surprise, given that it is generally easier to exert authority and/or social control over a smaller population, and that physical isolation will act as a natural barrier to the spread of a communicable disease such as influenza. This was particularly true of Yerba Buena Island, where there also existed a clear and transparent chain of command and a military culture of following orders. This raises the sobering question, however, of whether the lessons of 1918 can be accurately applied to 21st-century America. Even our smaller communities today are more mobile, more densely populated, and more heterogeneous than corresponding communities were in 1918, to say nothing about the nation at large.

For this reason, we believe it would prove instructive to investigate larger communities that had some success in dealing with the 1918 influenza pandemic but that cannot accurately be described as “provisional influenza escape communities.” In fact, it may be helpful to expand the definition of provisional influenza escape communities to take into account the fact that no sizable community in the continental United States during this period, civilian or military, experienced influenza, pneumonia, or death rates low enough to qualify. The central question to investigate would be whether such communities enacted NPI that might have mitigated the impact of the pandemic, or whether their results were the product of pure luck and coincidence. Was it because these NPI were enacted improperly, too late, or with inadequately enforced compliance, or for other reasons? Or is it because these NPI, for the most part, are really less effective in a pandemic than most of us care to contemplate? Given the fact that these NPI, however and whenever in the course of a pandemic they are prescribed, will be costly and

disruptive, it is imperative to conduct further research on their efficacy, implementation, execution, and ramifications.

Two communities that might help answer these questions are Grand Rapids, Michigan, and Pasadena, California, both of which reported influenza rates at or below 2 per 1,000. At the time, Grand Rapids had a population of more than 137,000 and a population density approaching 7,900 people per square mile. Pasadena had a population of approximately 45,000. Another city that might be instructive is Wichita, Kansas, a city of 62,000 at the time. Preliminary analysis has revealed 96 deaths from influenza and 294 from pneumonia during the fall of 1918.²⁰⁸ These cities were generally more reflective of American society as a whole in 1918, as the United States was rapidly moving toward an urban, industrial, and ethnically diverse nation, and might provide useful information on how to respond to an influenza pandemic today.

Equally instructive are the cases of communities that did not handle the influenza pandemic effectively. There are many examples of cities that instituted NPI but suffered high morbidity and mortality rates for a variety of reasons, such as not acting early and decisively, political bickering among federal, state, and local officials, caving in to economic interests, or lifting social distancing, protective sequestration, or quarantine restrictions soon after imposing them. These include some of America's largest cities, such as New York City, Los Angeles, Boston, Detroit, Pittsburgh, and Philadelphia. In this vein, it would be instructive to examine the extent to which the various levels of public health in the country at the time – town, city, county, state, federal, civilian, and military – coordinated or bungled their efforts to contain the pandemic. An analysis of the styles of leadership among these varied health agencies might also prove illuminating. A better understanding of why and how interdependent public health agencies

²⁰⁸ Tenth biennial report being the thirty-fifth and thirty-sixth annual reports of the state board of health of the state of Kansas June 30, 1918 to July 1, 1920. Topeka: Kansas State Printing Plant Imri Zumwalt; 1920.

succeed and fail when confronted with crisis might provide guidance for disaster preparedness in the 21st-century.

In addition, internationalizing the study should also prove informative. The case of American Samoa versus British Samoa raises some interesting questions. In American Samoa, a strict protective sequestration was enacted, whereas in British Samoa, some seventy-five miles away, no such NPI were implemented. American Samoa was kept completely free of influenza. British Samoa, on the other hand, suffered extensively, losing approximately 20% of its population to the disease. Jordan's Epidemic Influenza suggests that there are potential provisional influenza escape communities in the United Kingdom and Australia that merit further research; for example, Australia implemented a strict maritime quarantine especially against ships, goods, and people coming from New Zealand and South Africa which kept influenza out until winter 1919. Other potential provisional influenza escape communities include the island of Madagascar and the Gold Coast of Africa (Liberia, Gabon, Ghana).

We strongly recommend conducting similar historical studies of the 1957 and 1968 influenza pandemics. In 1957, for example, Israel delayed the introduction of influenza by two months compared to neighboring countries, because of restrictions on international travel with neighbors for political rather than public health reasons.²⁰⁹ Given that our nation today looks much more like the United States of the post-World War II era than the World War I era, such research could be especially useful. Similarly, a historical study of the 1976 swine flu incident might also prove instructive in determining when to segue from pandemic preparedness plans to pandemic action and intervention.²¹⁰ This decision is especially important when one

²⁰⁹ World Health Organization. Expert committee on respiratory virus disease: first report. World Health Organ Tech Rep Ser. 1959;58:1-59.

²¹⁰ Neustadt RE, Fineberg HV. The epidemic that never was: policy-making and the swine flu scare. New York: Vintage Books; 1983; McKenna MAJ. Ghosts of vaccines past. Atlanta Journal Constitution. 2005 Dec 18; p. 1C.

contemplates issues of government credibility (i.e., the potential for distrust this vaccine may have generated when people are offered a vaccine for the next pandemic), leadership, risk communication, public responses, and pandemic fatigue.

Additional research questions relate to how we might explore the ethical, social, legal, and economic implications of the various NPI described in this study. Moreover, to study the efficacy of NPI that might be employed in a future pandemic, we should consider developing special Institutional Review Boards (IRBs) capable of facilitating and/or fast-tracking such qualitative research during a seasonal influenza epidemic or in the midst of an influenza pandemic.

Appendix I: References
Archives and Primary Sources Consulted

Federal Archives

National Archives and Records Administration, Washington D.C.

Record Group 24

Logbooks of U.S. Navy Ships ca. 1840-1940

1918 deck logs of the following ships:

- USS Oregon
- USS Brutus
- USS Forward
- USS Minneapolis
- USS Pittsburgh
- USS San Diego
- USS Colorado
- USS Maryland
- USS South Dakota
- USS Marblehead
- USS New Orleans
- USS Frederick
- USS Yorktown
- USS West Virginia

Record Group 52

Records of the Navy Bureau of Medicine and Surgery

August 1918-February 1919

National Archives II, College Park, MD

Record Group 90

Records of the US Public Health Service

File boxes 1622, Influenza 1918

Record Group 112

Records of the Surgeon General's Office (Army)

Entry 29 (General Correspondence) and Entry 31, 1918

Record Group 165

Records of the War Department General and Special Staffs, War College Division and War Plans Division Subordinate Offices – Education and Recreation Branch

Committee on Education and Special Training Records of the Student Army Training Corps Units, 1918-19

National Archives and Records Administration Pacific Region, San Bruno, CA**Record Group 52**

Records of the Navy Bureau of Medicine and Surgery, 1917-1919

Record Group 90

Records of the US Public Health Service, 1917-1919

Record Group 112

Records of the Surgeon General's Office (Army), 1917-1919

The Library of Congress Manuscript Division, Washington, D.C.

Papers of William F. Fullam, 1877-1919

State, County, and Municipal Archives, by region**Northeast Region****Massachusetts*****Cambridge***

Harvard University Archives

Papers of President A. Lawrence Lowell, Student Army Training Corps

Stillman Infirmary Leaflets

Dean of the Faculty of Arts and Sciences, Correspondence

Annual Reports of the President and Treasurer, 1917-18, 1918-19, 1919-20

Center for the History of Medicine, Francis A. Countway Medical Library, Harvard University Medical School

Office Files of the Dean of the Medical School, box 15, folder 959

Connecticut***Darien***

Darien Public Library

Darien Review August 1918-December 27, 1918, weekly newspaper

New York***Hudson***

Columbia Green Community College Library

Hudson Republican newspaper on microfilm September 1918 to February 1919

Hudson Area Library

Albany

New York State Library

*New York State Department of Health's Monthly Bulletins
Vital Statistics Reports
Special Report that New York's governor commissioned after the flu pandemic*

New York State Archives
New York State Division for Youth, Administrative Records and case files, 1887-1977

Saranac Lake
Adirondack Room, Saranac Lake Free Library
Trudeau Institute Files
Trudeau Institute Annual Reports 1918, 1919, 1920
Box J28 MS, James-Baldwin correspondence

Trudeau Institute
The successor to the Trudeau Sanatorium had annual reports and also annual medical reports, which make a cursory mention of influenza

Vermont

Burlington

University Archives, Library Research Annex, and Special Collections, University of Vermont
Vermont State Board of Health Quarterly Bulletins, 1918-1919
Monkton, Grafton town reports 1918-1919
1914 AAA Map of Vermont roads
1914 Rutland Railroad Map (Rand McNally)
1916 Map of Vermont (Walker Lith. & Pub. Co.)

Montpelier

Vermont Department of Libraries
Holland Town Reports 1918-1919
Fletcher Town Reports 1918-1919

Newspapers

Burlington Free Press (September 1918 to February 1919)
St. Alban's Daily Messenger (September 1918 to February 1919)
Orleans County Monitor (September 1918 to February 1919)
Bristol Herald (September 1918 to February 1919)
Enterprise and Vermonter (September 1918 to February 1919)
Bellows Falls Times (September 1918 to February 1919)

Vermont State Archives
Governor Horace Graham Papers, 1918-1919
State of Vermont Health Laws 1918-1919

Barre

Vermont Historical Society Library
1916 Vermont Public Service Commission Railroad Map

Brownington

Orleans County Historical Society

Holland Highlights

Fletcher

Town Clerk's Office

Death Records

Monkton

Town Clerk's Office

Death Records

New Jersey***Princeton***

Seely G. Mudd Manuscript Library, Princeton University Archives

Historical Subject Files, Princeton and Wars collection boxes 410-413

Historical Subject Files, Series 18 Health and Well Being collection boxes 279-281

Office of President John Grier Hibben papers box 71

William K. Selden Health Services Collection box 1

Princeton Public Library

Princeton Packet on microfilm, August 1918 – January 1919

Pennsylvania***Pittsburgh***

The Western Pennsylvania School for Blind Children

School's official files includes every annual report issued since 1890, especially the years 1918, 1919, 1920

August 9, 2005 - Executive Director Janet Simon gave a tour of the physical plant which still stands in semblance to the facility that existed in 1918.

Notes and photographs on the building and location were taken to describe the institution

Pennsylvania Department, Carnegie Library

WPSBC unmarked folders (info all after 1918)

Influenza news clipping folders (mostly modern-day articles)

1920 Wagner's Complete Map of Pittsburgh and the adjoining boros

Carnegie Library

Newspapers

Pittsburgh Sun (September 1918 to February 1919)

Pittsburgh Gazette-Times (September 1918 to February 1919)

The Oaklander (September 1918 to February 1919)

The Hill Top Record (September 1918 to February 1919)

Carlisle

The United States Army Military History Institute, at the United States Army Heritage and Educational Center

Installation Collection, available records on:

Camp Custer

Camp Kearny

Camp Gordon

World War I Veteran's Survey Medical Department Ambulance Service Evacuation Ambulance Companies, Folders 1, 2, 3, 8

Allentown

Lehigh County Historical Society

Box MPF-709-3, Camp Crane folder

Papers of William E. Brooks, Lat 1, drawer 4, Brooks 1-3

Slee, Richard scrapbook

Camp Crane map, map drawer 18-2

Scrapbook of Camp Crane USAACS Lat 1 drawer 4 Hen

Lat 1 drawer 5 scrap 1 and 2

Camp Crane Allentown MPD 34 1 1918

Hendricks, Charles E. scrapbook pages (5) Lat 1 drawer 4 Hen 1

Local History Room, Allentown Public Library

Hellerich MH. Allentown 1762-1987: a 225-year history. Allentown, PA: Lehigh County Historical Society; 1987.

Bloom K, Wolbers M. Allentown: A Pictorial History. Norfolk/Virginia Beach: The Donning Company; 1984.

Allentown Public Library

Allentown Morning Call September 1918 to February 1919

Philadelphia

Special Collections, Bryn Mawr College Library, M. Carey Thomas Papers (president of the college at the time)

Microfilm reels 138, 139, and 162

The College News, Bryn Mawr

Bethlehem

Bethlehem Public Library

Bethlehem Globe Times, October 1918

West Region**California*****San Francisco***

Yerba Buena – tour plus a few materials given to us by BMCS Paul Andrieu

History Center, San Francisco Public Library
San Francisco Board of Supervisors meetings from 1918 and 1919

Reference Room, California Historical Society
Mayor James Rolph papers from September 1918 to February 1919

National Archives and Records Administration Pacific Region, San Bruno, CA
Record Group 52
Records of the Navy Bureau of Medicine and Surgery

Record Group 90
Records of the US Public Health Service

Record Group 112
Records of the Surgeon General's Office (Army)

San Francisco Board of Health

San Francisco City Hall and Board of Supervisors

Treasure Island Museum
Note: We are still looking for the materials related to Yerba Buena that were transferred from this facility when it closed in 2000.

Berkeley
Bancroft Library

Vallejo
Vallejo Naval and Historical Museum

Sacramento
California Military History Museum

California State Archives

Colorado

Denver
Colorado State Archives
Papers of the Gov. Gunter Collection, boxes 26958, 26773, and 26775

Stephen H. Hart Library, Colorado Historical Society
Collection of Colorado newspapers on microfilm includes:
Durango Evening Herald (September 1918 to February 1919)
Grand Junction News (September 1918 to February 1919)
Gunnison News Champion (September 1918 to February 1919)

Lake City Times (September 1918 to February 1919)
Montrose Daily Press (September 1918 to February 1919)
Sterling Democrat (September 1918 to February 1919)
Walsenburg World (September 1918 to February 1919)
Silverton Standard (September 1918 to February 1919)

Colorado Department of Public Health and Environment
State Board of Health documents from the period that could not be found in any other collection.
Board of Health Monthly Meeting Minutes from September through December 1918
Board of Health 1923 Biennial Report
Colorado State Health Code

Denver Public Library

Colorado University Archives, Boulder

State Health Board Annual (or biennial) Reports

Annual report of the state board of health of Alabama, January 1st to December 31st 1918.
Montgomery, Alabama: The Brown Printing Company, State Printers and Binders; 1919.

Annual report of the state board of health of Alabama, for the two years January 1st, 1919, to December 31st, 1920. Montgomery, Alabama: The Brown Printing Company, State Printers and Binders; 1919.

Bulletin of the Arizona State Board of Health. 1919 Apr 19;7(9):5-6.

Twenty-sixth biennial report of the state board of health of California for the fiscal years from July 1, 1918, to June 30, 1920. California State Printing Office; 1921.

Twenty-seventh biennial report of the state board of health of California for the fiscal years from July 1, 1920, to June 30, 1922. Sacramento: California State Printing Office; 1923.

Colorado state board of health 1921-1922 biennial report. Denver: Eames Bros.; 1923.

Black JT. State of Connecticut thirty-sixth report (42d and 43d years) of the state department of health for two years ending January 30, 1920. Hartford; 1920.

Twentieth report of the board of health of the state of Delaware for the two years ending December 31, 1920. (no publisher information provided)

Hurty JN. Report of the state board of health of the state of Indiana for the year ending September 30, 1918 (Abridged). Indianapolis: WM B. Burford, contractor for state printing and binding; 1919.

Guilford SH, M.D. Report of the state board of health for the biennial period ending June 30, 1920. Des Moines: State of Iowa; 1921.

Tenth biennial report being the thirty-fifth and thirty-sixth annual reports of the state board of health of the state of Kansas June 30, 1918, to July 1, 1920. Topeka: Kansas State Printing Plant Imri Zumwalt; 1920.

Leverett DB, M.D., Dr.P.H. Second annual report of the state department of health of Maine and the twenty-seventh annual report upon the births, marriages, divorces and deaths for the year ending December 31, 1918. Augusta.

Leverett DB, M.D., Dr.P.H. Second annual report of the state department of health of Maine and the twenty-seventh annual report upon the births, marriages, divorces and deaths for the year ending December 31, 1919. Augusta.

Annual report of the state board of health of Maryland for the year ending December 31, 1918. Baltimore: King Brothers, Inc., State Printer; 1922.

Annual report of the state board of health of Maryland for the year ending December 31, 1918. Baltimore: 20th Century Printing Co.; 1923.

Fourth annual report of the state department of health of Massachusetts – 1918. Boston: Wright and Potter Printing Co., State Printers; 1919.

Fifth annual report of the state department of health of Massachusetts – 1919. Boston: Wright and Potter Printing Co., State Printers; 1920.

Annual report of the department of public health for the year ending November 30, 1920. Boston: Wright and Potter Printing Co., State Printers; 1922.

Forty-sixth annual report of the secretary of the state board of health of the state of Michigan for the fiscal year ending June 30, 1918. Fort Wayne, Indiana: Fort Wayne Printing Company; 1919.

Forty-seventh annual report of the commissioner of the Michigan department of health for the fiscal year ending June 30, 1919. Fort Wayne, Indiana: Fort Wayne Printing Company; 1920.

Forty-eighth annual report of the commissioner of the Michigan department of health for the fiscal year ending June 30, 1920. Lansing, Michigan: Wynkoop Hallenbeck Crawford Co., State Printers.

Twenty-sixth report (twelfth biennial) of the state board of health of the state of New Hampshire for the fiscal period ending August 31, 1920. Concord, New Hampshire: John P. Clarke and Cragg Bindery; 1920.

Forty-second annual report of the State department of health of New Jersey – 1919. Trenton,

N.J.: Published by the State; 1920.

Forty-third annual report of the State department of health of New Jersey – 1920. Trenton, N.J.: MacCrellish & Quigley Co., State Printers; 1921.

Annual report of the state department of health of New York 1918 volume I. Albany, New York; 1919.

Annual report of the state department of health of New York 1919 volume I. Albany, New York; 1920.

Annual report of the state department of health of New York 1920 volume I. Albany, New York; 1921.

Lee SL, M.D. State of Nevada biennial report of the state board of health for period ending December 31, 1918. Carson City, Nevada: State printing office, Joe Farnsworth, Superintendent; 1919.

Eighteenth annual report of the North Carolina state board of health 1919-1920. Raleigh: Edwards & Broughton Printing Co., State Printers; 1921.

Fifteenth biennial report of the state board of health to the Governor of North Dakota for the years 1917 and 1918. Bismarck, N.D.: Tribune Printing.

Neal CA, M.D. State of Ohio department of health thirty-first report (43d year) Part I. Report of July 1, 1915, to December 31, 1928. Part II. Annual report, year ending December 31, 1929. Columbus, Ohio: The F.J. Heer Printing Co.; 1931.

Fourth annual report of the state department of health of Oklahoma for the year ending June 30, 1920. Oklahoma City, Oklahoma: State Capitol Building.

Fortieth annual report of the state board of health of South Carolina for the fiscal year 1919 to the legislature of South Carolina. Columbia, S.C.: Gonzales and Bryan, State Printers; 1920.

Collins WB, M.D. Biennial report of the Texas state board of health from September 1, 1916, to August 31, 1918, to the Governor. Austin, Texas: Von Boeckmann-Jones Co., Printers; 1919.

Vermont state board of health. Twenty-second [twelfth biennial] report of the state board of health of the state of Vermont from January 1, 1918, to December 31, 1919. Rutland, Vermont: The Turtle Company, Marble City Press Publishers VT Public Documents; 1920.

Vermont state board of health. Twenty-third [thirteenth biennial] report of the state board of health of the state of Vermont from January 1, 1920, to December 31, 1921. Rutland, Vermont: The Turtle Company, Marble City Press Publishers VT Public Documents; 1922.

Harper CA, M.D. Twenty-seventh report of the state board of health of Wisconsin for the term

ending June 30, 1918, with report of the state bureau of vital statistics of the years 1916 and 1917. Madison, Wisconsin: Democrat Printing Company, State Printer; 1919.

Newspapers Examined

General Information

New York Times (September 1918 to February 1919)

Los Angeles Times (September 1918 to February 1919)

Town Specific Newspapers

San Francisco

San Francisco Chronicle (September 1918 to February 1919)

San Francisco Examiner (September 1918 to February 1919)

Colorado

Durango Evening Herald (September 1918 to February 1919)

Grand Junction News (September 1918 to February 1919)

Gunnison News Champion (September 1918 to February 1919)

Lake City Times (September 1918 to February 1919)

Montrose Daily Press (September 1918 to February 1919)

Sterling Democrat (September 1918 to February 1919)

Walsenburg World (September 1918 to February 1919)

Silverton Standard (September 1918 to February 1919)

Princeton, New Jersey

Princeton Packet (weekly) (September 1918 to February 1919)

The Princetonian, Princeton University's student newspaper (not published in Fall 1918)

Pittsburgh, Pennsylvania

Pittsburgh Gazette-Times (September 1918 to February 1919)

Pittsburgh Daily Sun (September 1918 to February 1919)

The Oaklander (weekly) (September 1918 to February 1919)

The Hill Top Record (weekly) (September 1918 to February 1919)

Saranac Lake, New York

The Adirondack Express (scattered pages of isolated issues only) (September 1918 to February 1919)

Philadelphia, Pennsylvania

The College News, Bryn Mawr College (September 1918 to February 1919)

Burlington, Vermont

Burlington Free Press (September 1918 to February 1919)

Holland, Vermont

Newport Express and Standard (September 1918 to February 1919)

Fletcher, Vermont

St. Alban's Messenger (September 1918 to February 1919)

The County Courier (September 1918 to February 1919)

Grafton, Vermont

Bellows Falls (September 1918 to February 1919)

Brattleboro Reformer (September 1918 to February 1919)

Monkton, Vermont

Enterprise and Vermonter (September 1918 to February 1919)

Bristol Herald (September 1918 to February 1919)

Middlebury Register (September 1918 to February 1919)

Allentown, Pennsylvania

Allentown Morning Call (September 1918 to February 1919)

Cambridge, Massachusetts

The Harvard Crimson, (September 1918 to February 1919) *Harvard University*

Ann Arbor, Michigan

Michigan Daily (September 1918 to December 1918)

Darien, Connecticut

Darien Review (weekly) (September 1918 to February 1919)

Hudson, New York

The Hudson Republican (September 1918 to February 1919)

Bibliography

NEWSPAPER ARTICLES

San Francisco Chronicle

First influenza case is discovered in S.F. San Francisco Chronicle. 1918 Sep 24; 8.

5 new influenza cases reported here. San Francisco Chronicle. 1918 Oct 6; 6.

No such sea of faces at S.F. Museum in 25 years. San Francisco Chronicle. 1918 Oct 7; 9.

Quarantine is clamped over Camp Fremont. San Francisco Chronicle. 1918 Oct 9; 8.

Thirty-seven new cases found in S.F. San Francisco Chronicle. 1918 Oct 10.

Health experts to map drive on influenza. San Francisco Chronicle. 1918 Oct 12; 3.

378 new cases of influenza are reported. San Francisco Chronicle. 1918 Oct 15; 4.

Hassler urges churches and theaters close. San Francisco Chronicle. 1918 Oct 17; 5.

Health board closes public meeting places. San Francisco Chronicle. 1918 Oct 18; 1.

State health board closes all theaters. San Francisco Chronicle. 1918 Oct 19; 6.

Influenza is being fought by Red Cross. San Francisco Chronicle. 1918 Oct 20; 6.

All persons on streets urged to wear masks. San Francisco Chronicle. 1918 Oct 20; 6.

All persons serving public to wear masks. San Francisco Chronicle. 1918 Oct 20; 6.

Marysville closes gathering places. San Francisco Chronicle. 1918 Oct 20; 6.

Health board giving battle to influenza. San Francisco Chronicle. 1918 Oct 21; 3.

Epidemic is now reported under control. San Francisco Chronicle. 1918 Oct 22; 3.

Sore need of women's help at bedsides. San Francisco Chronicle. 1918 Oct 23; 3.

Women urged to make influenza masks at home. San Francisco Chronicle. 1918 Oct 23; 3.

Masks required. San Francisco Chronicle. 1918 Oct 23; 5.

City taking readily to gauze masks. San Francisco Chronicle. 1918 Oct 23; 3.

Archbishop Hanna turns over equipment and resources of diocese to use of Red Cross. San Francisco Chronicle. 1918 Oct 24.

Three influenza don'ts announced by Dr. Hassler. San Francisco Chronicle. 1918 Oct 24; 5.

Several days to see epidemic at peak, says board. San Francisco Chronicle. 1918 Oct 24.

Board to force mask wearing by ordinance. San Francisco Chronicle. 1918 Oct 24; 5.

Red Cross workers succeed in meeting heavy calls for aid in battle on influenza. San Francisco Chronicle. 1918 Oct 24.

Wear your mask! Commands drastic new ordinance. Emergency measure hits all persons. San Francisco Chronicle. 1918 Oct 25.

Everyone is compelled to wear masks by city resolution, great variety in styles of face adornment in evidence. San Francisco Chronicle. 1918 Oct 25.

Doctors stemming influenza spread, says Hassler. Health chief urges full precautions. San Francisco Chronicle. 1918 Oct 26.

Red Cross gives out 100,000 gauze masks. San Francisco Chronicle. 1918 Oct 26.

Red Cross to open fourteen city stations. San Francisco Chronicle. 1918 Oct 26.

8 influenza cases in El Dorado county. San Francisco Chronicle. 1918 Oct 27; 7.

Influenza bug cannot pass through mask, dean asserts. San Francisco Chronicle. 1918 Oct 27; 7.

S.F. Red Cross moves to new headquarters. San Francisco Chronicle. 1918 Oct 27; 7.

Managers of theaters aid authorities. San Francisco Chronicle. 1918 Oct 27; 3.

War against epidemic is successful. San Francisco Chronicle. 1918 Oct 27; 7.

Influenza cases in Santa Cruz increase. San Francisco Chronicle. 1918 Oct 27; 7.

110 arrested for disobeying masking edict. San Francisco Chronicle. 1918 Oct 28; 7.

Crisis of epidemic has passed, officials believe. Influenza cases begin to decrease. San Francisco Chronicle. 1918 Oct 28; 7.

Public cautioned against relaxing in influenza war. San Francisco Chronicle. 1918 Oct 28; 7.

Decrease in cases noted during day. San Francisco Chronicle. 1918 Oct 29; 9.

Warning and appeal! Wear masks and help nurse sick. San Francisco Chronicle. 1918 Oct 29; 9.

Epidemic closes Maryville saloons. San Francisco Chronicle. 1918 Oct 29.

Three shot in struggle with mask slacker. San Francisco Chronicle. 1918 Oct 29; 9.

Influenza on wane, San Mateo reports. San Francisco Chronicle. 1918 Oct 29; 9.

Mask wearing checks Richmond epidemic. San Francisco Chronicle. 1918 Oct 29; 9.

Influenza masks play big part in curbing epidemic, marked drop in new cases is observed. San Francisco Chronicle. 1918 Oct 30; 11.

Mask arrests net money for mercy. San Francisco Chronicle. 1918 Oct 30.

Salt water does it, U.S. sailor says. San Francisco Chronicle. 1918 Oct 30.

S.F. Factories concentrate on Red Cross masks. San Francisco Chronicle. 1918 Oct 30.

6 men sentenced to jail under mask law. San Francisco Chronicle. 1918 Oct 31.

New Red Cross hospital will open Friday. San Francisco Chronicle. 1918 Oct 31; 9.

Influenza epidemic in city drops slightly. Abatement of contagion shown here. San Francisco Chronicle. 1918 Oct 31; 9.

New Red Cross shop is given over to fight. San Francisco Chronicle. 1918 Nov 1; 9.

92,000 cases of influenza now in state. San Francisco Chronicle. 1918 Nov 1; 9.

Influenza shows drop in cases recorded for day. Officials get fighting grip on epidemic. San Francisco Chronicle. 1918 Nov 1; 9.

Continued masking holds influenza in check. Don't relax precautions says Hassler. San Francisco Chronicle. 1918 Nov 2; 9.

Influenza epidemic is losing fast. San Francisco Chronicle. 1918 Nov 4; 5.

Hassler warns city against carelessness in wearing of masks as new cases decline. San Francisco Chronicle. 1918 Nov 6; 9.

City continues epidemic fight. San Francisco Chronicle. 1918 Nov 8; 9.

Order barring gatherings may soon be raised by health board. San Francisco Chronicle. 1918 Nov 13; 1.

City to handle epidemic cases. San Francisco Chronicle. 1918 Nov 14; 5.

San Francisco theaters will open Saturday. San Francisco Chronicle. 1918 Nov 14; 1.

Influenza is still waning. San Francisco Chronicle. 1918 Nov 15; 4.

Influenza not beaten in state. San Francisco Chronicle. 1918 Nov 16; 2.

Masks may go by Thursday. San Francisco Chronicle. 1918 Nov 16.

Throngs jam theaters when ban is lifted. San Francisco Chronicle. 1918 Nov 17; 12.

Smokers hastily don masks when policeman looms. San Francisco Chronicle. 1918 Nov 18; 5.

Influenza is nearly gone. San Francisco Chronicle. 1918 Nov 18; 2.

Ringside picture reveals maskless fans to police. San Francisco Chronicle. 1918 Nov 20; 9.

City to doff masks tonight. San Francisco Chronicle. 1918 Nov 20; 1.

Masks will be put in discard at noon today. San Francisco Chronicle. 1918 Nov 21; 9.

San Francisco's mayor is caught without a mask. San Francisco Chronicle. 1918 Nov 21; 9.

Fremont remount escapes epidemic. San Francisco Chronicle. 1918 Nov 21; 5.

Masks prevent 20,000 cases. San Francisco Chronicle. 1918 Nov 22; 4.

Quarantine over, 4000 Navy men get shore leave. San Francisco Chronicle. 1918 Nov 22; 15.

San Francisco joyously discards masks in twinkling. Faces beam as gauze covers come off at time fixed. San Francisco Chronicle. 1918 Nov 22.

Influenza toll in state 3667. San Francisco Chronicle. 1918 Nov 23; 8.

Public schools of city reopen this morning. San Francisco Chronicle. 1918 Nov 25; 7.

Many new cases of influenza alarm southern cities. San Francisco Chronicle. 1918 Nov 26.

New influenza cases for day fall off to 25. San Francisco Chronicle. 1918 Dec 9; 6.

Hassler and city leaders hold confab. San Francisco Chronicle. 1918 Dec 10; 9.

Influence of women beats mask faction. San Francisco Chronicle. 1918 Dec 22; 10.

282 influenza cases, report. San Francisco Chronicle. 1918 Dec 21; 5.

Mask wearing obligatory in S.F. Schools. San Francisco Chronicle. 1919 Jan 5; 8.

Supervisors pass ordinance to protect city against further spread of malady. San Francisco Chronicle. 1919 Jan 11; 11.

Mask wearing increases fast. San Francisco Chronicle. 1919 Jan 14; 7.

Legislator without mask is arrested. San Francisco Chronicle. 1919 Jan 20; 3.

Influenza on wane, Tuesday reports show. San Francisco Chronicle. 1919 Jan 22; 9.

Hassler will fight repeal of mask law. San Francisco Chronicle. 1919 Jan 26; 9.

Thousands attend protest meeting. San Francisco Chronicle. 1919 Jan 26.

Mask wearing order goes as epidemic dies. San Francisco Chronicle. 1919 Feb 2.

San Francisco Examiner

Influenza is brought to S.F. by Chicagoan. San Francisco Examiner. 1918 Sep 24; 11.

Influenza strikes two more in S.F. San Francisco Examiner. 1918 Sep 25; 11.

Influenza epidemic is on way west. San Francisco Examiner. 1918 Sep 28; 5.

Francisco C. Quarantine proves time of gaiety. San Francisco Examiner. 1918 Oct 5; 7.

Quarantined sailor boys hold carnival. San Francisco Examiner. 1918 Oct 7; 10.

Grippe fought with gas mask. San Francisco Examiner. 1918 Oct 10; 8.

Death rate in cities in East takes jump. San Francisco Examiner. 1918 Oct 10; 8.

New York to enact anti-sneezing law. San Francisco Examiner. 1918 Oct 12; 5.

Nunan T. Influenza affects Orpheum patronage. San Francisco Examiner. 1918 Oct 14; 9.

\$100 fine, 10 days jail for not wearing mask. San Francisco Examiner. 1918 Oct 15; 11.

Influenza in S.F. Increased by 207 cases. San Francisco Examiner. 1918 Oct 15; 5.

Veils urged as influenza preventatives. San Francisco Examiner. 1918 Oct 16; 4.

All theatres are closed for epidemic. San Francisco Examiner. 1918 Oct 18; 5.

State health board closes all theatres. General closing of schools and churches not

included in order of California authorities. San Francisco Examiner. 1918 Oct 19; 4.

Twenty deaths influenza toll. San Francisco Examiner. 1918 Oct 20; 6.

People urged to wear masks everywhere. San Francisco Examiner. 1918 Oct 20; 6.

Influenza is not abating. San Francisco Examiner. 1918 Oct 21; 9.

Ward off influenza by wearing masks on street Board of Health asks public co-operation in its fight against the epidemic. San Francisco Examiner. 1918 Oct 21; 9.

All S.F. to unmask at noon today. San Francisco Examiner. 1918 Oct 21; 11.

Epidemic reaches height outside of San Francisco. San Francisco Examiner. 1918 Oct 21; 9.

Red Cross Wear a Mask Full page ad. San Francisco Examiner. 1918 Oct 21.

Ad for influenza masks. San Francisco Examiner. 1918 Oct 22; 11.

Mayor urges everyone to wear masks. San Francisco Examiner. 1918 Oct 22; 13.

Proclamation of mayor asks masks for all. San Francisco Chronicle. 1918 Oct 22; 8.

How to make mask to balk "flu" germs. San Francisco Examiner. 1918 Oct 22; 11.

S.F. dons gas mask to stop flu ravages. San Francisco Examiner. 1918 Oct 23; 11.

Gauze masks must be worn on the street. San Francisco Examiner. 1918 Oct 22; 13.

News in pictures. San Francisco Examiner. 1918 Oct 24; 11.

Wear masks in public places Alameda edict. San Francisco Examiner. 1918 Oct 25; 7.

Law in force till passing of influenza. San Francisco Examiner. 1918 Oct 25; 11.

Wearing mask compulsory in Oakland. San Francisco Examiner. 1918 Oct 26; 9.

99 per cent of citizens wear masks. San Francisco Examiner. 1918 Oct 26; 11.

Mask no bar to smoking sailor. San Francisco Examiner. 1918 Oct 26; 11.

Mask slacker arrested. San Francisco Examiner. 1918 Oct 26; 9.

Efficacy of flu masks is proven. White House makes its 700 employees wear gauze protection, only 8 sick. San Francisco Examiner. 1918 Oct 27; 6.

Hassler says masks prove their value. San Francisco Examiner. 1918 Oct 27; 6.

Three shot in row over "flu" mask. San Francisco Examiner. 1918 Oct 29; 13.

Influenza on decline in this city. San Francisco Examiner. 1918 Oct 29; 13.

Mask slackers given jail sentences, fines. San Francisco Examiner. 1918 Oct 29; 13.

Grippe decrease due to masks, says Hassler. Keep up flu war. Citizens are warned. San Francisco Examiner. 1918 Oct 30; 11.

Flu menace passing says health chief. Retention of masks held essential however, until danger of the disease is stamped out. Number of deaths and new cases steadily decreasing; S. F. leads in fighting epidemic. San Francisco Examiner. 1918 Nov 1; 13.

50 without masks are arrested. San Francisco Examiner. 1918 Nov 2; 9.

Influenza masks banish child disease. San Francisco Examiner. 1918 Nov 2; 11.

Gauze masks prevail until flu is extinct. Health officer declares SF will wear them until East conquers plague. Marked decrease in new cases reported; were 77 deaths and 531 new cases yesterday. San Francisco Examiner. 1918 Nov 5; 13.

Laurie A. Orders are orders, even for masks. Wise doctors know what is best. Mosquito theory was once a joke. San Francisco Examiner. 1918 Nov 5; 13.

Half of Nome down with influenza. San Francisco Examiner. 1918 Nov 8; 13.

Health department calls on the police to enforce the law at all places in the city. San Francisco Examiner. 1918 Nov 8; 13.

Influenza, as well as Huns, is defeated. San Francisco Examiner. 1918 Nov 12; 9.

Picture of mayor. San Francisco Examiner. 1918 Nov 12; 13.

'Flu' masks to be ousted Thanksgiving. San Francisco Examiner. 1918 Nov 13; 7.

Flu ban off; theatres to open Saturday. Reopening of SF meetings established. Shows resume performances; churches renew services Sunday; other affairs Monday; certain districts are to be excepted; unmasking due to come soon; adopt resolution unanimously. San Francisco Examiner. 1918 Nov 14; 13.

S.F. rapidly shakes off "flu" grip. San Francisco Examiner. 1918 Nov 15; 8.

'Flu' beaten indication from report. City's cases rapidly decrease, and conditions improve here with gratifying rapidity. San Francisco Examiner. 1918 Nov 16; 9.

Sirens will signal 'flu' masks off. Every whistle in city firehouses will sound glad tidings when the proclamation is signed. Epidemic definitely stamped out; conditions normal; schools to open Monday; quarantine off. San Francisco Examiner. 1918 Nov 20; 9.

Author of flu masks voluntarily pays fine. San Francisco Examiner. 1918 Nov 21; 11.

All S.F. to unmask at noon today. San Francisco Examiner 1918 Nov 21; 11.

The masked marvel. San Francisco Examiner. 1918 Nov 22; 18.

San Francisco wins victory in its battle with influenza. San Francisco Examiner. 1918 Nov 22; 18.

S. F. feels good without mask. It hides only thing worth while. This city always has a smile. San Francisco Examiner. 1918 Nov 22; 9.

"Flu" mask wearers get "bawling out". Signal sounds promptly at the stroke of 12 and those who do not doff gauze are ridiculed. San Francisco Examiner. 1918 Nov 22; 9.

Mayor and Hassler disagree on mask order. San Francisco Examiner. 1918 Dec 9; 9.

Dr. Hassler again to insist upon revival of masks. San Francisco Examiner. 1918 Dec 11; 10.

Dr. Hutchinson urges masks. San Francisco Examiner. 1918 Dec 11; 10.

Mask ruling to be acted upon Monday. Business men declare deaths from influenza not increasing; Dr. Hassler takes issue; Mayor Rolph decides not to call special meeting of supervisors to pass ordinance. San Francisco Examiner. 1918 Dec 12; 11.

Flu ordinance defeated by 9 to 7 vote. Decision follows hot argument in which members of board exchange unkind personalities. No action to be taken by health dept. unless imperative, says Dr. Hassler after meeting. San Francisco Examiner. 1918 Dec 20; 13.

Health board says it will use authority. San Francisco Examiner. 1918 Dec 20; 13.

Masks may come again in Oakland. San Francisco Examiner. 1919 Jan 1; 15.

Need of nurses at S.F. Hospital declared vital. San Francisco Examiner. 1919 Jan 3; 5.

'Flu' postpones opening of U.C. San Francisco Examiner. 1919 Jan 4; 5.

S.F. teachers to wear masks. San Francisco Examiner. 1919 Jan 5; 7.

Hassler calls for volunteers. San Francisco Examiner. 1919 Jan 6; 9.

Civic league demands 'flu' mask in S.F. San Francisco Examiner. 1919 Jan 7; 7.

Marked drop in flu deaths. San Francisco Examiner. 1919 Jan 19; 8.

Flu mask or jail is choice in S.F. today. San Francisco Examiner. 1919 Jan 20; 9.

Police take 100 maskless folk to jail. San Francisco Examiner. 1919 Jan 21; 11.

No flu masks for Oakland, council rules. San Francisco Examiner. 1919 Jan 22; 13.

Marked drop in flu cases in 48 hours. San Francisco Examiner. 1919 Jan 23; 5.

Dr. Hassler commended for masking. San Francisco Examiner. 1919 Jan 24; 4.

Flu on wane 75 per cent drop is noted. San Francisco Examiner. 1919 Jan 25.

New cases of influenza at low record. San Francisco Examiner. 1919 Jan 26; 12.

'Flu' masks banished by Rolph edict. San Francisco Examiner. 1919 Feb 2; 11.

Montrose Daily Press

US fighting influenza hard; rules issued by government to stop spread of noxious disease. Montrose Daily Press. 1918 Sep 24; 1.

Grand Junction closes schools, churches, theaters and stops all gatherings due to influenza. Montrose Daily Press. 1918 Oct 8; 1.

City council and health dept. Warning about 'flu. Montrose Daily Press. 1918 Oct 9; 1.

Quarantine on tight, Montrose closed up. Montrose Daily Press. 1918 Oct 14; 1.

Press hard hit by flu epidemic. Montrose Daily Press. 1918 Oct 22; 1.

Influenza spreading 60 to 70 cases here. Montrose Daily Press. 1918 Oct 22; 1.

Epidemic still forceful here; about 120 cases. Montrose Daily Press. 1918 Oct 24; 1.

52 deaths in 10 days in Silverton; 500 cases of the dreaded influenza. Montrose Daily Press. 1918 Oct 26; 1.

Although flu epidemic is about ended the quarantine is extended for one more week. Montrose Daily Press. 1918 Nov 14; 1.

Quarantine will be lifted tomorrow; on 39 days. Montrose Daily Press. 1918 Nov 20; 1.

Here's all the facts on the influenza epidemic here. Montrose Daily Press. 1918 Nov 22; 1.

Denver slams quarantine on again; 109 deaths in 11 days; people must mask. Montrose Daily Press. 1918 Nov 23; 1.

Influenza situation growing better all the time says Knott. Montrose Daily Press. 1918 Nov 25; 1.

Complete influenza record; 13 new cases in city in 24 hours. Montrose Daily Press. 1918 Nov 26; 1.

Only 9 new cases influenza in two days; three deaths. Montrose Daily Press. 1918 Nov 29; 1.

School opens on Monday. Montrose Daily Press. 1918 Nov 30; 1.

High school closed again due to fear of influenza; will open again on Dec. 30. Montrose Daily Press. 1918 Dec 5.

26 new cases influenza in last five days. Montrose Daily Press. 1918 Dec 5.

Influenza is on increase. Montrose Daily Press. 1918 Dec 12; 1.

Will get Mayo vaccine to fight 'flu' epidemic. Montrose Daily Press. 1918 Dec 12; 1.

Influenza shows gain in city in last few days; looks bad. Montrose Daily Press. 1918 Dec 12; 1.

What shall we do? Doctors talk over the epidemic here. Montrose Daily Press. 1918 Dec 13; 1.

'Small-pox-like' quarantine has been established by city; special officer hired. Montrose Daily Press. 1918 Dec 16; 1.

Dr. Knott speaks of influenza outlook. Montrose Daily Press. 1918 Dec 17; 1.

Dr. Blue says flue [sic] won't be a comeback. Montrose Daily Press. 1918 Dec 20; 1.

29 new cases. Montrose Daily Press. 1918 Dec 23; 1.

Judge Black discusses seriousness of the flu epidemic over country. Montrose Daily Press. 1918 Dec 27; 3.

A call to Montrose. Montrose Daily Press. 1918 Dec 27; 3.

City under quarantine again. Montrose Daily Press. 1918 Dec 28; 1.

City dads should be fair in this quarantine matter; no sense in silly edict issued. Montrose Daily Press. 1918 Dec 31; 1.

Now let's get together on this quarantine and be fair; make no enemies. Montrose Daily Press. 1919 Jan 3; 1.

High school to close for one week to help complete quarantine. Montrose Daily Press. 1919 Jan 4; 1.

Influenza decidedly on decrease, quarantine effect is being seen. Montrose Daily Press. 1919 Jan 3; 1.

Durango Evening Herald

Influenza cases reported here. Durango Evening Herald. 1918 Oct 5; 1.

All public places are ordered closed. Durango Evening Herald. 1918 Oct 8; 1.

Influenza residences bear cards. Durango Evening Herald. 1918 Oct 23; 1.

Serious conditions at Silverton worse. Durango Evening Herald. 1918 Oct 24; 1.

Silverton terror slightly abated. Durango Evening Herald. 1918 Oct 26; 1.

Help stop influenza epidemic, individual responsibility great. Durango Evening Herald. 1918 Nov 1; 1.

Grim reaper takes heavy toll in city since Saturday. Durango Evening Herald. 1918 Nov 4; 1.

La Plata County placed under quarantine to control influenza. Durango Evening Herald. 1918 Nov 6; 4.

Notice of quarantine. Durango Evening Herald. 1918 Nov 7; 3.

Help stop the flu. Durango Evening Herald. 1918 Nov 11; 3.

'Flu' restrictions slightly removed. Durango Evening Herald. 1918 Nov 26; 1.

Quarantine rules made more strict. Durango Evening Herald. 1918 Nov 30; 1.

Quarantine rules are changed slightly. Durango Evening Herald. 1918 Dec 11; 1.

150 cases of flu reported at Ouray. Durango Evening Herald. 1918 Dec 13; 1.

Walsenburg World

Colorado schools closed. Walsenburg World. 1918 Oct 10; 2.

Epidemic gains in army camps. Walsenburg World. 1918 Oct 10; 2.

Gunter's proclamation. Walsenburg World. 1918 Oct 10; 2.

Colorado soldier dies in camp. Walsenburg World. 1918 Oct 10; 2.

Meetings prohibited. Walsenburg World. 1918 Oct 17; 2.

Keeping well. Walsenburg World. 1918 Oct 17; 1.

Walsen camp news. Walsenburg World. 1918 Nov 28; 4.

Advice to 'flu' convalescents. Walsenburg World. 1918 Dec 5; 5.

U.S. Health service issues warning. Walsenburg World. 1919 Jan 2; 1.

Gunnison News-Champion

David A. Anderson dies at Camp Dix, New Jersey. Gunnison News Champion. 1918 Sep 27; 1.

Spanish flu close by. Gunnison News Champion. 1918 Oct 11; 1.

The 'flu' is after us. Gunnison News Champion. 1918 Oct 18; 1.

Flu epidemic rages everywhere but here. Gunnison News Champion. 1918 Oct 25; 1.

Death roll is long one. Gunnison News Champion. 1918 Nov 1; 1.

'Flu' toll is terrific. Gunnison News-Champion. 1918 Nov 1; 1.

Strangers land in jail. Gunnison News-Champion. 1918 Nov 1; 1.

Rockefeller in charge. Gunnison News-Champion. 1918 Nov 1; 1.

Quarantine proclamation by the county physician. Gunnison News Champion. 1918 Nov 1; 1.

Death list still grows. Gunnison News Champion. 1918 Nov 8; 1.

Flu situation very encouraging. No deaths. Gunnison News Champion. 1918 Nov 15; 1.

Ban raised tomorrow. Gunnison News Champion. 1918 Nov 22; 1.

Quarantine not raised, but no more cases. Gunnison News-Champion. 1918 Nov 29; 1.

Flu rampant in state. Gunnison News Champion. 1918 Nov 29; 1.

Mayo vaccine seems success. Gunnison News Champion. 1918 Dec 20; 1.

No flu now in county. Gunnison News Champion. 1918 Dec 6; 1.

Report as to quarantine appeal for cooperation by physician in charge. Gunnison News Champion. 1918 Dec 13; 1.

Reports to avoid quarantine were useless. Gunnison News Champion. 1918 Dec 13; 1.

No cure for influenza. Gunnison News Champion. 1918 Dec 27; 1.

Schools will open? Gunnison News Champion. 1918 Dec 27; 1.

Flu ban partly off. Gunnison News Champion. 1918 Dec 27; 1.

Flu ban lifted at Cañon City. Gunnison News Champion. 1918 Dec 27; 1.

How the flu progresses in nearby towns. Gunnison News Champion. 1918 Dec 27; 1.

Flu news. Gunnison News Champion. 1919 Jan 3; 1.

State board inspector advises opening schools. Gunnison News Champion. 1919 Jan 10; 1.

All schools to open again January 20th. Gunnison News Champion. 1919 Jan 10; 1.

Quarantine is lifted. Gunnison News-Champion. 1919 Feb 7; 1.

Flu bad in Salida. Gunnison News-Champion. 1919 Feb 21; 1.

Flu gets us at last. Gunnison News-Champion. 1919 Mar 14; 1.

Outbreak of flu at Cimarron again. Gunnison News-Champion. 1919 Apr 4; 1.

Grim hand of death clutches our community. Gunnison News-Champion. 1919 Mar 21; 1.

Silver World and Lake City Times

Centennial state items. Silver World and Lake City Times. 1918 Oct 3; 1.

Boulder students die of influenza. Silver World and Lake City Times. 1918 Oct 3; 1.

Colorado schools closed. Silver World and Lake City Times. 1918 Oct 10; 4.

Centennial state items. Silver World and Lake City Times. 1918 Oct 10; 4.

Nation combats 'flu' spread. Silver World and Lake City Times. 1918 Oct 17; 1.

Quarantine declared. Silver World and Lake City Times. 1918 Oct 17; 3.

Influenza abates in naval stations. Silver World and Lake City Times. 1918 Oct 31; 1.

Health talk: Spanish influenza or grip. Silver World and Lake City Times. 1918 Nov 14; 1.

New uses of 'flu' masks. Silver World and Lake City Times. 1918 Nov 28; 3.

Colorado news notes. Silver World and Lake City Times. 1919 Jan 2; 1.

How you feel when you have the flu. Silver World and Lake City Times. 1919 Jan 9; 3.

After the 'flu' -- fever or cold. Silver World and Lake City Times. 1919 Jan 9; 4.

Schools will open. Silver World and Lake City Times. 1919 Jan 23; 3.

The schools will open -- when? Silver World and Lake City Times. 1919 Feb 6; 3.

Grand Junction News

Spanish influenza. Grand Junction News. 1918 Oct 12; 3.

Churches of the city to be closed Sunday. Grand Junction News. 1918 Oct 12; 4.

Seventeen new cases of flu yesterday shows decrease in its spread. Grand Junction News. 1918 Oct 26; 1.

Influenza is thing of the past in some camps. Grand Junction News. 1918 Oct 26; 1.

Quarantine should be more strict says defense council. Grand Junction News. 1918 Nov 2; 1.

Flu ban lifted here; theaters, churches and schools to open. Grand Junction News. 1918 Nov 23; 1.

Flu office doubles its activities. Grand Junction News. 1918 Nov 23; 6.

City schools will open on Tuesday next. Grand Junction News. 1918 Nov 23; 1.

Flu office makes good in handling Spanish influenza. Grand Junction News. 1918 Dec 14; 1.

Uncle Sam's advice on flu. Grand Junction News. 1918 Dec 28; 3.

Silverton Standard

Colorado schools closed. Silverton Standard. 1918 Oct 12; 5.

Sterling Democrat

Colleges and public places being closed because of Spanish flu. Sterling Democrat. 1918 Oct 10; 1.

Four die of influenza the past week, one young man drowned. Sterling Democrat. 1918 Oct 24; 1.

Closing ban will not be lifted anywhere in the state until after Nov. 4th. Sterling Democrat. 1918 Oct 31; 1.

Princeton Packet

Princeton to adopt new army plan. Princeton Packet. 1918 Sep 6; 1.

University now under government control. Princeton Packet. 1918 Sep 27; 1.

Princeton ready for Liberty Loan campaign. Princeton Packet. 1918 Sep 27; 1.

Your chance to help the sick soldiers. Princeton Packet. 1918 Oct 4; 1.

Board closes schools. Princeton Packet. 1918 Oct 4; 9.

Two Spanish influenza victims here. Princeton Packet. 1918 Oct 4; 1.

Health board stops public gatherings. Princeton Packet. 1918 Oct 4; 1.

Spanish influenza. Princeton Packet. 1918 Oct 4; 8.

The school observer section 'no school!' Princeton Packet. 1918 Oct 4; 3.

The local influenza situation. Princeton Packet. 1918 Oct 4; 2.

Red Cross column. Princeton Packet. 1918 Oct 11; 6.

Special notice. Princeton Packet. 1918 Oct 11; 1.

Red Cross meeting postponed. Princeton Packet. 1918 Oct 11; 1.

Princeton now has a town hospital. Princeton Packet. 1918 Oct 11; 1.

Liberty programme cancelled by health board. Princeton Packet. 1918 Oct 11; 1.

Local hospital filled since opening. Princeton Packet. 1918 Oct 18; 1.

Guards on the campus. Princeton Packet. 1918 Oct 18; 6.

Uncle Sam's advice on flu. Princeton Packet. 1918 Oct 18; 8.

Health board's more stringent restrictions. Princeton Packet. 1918 Oct 18; 1.

Trained nurse dies. Princeton Packet. 1918 Oct 25; 1.

Board of health notice. Princeton Packet. 1918 Oct 25; 8.

Hospital proving a great help during the epidemic. Princeton Packet. 1918 Oct 25; 1.

Quarantine to be lifted this Sunday. Princeton Packet. 1918 Nov 1; 1.

All churches to be open Sunday. Princeton Packet. 1918 Nov 1; 1.

Back to school. Princeton Packet. 1918 Nov 4; 1.

Town may have a permanent hospital. Princeton Packet. 1918 Nov 8; 1.

S.A.T.C. to demobilize on December first. Princeton Packet. 1918 Nov 29; 1.

Advice to 'flu' convalescents. Princeton Packet. 1918 Dec 6; 5.

Health board holds meeting. Princeton Packet. 1918 Dec 20; 1.

Influenza. Princeton Packet. 1918 Dec 27; 4.

Pittsburgh Sun

"Spanish influenza" reported in Chicago. Pittsburgh Sun. 1918 Sep 21; 2.

Influenza's spread delays draft call. Pittsburgh Sun. 1918 Sep 27; 2.

All theaters and saloons here are closed in fight against Spanish influenza epidemic. Pittsburgh Sun. 1918 Oct 4; 1.

Firm stand taken here for health. Pittsburgh Sun. 1918 Oct 4; 1.

175,000 suffer from epidemic of influenza. Pittsburgh Sun. 1918 Oct 4; 1.

Physicians ordered to report cases. Pittsburgh Sun. 1918 Oct 4; 1.

Closing order being obeyed, reports show. Pittsburgh Sun. 1918 Oct 4; 2.

U.S. health bureau tells of epidemic. Pittsburgh Sun. 1918 Oct 4; 14.

Editor. For our protection. Pittsburgh Sun. 1918 Oct 4; 5.

Long JJ. Pittsburgh, for first time, sees all sports suspended. Pittsburgh Sun. 1918 Oct 5; 9.

Hungerford. Smash it in its infancy. Pittsburgh Sun. 1918 Oct 5 1918. Editorial cartoon.

70 Soldiers in barracks here stricken with influenza; Situation here does not alarm. Pittsburgh Sun. 1918 Oct 5; 1.

Daily health report. Pittsburgh Sun. 1918 Oct 7; 15.

States divided into nursing districts. Pittsburgh Sun. 1918 Oct 7; 8.

Churches are closed under health order. Pittsburgh Sun. 1918 Oct 7; 1.

Red Cross supplies face masks to Pitt. Pittsburgh Sun. 1918 Oct 8; 9.

Hospitals fight against the influenza. Pittsburgh Sun. 1918 Oct 8; 8.

Many influenza cases found in nearby points. Pittsburgh Sun. 1918 Oct 9; 19.

Influenza is on increase, reports show. Pittsburgh Sun. 1918 Oct 9; 11.

Fewer cases of influenza reported. Pittsburgh Sun. 1918 Oct 10; 2.

Liberty day program. Pittsburgh Sun. 1918 Oct 11; 8.

Increase in camp epidemics reported. Pittsburgh Sun. 1918 Oct 11; 14.

What to do to prevent it and how to treat influenza. Pittsburgh Sun. 1918 Oct 11; 14.

Epidemic here not alarming, figures show. Pittsburgh Sun. 1918 Oct 11; 14.

Influenza hold on Pittsburgh is weakening. Pittsburgh Sun. 1918 Oct 12; 3.

Theater ban may last five weeks. Pittsburgh Sun. 1918 Oct 15; 1.

659 new cases of influenza are reported. Pittsburgh Sun. 1918 Oct 15; 9.

Fewer cases of influenza are reported. Pittsburgh Sun. 1918 Oct 16; 2.

Fewer deaths in influenza epidemic here. Pittsburgh Sun. 1918 Oct 17; 17.

Little change in influenza outlook today. Pittsburgh Sun. 1918 Oct 18.

Business girls to combat influenza. Pittsburgh Sun. 1918 Oct 18; 12.

Report shows fewer cases of influenza. Pittsburgh Sun. 1918 Oct 19; 3.

Churches of city are still closed. Pittsburgh Sun. 1918 Oct 19; 5.

Epidemic adds to death list in Pittsburgh. Pittsburgh Sun. 1918 Oct 21; 4.

Influenza reports indicate increase. Pittsburgh Sun. 1918 Oct 21; 8.

Epidemic now waning here officials think. Pittsburgh Sun. 1918 Oct 22; 3.

Coal men to fight epidemic at mines. Pittsburgh Sun. 1918 Oct 22; 2.

Big increase in influenza victims today. Pittsburgh Sun. 1918 Oct 23; 2.

State closing ban may soon be rescinded. Pittsburgh Sun. 1918 Oct 24; 2.

Epidemic causes loss in coal production. Pittsburgh Sun. 1918 Oct 24; 2.

Schools close as deaths from epidemic grow. Pittsburgh Sun. 1918 Oct 24; 2.

Health department closes libraries. Pittsburgh Sun. 1918 Oct 24; 2.

713 new cases of influenza are reported. Pittsburgh Sun. 1918 Oct 25; 22.

Government's doctors here for epidemic. Pittsburgh Sun. 1918 Oct 26; 2.

Mayor Babcock favors lifting epidemic bans. Pittsburgh Sun. 1918 Oct 28; 8.

Dr. Royer declines to lift closing ban. Pittsburgh Sun. 1918 Oct 28; 1.

Babcock and Royer confer on epidemic. Pittsburgh Sun. 1918 Oct 29; 8.

Reading rooms open. Pittsburgh Sun. 1918 Oct 30; 1.

Halloween carnival banned in city. Pittsburgh Sun. 1918 Oct 30; 1.

Closing order may be lifted within week. Pittsburgh Sun. 1918 Oct 30; 8.

Last week death list totals 1,032. Pittsburgh Sun. 1918 Oct 31; 2.

Big decrease in influenza cases shown. Pittsburgh Sun. 1918 Oct 31; 2.

Closing order will be lifted on November 9. Pittsburgh Sun. 1918 Nov 1; 12.

Fight on lifting influenza ban is expected: Radical steps by Harrisburg anticipated. Pittsburgh Sun. 1918 Nov 2; 1.

Fight begins on influenza ban violators. Pittsburgh Sun. 1918 Nov 5; 1.

Theaters quit fight against state official. Pittsburgh Sun. 1918 Nov 6; 8.

Ban may stay unless death rate lowers. Pittsburgh Sun. 1918 Nov 7; 2.

Editor. Theaters are opened. Pittsburgh Sun. 1918 Nov 9; 4.

Royer closing ban is lifted at noon today. Pittsburgh Sun. 1918 Nov 9; 1.

Influenza epidemic will soon be over. Pittsburgh Sun. 1918 Nov 11; 10.

Influenza reports indicate increase. Pittsburgh Sun. 1918 Nov 21; 8.

Only 66 new "flu" cases are reported. Pittsburgh Sun. 1918 Dec 10; 1.

Increase is shown in influenza cases. Pittsburgh Sun. 1918 Dec 14; 1.

60 new "flu" cases are reported in city. Pittsburgh Sun. 1918 Dec 16; 1.

61 new influenza cases are reported. Pittsburgh Sun. 1918 Dec 17; 2.

Influenza strikes its lowest figure. Pittsburgh Sun. 1918 Dec 18; 1.

Only 13 new cases of "flu" reported. Pittsburgh Sun. 1918 Dec 19; 1.

Editor. Influenza ravages. Pittsburgh Sun. 1918 Dec 20; 6.

Influenza reports show 45 new cases. Pittsburgh Sun. 1918 Dec 21; 1.

"Flu" shows increase: 60 cases are reported. Pittsburgh Sun. 1918 Dec 26; 1.

16 influenza cases are reported today. Pittsburgh Sun. 1918 Dec 27; 1.

27 new "flu" cases. Pittsburgh Sun. 1919 Jan 4; 6.

27 influenza cases in 42-hour period. Pittsburgh Sun. 1919 Jan 6; 11.

111,688 dead from "flu" in 46 cities. Pittsburgh Sun. 1919 Jan 6; 20.

36 new "flu" cases. Pittsburgh Sun. 1919 Jan 7; 11.

Record state death rate laid to "flu". Pittsburgh Sun. 1919 Jan 15; 11.

20 new influenza cases. Pittsburgh Sun. 1919 Jan 18; 2.

Whisky praised as influenza medicine. Pittsburgh Sun. 1919 Jan 21; 11.

Big increase shown in influenza cases. Pittsburgh Sun. 1919 Jan 22; 2.

New influenza cases and deaths increase. Pittsburgh Sun. 1919 Jan 23; 1.

New steps taken to combat "flu". Pittsburgh Sun. 1919 Jan 24; 10.

Influenza reported increasing again. Pittsburgh Sun. 1919 Jan 28; 2.

Fewer influenza cases are reported. Pittsburgh Sun. 1919 Jan 29; 1.

"Flu" and pneumonia cases show decrease. Pittsburgh Sun. 1919 Feb 3; 1.

Pittsburgh Gazette-Times

News of national army cantonments. Pittsburgh Gazette-Times. 1918 Sep 29; 2.

New "grippe" ravages East. Pittsburgh Gazette-Times. 1918 Sep 30.

Editor. Again - the grip! Pittsburgh Gazette-Times. 1918 Oct 1; 6.

Influenza in the army is waning. Pittsburgh Gazette-Times. 1918 Oct 3.

Epidemic not to close schools. Pittsburgh Gazette-Times. 1918 Oct 3.

Growth of epidemic prompts drastic order by Dr. Royer. Pittsburgh Gazette-Times. 1918 Oct 4; 1.

Influenza vaccine will get severe test doctors to be masked. Pittsburgh Gazette-Times. 1918 Oct 4; 1.

Closing order will be obeyed in Pittsburgh. Pittsburgh Gazette-Times. 1918 Oct 4; 1.

Local grid games today called off Pitt and Great Lakes won't play because of influenza epidemic. Pittsburgh Gazette-Times. 1918 Oct 5; 10.

For those who would not take Spanish influenza. Pittsburgh Gazette-Times. 1918 Oct 5; 5.

Sunday gas lid on yet despite epidemic plea. Pittsburgh Gazette-Times. 1918 Oct 5; 2.

Influenza sweeping nation: Pittsburgh under quarantine. Pittsburgh Gazette-Times. 1918 Oct 5; 1.

7,000 boys ill, 167 have died at Camp Lee. Pittsburgh Gazette-Times. 1918 Oct 5; 5.

Schools will help prevent epidemic here. Pittsburgh Gazette-Times. 1918 Oct 6; 1.

Quarantine not satisfactorily observed. Pittsburgh Gazette-Times. 1918 Oct 6; 2-1.

Use gas masks to ward off influenza. Pittsburgh Gazette-Times. 1918 Oct 6; 7.

Influenza does not stop golf play. Pittsburgh Gazette-Times. 1918 Oct 6; 3.

Health chiefs say epidemic here is sure. Pittsburgh Gazette-Times. 1918 Oct 7; 1.

List of grip victims show big increase. Pittsburgh Gazette-Times. 1918 Oct 8; 1.

Boys in schools out to fight influenza. Pittsburgh Gazette-Times. 1918 Oct 8; 7.

Officials plan hospitals for grip patients. Pittsburgh Gazette-Times. 1918 Oct 9; 1.

Maj. Day hit by epidemic he is fighting. Pittsburgh Gazette-Times. 1918 Oct 10; 4.

Rapid spread of influenza in Pittsburgh. Pittsburgh Gazette-Times. 1918 Oct 10; 1.

Larger death toll is taken by pneumonia. Pittsburgh Gazette-Times. 1918 Oct 11; 1.

Liquor men to urge saloons' opening. Pittsburgh Gazette-Times. 1918 Oct 11; 7.

Influenza hits many cities in nation. Pittsburgh Gazette-Times. 1918 Oct 11; 7.

Surgeon General Blue gives advice on influenza. Pittsburgh Gazette-Times. 1918 Oct 12; 9.

Army officer is victim of influenza. Pittsburgh Gazette-Times. 1918 Oct 12; 7.

Deaths from grip increase; fewer cases. Pittsburgh Gazette-Times. 1918 Oct 13; 2-5.

Cases of grip increase in camps. Pittsburgh Gazette-Times. 1918 Oct 13; 2-5.

Home nursing urged to rest tired doctors. Pittsburgh Gazette-Times. 1918 Oct 13; 2-5.

Grip deaths increased 10 in 24 hours. Pittsburgh Gazette-Times. 1918 Oct 14; 1.

Red Cross busy in checking epidemic. Pittsburgh Gazette-Times. 1918 Oct 15; 11.

Full force of epidemic yet to come. Pittsburgh Gazette-Times. 1918 Oct 15; 11.

Grip epidemic victims now number 4,445. Pittsburgh Gazette-Times. 1918 Oct 16; 1.

Urgent calls sent out by Red Cross. Pittsburgh Gazette-Times. 1918 Oct 17; 18.

Heavier toll by epidemic in camps. Pittsburgh Gazette-Times. 1918 Oct 17; 11.

Fewer cases of influenza are reported. Pittsburgh Gazette-Times. 1918 Oct 17; 11.

Red Cross needs 300 nurses to fight Spanish influenza. Pittsburgh Gazette-Times. 1918 Oct 19; 9.

Peak not hit by rising tide of influenza. Pittsburgh Gazette-Times. 1918 Oct 19; 9.

High tide of influenza is maintained. Pittsburgh Gazette-Times. 1918 Oct 20; 1.

Medical men unite forces to fight grip. Pittsburgh Gazette-Times. 1918 Oct 22; 1.

Children best in schools, says Burns. Pittsburgh Gazette-Times. 1918 Oct 23; 7.

City schools not closed by grip epidemic. Pittsburgh Gazette-Times. 1918 Oct 23; 1.

Epidemic gains in eight counties. Pittsburgh Gazette-Times. 1918 Oct 23.

City schools are closed by grip fighters. Pittsburgh Gazette-Times. 1918 Oct 24; 1.

Royer refuses any easing of influenza ban. Pittsburgh Gazette-Times. 1918 Oct 25; 7.

Real vaccine for influenza will be made. Pittsburgh Gazette-Times. 1918 Oct 25; 1.

Prisoners escape epidemic. Pittsburgh Gazette-Times. 1918 Oct 25; 14.

Nation unites with state in fighting grip. Pittsburgh Gazette-Times. 1918 Oct 26; 1.

Catholic aid in epidemic is accepted. Pittsburgh Gazette-Times. 1918 Oct 27; 2.

Arrests for drunkenness show marked decrease since saloons are closed. Pittsburgh Gazette-Times. 1918 Oct 27; 2-6.

Vaccination against 'flu' here is urged. Pittsburgh Gazette-Times. 1918 Oct 28; 1.

Steam shovel is used to dig graves for N.Y. victims of influenza. Pittsburgh Gazette-Times. 1918 Oct 28; 1.

Babcock asks state to lift influenza ban. Pittsburgh Gazette-Times. 1918 Oct 28; 1.

Halloween celebration may be banned by police under health rulings. Pittsburgh Gazette-Times. 1918 Oct 29; 5.

Ban remains; Babcock goes to Harrisburg. Pittsburgh Gazette-Times. 1918 Oct 29; 1.

Mayor to meet opposition from governor and Royer. Pittsburgh Gazette-Times. 1918 Oct 29; 5.

Police prohibit Halloween celebrations; ban crowds. Pittsburgh Gazette-Times. 1918 Oct 30; 5.

Mayor's effort to remove ban without avail. Pittsburgh Gazette-Times. 1918 Oct 30; 1.

Influenza ban is modified very slightly. Pittsburgh Gazette-Times. 1918 Oct 31; 1.

Influenza epidemic wanes in Pittsburgh; ban may soon be lifted by authorities. Pittsburgh Gazette-Times. 1918 Nov 1; 9.

Spanish influenza is epidemic here. Pittsburgh Gazette Times. 1918 Nov 1; 9.

Gloom-draped Pittsburgh mourns lost Halloween. Pittsburgh Gazette-Times. 1918 Nov 1; 9.

Mayor Babcock's proclamation regarding lifting of ban here. Pittsburgh Gazette-Times. 1918 Nov 2; 1.

Managers vote to open all theaters Monday. Pittsburgh Gazette-Times. 1918 Nov 2; 5.

Influenza ban abrogated by city officers. Pittsburgh Gazette-Times. 1918 Nov 2; 1.

Royer to get legal advice before acting. Pittsburgh Gazette-Times. 1918 Nov 2; 1.

Drastic ban on Lancaster; Dr. Royer says liquor men are defying state orders. Pittsburgh Gazette-Times. 1918 Nov 2; 5.

Royer awaits violations of closing order. Pittsburgh Gazette-Times. 1918 Nov 3; 1.

Relief work here menaced by acts of mayor, says Royer. Pittsburgh Gazette-Times. 1918 Nov 3; 6.

Plea is made for influenza ban by Blue. Pittsburgh Gazette-Times. 1918 Nov 5; 1.

All theaters agree to obey influenza ban. Pittsburgh Gazette-Times. 1918 Nov 6; 1.

Influenza less throughout state. Pittsburgh Gazette-Times. 1918 Nov 7; 11.

Influenza ban to be lifted next Saturday. Pittsburgh Gazette-Times. 1918 Nov 7; 11.

Only 874 die of influenza in day. Pittsburgh Gazette-Times. 1918 Nov 8; 7.

Schools in city will reopen November 18. Pittsburgh Gazette-Times. 1918 Nov 8; 9.

Pitt night classes will meet Monday. Pittsburgh Gazette-Times. 1918 Nov 9; 4.

All theaters in city open today Royer gives ban-lifting regulations. Pittsburgh Gazette-Times. 1918 Nov 9; 1.

Dr. Royer gives warning to influenza sufferers who are now convalescent. Pittsburgh Gazette-Times. 1918 Nov 9; 9.

Mayor declares in general holiday Pittsburgh today. Pittsburgh Gazette-Times. 1918 Nov 11; 2.

Epidemic still affecting coal. Pittsburgh Gazette-Times. 1918 Nov 11; 2.

Board decides schools open next Monday. Pittsburgh Gazette-Times. 1918 Nov 12; 3.

Influenza rate still high. Pittsburgh Gazette-Times. 1918 Nov 20; 10.

Eight school teachers die of influenza. Pittsburgh Gazette-Times. 1918 Nov 20; 10.

Many flare-ups of influenza in state. Pittsburgh Gazette-Times. 1918 Nov 21; 7.

New outbreak of influenza is threatened. Pittsburgh Gazette-Times. 1918 Nov 22; 1.

New influenza cases show slight decrease. Pittsburgh Gazette-Times. 1918 Nov 23; 4.

New cases of influenza in 24 hours total 198. Pittsburgh Gazette-Times. 1918 Nov 27; 9.

Influenza is stationary. Pittsburgh Gazette-Times. 1918 Dec 4; 2.

Night schools to reopen Jan. 5. Pittsburgh Gazette-Times. 1918 Dec 26; 7.

Mason W. The epidemic. Pittsburgh Gazette-Times. 1918 Dec 30; 6.

No decrease in influenza. Pittsburgh Gazette-Times. 1918 Dec 31; 8.

A review of the year 1918. Pittsburgh Gazette-Times. 1919 Jan 1; 26.

Dr. B.A. Booth dies from influenza. Pittsburgh Gazette-Times. 1919 Jan 14; 7.

185,000 deaths last year sets new state record. Pittsburgh Gazette-Times. 1919 Jan 15; 7.

Music in the home furthered by the influenza epidemic. Pittsburgh Gazette-Times. 1919 Jan 20; 9.

Pastor arrested in pulpit for influenza violations. Pittsburgh Gazette-Times. 1919 Jan 27; 3.

Bryn Mawr College News

Quarantined again. The College News. 1918 Oct 2; 6.

Enlist now. The College News. 1918 Oct 2:2.

Quarantine rules extended. The College News. 1918 Oct 10.

Calendar. The College News. 1918 Oct 10: 6.

Bryn Mawr opens fifth war year with stand for liberal studies. The College News. 1918 Oct 10: 1.

Found. The College News 1918 Oct 17: 3.

Flu rumors exaggerated. The College News. 1918 Oct 17: 6.

College well isolated. The College News. 1918 Oct 24: 1.

News in brief. The College News. 1918 Oct 24: 6.

Influenza hospital gets ward and diet pantry. The College News. 1918 Oct 24: 1.

Lantern night proves freshman's power of song. The College News. 1918 Nov 7: 1.

Emergency hospital becomes convalescent home. The College News. 1918 Nov 14: 5.

Classes give way to peace celebration. The College News. 1918 Nov 14: 1.

St. Albans Daily Messenger

Fletcher. St. Albans Daily Messenger. 1918 Sep 24.

St. Albans free of influenza. St. Albans Daily Messenger. 1918 Sep 23.

What is Spanish influenza? St. Albans Daily Messenger. 1918 Sep 24.

Fletcher. St. Albans Daily Messenger. 1918 Sep 24.

Epidemic still rages in state. St. Albans Daily Messenger. 1918 Sep 27; 1.

Grip shows no let up in state. St. Albans Daily Messenger. 1918 Oct 3; 1.

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Dean A to Baldwin, WH. 1919 Aug 28. Folder: Influenza Epidemic 1918-19.

Dean A to Doctor. 1918 Oct 18. Folder: Influenza Epidemic 1918-19.

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Negative Research – Potential provisional influenza escape communities disqualified upon further review

Location Investigated	Archives Consulted	Other Sources
Fort Hancock, N.J. (military)		
Camp Holabird, Baltimore, MD (military)		
Provost guard, Pearl and Park Streets, New York City (military)		
Fort Story, VA (military)		
Fort Terry, NY (military)		
Fort Totten, NY (military)		
Fort H.G. Wright, NY (military)		
Camp Kearny, CA (military)	Military History Institute, Carlisle, PA	
Camp Custer, MI (military)	Military History Institute, Carlisle, PA; NARA RG 112	
12 th District Naval Ships (based out of San Diego, CA) (military)	NARA RG 24 Ship Logs; NARA RG 52 BuMed	
Mare Island, CA (military)	NARA RG 52 BuMed; California Historical Society	
Monkton, VT (civilian)	Monkton Death Records; Monkton Town Reports, 1918-1920	Burlington Free Press; Enterprise and Vermonter
Grafton, VT (civilian)	Grafton Historical Society, Grafton Town Reports, 1918-1920	Bellows Falls Times
Holland, VT (civilian)	Orleans County Historical Society	Orleans County Monitor
Lake City, CO (civilian)		
Dartmouth College, NH (civilian)	Dartmouth Archives	
Ann Arbor, MI (civilian)	University of Michigan Bentley Historical Library	The Michigan Daily on microfilm

Darien, Connecticut (civilian)		The Darien Review Newspaper
NY State Training School for Girls, Hudson, NY (civilian)	Columbia Green Community College; NY State Department of Corrections and Office of Children and Family Services; NY State Archives; Hudson Area Association Library	Hudson Republican Newspaper

Appendix II: Images

List of Maps, Photographs, and Documents

Maps showing the introduction and spread of influenza into the United States in fall 1918	240-241
Photographs and images of the provisional influenza escape communities	242-261
Documents related to public health education and risk communications, c. 1918	262-272

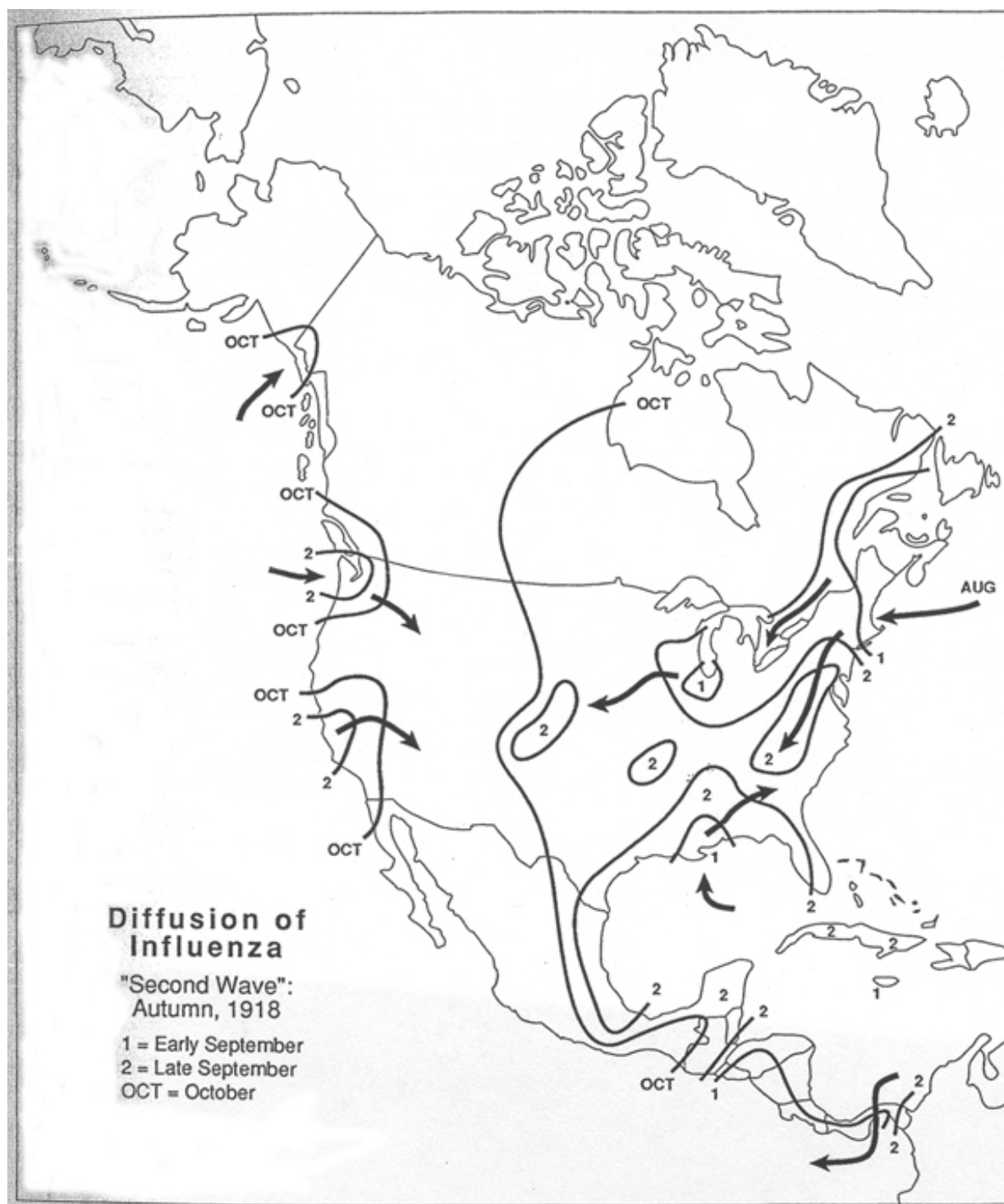


Figure 1. From Patterson KD, Pyle GF. The geography and mortality of the 1918 influenza pandemic. *Bulletin of the History of Medicine*. 1991;65:4-21.

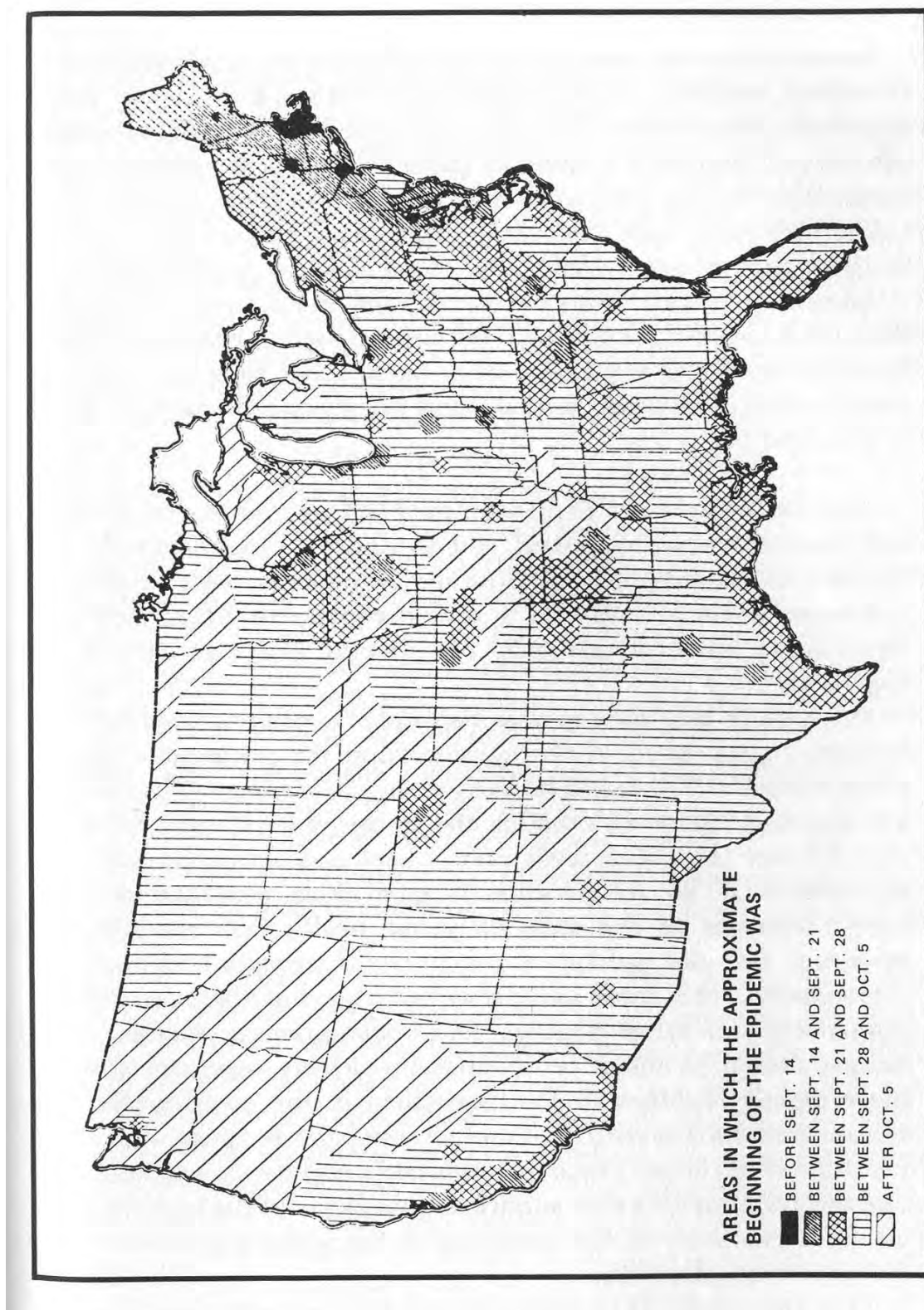


Figure 2. From Sydenstricker E. Preliminary statistics of the influenza epidemic. Public Health Rep. 1918;33(52):2305-21.

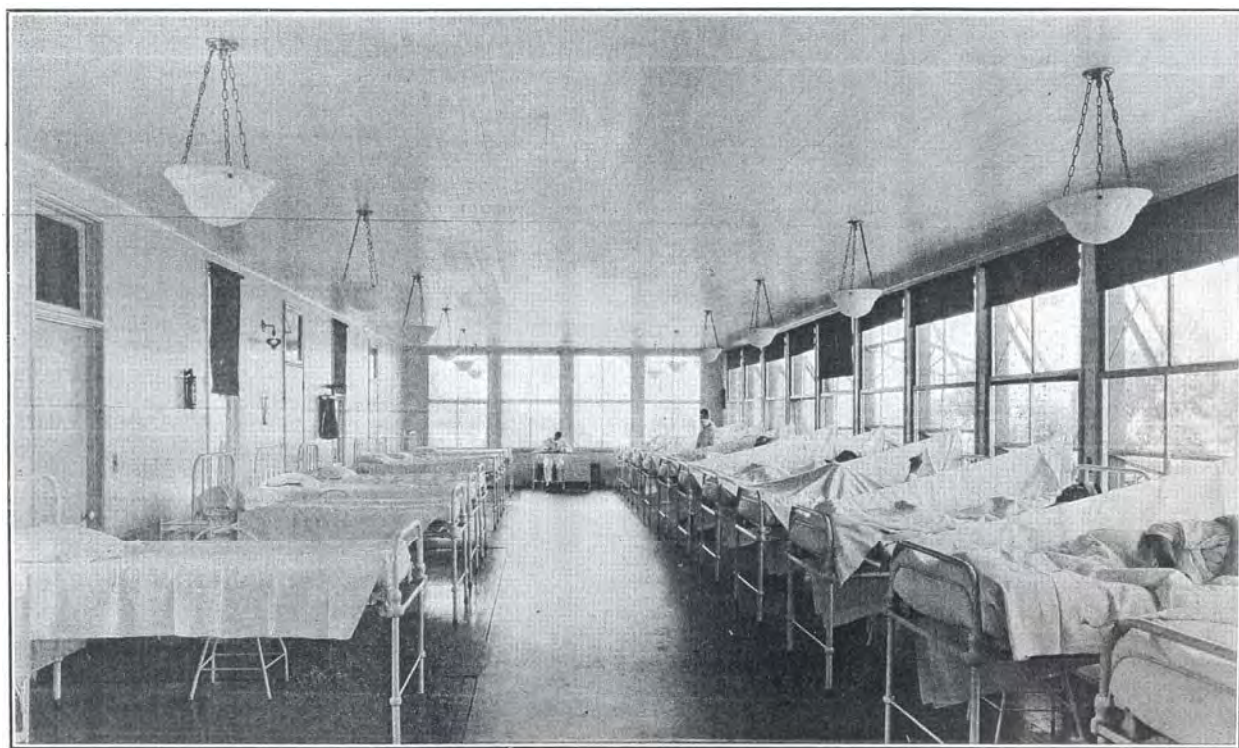


Figure 3. Aerial view of San Francisco, California, and Yerba Buena Island showing construction of San Francisco Bay Bridge; Photographer: US Navy; Date: July 16, 1935. From Ames Imaging Library System (AILS), National Aeronautics and Space Administration, <http://ails.arc.nasa.gov/Images/Historical/A93-0075-6.html>, accessed [2006 Jan 12].

Photo # NH 100361 Wharf area at Naval Training Station San Francisco, California, 1921



Figure 4. Naval Training Station, San Francisco, California. View looking southward over the wharf area, from the eastern end of Yerba Buena ("Goat") Island, 1921. Long Wharf is in the foreground, lined with rowing boats on davits. Beyond is Navy Wharf, with the receiving ship *Boston* (1887-1946) at far left. The Lighthouse Wharf is beyond that. Collection of Eugene R. O'Brien. Photo #: NH 100361. U.S. Naval Historical Center Photograph. From U.S. Naval Historical Center, <http://www.history.navy.mil/photos/images/i000000/i00361.jpg>, accessed [12 Jan 2006].



PNEUMONIA WARD. U. S. NAVAL TRAINING STATION, SAN FRANCISCO, CALIF.

Figure 5. Pneumonia Ward, U.S. Naval Training Station (Yerba Buena), San Francisco, California. From Annual Reports of the Navy Department for the Fiscal Year 1919. Washington, DC: Government Printing Office; 1920; 2366-2.

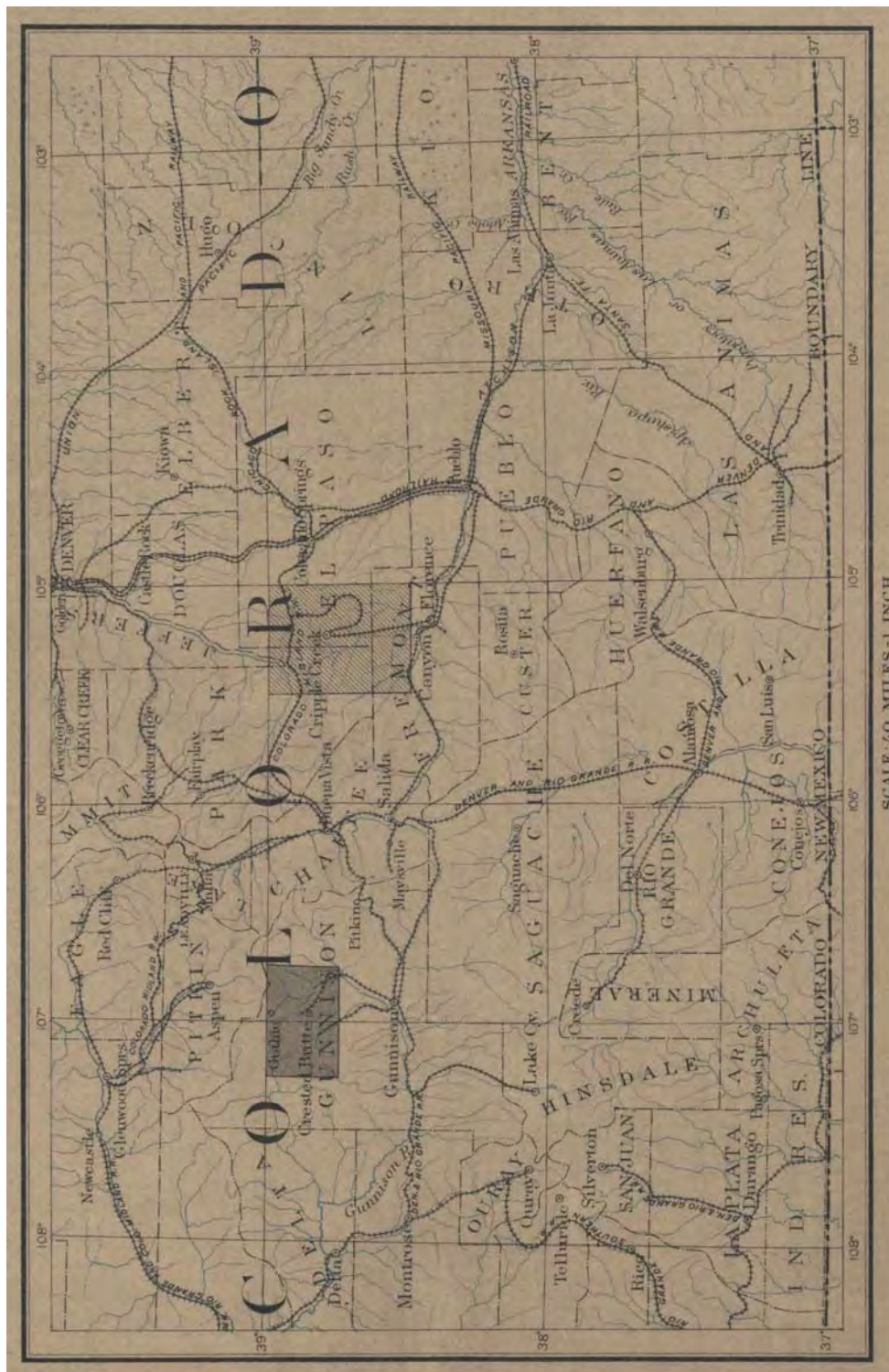


Figure 6. 1894 USGS Map of Colorado showing Gunnison and other towns mentioned in the Gunnison case study. US Department of Interior, US Geological Survey. Geologic Atlas of the United States: Anthracite -- Crested Butte Folio, Colorado. Washington, DC: US Geological Survey; 1894.



Figure 7. View north of Main Street from New York Avenue, Gunnison, Colorado, shows a smoothly graded dirt street with a traffic light at the intersection of Tomichi and Main; automobiles diagonally parked in front of businesses. Some original 1880s buildings include Atlantic Gardens, "Red Light" buildings, Gunnison Hardware store, and the First National Bank, circa 1930. From Denver Public Library Western History Collection, call number X-9405. At <http://photowest.org>, accessed [12 Jan 2006]. Used with permission.



Figure 8. View of Western State College, Gunnison, Colorado, includes North and South Halls of the Taylor Hall complex, with Central under construction. Tiny clapboard one-room buildings north of Taylor, known as Highland Village, serve as student housing. From Denver Public Library, Western History Collection, call number X-9302. At <http://photowest.org>, accessed [12 Jan 2006]. Used with permission.

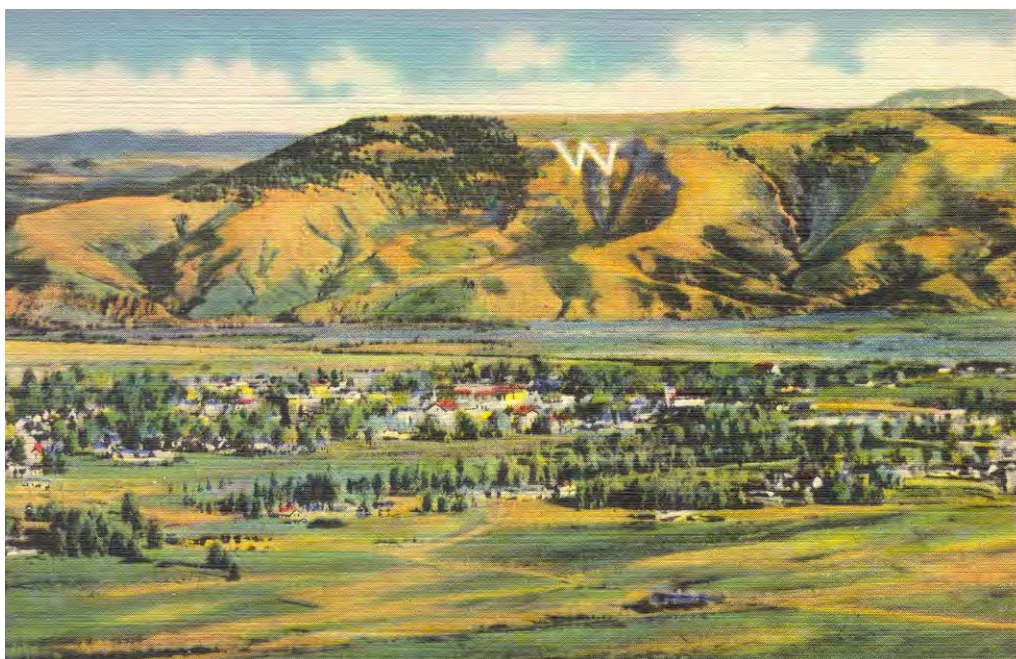


Figure 9. Postcard of Gunnison Valley, Mount Tenderfoot, and Western State 'W' at Gunnison on Highway 50, Colorado. Circa 1920. From the Center for the History of Medicine Image Collection.

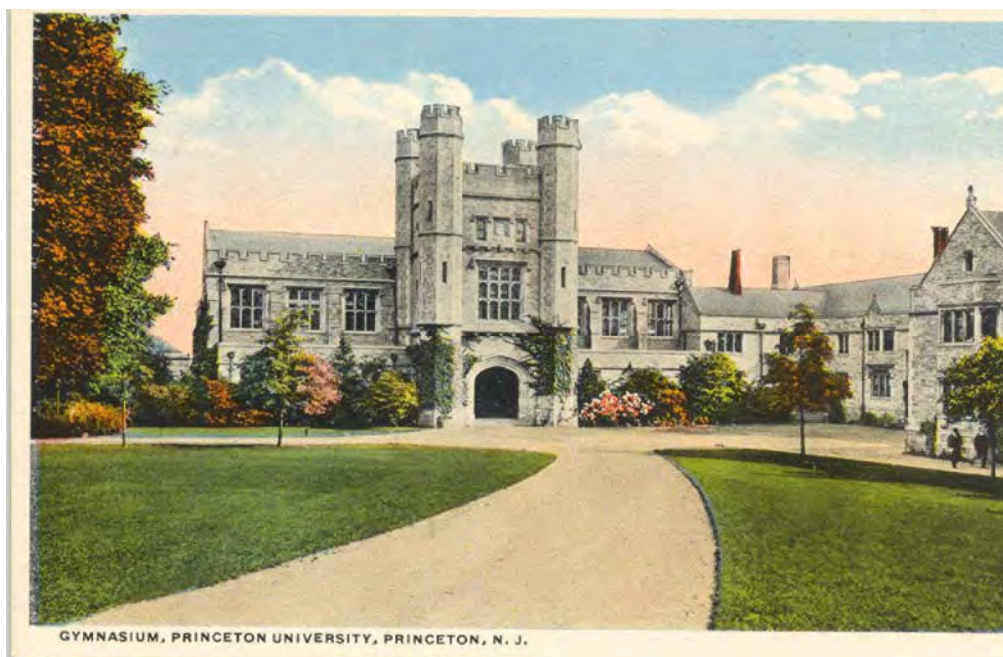
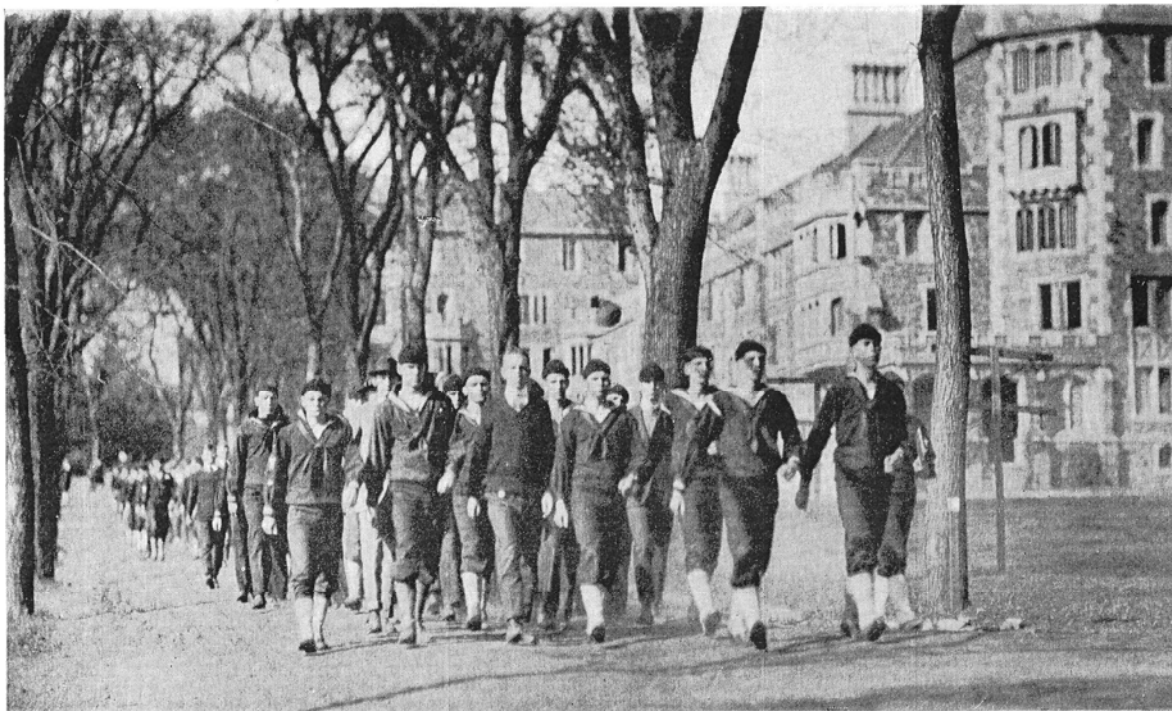


Figure 10. The gymnasium of Princeton University, Princeton, New Jersey. This building was used as an isolation hospital for influenza patients. From the Center for the History of Medicine Image Collection.



THE PRINCETON NAVAL UNIT IN ACTION

Figure 11. Photograph of Princeton Student Naval Training Corps, 1918. From The Princeton Bric-a-Brac Volume XLIV. 1919 Jun 1; 100. Available at Seely G. Mudd Archive, Princeton University, Princeton, New Jersey.



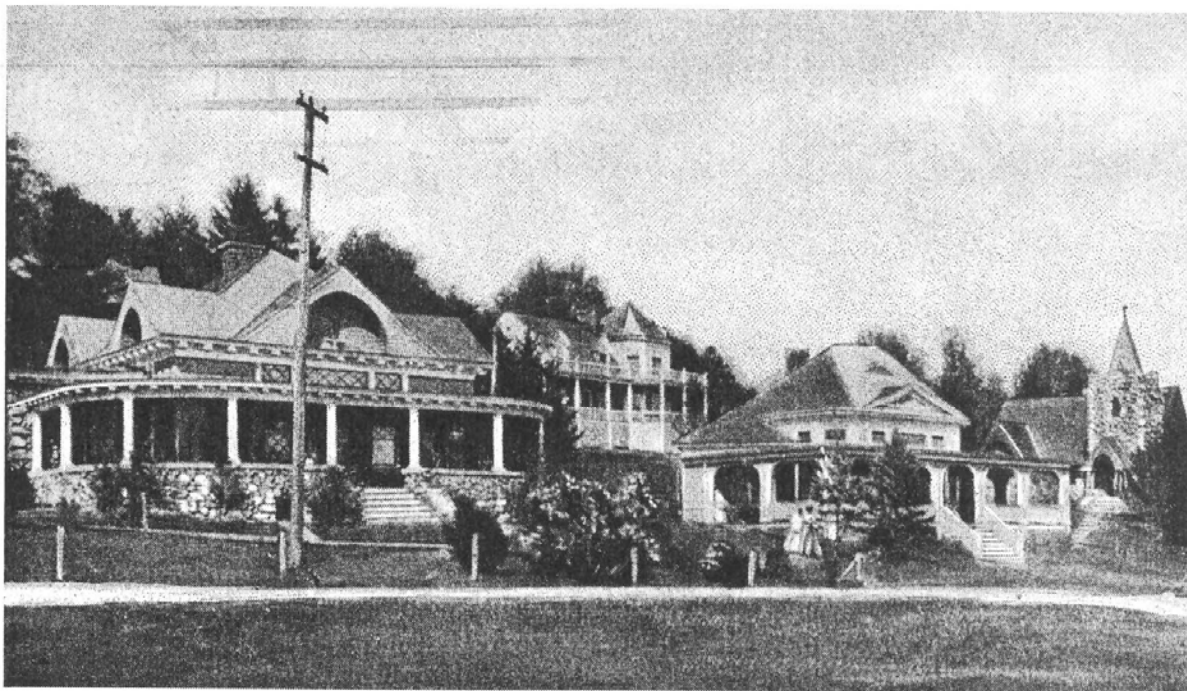
Figure 12. Western Pennsylvania School for Blind Children (in 1918, the Western Pennsylvanian Institution for the Blind) Pittsburgh, Pennsylvania, 2005. This is the front view of the original building, which still stands today in downtown Pittsburgh. From the Center for the History of Medicine Image Collection.



Figure 13. Photograph of female students knitting and crocheting at WPIB during the 1906-07 school year. From the Western Pennsylvania School for Blind Children historical photograph archive.



Figure 14. Students and staff playing in the yard of the WPIB, circa 1920. From the Western Pennsylvania School for Blind Children historical photograph archive.



*The Saranac Tuberculosis Sanatorium in the
Adirondack Mountains, in upstate New York*

Figure 15. Postcard of the Trudeau Tuberculosis Sanatorium, circa 1920. From the Center for the History of Medicine Image Collection.

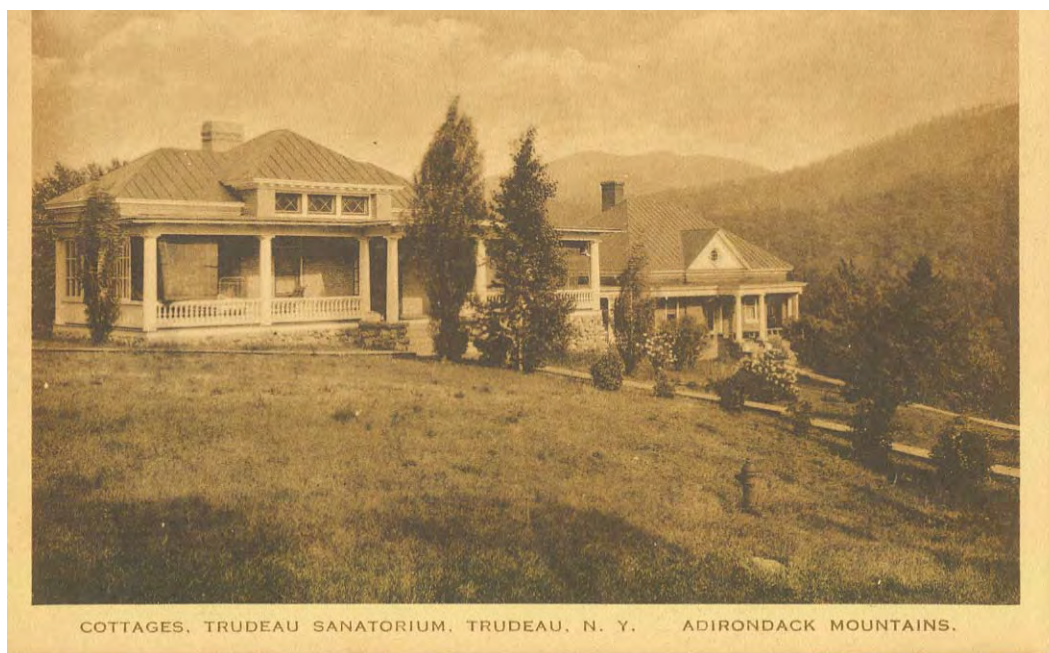


Figure 16 Cottages at the Trudeau Sanatorium, Saranac Lake, New York. Circa 1920. From the Center for the History of Medicine Image Collection.



Figure 17. Map of the Saranac Lake region, Adirondack State Park, New York, circa 1900. From Trudeau Institute, Saranac Lake, New York. Scrapbook Trudeau Sanatorium A.C.S. Cottages and Grounds. No. 1 1884-.



Figure 18. Postcard of Taylor Hall, Bryn Mawr College. From the Center for the History of Medicine Image Collection.



Figure 19. Bryn Mawr College, "During the Flu Epidemic, Bryn Mawr Hospital Quarters, c. 1918." From Bryn Mawr College Library. Used with permission.

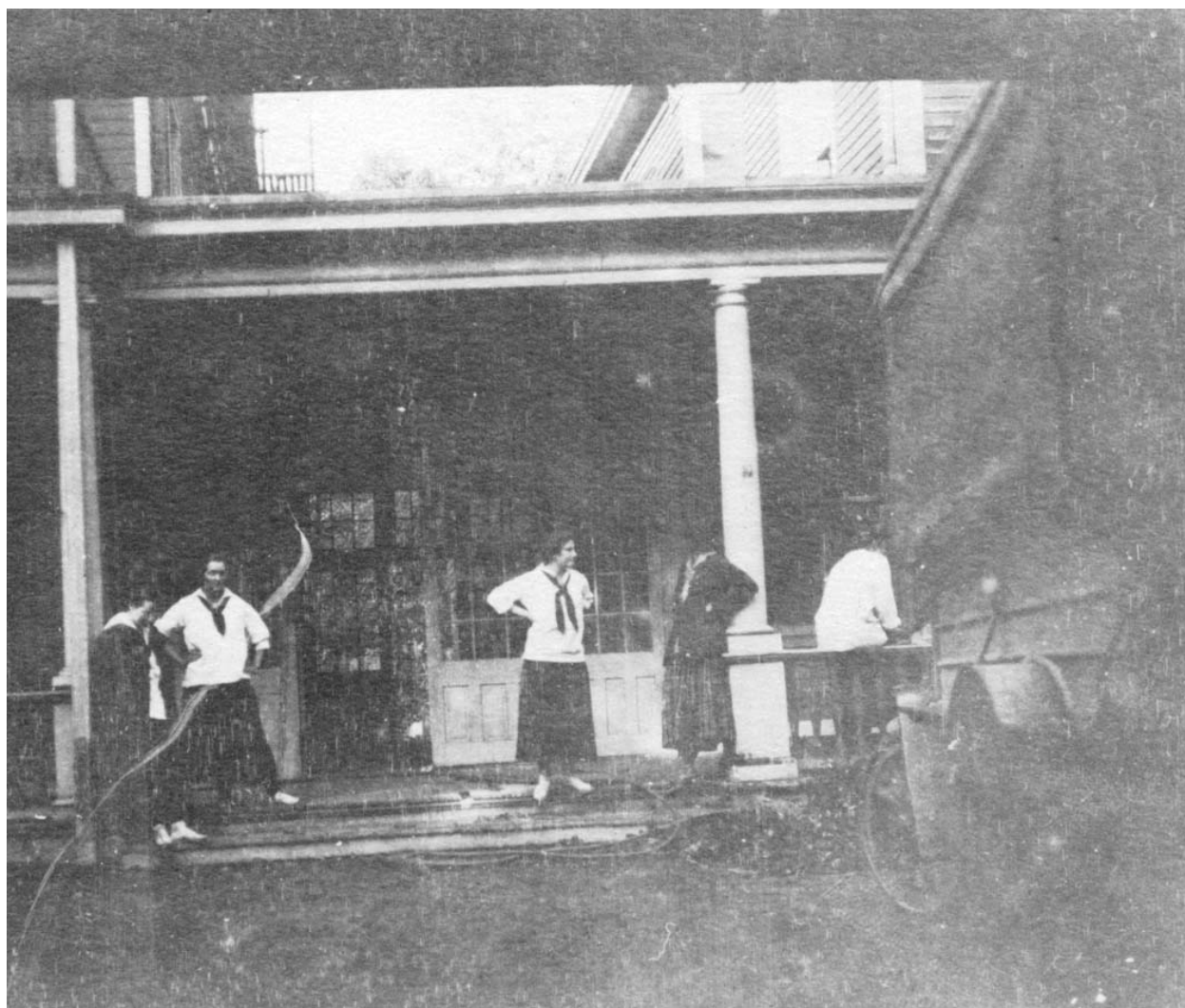


Figure 20. Bryn Mawr College, "Cleaning emergency hospital quarters at Bryn Mawr College during Flu Epidemic – 1918." From Bryn Mawr College Library. Used with permission.

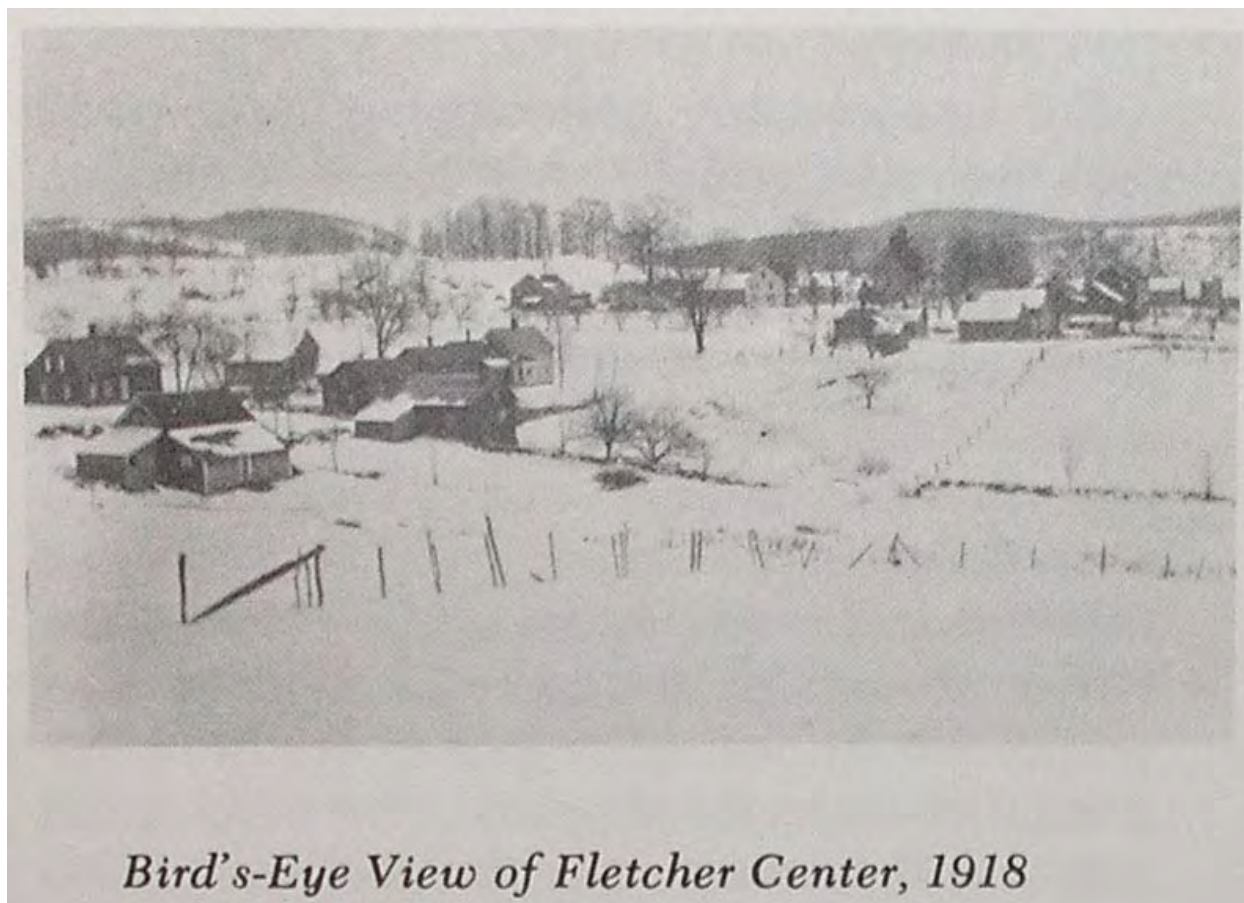


Figure 21. Fletcher, Vermont, 1918. From Town of Fletcher. A history of Fletcher, Vermont. Burlington, Vermont: George Little Press Inc.; July 1976, 1.



Figure 22. Fletcher Main Street, Fletcher, Vermont, 2005. From the Center for the History of Medicine Image Collection.

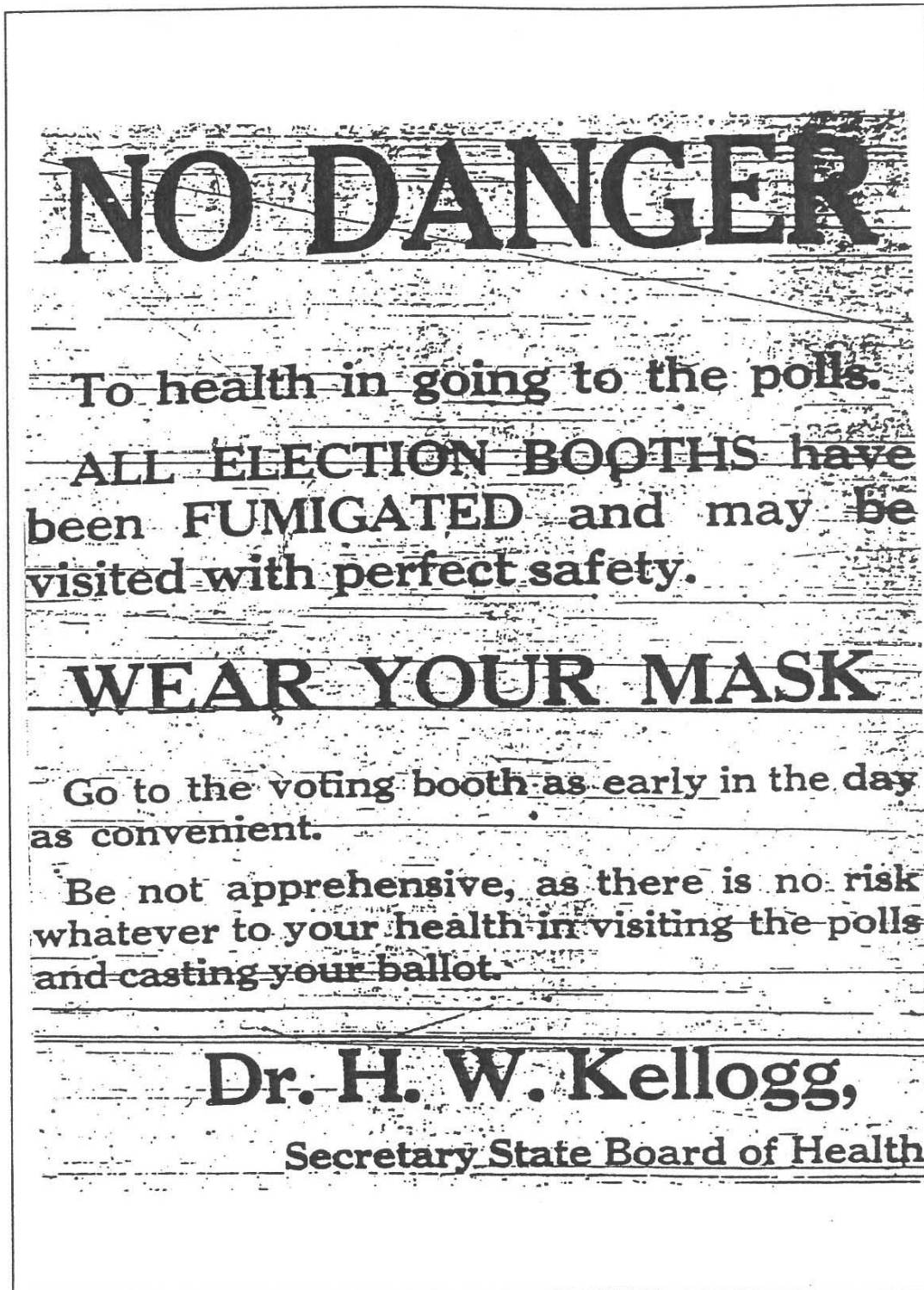


Figure 23. Notice Placed in Sacramento Bee 1918 Nov 4. From Johnson LA. The invisible enemy: Epidemic influenza in Sacramento, 1918-1919. California State University, Sacramento; 1994.

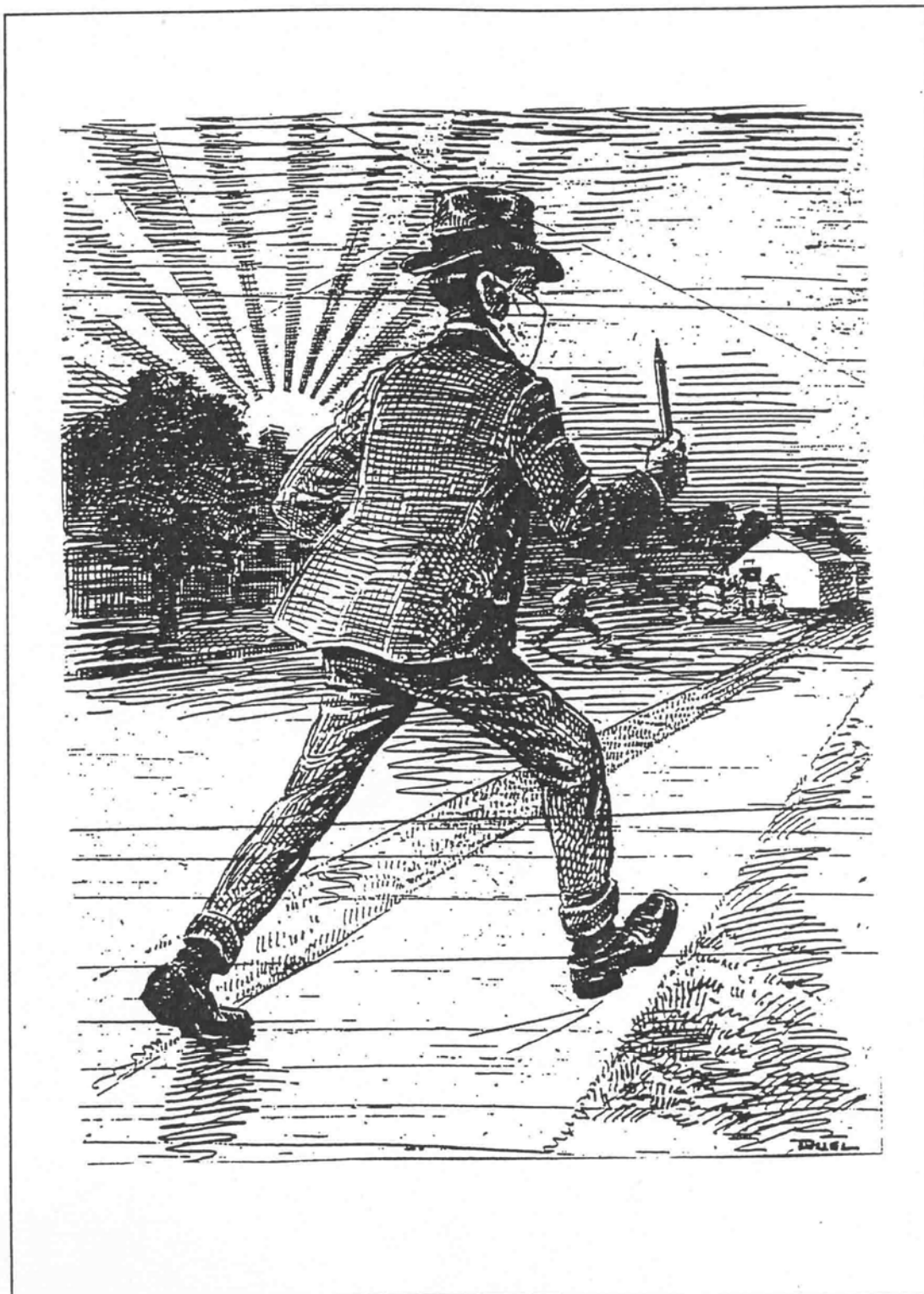


Figure 24. Wear your mask and take your pencil to the polls. *Sacramento Bee*. 1918 Nov 4. From Johnson LA. The invisible enemy: Epidemic influenza in Sacramento, 1918-1919. California State University, Sacramento; 1994.

THE INFLUENZA MASK AND ITS CONSEQUENCES

FELLOW CITIZENS OF THE UNITED STATES:

The Red Cross Society, or any other organization, has no right whatever to cause sensational alarms by saying: "Influenza! Wear Your Mask! It Might Save Your Life!" Because a great many sensitive and excitable persons contract epidemic diseases through fear and fright.

The Red Cross is welcome to suggest all the best means at their command to check plagues, etc., so long as it does not encroach upon the personal liberties of the people, by using the press and both the civil and military powers, to force the people to wear the unsanitary, outrageous, horrible masks.

Excepting hospitals, sick rooms, and dissecting rooms, the mask should never be permitted on the public thoroughfares for the following reasons, to-wit: It scares the people, it develops diseases and spreads them, it smells bad, it harms the wearer (while inhaling his or her own carbonic acid gas), it encourages municipal corruptions, it discourages immigration, it hurts both the State and business generally, it endangers the public safety, it puts out of sight our young girls, it spoils engagements, it delays marriages, it enables married folks to deceive each other, it disables the police to take the men who robbed the train, it pleases the kaiser, and it creates, far and wide, a warlike feeling because the cure for influenza is still worse than the influenza.

According to the Laws of Nature, the mouth and nose must have a free action to expel the carbonic acid gas while breathing; hence, any devices on the contrary are positively unhealthy.

Instead of masks—while fevers are around—I suggest that a disinfecting pad of blue silk, like a badge (3 in. x 2 ¼ in.) should be carried on the left side of the chest by persons in good health, and a red color by those people having contagious diseases.

Fevers come along with the history of the Animal Kingdom as a natural, necessary evil to check the overgrowth of races, rational and irrational alike. And the best means to meet them are fumigations, disinfectants and the cultivation of plants. So, with or without plagues at hand, railroad companies, theatres, churches, schools, stores, etc., should always have disinfectants.

The cultivation of both gardens and forests answers five important purposes, to say nothing of the middle man, to-wit: (1)—It absorbs the carbonic acid gas from the atmosphere; (2)—It employs the idle; (3)—It beautifies the surroundings; (4)—It encourages the wind-mill industry; and, (5)—It prevents the scarcity of food and timber. Likewise, the Rocky Mountains could be improved by degrees.

Drenches of drinking-water as a preventive, being highly injurious to health, should be discontinued from the fact that they multiply the ague fever, the malaria fever, the typhus fever, and the influenza fever.

Drinking-water should be taken as indicated by Nature and never as recommended by Dr. Sangrado (in Gil Blas of Santillane, by Le Sage) and by some boards of health. Bear in mind that the drinking-water is not the same throughout the world.

Boards of health should be managed by reliable physicians only; which institutions should act within the limits of the Constitution of the United States. Hence, the arbitrary mask law, being unconstitutional, must be revoked for good before anything of a fatal nature occurs.

The names and addresses of new patients are positively demanded in print for investigation.

As the influenza can be had at any time, avoid cold refreshments, ice creams, sleighing soon after leaving theatre, dancing, gymnasium, bowling; keeping one eye on the sudden changes of temperature by carrying the overcoat, etc.; also, avoid cold, solid floors wherever you work.

The writer, willing to restore the good name of California, has suggested to the now Governor of the State, that the money collected through an arbitrary, martial-like law should be refunded.

Fraternally,

ERMINIO CHAVEZ, SR.

Alameda, Calif., January, 1919.

96 Please acknowledge receipt of this circular.

Figure 25. "The influenza mask and its consequences" Anti-Mask League circular, January 1919. From James Rolph Papers Box 46 Folder 547, California Historical Society, San Francisco, California.

**YOU SUBMITTED TO THE
UNHEALTHY MASKS**

*Are you willing to submit to
the filthy serums manufac-
tured from diseased animals ?*

At Gallop's Island, recently, one hundred sailors ate the so-called Influenza germs in their food and also allowed the germs to be injected into their blood without any evil effects. This, and medical tests showing that people have diseases without having the germs supposed to be responsible for the trouble, while others have the germs and not the maladies, prove conclusively that germs do not and never did cause disease.

Dr. Hassler says that on the 13th of Jan. 25 per cent and on the 16th of Jan. 50 per cent of the people of San Francisco were wearing masks. We all know that less than 5 per cent wore masks on these dates. Would it not be better, if our Board of Health issued reliable statistics?

Ben Franklin Press, 140 Second Street

Figure 26. You Submitted to the Unhealthy Masks? From SF Misc/Ephm OV, Influenza-S.F., California Historical Society, San Francisco, California.

INFLUENZA!

How to Avoid It! How to Care for Those Who Have It!

The following suggestions of the California State Board of Health may prove of immeasurable value to any man or woman who will read, remember and act upon them in the present great emergency. The counsel here set forth has been prepared after consultation with some of the ablest medical men in America. If you will follow the dictates of this official bulletin, you will be doing your duty to your fellow man and to yourself.

What To Do Until the Doctor Comes!

If you feel a sudden chill, followed by muscular pain, headache, backache, unusual tiredness and fever, go to bed at once.

See that there is enough bed clothing to keep you warm.

Open all windows in your bedroom and keep them open at all times, except in rainy weather.

Take medicine to open the bowels freely.

Take some nourishing food, such as milk, egg-and-milk or broth every four hours.

Stay in bed until a physician tells you that it is safe to get up.

Allow no one else to sleep in the same room.

Protect others by sneezing and coughing into handkerchiefs or cloths, which should be boiled or burned.

Insist that whoever gives you water or food or enters the sick room for any other purpose shall wear a gauze mask, which may be obtained from the Red Cross or may be made at home of four to six folds of gauze and which should cover the nose and mouth and be tied behind the head.

Remember that these masks must be kept clean, must be put on outside the sick room, must not be handled after they are tied on, and must be boiled five minutes and thoroughly dried every time they are taken off.

TO HOUSEHOLDERS

Keep out of the sick room unless attendance is necessary.

Do not handle articles coming from the sick room until they are boiled.

Allow no visitors, and do not go visiting.

Call a doctor for all inmates who show signs of beginning sickness.

The usual symptoms are: Inflamed and watery eyes, discharging nose, backache, headache, muscular pain, and fever.

Keep away from crowded places, such as "movies," theaters, street cars.

See to it that your children are kept warm and dry, both night and day.

Have sufficient fire in your home to disperse the dampness.

Open your windows at night. If cool weather prevails, add extra bed clothing.

TO WORKERS

Walk to work if possible.

Avoid the person who coughs or sneezes.

Wash your hands before eating.

Make full use of all available sunshine.

Do not use a common towel. It spreads disease.

Should you cough or sneeze, cover nose and mouth with a handkerchief.

Keep out of crowded places. Walk in the open air rather than go to crowded places of amusement.

Sleep is necessary for well-being—avoid over-exertion. Eat good clean food.

Keep away from houses where there are cases of influenza.

If sick, no matter how slightly, see a physician.

If you have had influenza, stay in bed until your doctor says you can safely get up.

TO NURSES

Keep clean. Isolate your patients.

When in attendance upon patients, wear a mask which will cover both the nose and the mouth. When the mask is once in place, do not handle it.

Change the mask every two hours. Owing to the scarcity of gauze, boil for 5 minutes and rinse, then use the gauze again.

Wash your hands each time you come in contact with the patient. Use bichloride of mercury, 1:1000, or Liquor Cresol compound, 1:100, for hand disinfection.

Obtain at least seven hours' sleep in each twenty-four hours. Eat plenty of good, clean food.

Walk in the fresh air daily.

Sleep with your windows open.

Insist that the patient cough, sneeze or expectorate into cloths that may be disinfected or burned.

Boil all dishes.

Keep patients warm.

For Copies of this publication apply to

Oakland Health Dept. City Hall, Oakland

Figure 27. Influenza advice from the Oakland, California Health Department. From Vault B 168, California Historical Society, San Francisco, California.

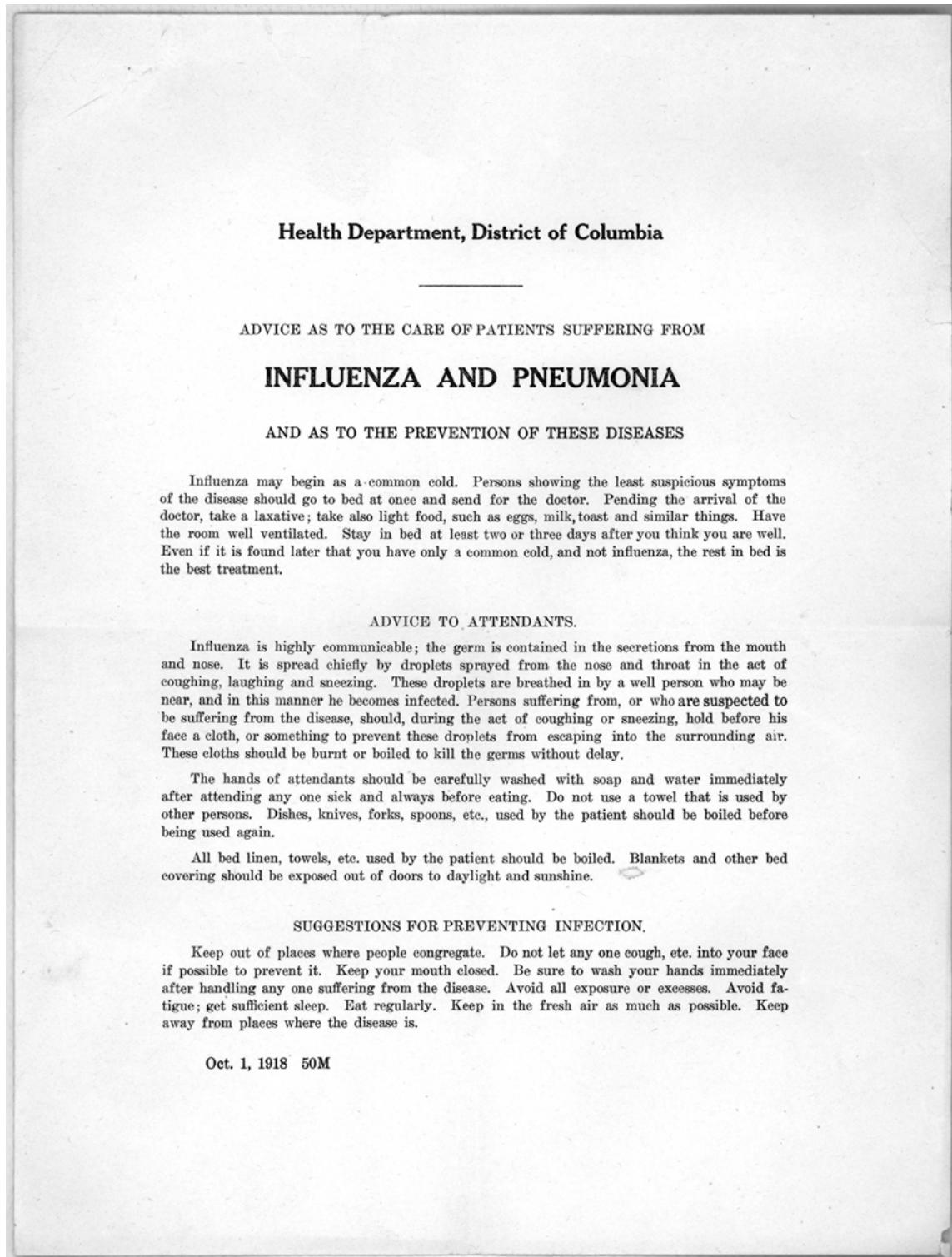


Figure 28. District of Columbia Health Department influenza advice, October 1, 1918. From Library of Congress, Rare Book and Special Collections Division. Library of Congress, American Memory, <http://memory.loc.gov/ammem>, accessed [12 Jan 2006]. Portfolio 208, Folder 23, digital ID **rbpe 20802300** <http://hdl.loc.gov/loc.rbc/rbpe.20802300>.

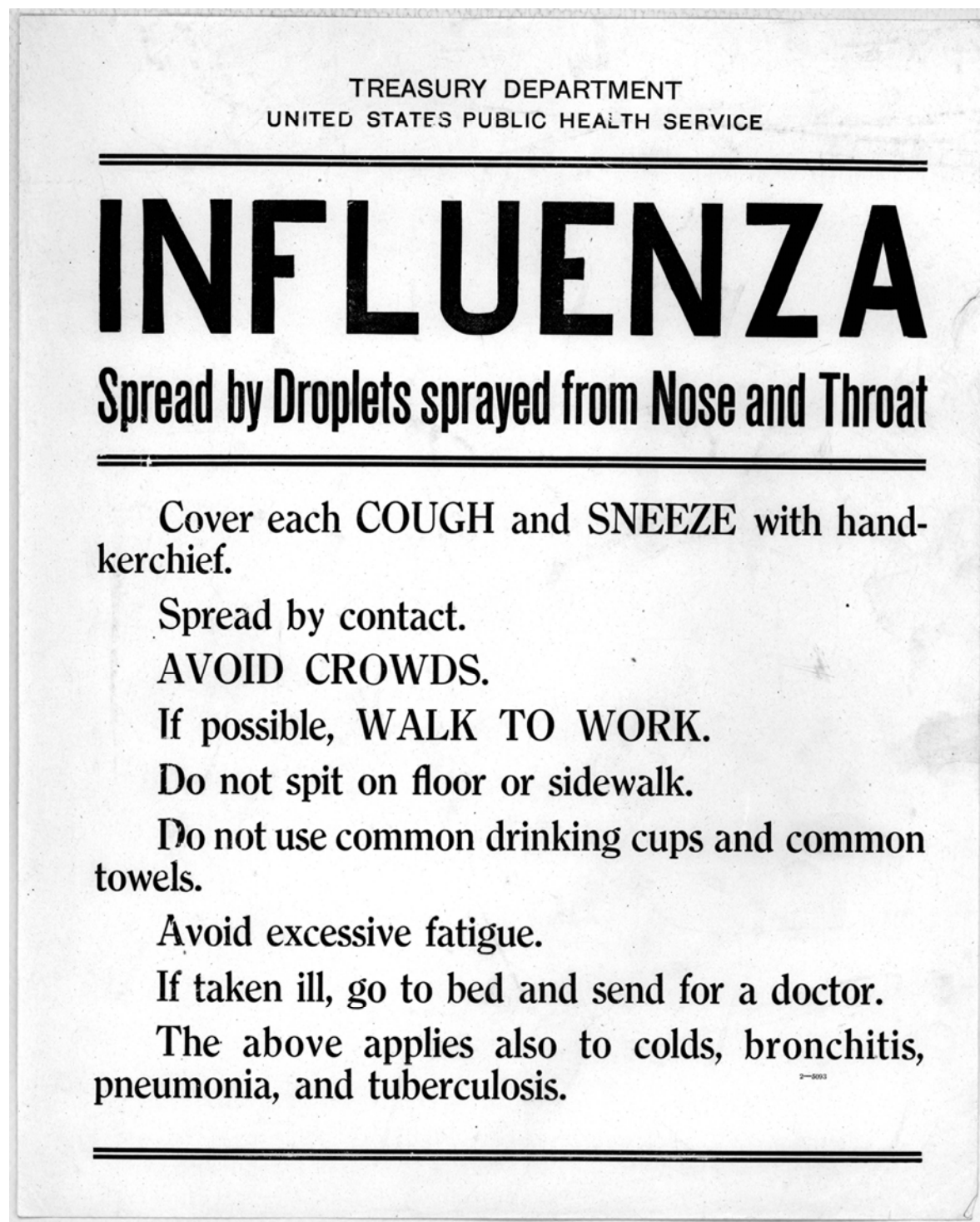


Figure 29. Treasury Department, United States Public Health Service influenza advice, 1918. From Library of Congress, Rare Book and Special Collections Division. Library of Congress, American Memory, <http://memory.loc.gov/ammem>, accessed [12 Jan 2006]. Printed Ephemera Collection; Portfolio 241, Folder 19, digital ID **rbpe 24101900** <http://hdl.loc.gov/loc.rbc/rbpe.24101900>.

Display Ad 23 - No Title
 1918 Oct 12: ProQuest Historical Newspapers. The New York Times (1851 - 2002)

Macys
 34th Street, Broadway, 34th to 35th St.
 We Sell *Department Store* Merchandise at *Prices Lower Than Any Other Store, but for Cash Only.*
 Store Open All Day Today.



(Out) fluenza!
 Keep Influenza OUT—Bar Its Way in With **Sanitary Cloth Window Ventilators**
 Dirt and dust—the accredited agents of disease—can be kept out of your rooms while fresh air is admitted through these practical ventilators.
Filters the Air—Keeps Out Dust, Dirt, Rain and Snow—
Fits the Nursery, the Bed Room, Bath Room, Office, Factory, etc.
 Wherever fresh air is needed these ventilators will serve, since they are adjustable to any ordinary window opening.
Not Transparent
 Made of buff colored, fine mesh cotton fabric, in a mission or oak stain frame, they are just the thing for bath room and chamber.
 9-in. high frame comes in three widths with from 14-in. to 25-in. adjustment, 48-in. to 66-in. 15-in. high frame has width adjustment of 14-in. and 18-in. in two size widths, 64-in. and 66-in. Bring correct window measurements. Ventilators not exchanged.
 812725—Basement, 33th St.

Store Hours:
 This store opens at 9:45 A. M., and closes 6:15 P. M., until further notice.

Buy Your Bond to Freedom
 We Have the Actual Bonds on Sale in This Store—Women's Liberty Loan Committee Booth, Main Floor, 34th St., Broadway.

Macys for MEDICINES
Prophylactum
 A superior antiseptic mouth wash and gargle—prepared from our own formula...
For Influenza
 Use it as you would your tooth wash and as often as you please. **AGREEABLE TO THE TASTE. POPULARLY PRICED. EFFICIENT.** L a f g e bottle, 49c
 812726—Main Floor, Rear.

ANNOUNCEMENT EXTRAORDINARY
Our Annual October Drug Sale
 will not be held this year on account of the unprecedented conditions restricting the employment market. Competent help in these October sales is an absolute requisite; lacking which we would not risk its failure through inadequate service.
However—
 No matter what prices are asked elsewhere in the city for similar quality drugs, here you may still depend on finding them at lower prices.
 812727—Drug Dept., Main Fl.

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Figure 30. Display Ad 23 – No Title. New York Times (1857 – Current File): 1918 Oct 12: ProQuest Historical Newspapers. The New York Times (1851 – 2002).

Display Ad 39 -- No Title
 New York Times (1857-Current file); Oct 2, 1918; ProQuest Historical Newspapers The New York Times (1851 - 2002)
 pg. 10

"Spanish" Influenza!

*Some facts about it and how to
 prevent its spread*

"SPANISH" INFLUENZA is a serious matter, and something of a mystery. It probably originated in the ranks of the German Army and in prison camps. It no doubt spread from there southward through Spain and northward into Holland, France, England and the Scandinavian countries. America was free from it until August 12th, when a Norwegian steamer arrived at an Atlantic port, having had over 200 cases on the voyage. Whether this marks the entry of the epidemic or not, the fact remains that "Spanish" Influenza is here and is a serious menace, much like the familiar Grippe.

The disease is not alarming in itself if proper precautions are taken. But without care, the high fever and the likelihood of pneumonia to follow make it extremely dangerous. The Surgeon-General of the Army recently issued the following rules by which the public may guard against the spread of this subtle enemy:

Rules to Avoid Respiratory Diseases (By the Surgeon General of the U. S. Army)

1. Avoid needless crowding—influenza is a crowd disease.
2. Smother your cough and sneeze—others do not want the germs which you would throw away.
3. Your nose, not your mouth, was made to breathe through—get the habit.
4. Remember the three C's—a clean mouth, clean skin, and clean clothes.
5. Try to keep cool when you walk and warm when you ride and sleep.
6. Open the windows—always at home at night; at the office when practicable.
7. Food will win the war if you give it a chance—help by choosing and chewing your food well.
8. Your fate may be in your own hands—wash your hands before eating.
9. Don't let the waste products of digestion accumulate—drink a glass or two of water on getting up.
10. Don't use a napkin, towel, spoon, fork, glass, or cup which has been used by another person and not washed.
11. Avoid tight clothes, tight shoes, tight gloves—seek to make nature your ally not your prisoner.
12. When the air is pure breathe all of it you can—breathe deeply.

Remember the Three C's which are given in these rules

Clean Mouths

Not simply the usual matter-of-fact brushing of the teeth, but thorough cleanliness. Gargle the throat with warm water and salt, or a little Colgate's Ribbon Dental Cream dissolved in water. Brush the teeth, gums, and tongue carefully morning, noon and night with Ribbon Dental Cream. It is not a cure-all—but it is a safe, sane, efficient dentifrice and will help prevent infection by keeping your mouth clean.

The present crisis emphasizes the good sense of a recent action by the National Dental Association who wrote to the War Industries Board as follows:

"In this day of recognition of the value of preventive medicine, it is accepted by dentistry, medicine, and boards of health, that a clean mouth is one of the essentials to prevent the carrying of contagious disease. To preserve a proper sanitary condition of the mouth, the use of a suitable brush and dentifrice is required."

See that your mouth is clean, Clean, CLEAN.

Clean Skins

And that means more than your usual habit in these days of epidemic. A thorough bath once a day is the least you should take. Use warm water if possible, and plenty of soap. Colgate's Coleo Soap serves the purpose splendidly—a soap that is made entirely of vegetable oils. It lathers freely in hard or soft, hot or cold water and cleans thoroughly. If you haven't Coleo, until you can get it, use any good soap—and once again, use plenty of it. Soap costs less than medicine.

As a still further precaution place a little Eucalyptol Vaseline in each nostril, morning, noon, and night, and rub the bridge of the nose with it when you go to bed.

A clean body throws off infection better than one less clean—see that yours is super-clean.

School Principals, Teachers, and Employers of Labor may secure, on request, an enlarged copy of this Health Notice, for posting.
 Address Colgate & Co., New York

Clean Clothes

Not only neat, tidy and brushed—but CLEAN.

Change your underwear as often as possible. It may mean more laundry bills for a while but it may be the means of preventing infection. Have your outer garments brushed and aired thoroughly every day. Change them, too; wear old clothes if necessary so that the same suit, coat or dress is not worn every day. This is some trouble but it may prevent the carrying of the infection into your home or to other people.

And along with clean clothes, clean skins, clean mouths for yourself and your family, observe the other simple rules given above. Start practicing these rules before you begin to feel back-achy, to sneeze, to cough, to feel generally run down. The ounce of prevention is still worth the pound of cure. But if you do suspect that the germ has got into you, do not rely on these measures. Go to bed at once, and call your Doctor to avoid a bad fever and possible pneumonia.

Published in the interest of "Good Teeth—Good Health" by COLGATE & CO., NEW YORK

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Figure 31. Display Ad 39 – No Title. New York Times (1857 – Current File): 1918 Oct 2: 10. ProQuest Historical Newspapers. The New York Times (1851 – 2002).

Display Ad 74 -- No Title
New York Times (1857-Current file); Oct 20, 1918; ProQuest Historical Newspapers The New York Times (1851 - 2002)
pg. 18

Over the Week End DON'T TELEPHONE Unless It Is Absolutely Necessary

During the present week our operating force has been seriously depleted by Spanish Influenza.

The shortage of operators continues to increase.

Only a radical decrease in the number of calls will save the situation.

Will you help us meet the emergency over the week end by refraining from using the telephone except for indispensable calls?

Cards asking for the voluntary restriction of calls have been mailed to all subscribers. A supply may be secured on application at any of our Commercial Offices. Will you please place one near your telephone as a reminder for yourself, your family or your employees, that no telephone calls are to be made unless they are absolutely necessary?



NEW YORK TELEPHONE COMPANY

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Figure 32. Display Ad 74 – No Title. New York Times (1857 – Current File): 1918 Oct 20: 18. ProQuest Historical Newspapers. The New York Times (1851 – 2002).

How to Avoid All Respiratory Diseases; Surgeon General of the Army Gives Rules
Special to The New York Times.
New York Times (1857-Current file); Sep 22, 1918; ProQuest Historical Newspapers The New York Times (1851 - 2002)
pg. 21

How to Avoid All Respiratory Diseases; Surgeon General of the Army Gives Rules

Special to The New York Times.

WASHINGTON, Sept. 21.—The Surgeon General of the army today issues the following rules to the public to safeguard against the spread of respiratory diseases:

1. Avoid needless crowding—influenza is a crowd disease.
2. Smother your coughs and sneezes—others do not want the germs which you would throw away.
3. Your nose, not your mouth, was made to breathe through—get the habit.
4. Remember the three Cs—a clean mouth, clean skin, and clean clothes.
5. Try to keep cool when you walk and warm when you ride and sleep.
6. Open the windows—always at home at night; at the office when practicable.
7. Food will win the war if you give it a chance—help by choosing and chewing your food well.
8. Your fate may be in your own hands—wash your hands before eating.
9. Don't let the waste products of digestion accumulate—drink a glass or two of water on getting up.
10. Don't use a napkin, towel, spoon, fork, glass, or cup which has been used by another person and not washed.
11. Avoid tight clothes, tight shoes, tight gloves—seek to make nature your ally not your prisoner.
12. When the air is pure breathe all of it you can—breathe deeply.

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Figure 33. How to avoid all respiratory diseases; Surgeon General of the Army gives rules. Special to The New York Times. *New York Times* (1857 – Current File): 1918 Sep 22: 21. ProQuest Historical Newspapers. *The New York Times* (1851 – 2002).