

## ***Escaping the Flu:***

### **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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### **Purpose**

- The purpose of this study was to assess various nonpharmaceutical interventions (NPI) implemented to prevent or contain the second wave of the 1918-1920 influenza pandemic in the continental United States.



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### **The 4 Waves of the 1918-1920 Influenza Pandemic**

1st Wave	February to May, 1918
2nd Wave	September to December, 1918
3rd Wave	January to April, 1919
4th Wave	January to March, 1920

- The waves of the pandemic did not always coincide with seasonal influenza patterns.
- Some waves went on for uncomfortably long periods of time.
- We focused on the 2nd wave because it was the most severe, in terms of morbidity and mortality; and coincides with the period where public health officials implemented the widest menu of NPI.

(Source: E.O. Jordan. *Epidemic Influenza*. Chicago: AMA; 1927.)



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**Menu of Nonpharmaceutical Interventions (NPI)**  
**During the 1918-1920 Pandemic**

- Isolation of ill persons.
- Quarantine of those suspected of having contact with the ill.
- Selective Social Distancing Measures (e.g., cancellation of schools and mass gatherings, or voluntary non-participation in public events).
- Reducing an individual's risk for infection (e.g. face masks, hand washing, respiratory etiquette).
- Public Health Education and Risk Communications.
- Protective Sequestration.



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**Protective Sequestration**

*Measures taken by the authorities to protect a defined and still healthy population from infection before it reaches that population.*

- Prohibitions on members of the community from leaving the site.
- Prohibitions on visitors from entering a circumscribed perimeter.
- When visitors are allowed to enter, they are typically placed in quarantine for a period of time prior to their admission into the community or institution.
- If available, these measures take advantage of geographical barriers (e.g., an island community or remote location).
- This measure is explicitly different from quarantine, which places restrictions only on those suspected of having contact with the ill.



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**Don't just stand there, do something!**



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**U.S. Naval Training Station,  
Yerba Buena Island,  
San Francisco, California**

Aerial view of San Francisco, California, and Yerba Buena Island showing construction of San Francisco Bay Bridge 1936.

**Gunnison, Colorado**



Postcard of Gunnison Valley, circa 1920




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**Princeton University,  
Princeton, New Jersey**



Gymnasium, Princeton University circa 1920

**Bryn Mawr College,  
Bryn Mawr, Pennsylvania**



Taylor Hall, Bryn Mawr College circa 1920




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Cottages, Trudeau Sanitarium, Saranac Lake, New York circa 1910

**Trudeau Tuberculosis  
Sanitarium, Saranac  
Lake, New York**

**Western Pennsylvania Institution  
for the Blind,  
Pittsburgh, Pennsylvania**



WPB Main Building, August 2005




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**Fletcher, Vermont**



Fletcher center, 1918



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**Provisional Influenza Escape Community**

A community or institution where there were:

- Relatively few reported cases of influenza (compared to surrounding areas or analogous institutions, communities, towns, cities).
- 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.



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**Provisional Influenza Escape Community**

- 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 due to 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, we were unable to rank the importance of these factors in each of the communities we examined.



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### Methods - Data Collection

- Examination of over 1,500 medical, public health, and historical scholarly articles published from 1918 to 2006.
- Review of 240 federal and 92 state (from 40 states) documents and 25 special local reports.
- Searches of historical, medical, and public health databases.
- *In situ* research at 34 libraries, museums, public health departments, town halls, archives.
- Inter-library loan search for photographs, pamphlets, maps, and books.
- Extensive search and review of over 1,000 newspaper and popular periodical articles published between 1918 - 1920.
- Development of a computer-based digitized reference database of the 1918-1920 pandemic.



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### Methods - Data Analysis

- The primary source materials were read and abstracted by each member of the UM-CHM Influenza Research Team.
- They were discussed for historical significance.
- Cross-checked, verified, and analyzed.
- These materials were synthesized into a narrative and distilled into case study face sheets.
- Interpretation of historical materials involves a great deal of negative research.



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### Central Study Questions

- What were the social, cultural, and historical context and nature of the NPI in the escape communities we studied?
- Did the measures contribute to the prevention or containment of the pandemic?
- What political, economic, and social costs came with these NPI?
- To what extent did mitigating or uncontrollable factors contribute to the outcome?
- How did these communities maintain NPI during the 4 month long second wave of the 1918 pandemic?



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Fletcher, Vermont



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Trudeau Tuberculosis Sanitarium, NY



Western Pennsylvania Institution for the Blind, PA



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U.S. Naval Training Station  
Yerba Buena Island, CA



Naval Training Station, San Francisco, California. View looking southward over the wharf 1921.

- Population - Approximately 6,000 seaman, naval officers and some of their family members, and civilians living on 116 acres.
- Population Density - 33,103 persons/sq. mi.
- Cases - 0 cases during period of protective sequestration (Sep. 23, 1918 – Nov. 21, 1918); 25 cases after these NPI were lifted (Nov. 21, 1918 to Dec. 31, 1918).
- Deaths - 0 during protective sequestration (Sep. 23, 1918 – Nov. 21, 1918); 3 deaths from influenza and 2 deaths from pneumonia after lifting the NPI (Nov. 21, 1918- Dec. 31, 1918).
- NPI employed – protective sequestration, quarantine, isolation, face masks, daily inspection and disinfection methods, respiratory etiquette, public health education and risk communications.
- Geographical Benefit: It's an island!



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### Gunnison, Colorado



- The town delayed the introduction of influenza until March, 1919.
- Population - 1,329 in the town of Gunnison; 5,590 in Gunnison county (1920 census).
- Population Density - Town: 414 persons/sq mi.; Entire county: 1.8 persons/sq. mi.
- Influenza Cases - 0 (in the town); 2 (in the county).
- Influenza Deaths - 0 (in the town); 1 (in county).
- NPI employed - protective sequestration, quarantine, isolation, *cordon sanitaire*, social distancing, public health education and risk communications.
- Geographical benefit: Small town in the Rockies *but* it had major train access and most of the surrounding towns were severely affected by the pandemic.



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### Princeton University



- Population - 1,142 men at the University; 92% enrolled in SATC and SNTC.
- Population Density of the town of Princeton: 3,176 persons/sq mi.
- Influenza Cases - Approximately 68 in University as of December 1918.
- Influenza Deaths - 1 (a faculty member); 0 in the student body.
- In the town of Princeton, there were 32 deaths and overall case fatality of 8.5%.
- NPI employed - protective sequestration, quarantine, isolation, *cordon sanitaire* of Nassau Street (the dividing line between the campus and the town), social distancing, public health education and risk communications, daily inspection, disinfection, and case reporting measures.



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### Face Masks - San Francisco

- 90% compliance reported with first face mask ordinance (Oct 28 - Nov 21, 1918).
- 10% compliance reported under the second face mask ordinance (Jan 11 - Feb 2, 1919).
- Many wore masks intermittently, incorrectly, or haphazardly.
- A small but vocal minority of face mask resisters occasionally incited civil unrest.
- There were no face mask standards; quality varied widely.



From San Francisco Examiner 1918 Nov 12 p. 13. Mayor Ralph Hall upon the shoulders of fringed iron workers in Armistice Day parade.



From San Francisco Examiner 1918 Oct 24 p. 11.



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**Limits of Historical Research**

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**Limits of Historical Research**

- History does not serve as an exact roadmap for the future, or even the past.
- Significant gaps in archival and primary source records.
- Important differences between American society in 1918 and today.
- Unreliability of diagnosing and reporting influenza data, circa 1918.
- Critical numerical population data were either not recorded or recorded in a less than consistent manner.
- The obfuscating effects of influenza mythologies and, at times unsubstantiated, pronouncements about pandemics to come.

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**Power of Historical Research**

- The seven communities differed from one another in location, population density, demographic mix, and community organization.
- This is the first study to systematically examine and compare provisional influenza escape communities in the continental United States during the 1918 – 1920 influenza pandemic almost exclusively based on primary source materials.

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**Future Research Avenues:**  
**Mitigated Escape Communities of 1918 – 1920**

- Our research has uncovered several major American cities that applied various NPI's at different points during the pandemic which appear to have resulted in a lower mortality and morbidity than those major cities that did not.
- How did these NPIs mitigate the impact of the pandemic?
- Did timing and layering or combining these interventions have an effect on the pandemic?
- Were these *the right* interventions to employ in a given community?
- How did local, state, and national differences frame these implementations?
- What can 'failed' communities teach us about current planning strategies?



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**Conclusions - 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.



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**Conclusions - Pandemic Preparedness**

- Effective, accurate, trustworthy, and up-to-date public health education and risk communications along with community cooperation are essential to the successful prevention and containment of an epidemic.



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### Conclusions - 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 often the result of multiple factors, including:

- good fortune
- viral normalization patterns
- geographical separation
- various NPI taken



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### Conclusions - Protective Sequestration

Protective sequestration stands the best of chance of success if:

- Enacted early enough in the pandemic.
- Crafted so as to encourage the compliance of the population involved.
- Continued for the lengthy period of time at which the area is at risk.

But the cost of protective sequestration can be high:

- Quarantine of any outsider who seeks entry and prohibitions against residents leaving.
- Self-sufficiency in the supplies necessary for daily living.
- Enforcement of regulations.
- It can be difficult for those sequestered to maintain some semblance of a normal life.
- Requires a brand of bold leadership which may not be common.



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### Conclusions - Protective Sequestration

➤ Personnel and facilities critical to the maintenance of national security, universities, health care institutions, and other sub-communities with close living conditions and some degree of social control, might benefit from protective sequestration and should consider formulating such plans.



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### Conclusions - Protective Sequestration

- > The most successful protective sequestrations of the 1918-1920 pandemic were maintained for a period of months and lifted when the pandemic appeared to be on the wane.
- > Measures to ensure the integrity of the protective sequestration (as well as concomitant NPI) while preventing alienation, depression, loneliness, stigmatization, resentment, noncompliance, and hostility among the confined population should be developed as a central part of a pandemic preparedness plan.



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### Conclusions - Protective Sequestration

- > Protective sequestration employed during the second wave of the 1918 pandemic *may have* prevented influenza cases and led to milder morbidity and mortality rates in successive waves once the measures were lifted.
- > These measures have the potential to create susceptible populations affected by subsequent waves of pandemic influenza.
- > In current pandemic planning, protective sequestration *might* shield selected populations from infection until vaccines and antiviral agents become available.



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### Conclusions - NPI During the Pandemic

- > 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 NPI and most of them sustained significant illness and deaths.
- > We could not assess how the timing of NPI implementation affected containment efforts.
- > Whether these NPI lessened what *might have* been even higher rates had these measures not been in place is not possible to say on the basis of available historical data.



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**Conclusions - NPI During the Pandemic**

- If 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 and fiscal, physical, and human resources, is critical.
  
- Internecine rivalries or disagreements between local, state, and federal agencies have a strong potential to detract from pandemic influenza prevention and containment.



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**Conclusions - NPI During the Pandemic**

Today, there is great debate on the efficacy of face masks but:

- 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.
  
- Our research did uncover several legal, social, political, and cultural conundrums associated with the passage and enforcement of mandatory face mask laws.



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**Conclusions - NPI During the Pandemic**

Disposal of the dead during an influenza pandemic.

- We uncovered numerous 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.
  
- 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.



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### Conclusions

➤ As disasters past and recent have demonstrated, any crisis that prevents access to financial resources and even basic needs of living, particularly for the nation's poorest citizens, can have deleterious effects on pandemic containment.



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### Conclusions

➤ Internationalizing our study and broadening it to include "mitigated" as well as "failed" influenza communities for the 1918, 1957, and 1968 pandemics should yield even greater knowledge as we strive to plan for avian influenza and other emerging infectious threats in the years to come.



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Franck Provost. Reuters. Time Magazine October 18, 2005. Farmer Stephane Lelue examines a chicken on a farm in Janze near Rennes in western France.

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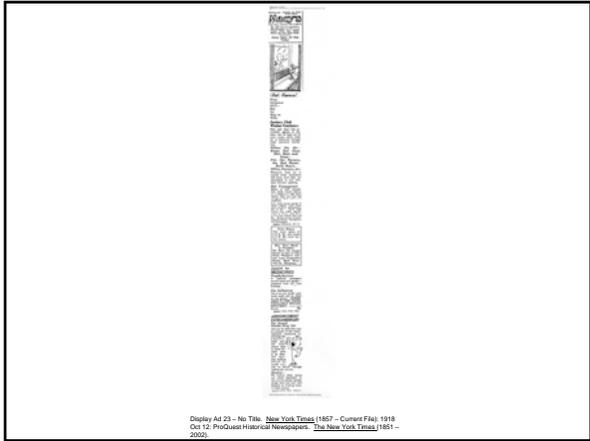
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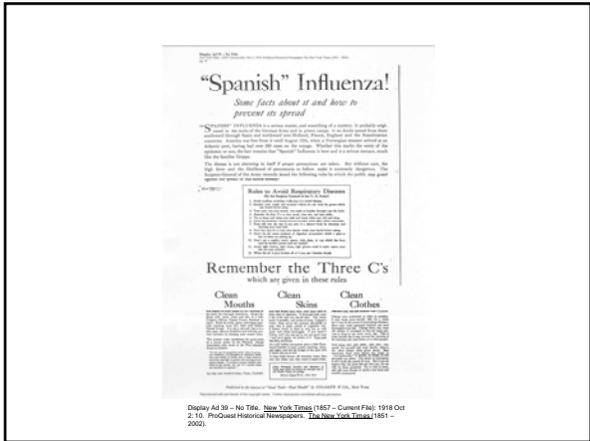
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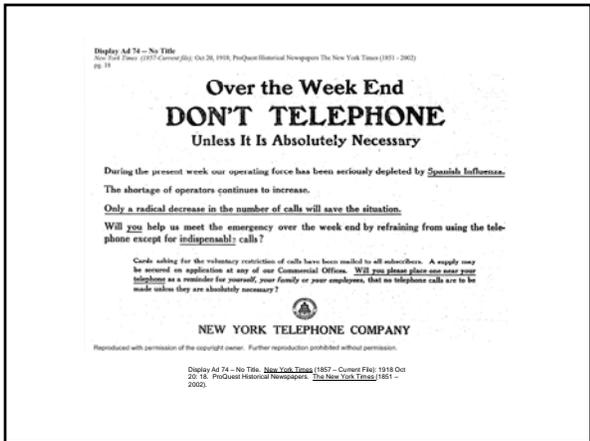
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Students and staff playing in the yard of the WPHB, circa 1920. From the Western Pennsylvania School for Blind Children historical photograph archive.

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Map of the Saranac Lake region, Adirondack State Park, New York, circa 1900. From Trudeau Institute, Saranac Lake, New York. Scripbook Trudeau Sanatorium A.C.S. Cottages and Grounds, No. 1 1884.

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Bryn Mawr College, "During the Flu Epidemic, Bryn Mawr Hospital Quarters, c. 1918." From Bryn Mawr College Library.

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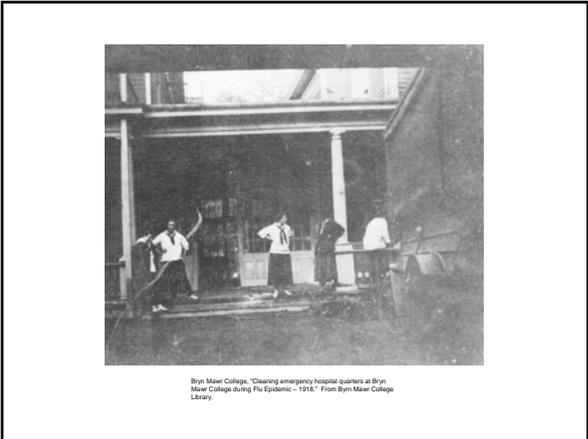
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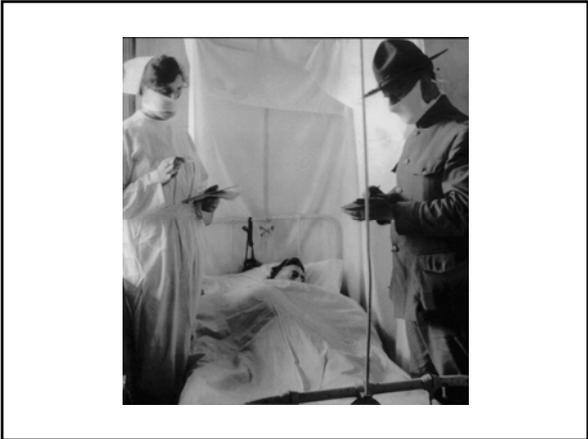
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