Lost lessons of the 1918 influenza: the 1920s working hypothesis, the public health paradigm, and the prevention of deadly pandemics.

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ABSTRACT

In standard historical accounts, the hyperlethal 1918 flu pandemic was inevitable once a novel influenza virus appeared. However, in the years following the pandemic, it was obvious to distinguished flu experts from around the world that social/environmental conditions interacted with infectious agents and could enhance the virulence of flu germs. Based on the timing and geographic pattern of the pandemic, they hypothesized that an “essential cause” of the pandemic’s extraordinary lethality was the extreme, prolonged, and industrial-scale overcrowding of U.S. soldiers in World War One, particularly on troopships. This literature synthesis considers research from history, public health, military medicine, veterinary science, molecular genetics, virology, immunology, and epidemiology. Arguments against the hypothesis provide disconfirming evidence. Overall, the findings are consistent with an immunologically similar virus varying in virulence in response to war-related conditions. The enhancement of virulence hypothesis deserves to be included in the history of the pandemic and the war. These lost lessons of 1918 point to possibilities for blocking the transformation of innocuous infections into deadly disasters and are relevant beyond influenza for diseases like COVID-19.

OBJECTIVES

To determine if the 1920s working hypothesis must be rejected, based on the best evidence available today.

BACKGROUND

The 1920s working hypothesis on the cause of the 1918 flu pandemic’s extraordinary lethality was that war-related conditions, especially industrial-scale, prolonged, extreme overcrowding in the US Army, led to selection for high-virulence influenza. For the last 50 years, this hypothesis has been neglected or actively rejected in the standard histories of the war and the pandemic.

RESULTS

Findings consistent with the 1920s hypothesis:

- There was an epidemic of deadly measles (viral) pneumonia in the US Army in early 1918; more pneumonia epidemics were predicted.
- There was a mild 1st (herald) wave before a severe 2nd wave (suggesting “the novel pandemic virus” was not inherently lethal).
- People infected in the 1st wave were often immune in 2nd wave (suggesting an immunologically similar virus in different waves).
- Between the first and second waves was the main phase of the transoceanic transport of US troops with extreme overcrowding.
- The 2nd wave exploded from Brest, France, where US troops landed.
- The global spread of the 2nd wave frequently involved introduction from (military) ships, with sustained severely related to conditions.
- The 3rd wave corresponds with the return home of guest-workers, demobilized soldiers, liberated PDWs.
- The World War created unsanitary living conditions for civilians around the world, including in non-belligerent nations.
- Flu was worse where crowding was worse, e.g. Philadelphia in US.
- Soldiers at the front were less vulnerable to flu than those in crowded barrack towns back home.
- The elderly had negative excess mortality (suggesting immunity from prior H1N1, arguing against inherent novel H1N1 lethality).
- Infants and young children were severely affected (arguing against a biological targeting of “healthy adult” immune systems).
- Evolutionary biology today provides a model for understanding how overcrowding selects for virulence-host mobility independence.
- Low-virulence avian influenza virus becomes highly virulent upon introduction into industrial overcrowded poultry farms.
- Human activity today is selecting for harmful traits (e.g. antiviral resistance) in human influenza virus.

CONCLUSIONS & IMPLICATIONS

The hypothesis that industrial-scale prolonged extreme overcrowding of US soldiers constituted a successful “experimentation” in selecting for highly virulent influenza is consistent with available historical and scientific evidence. It has not been replaced by a superior hypothesis for explaining hyperlethality and the other known features of the 1918 flu.

The 1920s working hypothesis deserves to be included in histories of the war and of the pandemic. More importantly, it suggests a possible path forward to prevention of pandemic disasters. These findings are relevant beyond influenza for diseases like COVID-19.

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