Mortality Risk Differences between Australian and New Zealand Soldiers during the 1918-19 Influenza Pandemic

Jennifer A Summers1*, Nick Wilson1, G Dennis Shanks MD2,3.

1Department of Public Health, University of Otago, Wellington, New Zealand
2Australian Army Malaria Institute, Enoggera, Australia
3School of Population Health, University of Queensland, Brisbane, Australia
*Corresponding author, Jennifer Summers, PhD candidate, email: jenn.summers@gmail.com

Background

The influenza pandemic of 1918-19, one of the most lethal events in recorded human history, occurred during the turbulent final stages of World War One. Previous research has found that pandemic mortality (defined as influenza and/or secondary pneumonia) could vary greatly between different populations. Therefore we used data on both Australian and New Zealand military force records (two groups with many common characteristics [figure 1]) to examine some of the epidemiological features that may have influenced differences in pandemic mortality.

Methods

Historical sources were consulted and individualised data for both forces were used to identify pandemic deaths occurring within both the Northern and Southern Hemispheres. For the Australian forces, non-combat deaths occurring within the pandemic period were defined as pandemic influenza deaths. For the New Zealand forces, the definition was of those confirmed as dying of influenza, pneumonia or bronchitis in the pandemic period.

Pandemic periods were defined as occurring from late August 1918 to March 1919 in the forces located in the Northern Hemisphere and from November to December 1918 in the Southern Hemisphere forces (a mixture of discharges and recruits).

Results

Both forces experienced similar combat and health care conditions in Europe as part of the combined Commonwealth forces. Also, there were similar risks for pandemic mortality for both forces in the Northern Hemisphere (Australian: 6.6 per 1000 vs New Zealand: 6.4 per 1000). Amongst those stationed in the Southern Hemisphere, the New Zealand forces experienced a nine-fold higher risk of death in the pandemic compared to the Australian forces (Australian: 1.9 per 1000 vs New Zealand: 17.2 per 1000).

Both forces when located in the Southern Hemisphere experienced increased mortality in two pandemic waves (figure 2). The first occurred in late 1918, and the second in the early months of 1919. Notably, neither force experienced an additional/second wave of mortality in the Southern Hemisphere.

Discussion

The difference in the pneumonia/influenza mortality rates between the Australian and New Zealand forces is most likely explained by the difference in how recruits were entered into military service and in what numbers. For example, the difference in mortality risk between the forces in the Southern Hemisphere is likely to be related to the fact that only the New Zealand forces were trained in military recruit camps prior to deployment and Southern Hemisphere pandemic-related deaths were highest amongst forces located in these camps.

Military recruit camps were known to be a high risk location for outbreaks of respiratory infections, since the majority of those accommodated in them were ‘fresh recruits’ with arguably less exposure to infectious pathogens and therefore less acquired immunity when compared to ‘seasoned troops’. This finding is consistent with previous work and suggests the importance of pre-existing immunity (at least to secondary bacterial infections) in determining risk of death in a pandemic.

Conclusions

This otherwise unexplained mortality risk difference between two similar populations is likely to have arisen from their differing training circumstances whereby New Zealand soldiers were newer to the military and thus more immunologically naïve to bacterial respiratory pathogens. If so, this further highlights the importance of secondary bacterial pneumonia in determining mortality risk during influenza pandemics.

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