CFID Summer Studentship Final Report
Pandemic Waves - Mortality in the Canadian Expeditionary Force, 1918
Alex Rewegan, McMaster University

The 1918-1919 influenza pandemic was arguably the worst demographic disaster of the twentieth century in terms of the sheer speed in which it spread and the toll of mortality from it.[1] It swept the world in three waves: a mild spring/summer wave was followed by the deadly fall wave, culminating with a recurrence in the winter of 1918-1919.

While the spring/summer (herald) wave of the disease has been positively identified in the United States (New York City and in army camps across the country)[2] and in Mexico[3], the evidence for a herald wave in Canada is less clear. It was once accepted that influenza was first introduced to Canada during the fall wave of the epidemic.[4] However, Humphries reports that a small number of military hospitals in Canada experienced a higher than normal incidence of influenza and pneumonia between March and April 1918[5] and a retrospective analysis of the Ontario Death Registry for 1918 also suggests that several communities in the province experienced excess influenza mortality in April and May 1918.[6]

To explore this question more fully, my research focused on influenza deaths among soldiers in the Canadian Expeditionary Force (CEF) in the year prior to the pandemic (1917) and during 1918. The soldier population presents an ideal opportunity to examine influenza mortality. Between 1914 and 1919, an army of 600, 000 soldiers was mustered in Canada to fight in World War I; some 400, 000 men were trained in over 60 military camps across the country, then transported to Europe.[7,8] Unlike the civilian population, the health of soldiers was monitored on a daily basis and their deaths were carefully recorded by the Commonwealth War Graves Commission. Beyond Humphries' research linking the Canadian military and the spread of the epidemic[9], there has been no systematic study of mortality in the Canadian Expeditionary Force (CEF) during the influenza pandemic.

Materials and Methods

In order to determine the occurrence of influenza in the CEF in 1917 and 1918, I extracted mortality records from the Commonwealth War Graves Commission's online database which contains the surname, name, date of death, war, rank, regiment and place of commemoration for the 1.7 million men and women of the Commonwealth who died during the two world wars.[10] The Commonwealth forces did not repatriate war dead during World War I[11] and by removing the names of soldiers commemorated on large monuments but not actually buried in Canada, I was able to develop an Excel database of the 2528 individuals who were commemorated, buried, and died in Canada between 1917 and 1918.

To determine which soldiers died from influenza, I used the soldiers' surname, name, date of death, and regiment numbers to link their death record in the Commonwealth War Graves Commission database to a cause of death in the Canada War Graves Registers Circumstances of Casualty database, available on Ancestry.ca.[12] This database contains information on the place and cause of a soldier's death. Following Brundage and Shanks, causes of death recorded as pneumonia were included because it was an important secondary infection.[13] Influenza-related deaths are thus labelled as 'Pneumonia/Influenza (P/I)' and other causes as 'Non-P/I'.

Once cause of death was established, I calculated monthly mortality rates per 10,000 using the strength of the CEF in Canada as the population at risk, available from Library and Archives of Canada.[14] Monthly mortality rates were calculated as follows:[15]

$MR_{(t)} = \#D_{(t)} / SP_{(t)} \times 10000$

where t is the month in question, MR is the mortality rate, #D is the number of deaths, and SP is the total population of soldiers in Canada (the strength of the CEF). From this, excess mortality attributable to influenza was calculated as follows:[16]

$EM_{(t)} = OM_{(t)} - ExpM_{(t)}$,

where t is the month in question, EM is the excess mortality, OM is the observed mortality, and ExpM is the expected mortality (the monthly mortality rates of 1917, the year preceding the influenza pandemic).

Results

The results of this analysis indicate that influenza was present among soldiers in Canada in the spring and summer of 1918, prior to the deadly fall outbreak.

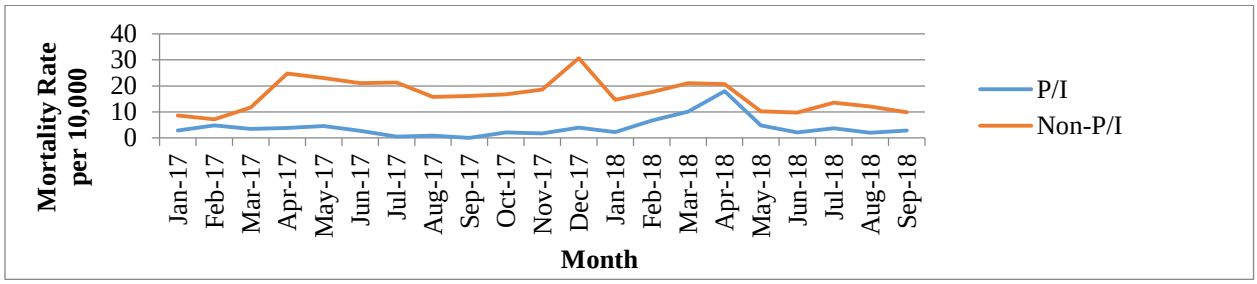

Figure 1: P/I vs Non-P/I Monthly Mortality Rates, January 1917 to September 1918

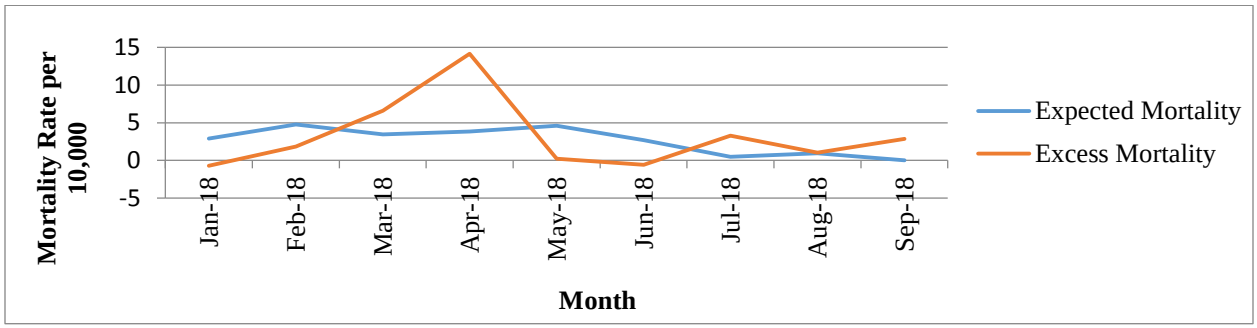

Figure 2: Excess Mortality of P/I Deaths, January 1918 to September 1918

Figure 1 shows a clear increase in P/I mortality from February to May 1918. Figure 2 shows a dramatic increase in excess mortality attributed to P/I deaths from February to May 1918. Interestingly, excess influenza mortality was also evident in July, during the summer of 1918.

Conclusions

This research on mortality among CEF soldiers stationed in Canada in 1917 and 1918 adds to the growing body of data that points to the presence of a herald wave of influenza in Canada prior to the fall outbreak of 1918. It is important to note that the majority of soldiers travelled to and from civilian centres on a regular basis and that many of the death records noted that soldiers died in their own homes and not in military camps. Because soldiers were freely interacting with the civilian population, the herald wave identified amongst CEF soldiers was unlikely to have been limited to them.

Acknowledgments

I would like to thank: Susan Richardson, Natalie Prystajecky, and the rest of the CFID for granting me this research opportunity; Ann Herring, my supervisor, and her graduate student, Kandace Bogaert; my colleague and friend Melissa Yan, who helped me with over 120 hours of death record-linkage; Alain Gagnon provided me with the work experience necessary to work with historical records; Kris Inwood introduced us to the Commonwealth War Graves Commission database.

---

[1]Phillips H, Killingray D, editors (2003). The Spanish influenza pandemic of 1918-19: New perspectives. London, Routledge: 121–2

[2]Barry, J.M, Viboud, C, Simonsen, L (2008). Cross-Protection between Successive Waves of the 1918-1919 Influenza Pandemic: Epidemiological Evidence from US Army Camps and from Britain. Journal of Infectious Diseases, 198:1427-34

[3]Chowell, G, Viboud, C, Simonsen, L, Miller, M, Rodolfo, A (2010). Mortality Patterns Associated with the 1918 Influenza Pandemic in Mexico: Evidence of a Spring Herald Wave and Lack of Pre-existing Immunity in Older

[4]MacPhail, A. (1925) Official History of the Canadian Forces in the Great War 1914-1919: The Medical Services. F.A. Acland, Ottawa. Dicken McGinnis, J. (1977) The Impact of Epidemic Influenza: Canada, 1918-1919. Historical Papers. 121-140.

[5]Humphries, M.O (2013). The Last Plague: Spanish Influenza and the Politics of Health and War. Toronto: University of Toronto Press

[6]Korol, E (2011). The 1918 influenza pandemic in Ontario: impact of the Herald Wave on autumn mortality. HSL Thesis.McMaster University

[7]Busch, B.C ed.(2003). Canada and the Great War: Western Front Association Papers. Kingston: McGill-Queen's University Press

[8]Love, D (1999). "A Call to Arms" The Organization and Administration of Canada's Military in World War One. Bunker to Bunker Books, Winnipeg

[9]Humphries, M.O (2013). "The Last Plague."

[10]Find War Dead. Commonwealth War Graves Commission. n.d. Available online at: http://www.cwgc.org/find-war-dead.aspx

[11]Recovery and Burial (2013). Department of National Defence – Directorate of History and Heritage. Available online at: http://www.cmp-cpm.forces.gc.ca/dhh-dhp/dc-tc/bc-bc-eng.asp

[12]Ancestry.ca. (2010). Canada, War Graves Registers (Circumstances of Casualty), 1914-1948. Provo, UT, USA: Ancestry.com Operations, Inc.http://search.ancestry.ca/search/db.aspx?dbid=1973

[13]Brundage, J and Shanks, GD (2008). Deaths from Bacterial Pneumonia during 1918-19 Influenza Pandemic. Emerging Infectious Diseases 14(8):1193-1199

[14]Library and Archives of Canada.Returns and Statistics of the Canadian Expeditionary Force and Canadian Siberian Expeditionary Force. RG 24-C-6-e, Vol. 1842 File Part 1, File no. GAQ-10-45

[15]Korol, E (2011).

[16]Korol, E (2011).