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H1N1 in Retrospect: A Review of Risk Factors and Policy Recommendations

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Abstract
The H1N1 pandemic of 2009 devastated Indigenous communities worldwide. In order to explain infection patterns and prevent repeating history in future pandemics, associations with infection were investigated. This revealed that the vulnerability of Indigenous communities to infection was associated with poor performance on measurements of social determinants of health. Several policy recommendations pertaining to non-pharmaceutical interventions, prioritization of scarce health care resources, and pandemic planning are made to improve this situation. The best approach would be to empower Indigenous communities to take control over and improve local conditions. Success of such strategies in the battle against other Indigenous health issues suggests that these interventions would be invaluable against emerging infectious disease.

Keywords
H1N1, influenza, infectious disease, pandemic, Indigenous populations

H1N1 in Retrospect: A Review of Risk Factors and Policy Recommendations

In twenty first century society, infectious disease is coalesced throughout the world by the rapid movement of people and cargo. This creates a sense of global interconnectedness, with people worldwide being affected by the same infectious diseases. The H1N1 influenza pandemic of 2009 is a recent example of such global infiltration. As the infection spread worldwide, a common trend appeared: Indigenous communities in nations separated by thousands of kilometers were being devastated by the virus with higher infection rates and the manifestation of more severe symptoms than the general population. In the Northern Territory of Australia, pandemic influenza rates in Indigenous populations were almost five times the rate seen in non-Indigenous populations (Markey, Su, & Krause, 2010). In New Zealand, Pacific Islanders were seven times more likely to be hospitalized due to H1N1 than those of European descent (Verrall et al., 2010). In Canada, Aboriginals, who make up 4.6 percent of the population, contributed to 10 percent of H1N1 cases (Helferty et al., 2010). Furthermore, these rates potentially underestimate the impact in certain communities because subgroups may have experienced even higher rates of infection. For instance, Inuit in Canada faced a hospitalization rate sevenfold higher than the already staggering rate among First Nations (La Ruche et al., 2009). The H1N1 influenza pandemic was an international crisis that required immediate action. However, acting effectively required an understanding of this phenomenon: Why were Indigenous populations bearing the brunt of the pandemic?

Research During the Pandemic

To explain this worldwide trend and reduce the impact of the virus, characteristics that make populations vulnerable to infection needed to be identified. However, during the peak of the pandemic, information on infection patterns was extremely limited, which made this task difficult, if not impossible. Seasonal influenza data, however, was widely available and could be used to identify pertinent factors, since the transmissibility of the H1N1 pandemic influenza virus was found to be comparable to seasonal influenza with respect to direct contact and respiratory droplet transmission (Maines et al., 2009; Spence & White, 2010). Using this approach, high rates of infection and/or severe clinical presentation were found to be associated with factors that ranged from broader social determinants of health, including substandard housing and low levels of education, to more proximal clinical risk factors, such as smoking and obesity (Spence & White, 2010). The state of these distal and proximate determinants of health among Indigenous populations worldwide provide a foundation for understanding the devastation observed (Spence & White, 2010).

Although the use of seasonal influenza data was useful during the pandemic, current H1N1 pandemic influenza data should be investigated more directly to identify community factors that are associated with severe pandemic influenza infection. The direct use of H1N1 data is warranted because influenza activity varies from season to season, as does the public's degree of awareness and patient care-seeking behaviour, making it a less than ideal source of information on which to base conclusions (Carcione et al., 2010).

Indigenous Populations at Risk?

Using information regarding individuals with laboratory-confirmed H1N1 in Ontario, Canada, Lowcock, Rosella, Foisy, McGeer, and Crowcroft (2012) investigated the effects of social determinants

of health and mediating clinical risk factors on pandemic influenza severity by employing a case-control design. They found that hospitalized individuals were significantly more likely to live in neighbourhoods with a high material deprivation index, a score reflecting a low employment to population ratio, lower average income, and a higher proportion of people without a high school diploma. Although smoking, obesity, chronic morbidity, family doctor use, and antiviral treatment did explain some of the associations, large gaps in understanding remain. This suggests that social determinants of health affect infection in ways that extend beyond the recognized risk factors (Lowcock et al., 2012).

The results found by Lowcock et al. (2012) are in line with those found in studies using data on seasonal influenza and acute respiratory infections (Glezen, Greenberg, Atmar, Piedra, & Couch, 2000; Hawker et al., 2003; Spence & White, 2010). As seen in seasonal influenza comparisons, the results paint an unfavourable picture for many Indigenous communities, putting them at a particularly high risk of infection rates with more severe complications (Spence & White, 2010). Another factor that may contribute to the disproportionate impact on Indigenous communities is a possible link between prior receipt of trivalent inactivated influenza vaccine and H1N1 infection. Several Canadian investigations reported findings that consistently showed an increased risk of H1N1 infection with prior receipt of the seasonal influenza vaccine (Janjua et al., 2010; National Advisory Committee on Immunization, 2009; Skowronski et al., 2010). This may help to explain elevated infection rates seen in areas where Indigenous communities have higher vaccination rates than in the general population, such as those in British Columbia, Canada (Environics Research Group, 2006). However, laboratory studies will be needed to elucidate the effect of seasonal influenza vaccine on H1N1 infection since international investigations have reported negligible, or even protective, effects of prior vaccination (Janjua et al., 2010).

A theory that emerged in discussions surrounding pandemic influenza and its associated severity in Indigenous populations worldwide is that of proposed genetic susceptibility of this group (Zarychanski et al., 2010). Genetics have been known to influence host susceptibility to viral infection, as in the case of HIV (Gonzalez et al., 2005; Hardie et al., 2008). Zarychanski et al. (2010) propose that it is tempting to apply this logic to the influenza pandemic: that is, a predisposition to severe H1N1 infection is shared among Indigenous people, perhaps due to a certain immunodeficiency and could explain higher infection rates. However, Zarychanski et al. (2010) are quick to point out that Canadian Aboriginals and Australian Aboriginals, for example, do not share a common ancestry but, what is shared by the two groups, is a similar experience of social marginalization and inequality that has led to significant health disparities (Gracey & King, 2009; King, Smith, & Gracey, 2009; Zarychanski et al., 2010). Therefore, it is much more likely that elevated infection rates are the result of the poor socioeconomic conditions Aboriginals experience rather than a genetic predisposition that evolved separately among unrelated tribes.

Policy Recommendations

The risk factors for H1N1 infection and their disproportionate prevalence among Indigenous people makes this group particularly vulnerable or "high risk." H1N1 was generally found to have only mild symptoms but it can be seen as a "test run" of current pandemic plans (Zarychanski et al., 2010). Key interventions enacted should be analyzed with respect to Indigenous populations to identify any lessons

that may be learned and applied to future pandemics, including non-pharmaceutical interventions, prioritization of scarce health care resources, and pandemic planning.

Non-pharmaceutical interventions will likely be the first strategies implemented to curtail the spread of infection before a vaccine is available (Halder, Kelso, & Milne, 2010). An example of a non-pharmaceutical strategy would be social distancing – the closure of schools or businesses and the cancellation of other public gatherings (Baum, Jacobson, & Goold, 2009). On the surface, this course of action seems like a straightforward way to limit exposure; however, it illustrates an important drawback. Measures like this have not taken into account Indigenous culture and localized social norms. Social distancing methods may prove ineffective in Indigenous communities as there are important ceremonial gatherings that community members, even if sick, are still very likely to attend (Massey et al., 2009). Policy development must, therefore, be carried out in a culturally appropriate manner.

With increasing severity and rates of infection, pressures are put on health care systems as hospitals and health units are pushed to capacity. It becomes necessary to prioritize the allocation of scarce health care resources in order to maximize their benefits. An example of this principle is seen in the allocation of ventilators. The progression of H1N1 in certain patients results in acute respiratory distress that may require ventilation. In some hospitals, allocation of ventilators was based on utility and efficiency, promoting actions that maximized the greatest good for the greatest number of people (Silva et al., 2010). However, this policy potentially disadvantages populations that are at increased risk of infection. For example, the risk factors for infection that are disproportionately present in Indigenous communities are also linked to extended duration of required ventilation (Centers for Disease Control and Prevention, 2009). While it is deemed undesirable to place patients on ventilators for extended periods because it reduces availability for other patients, applying the principles of utility and efficiency in this situation would exclude some Indigenous people (Silva et al., 2010). Therefore, this policy may magnify existing social and health inequalities. A more socially responsible policy would be to recognize the fact that Indigenous populations account for a disproportionately higher percentage of hospitalized persons, justifying the higher use of ventilators even if doing so is inefficient.

In addition to specific non-pharmaceutical interventions and the allocation of resources, it is important that the general policies stemming from pandemic planning be culturally sensitive and relevant. How can this be accomplished? Indigenous communities must be directly included in pandemic planning. Consultations in Australia have identified key issues that should be included in pandemic plans, such as training local "go to" persons and communicating information in a direct format while demonstrating respect for the local culture (Massey et al., 2009). It is important to remember that consultation need not be limited to issues of cultural sensitivity. For example, traditional Native medicine was used during the 1918 Spanish Flu pandemic and many lessons can be carried over to today. In one documented case, a Native American family from South Dakota was struck with the virus while in the midst of a five-day journey back to their home after picking potatoes. The use of traditional Native medicine helped to spare the lives of the entire family (Centers for Disease Control and Prevention, 2012). Particularly interesting about this story is that the Native medicine and its underlying principles very closely mirrors modern methods of infection control, such as quarantine, hydration, and pharmacology. This suggests that traditional medicine can be helpful in combating infection and it is also very compatible with current pandemic plans.

Building on the success of consultation, policy should go further by developing equal partnerships with Indigenous communities that focus on enabling them to improve their own health status. Community self-determination results in culturally sensitive and effective services that lead to improvements in individual health (Chandler & Lalonde, 1998; Kirby & LeBreton, 2002). Although I am not aware of comprehensive influenza prevention programs encompassing these principles, success stories in battling other health issues make it likely that increased self-determination in Indigenous communities could be a major force in future pandemic planning.

An example is illustrated by the Kahnawake Schools Diabetes Prevention Project. Kahnawake is a Mohawk community of 7,000 people near Montreal, Canada that reflects a trend seen in Aboriginal communities worldwide: rising rates of Type II diabetes combined with an earlier average age of onset (Naqshbandi, Harris, Esler, & Antwi-Nsiah, 2008). However, the closely-held Mohawk value of taking care of future generations prompted a call to action and the subsequent formation of the Kahnawake Schools Diabetes Prevention Project. Through the promotion of community capacity building, program ownership, and respect for Mohawk tradition and culture, programs have been put in place to increase physical activity and healthy eating habits (Macauley et al., 1997).

Fundamental to the above project is the idea of equal partnerships between community members, community-based researchers, and academic researchers (Potvin, Cargo, McComber, Delormier, & Macauley, 2003). Community members from health, social, political, spiritual, and recreational sectors had major influences throughout the project (Cargo et al., 2003). They decided to focus the project on their children through school and community interventions. Furthermore, community members were involved in each stage of the project, including development, implementation, and evaluation (Potvin et al., 2003). As Potvin (2003) described, the community members "were not considered as passive agents of someone else's vision" (p. 1,301). It was truly a project by the people, for the people.

Although focused on diabetes, the principles in the Kahnawake Schools Diabetes Prevention Project could be applied to pandemic intervention. Diabetes shares a similar global trend to an influenza pandemic and these principles of self-determination and community building would no doubt also be of use in pandemic influenza prevention. As such, universities and other organizations should engage in reciprocal relationships with Indigenous communities, whereby community members are empowered to take action and be actively involved in the development and implementation of prevention strategies that are respectful of local values and culture.

To make the most potent impact, policies need to go one step further and integrate the idea of community empowerment with programs designed to reverse the poor conditions present in many Indigenous communities. That is, programs also need to address the social determinants of health affecting H1N1 infection, such as those investigated by Lowcock et al. (2012). As seen in the Kahnawake Schools Diabetes Prevention Project, Indigenous people in Canada and throughout the world value a concept of health that encompasses physical, spiritual, emotional, and mental dimensions (Maher, 1999; Turton, 1997). Programs that take a holistic approach in addressing these determinants are, therefore, quite compatible with traditional culture and do not interfere with the idea of self-determination. Furthermore, improving education and employment rates would give policies a greater ability to reduce the impact of future pandemics as well as other infectious and chronic disease (Farmer, 1996; Michelozzi et al., 1999; Mao, Hu, Ugnat, Semenciw, & Finchman, 2001; van Rossum, Shipely, van

de Mheen, Grobbee, & Marmot, 2000). However, despite the powerful potential of such projects, it may be difficult to set these programs in motion. The mechanisms by which community variables improve health are poorly understood and policymakers often associate health policy with acute care (Brown, 2006; Lowcock et al., 2012). For these reasons, programs that bear more immediate and direct results are likely to receive funding over programs addressing more distal factors. It is, therefore, crucial that programs focusing on improving the social determinants of health be advocated for and funded in Indigenous communities to not only reduce the impact of future pandemics, but to improve general health overall.

Conclusion

With the world's Indigenous people being affected by higher infection rates and more severe outcomes during the 2009 H1N1 pandemic, it is imperative to ensure that this disproportionate suffering not be in vain. Without any changes, Indigenous populations remain vulnerable to devastation if and when another pandemic occurs. Actions need to be taken now. Policy needs to be developed with Indigenous communities in mind, through direct consultation, partnerships, and community engagement. Also, communities must be empowered to develop and implement their own policies. Policies would best address pandemic infection rates by focusing on improving social conditions, including housing, income, employment, and education rates. By building healthy communities, Indigenous people would become more resilient to future infection, and they would also experience a general improvement in their quality of life.

References

Baum, N. M., Jacobson, P. D., & Goold, S. D. (2009). "Listen to the people": Public deliberation about social distancing measures in a pandemic. *The American Journal of Bioethics, 9*(11), 4 - 14.

Brown, L. D. (2006). Health determinants, policy indeterminacy? *Health Economics, Policy and Law, 1* (4), 409 - 414.

Carcione, D., Giele, C., Dowse, G. K., Mak, D. B., Goggin, L., Kwan, K.,...Effler, P. (2010). Comparison of pandemic (H1N1) 2009 and seasonal influenza, Western Australia, 2009. *Emerging Infectious Diseases, 16*(9), 1388 – 1395. doi:10.3201/eid1609.100076

Cargo, M., Levesque, L., Macaulay, A. C., McComber, A., Desrosiers, S., Delormier, T.,...Kahnawake Schools Diabetes Prevention Project (KSDPP) Community Advisory Board. (2003).Community governance of the Kahnawake Schools Diabetes Prevention Project, Kahnawake Territory, Mohawk Nation, Canada. *Health Promotion International, 18*(3), 177 - 187.

Centers for Disease Control and Prevention. (2009). Intensive-care patients with Severe Novel Influenza A (H1N1) Virus Infection – Michigan. *Morbidity and Mortality Weekly Report. 58*, 1 – 4.

Centers for Disease Control and Prevention. (2012). *Pandemic influenza storybook*. Retrieved from http://www.pandemicflu.gov/storybook

Chandler, M. J., & Lalonde, C. E. (1998). Cultural continuity as a hedge against suicide in Canada's First Nations. *Transcultural Psychiatry, 35*(2), 191 - 219.

Environics Research Group. (2006). *First Nations and Inuit Adult Immunization Coverage Survey (FNIICS). First Nations and Inuit Health Branch, Health Canada (contract #H1011–060001/001/CY).* Ottawa, ON, Canada: First Nations and Inuit Health Branch, Health Canada.

Farmer, P. (1996). Social inequalities and emerging infectious diseases. *Emerging Infectious Diseases, 2*(4), 259 - 269.

Glezen, W. P., Greenberg, S. B., Atmar, R. L., Piedra, P. A., & Couch, R. B. (2000). Impact of respiratory virus infections on persons with chronic underlying conditions. *The Journal of the American Medical Association, 283*(4), 499 - 505.

Gonzalez, E., Kulkarni, H., Bolivar, H., Mangano, A., Sanchez, R., Catano,...Ahuja, S. K. (2005). The influence of CCL3L1 gene-containing segmental duplications on HIV-1/AIDS susceptibility. *Science, 307,* 1434 - 1440.

Gracey, M., & King, M. (2009). Indigenous health part 1: Determinants and disease patterns. *The Lancet, 374*, 65 - 75.

Halder, N., Kelso, J. K., & Milne, G. (2010). Analysis of the effectiveness of interventions used during the 2009 A/H1N1 influenza pandemic. *BMC Public Health, 10*, 168.

Hardie, R. A., Luo, M., Bruneau, B., Knight, E., Nagelkerke, N. J., Kimani, J.,...Plummer, F. A. (2008). Human leukocyte antigen-DQ alleles and haplotypes and their associations with resistance and susceptibility to HIV-1 infection. *AIDS, 22*, 807 - 816.

Hawker, J. I., Olowokure, B., Sufi, F., Weinberg, J., Gill, N., & Wilson R. C. (2003). Social deprivation and hospital admission for respiratory infection: An ecological study. *Respiratory Medicine, 97*(11), 1219 - 1224.

Helferty, M., Vachon, J., Tarasuk, J., Rodin, R., Spika, J., & Pelletier, L. (2010). Incidence of hospital admissions and severe outcomes during the first and second waves of pandemic (H1N1) 2009. *Canadian Medical Association Journal, 182*(18), 1981 - 1987.

Janjua, N. Z., Skowronski, D. M., Hottes, T. S., Osei, W., Adams, E., Petric, M.,...Bowering, D. (2010). Seasonal influenza vaccine and increased risk of pandemic A/H1N1-related illness: First detection of the association in British Columbia, Canada. *Clinical Infectious Disease, 51*(9), 1017-1027.

King, M. Smith, A., & Gracey, M. (2009). Indigenous health part 2: The underlying causes of the health gap. *Lancet, 374*, 76 - 85.

Kirby, M. J. L., & LeBreton, M. (2002). *The health of Canadians – the federal role. Final report of the Standing Senate Committee on Social Affairs, Science and Technology*. Ottawa, ON: Parliament of Canada.

La Ruche, G., Tarantola, A., Barboza, P., Vaillant, L., Guegen, J., Gastellu-Etchegorry, M. for the epidemic intelligence team at InVS. (2009). The 2009 pandemic H1N1 influenza and Indigenous populations of the Americas and the Pacific. *Eurosurveillance, 14*(42), pii19366.

Lowcock, E. C., Rosella, L. C., Foisy, J., McGeer, A., & Crowcoft, N. (2012). The social determinants of health and pandemic H1N1 2009 influenza severity. *American Journal of Public Health, 102*(8), e51 - 58.

Macaulay, A. C., Paradis, G., Potvin, L., Cross, E. J., Saad-Haddad, C., McComber, A.,...Rivard, M. (1997). The Kahnawake Schools Diabetes Prevention Project: A diabetes primary prevention program in a native community in Canada. Intervention and baseline results. *Preventative Medicine, 26*, 779 - 790.

Maines, T. R., Jayaraman, A., Belser, J. A., Wadford, D. A., Pappas, C., Zeng, H.,...Tumpey, T. M. (2009). Transmission and pathogenesis of swine-origin 2009 A (H1N1) influenza viruses in ferrets and mice. *Science, 325*(5939), 484 - 487.

Maher, P. (1999). A review of "traditional" Aboriginal health beliefs. *The Australian Journal of Rural Health, 7*(4), 229 - 236.

Mao, Y., Hu, J., Ugnat, A-M., Semenciw, R., & Fincham, S. (2001). Socioeconomic status and lung cancer risk in Canada. *International Journal of Epidemiology, 30*(4), 809 - 817.

Markey, P., Su, J. Y., & Krause, V. (2010). Summary of influenza in 2009 in the Northern Territory. *The Northern Territory Disease Control Bulletin, 17*(1), 1 - 10.

Massey, P. D., Pearce, G., Taylor, K. A., Orcher, L., Saggers, S., & Durrheim, D. N. (2009). Reducing the risk of pandemic influenza in Aboriginal communities. *Rural Remote Health, 9*(3), 1290.

Michelozzi, P., Perucci, C., Forastiere, F., Fusco, D., Ancona, C., & Dell'Orco, V. (1999). Inequality in health: Socioeconomic differentials in mortality in Rome, 1990-95. *Journal of Epidemiology and Community Health, 53*(11), 687 - 693.

Naqshbandi, M., Harris, S. B., Esler, J. G., & Antwi-Nsiah, F. (2008). Global complication rates of Type 2 diabetes in Indigenous peoples: A comprehensive review. *Diabetes Research and Clinical Practice, 82*, 1 - 17.

National Advisory Committee on Immunization. (2009). Statement on seasonal trivalent inactivated influenza vaccine (TIV) for the 2009–2010 season. *Canada Communicable Disease Report, 35* (ACS-6), 1 – 41.

Potvin, L., Cargo, M., McComber, A. M., Delormier, T., & Macauley, A. C. (2003). Implementing participatory intervention and research in communities: Lessons from the Kahnawake Schools Diabetes Prevention Project in Canada. *Social Science and Medicine, 56*(6), 1295 - 1305.

Silva, D. S., Nie, J. X., Rossiter, K., Sahni, S., Upshur , R. E., & Canadian Program of Research on Ethics in a Pandemic. (2010). Contextualizing ethics: Ventilators, H1N1 and marginalized populations. *Healthcare Quarterly, 13*(1), 32 - 36.

Skowronski, D. M., De Serres, G., Crowcroft, N. S., Janjua, N. Z., Boulianne, N., Hottes, T. S.,... Canadian SAVIOR Team. (2010). Association between the 2008–09 seasonal influenza vaccine and pandemic H1N1 illness during spring-summer 2009: Four observational studies from Canada. *PLOS Medicine, 7*(4), e1000258.

Spence, N., & White, J. P. (2010). Scientific certainty in a time of uncertainty: Predicting vulnerability of Canada's First Nations to Pandemic H1N1/09. *The International Indigenous Policy Journal, 1*(1). Retrieved from: http://ir.lib.uwo.ca/iipj/vol1/iss1/1

Turton, C. L. (1997). Ways of knowing about health: An Aboriginal perspective. *Advances in Nursing Science, 19*(3), 23 - 36.

van Rossum, C. T. M., Shipley, M. J., van de Mheen, H., Grobbee, D. E., & Marmot, M. G. (2000). Employment grade differences in cause specific mortality. A 25 year follow up of civil servants from the first Whitehall study. *Journal of Epidemiology and Community Health, 54*(3), 178 - 184.

Verrall, A., Norton, K., Rooker, S., Dee, S., Olsen, L., Tan,...Blackmore, T. K. (2010). Hospitalizations for Pandemic (H1N1) 2009 among Maori and Pacific Islanders, New Zealand. *Emerging Infectious Diseases,* 16(1). Retrieved from http://wwwnc.cdc.gov/eid/article/16/1/09-0994.htm

Zarychanski, R., Stuart, T. L., Kumar, A., Doucette, S., Elliot, L., Kettner, J., & Plummer, F. (2010). Correlates of severe diseases in patients with 2009 pandemic influenza (H1N1) virus infection. *Canadian Medical Association Journal, 182* (3), 257 - 264.