June 2019

TARRANT VIRAL watch

IN THIS ISSUE

The influenza season is coming to a close in Alberta as most indicators of influenza activity have been decreasing. It was an A(H1N1) predominant season with a late season influx of A(H3). Influenza B was low this season. The season was busy with over 945 samples collected for the vaccine effectiveness study and over 160,000 patients screened for ILI and LRTI. This year five new sentinels have enrolled in the program. Our data contributed to four publications in peer reviewed journals, a presentation at a regional meeting and contributed to the WHO decision on next season's vaccine. Without your support, these accomplishments and developments in cutting edge research would not be possible. Thank you for your contributions and we hope to see your participation continue throughout the summer and next season!

Preparing for the 2019-20 Season

- AHS mandates we maintain a 90% active sentinel rate. We will be contacting you over the next few months to confirm your continued involvement with the program for the upcoming year. Should you be unable to continue with the program, or wish to opt out, please contact us by email at tarrant@ucalgary.ca.
- The influenza vaccine for the coming season will contain the A/Brisbane/02/2018 (H1N1) pdm09-like virus, an A/Kansas/14/2017 (H3N2)-like virus; a B/Colorado/06/2017-like virus (B/Victoria/2/87 lineage); and a B/Phuket/3073/2013-like virus (B/Yamagata/16/88 lineage)
- You will receive new VE requisition forms for the 2019-20 season in late August/early September. Until then, please continue to use the YELLOW 2018-19 season forms for the VE study.
- We welcomed Samiha Mohsen as a new research assistant, she will work with us as she begins her Master's degree in Epidemiology this fall.

2018-2019 Flu Season Update

Alberta Influenza

From the beginning of the season, there have been over 7,600 laboratory- confirmed cases of influenza in the province. The majority (3,847, 51%) of cases were influenza A(H1N1). There have been 1391 cases of influenza A(H3) and 350 cases of influenza B. Influenza peaked in week 48 (late November), with 629 laboratory confirmed cases, majority being Influenza A(H1N1). This number was lower than the number obtained during the peak for last season (904 cases). The rate for influenza A (H3N2) began to increase after week 5 (early February) and peaked in week 14 (early April) with 127 cases. As of June 15, 2019, there have been 1,939 hospitalization cases and 52 deaths. For the 2018/2019 Seasonal Influenza Immunization Program (Aug 26, 2018– Jun 08, 2019), over 1.3 million Alberta residents received an annual dose, an overall coverage rate of 29% for the province. The coverage rate for the previous 2017/2018 seasonal influenza immunization program was also 29%.

Other Infectious Respiratory Diseases:

Rhinovirus/enterovirus predominated at the start of the season, reaching its peak in September with 201 confirmed cases. RSV began to increase in November and reached its peak in December with 147 cases and has been on a decline since then. Parainfluenza, adeno- virus and mixed infections had low levels of detection throughout the season.

Data Source: AHS Public Surveillance

Canada

Influenza activity in Canada continues to decline and iswithin the expected range for this time of the year. Influenza A (H1N1)pdm09 was the predominant subtype overall for the 2018-19 season. Influenza A(H3N2) and influenza B continue to co-circulate, however the level of influenza B was very low compared to previous seasons.

So far this season, there have been over 47,000 laboratory – confirmed influenza cases, 96% have been influenza A of which 70% were A(H1N1)pdm09. About 83% of all influenza A(H1N1)pdm09 were in individuals less than 65 years of age while 58% of all influenza A(H3N2) were in individuals 65 years or older.

So far this season, there have been 1298 influenza-associated hospitalizations, 246 ICU admissions and 10 deaths in the pediatric population. Among adults there have been 944 hospitalizations, 117 ICU admissions and 54 deaths.

From September 1, 2018 to 23 May, 2019, the National Microbiology Laboratory (NML) has characterized 2,252 influenza viruses (488 A(H3N2), 1,612 A(H1N1) and 152 B) that were received from Canadian laboratories.

Data source: Flu watch

International

Internationally, as of June 10th 2019, influenza activity has returned to inter-seasonal levels in the temperate northern hemisphere. In the temperate southern Hemisphere, influenza detection has increased overall. Seasonal Influenza A virus was the dominant strain reported by all countries. The 2019 Influenza season started earlier in Australia, Chile, South Africa and New Zealand than the previous seasons.

Data Source: WHO

Children and the 2018/19 influenza season

The Influenza A (H1N1)pdm09 virus has caused the primary epidemic of the 2018/19 season in the northern hemispheres. In Canada, H3N2 was the dominant strain during the years of 2014/15, 2016/17 and 2017/18, while the H1N1 strain was dominant in 2013/14 and 2015/16 flu seasons. This sequence of annual datasets enabled us to ask, 'what is the effect of age upon susceptibility to influenza?'

Methods

For these years, epidemiological data were collected from patients who met the standardized case definition for influenza like illness and sent with a nasal/nasopharyngeal swab to the provincial public health laboratory. Those who tested positive to the dominant influenza subtype were cases, while controls tested negative to any influenza virus. To control for vaccine effects, analysis was restricted to unvaccinated patients.

The age distribution of unvaccinated influenza A(H1N1)pdm09 cases and unvaccinated controls in 2018/19 was compared with previous influenza A(H1N1)pdm09-dominant seasonal epidemics (i.e. 2013/14 and 2015/16) Similar comparisons were made for influenza A(H3N2)-dominant seasons (i.e. 2014/15, 2016/17 and 2017/18)

Results

Compared to previous seasons, in the 2018/19 season children less than 10 years comprised a greater proportion (29%) of influenza A (H1N1)pdm09 cases than controls (16%). Those aged 5- 9 years had the highest influenza A test-positivity (73%). This percentage was higher than in the same age group during prior influenza H1N1 seasons and also all other age groups in other epidemics assessed. In addition, unvaccinated patients were more highly skewed towards children ages between 1- 9 years.

This finding may have an immune-epidemiologic explanation. These children were born after the 2009 pandemic and lack the 2009 pandemic-induced immunity. Also, these children now attend school which enhances transmission.

Conclusions:

Children aged 5-9 years contributed to more medically-attended cases of Influenza A(H1N1)pdm09 illness in Canada during the 2018/29 season than in prior seasons. It is predicted that children born after 2009 and lacking pandemic-induced immunity to Influenza A(H1N1)pdm09, entering their teenage period (10-19 years) which is associated with highest social contact, will cause greater transmission during subsequent influenza A(H1N1)pdm09 epidemics over the next decade.

Skowronski, D. M., Leir, s., Serres, G. D., Murit, M., Dickinson, J. A., Winter, A., ... & Gubbay, J. (2019). Children under 10 years of age were more affected by the 2018/19 influenza A(H1N1)pdm09 epidemic in Canada: possible cohort effect following the 2009 influenza pandemic

Consideration of Sex in the Evaluation of Influenza VE

Little research is done on the effect of sex on Influenza VE, though it could affect this as so many other issues in health and disease. Females are more likely to seek health care and influenza vaccine coverage than males in both Canada as well as the USA; further, they are also more prone to exposure to Influenza due to traditional gender roles of caring for children, elderly, and family members. On the other hand, males have a higher mortality rate than females when infected with Influenza.

Question: We therefore asked whether there is a sex difference in Influenza Vaccine effectiveness?

Method: The Canadian Sentinel Practitioner Surveillance Network's (SPSN) database for the seasons of 2010-2011 to 2016-2017 was used. Data was collected from Alberta, British Columbia, Ontario, and Quebec. Patients with influenza-like-illness standardized definition who were older than 1 year of age were tested for the presence of Influenza and questioned on prior Influenza vaccination history. Patients who tested positive for Influenza were considered cases, while those who tested negative were considered controls

Results: More females than males participated in the SPSN (60% vs 40%). Females also had a higher vaccine coverage compared to males (overall 21% vs 23%). While vaccine effectiveness varied with age, sex, season, and subtype, the overall adjusted vaccine effectiveness was higher for females (49%) vs males (38%). The difference in vaccine effectiveness was greatest in older adults over 50 years (48% in females and 29% in males).

Birth Cohort Effects in Influenza

Influenza viruses replicate rapidly, with an error-prone process, causing the subtypes to change over time. This means different birth cohorts are exposed to different Influenza A strains. US influenza surveillance data suggested different hospitalization rates for different age groups in varying seasons. For instance, adults had higher hospitalizations during H3 dominant seasons than H1 dominant seasons. In contrast, younger adults were more likely to be hospitalized during H1 dominant seasons suggesting that original virus exposure may be the cause of these results. Therefore, these researchers asked whether current infection, hospitalization and mortality rates differed by birth cohorts, related to the likely first virus types they were exposed to.

Method: Surveillance data in US hospitals during 2000-2017 were examined for birth cohorts born between 1918 and 1989 and related to the dominant influenza epidemics in these periods. The relative risk rates of these cohorts were examined in different dominant seasons (H1 and H3) during pre-pandemic, pandemic, and later periods.

Results: For cohorts from H1-dominant periods (1918, 1933, and 1947), positive influenza results were more common during H3 predominant seasons than H1 predominant seasons. However, after the 2009 H1 pandemic more severe disease & deaths occurred in the H1 predominant seasons rather than H3, for those in the 1957 and later birth cohorts whose first experience of influenza was H3.

Conclusion: The first major infection with influenza gives greater immunity to that group of viruses than to the alternate group, and this difference persists through life.