Global Influenza Hospital Surveillance Network

SERIOUS OUTCOMES SURVEILLANCE (SOS) NETWORK
HALIFAX, NOVA SCOTIA, CANADA

INFLUENZA BURDEN OF DIESEASE AND PRELIMINARY 2017/18 END-OF-SEASON INFLUENZA VACCINE EFFECTIVENESS ESTIMATES FOR PREVENTING INFLUENZA-ASSOCIATED HOSPITALIZATION AMONG CANADIAN ADULTS: AN UPDATE FROM THE CIRN SERIOUS OUTCOMES SURVEILLANCE (SOS) NETWORK

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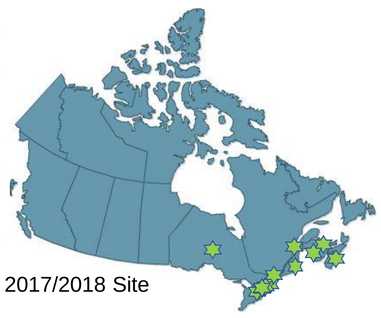
Site presentation

- 13 adult academic and community hospital sites in 4 Canadian Provinces (Ontario, Quebec, New Brunswick, Nova Scotia) representing approximately ~8200 acute care beds
- Population enrolled is approximately 2/3 older adults >=65 years of age, admitted to hospitals with an acute respiratory illness
- Influenza seasons in Canada typically begin with early influenza A activity, followed by a later influenza B peak



Methods

- Active surveillance for influenza infection in adults (≥16 years of age) was conducted January 1st, 2018 to April 30th, 2018
  - ➢ NP swab obtained from all patients with an admitting diagnosis of CAP, exacerbation of COPD/asthma, unexplained sepsis, any respiratory diagnosis or symptom
  - ➢ All NP swabs tested for influenza A & B by PCR
  - ➢ Influenza typing and B lineage characterization performed at Canadian Immunization Research Network's (CIRN) SOS Network Central Laboratory at the Canadian Center for Vaccinology in Halifax, NS
  - ➢ Other clinical and demographic information was also collected, including information about comorbidities, medications, and frailty (*see clinical frailty scale)

- Influenza positive cases matched to influenza-test negative controls on Admission date (within 14d of DOA of case), age stratum (≥ 65y or <65y) and site of enrolment to calculate influenza vaccine effectiveness (VE) using multivariable logistic regression

VE = 1-OR x 100%,
with 95% CI (Confidence Intervals)

- Preliminary, unmatched VE is presented in this analysis

Clinical Frailty Scale*

1 Very Fit – People who are robust, active, energetic and motivated. These people commonly exercise regularly. They are among the fittest for their age.

2 Well – People who have **no active disease symptoms** but are less fit than category 1. Often, they exercise or are very **active occasionally**, e.g. seasonally.

3 Managing Well – People whose **medical problems are well controlled,** but are **not regularly active** beyond routine walking.

4 Vulnerable – While **not dependent** on others for daily help, often **symptoms limit activities.** A common complaint is being "slowed up", and/or being tired during the day.

5 Mildly Frail – These people often have **more evident slowing,** and need help in **high order IADLs** (finances, transportation, heavy housework, medications). Typically, mild frailty progressively impairs shopping and walking outside alone, meal preparation and housework.

6 Moderately Frail – People need help with **all outside activities** and with **keeping house.** Inside, they often have problems with stairs and need **help with bathing** and might need minimal assistance (cuing, standby) with dressing.

7 Severely Frail – Completely dependent for personal care, from whatever cause (physical or cognitive). Even so, they seem stable and not at high risk of dying (within ~ 6 months).

8 Very Severely Frail – Completely dependent, approaching the end of life. Typically, they could not recover even from a minor illness.

9 Terminally Ill - Approaching the end of life. This category applies to people with **a life expectancy <6 months**, who are **not otherwise evidently frail.**

Scoring frailty in people with dementia

The degree of frailty corresponds to the degree of dementia. Common **symptoms in mild dementia** include forgetting the details of a recent event, though still remembering the event itself, repeating the same question/story and social withdrawal.

In **moderate dementia,** recent memory is very impaired, even though they seemingly can remember their past life events well. They can do personal care with prompting.

In **severe dementia,** they cannot do personal care without help.

* 1. Canadian Study on Health & Aging, Revised 2008.
2. K. Rockwood et al. A global clinical measure of fitness and frailty in elderly people. CMAJ 2005;173:489-495.

Results

Table 1: Clinical characteristics of influenza positive cases enrolled in the SOS Network, 2017-2018 influenza season

Characteristics	Cases (n=2063) n (%)*
Age	
16-49y	209 (10.1%)
50-64y	276 (13.4%)
65-75y	432 (20.9%)
>75 y	1146 (55.6%)
Subtype	
A	1138 (55.2%)
B	923 (44.7%)
A/B	2 (0.1%)
Strain	
A/H1N1	18 (1.6%)
A/H3N2	309 (27.2%)
A/Other	2 (0.2%)
A/Unknown	809 (71.1%)
Male	912 (44.2%)
≥1 comorbidity	1868 (93.4%)
Pregnant	41 (2.0%)
Smoker (past or current)	854 (54.4%)
Antiviral use PTA	16 (0.8%)
Received 2017/18 influenza vaccine	491 (56.7%)
Admitted from long-term care facility	134 (6.7%)
Frailty Scale	
1- Very Fit	43 (2.4%)
2- Well	101 (5.6%)
3- Managing Well	363 (20.3%)
4- Vulnerable	390 (21.8%)
5- Mildly Frail	362 (20.2%)
6- Moderately Frail	314 (17.5%)
7- Severely Frail	169 (9.4%)
8- Very Severely Frail	32 (1.8%)
9- Terminally Ill	18 (1.0%)

*Proportions are are among patients with known information for that variable, missing values were excluded

Figure 1. Epidemiologic curve of influenza A/B during the 2017/2018 season in Canada. *Surveillance was officially started on January 1, 2018

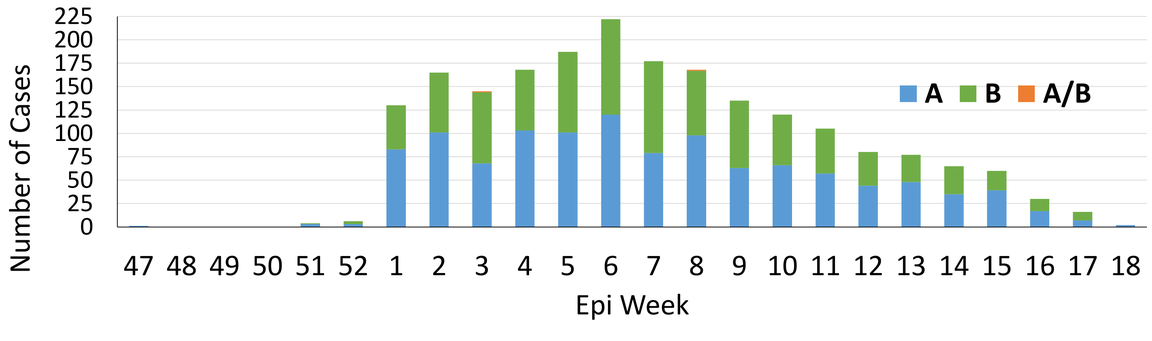


Table 2: Outcomes of influenza positive cases (all influenza, influenza A, influenza B), 2017/2018 season

Outcome	All Influenza %, N	Influenza A %, N	Influenza B %, N
Admitted to ICU	11.3%, 233/2062	11.2%, 127/1137	11.4% 106/923
Mechanically Ventilated	5.3%, 105/2000	5.6%, 62/1105	4.8%, 43/893
Died during this admission	6.4%, 129/1998	5.8%. 64/1103	7.1%, 64/893

Table 3: Outcomes of influenza positive cases by frailty score, 2017/2018 season

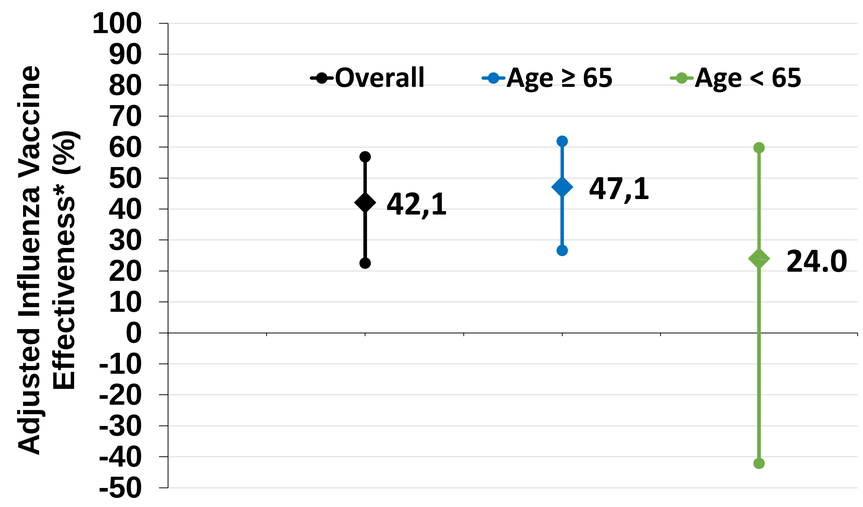
Outcome	FRAILTY SCALE SCORE								
	1 %	2 %	3 %	4 %	5 %	6 %	7 %	8 %	9 %
Admitted to ICU	18.6%	12.9%	12.4%	9.5%	12.2%	7.6%	8.9%	12.5%	22.2%
Mechanically Ventilated	11.6%	4.0%	6.6%	4.1%	5.5%	2.9%	4.4%	9.4%	11.1%
Died during this admission	0.0%	1.0%	2.2%	3.6%	6.4%	4.8%	16.0%	37.5%	77.9%

Table 4: Clinical characteristics of influenza positive cases and test-negative controls enrolled in the SOS Network, 2017-2018 influenza season

Characteristics	Cases (n=398) n (%)*	Controls (n=428) n (%)*	p value
Age			0.02
16-49y	34 (8.5)	24 (5.6)	
50-64y	49 (12.3)	58 (13.6)	
65-75y	95 (23.87)	138 (32.2)	
>75 y	220 (55.28)	208 (48.6)	
Male	169 (42.5)	197 (46.0)	0.30
≥1 comorb	361 (93.0)	412 (96.7)	0.02
Pregnant	6 (1.5)	2 (0.5)	0.16
Smoker (Past or Current)	211 (66.1)	247 (67.3)	0.80
Antiviral use PTA	3 (0.8)	1 (0.2)	0.35
Received 2017/2018 influenza vaccine	217 (54.5)	289 (67.5)	<0.01
Admitted from long-term care facility	11 (2.8)	22 (5.2)	0.10
≥4 medications	298 (74.9)	352 (82.2)	0.02

*Proportions are are among patients with known information for that variable, missing values were excluded

Figure 2: Vaccine effectiveness of the influenza vaccine for preventing all influenza and influenza-A related hospitalizations in patients of all ages, patients ≥65 years of age, and patients <65 years of age



*All ages estimate adjusted for: age, antiviral use prior to admission. Age ≥65 estimate adjusted for age, antiviral use prior to admission, frailty score, prior comorbidities. Age <65 estimate adjusted for age and antiviral use prior to admission.

Key aspects & challenges

Key Aspects

- The 2017/2018 influenza season in Canada had circulation of influenza A (where the main circulating strain was influenza A/H3N2), and influenza B
- Proportions patients who experienced serious outcomes were similar between influenza A and B; however, outcomes varied considerably by frailty scale scores
- Overall influenza vaccine effectiveness (VE) was 42.1% (95% CI: 22.5-56.8) for preventing influenza-related hospitalization

Challenges and Future Directions

- The SOS Network continues to have challenges in ascertaining influenza immunization status for calculation of influenza VE, primarily due to the lack of available immunization registries across Canada
- The SOS Network seeks to continue to conduct influenza surveillance in the 2018/2019 season, with a focus on evaluating influenza burden of disease, serious outcomes, and influenza VE in hospitalized, Canadian adults. The SOS Network also aims to continue investigating key risk factors (e.g. frailty) for serious outcomes among Canadian older adults hospitalized with acute respiratory illnesses.

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