

Waning protection of influenza vaccine?

Early- vs. late-season influenza vaccine effectiveness estimates over 3 seasons in Canada: An analysis from the CIRN Serious Outcomes Surveillance (SOS) Network

Shelly McNeil

On behalf of the CIRN SOS Network Investigators

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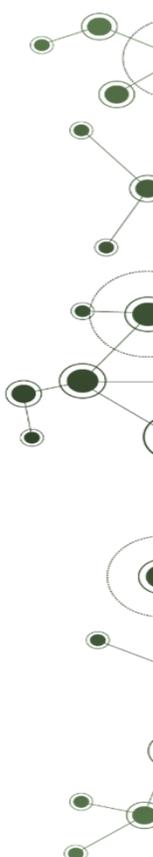
Disclosures

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Full Author List

Michaela K. Nichols, Melissa K. Andrew, Todd F. Hatchette, Ardith Ambrose, Guy Boivin, William Bowie, Ayman Chit, Gael Dos Santos, May ElSherif, Karen Green, Francois Haguinet, Barbara Ibarguchi, Jennie Johnstone, Kevin Katz MD, Phillipe Lagacé-Wiens, Jason LeBlanc, Mark Loeb, Donna MacKinnon-Cameron, Anne McCarthy, Janet E McElhaney, Allison McGeer, Andre Poirier, Jeff Powis, David Richardson, Makeda Semret, Stephanie Smith, Daniel Smyth, Grant Stiver, Geoffrey Taylor, Sylvie Trottier, Louis Valiquette, Duncan Webster, Lingyun Ye, **Shelly A McNeil**; on behalf of the Serious Outcomes Surveillance Network of the Canadian Immunization Research Network (CIRN) and the Toronto Invasive Bacterial Diseases Network (TIBDN)



Background and Rationale

- Influenza vaccines should provide effective protection against influenza for the entire duration of the influenza season
- Observational studies (Europe, US) have demonstrated evidence of decreasing influenza vaccine effectiveness (VE) as time since vaccination increases; this may contribute to late season outbreaks
- We sought to examine early vs. late season VE for preventing influenza-related hospitalization in Canada over 3 influenza seasons (2011-2014)

Kissling. Euro Surveill 2013;18 (5)

Castilla. Euro Surveill 2013;18(5)

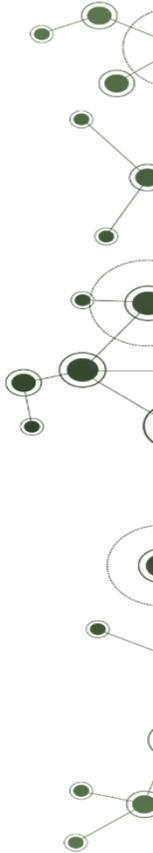
Kissling. Eurosurveill 2016;21(16)

Ferdinands CID 2017;64(5)

Pebody. Euro Surveill 2013;18(5)

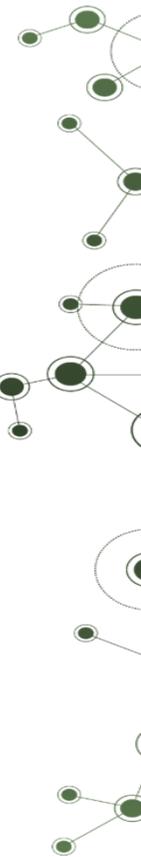
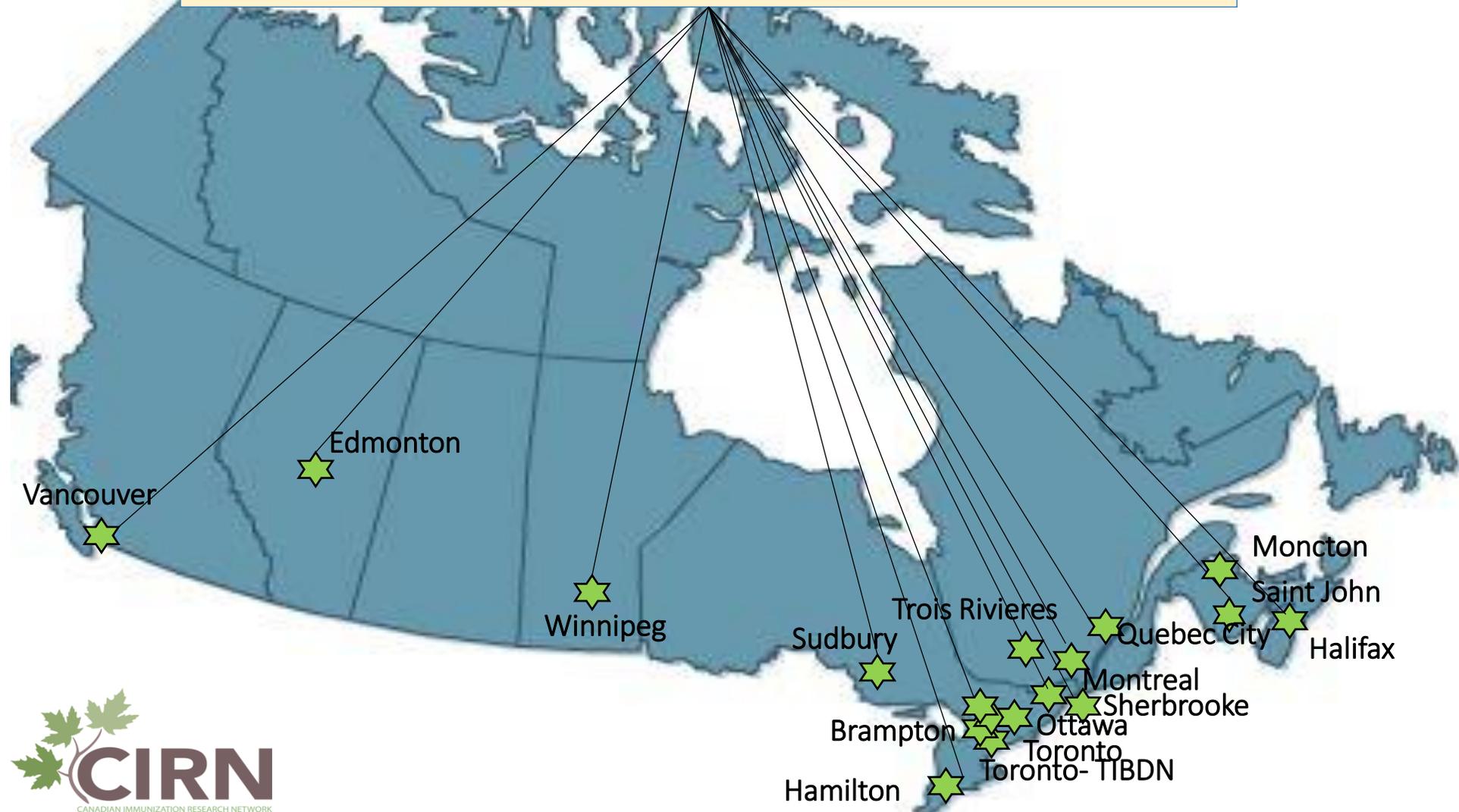
Andrews. Euro Surveill 2014;19:5-13

Jiimenez-Jorge. BMC Infect Dis 2103;13(1)



The CIRN SOS Network:

- 2011/2012: 40 hospitals in 6 provinces, 15,000 beds
- 2012/2013: 45 hospitals in 7 provinces, 18,000 beds
- 2013/2014: 45 hospitals in 7 provinces, 18,000 beds



Methods

- Active surveillance for influenza infection in adults (≥ 16 years of age) (Nov. 15)
 - 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 CIRN SOS Central Lab, CCFV

Case: Adult patients with positive test for influenza whose admission is attributable to influenza or a complication of influenza

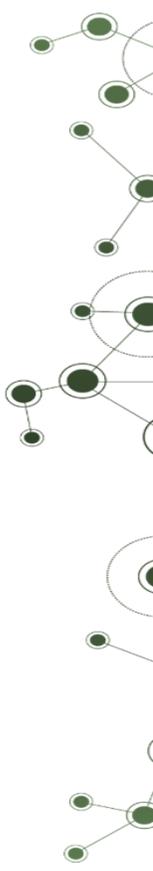
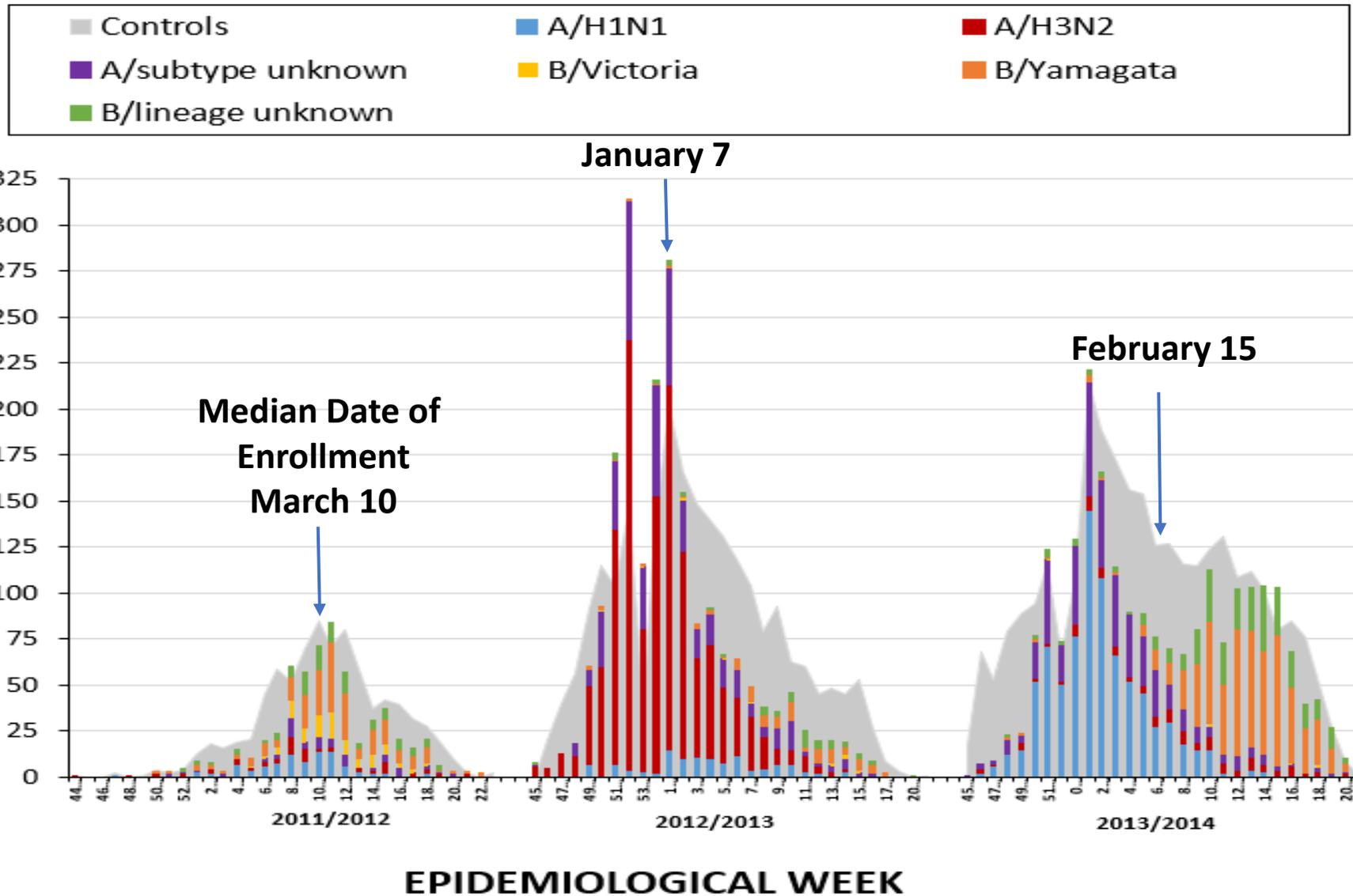
Test-Negative Control: Consenting adult patients with diagnosis compatible with influenza who test negative, matched to cases on site, admission date (within 14d), and age ($\geq 65y$ or $< 65y$)

Methods

- Early/Late Season = Patients enrolled before/after the median enrolment date within each influenza season
- VE was estimated as (1 minus odds ratio of influenza in vaccinated versus unvaccinated patients) x 100% using conditional logistic regression. VE reported with corresponding 95% confidence intervals (CIs).
- VE estimates were adjusted for variables significantly related to influenza outcome in univariate models (eg. prior medical comorbidities, antiviral use prior to admission, age, frailty).

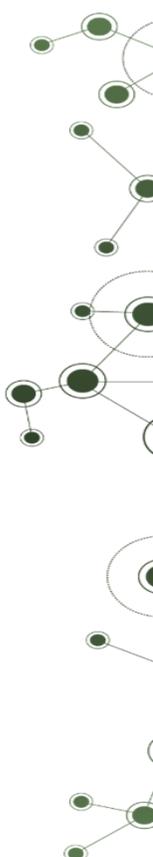


Results - Epi Curves- 2011/13 to 2013/4

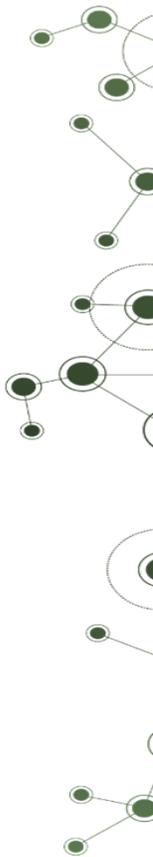
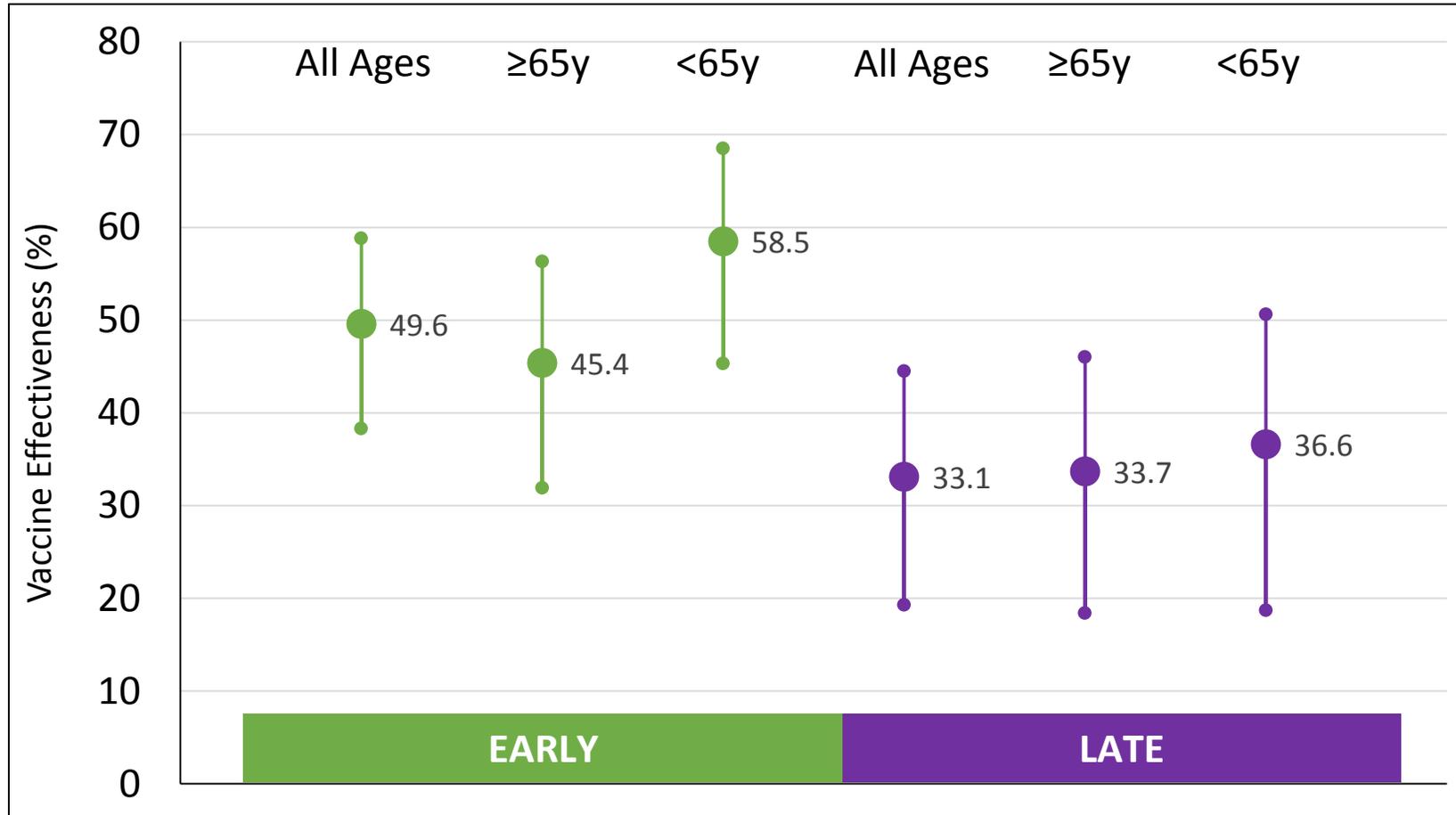


Results- Demographic and clinical characteristics of cases and controls (10/11-13/14)

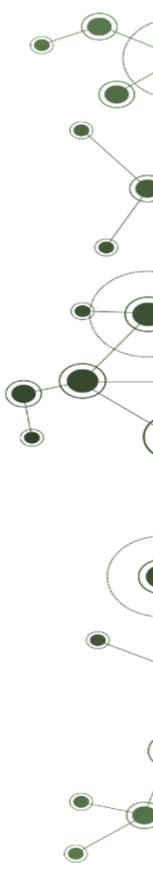
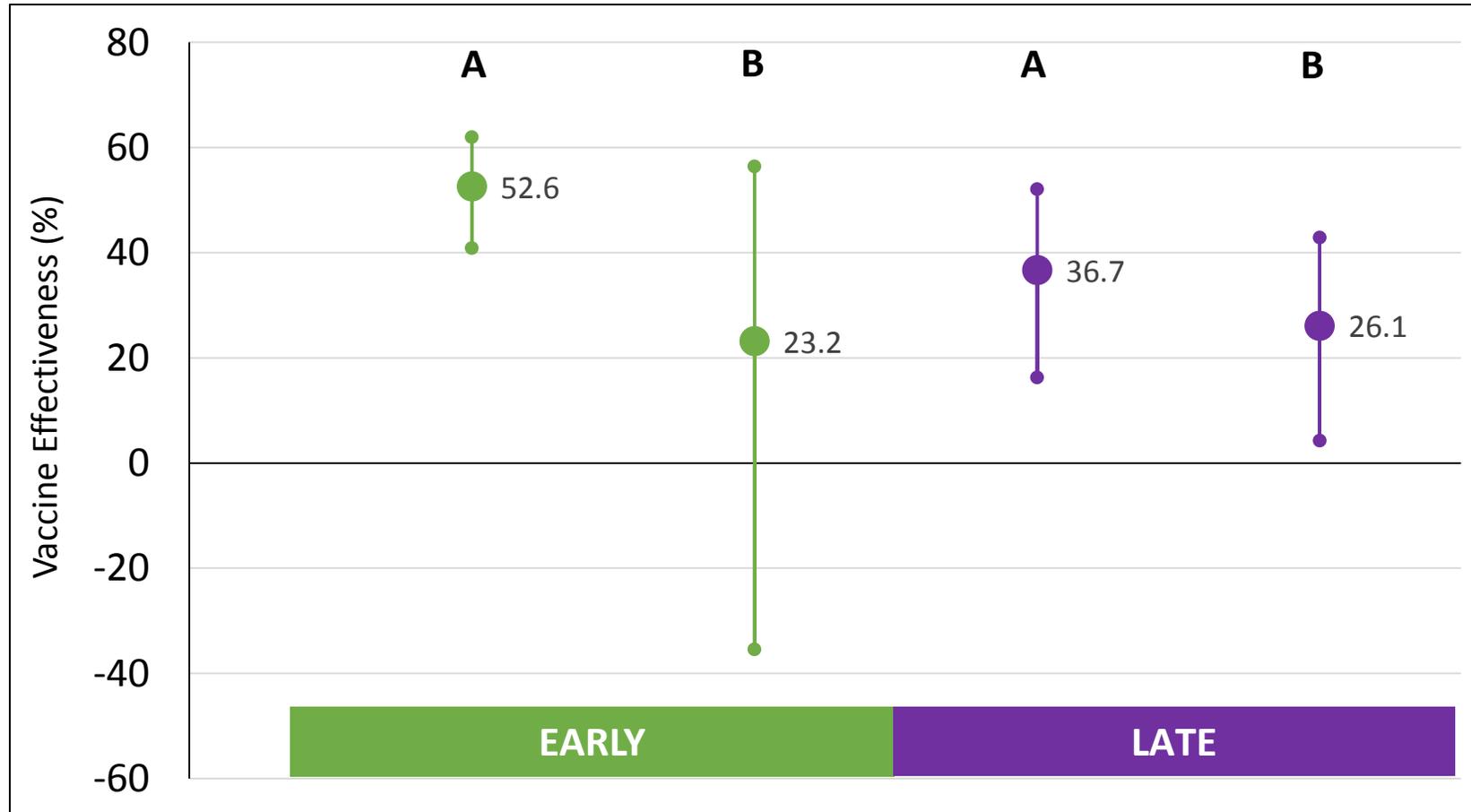
Characteristics	Cases (n=3394) n (%)	Controls (n=4560) n (%)	p value
Age mean (range)	67.6 (16-105)	68.8 (16-104)	0.193
16-49y	611 (18.0)	626 (13.7)	
50-64y	705 (20.8)	995 (21.8)	
65-75y	674 (19.9)	1063 (23.3)	
>75 y	1404 (41.4)	1876 (41.1)	
Female	1805 (53.2)	2436 (53.4)	0.94
≥1 comorbidities	3025 (89.1)	4234 (92.9)	0.00
Pregnant	87 (2.6)	13 (0.3)	0.00
Smoker	1669 (49.2)	2702 (59.3)	0.00
Antiviral use PTA	33 (1.0)	32 (0.7)	0.33
Current season vaccine	1585 (46.7)	2806 (61.5)	0.00
Prior season vaccine	1588/2957 (53.7)	2360/3758 (62.8)	0.00



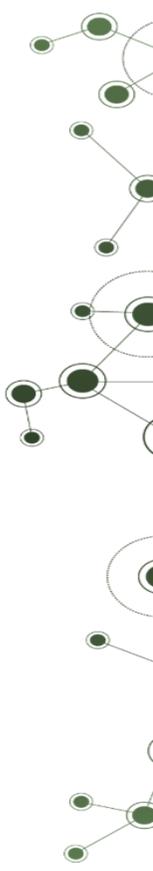
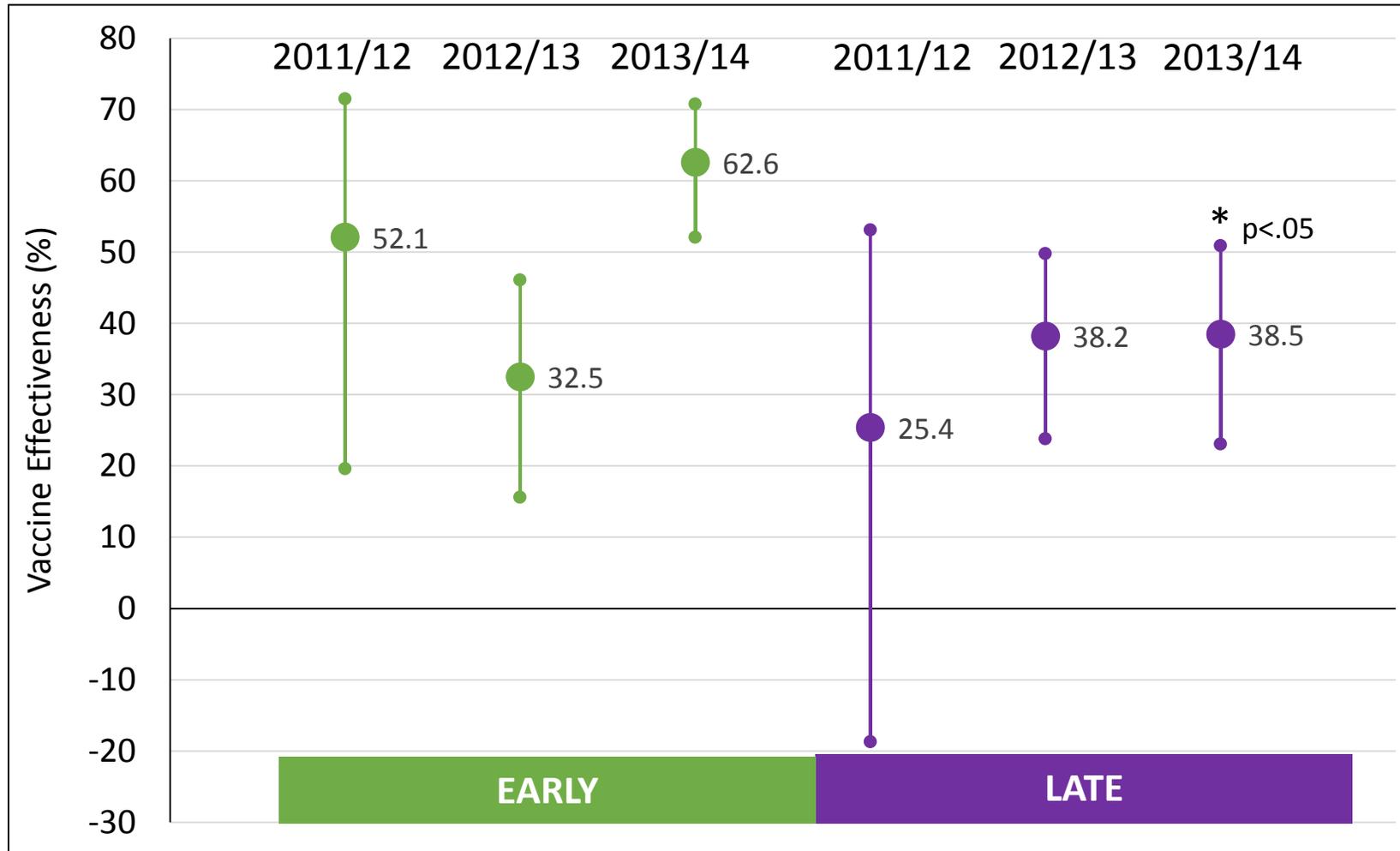
Results- Early vs Late VE Overall and by Age (11/12- 13/14)



Results- Early vs Late VE by Influenza Type (11/12- 13/14)



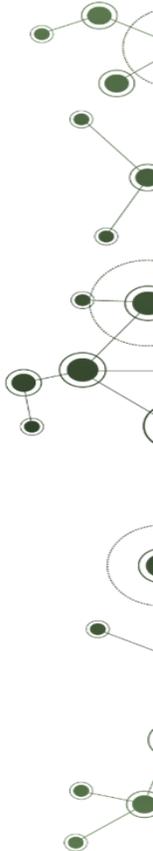
Results — Early vs. Late VE by Season



Discussion

- Overall, consistent trends of waning VE were observed against influenza hospitalizations in the latter half of influenza seasons in Canada, but a statistically significant reduction in VE was observed only in 13/14, a season characterized by late circulation of influenza B(Yamagata) for which overall VE was low (29%)
- To better understand the significance of these trends modelling days since influenza vaccination as a predictor in multivariable logistic regression model¹ underway
- Given the many factors that could contribute to reduced VE over the course of the season, it will be difficult to quantify the impact of intra-season waning, if any

¹Ferdinands JM, Fry AM, Reynolds S, Petrie JG, Flannery B, Jackson ML, Belongia EA. Intraseason waning of influenza vaccine protection: evidence from the US Influenza Vaccine Effectiveness Network, 2011–2012 through 2014–2015. *Clinical Infectious Diseases*. 2017 Mar 1;64(5):544-50.



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Questions?

