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LETTERS TO THE EDITOR

Moderate influenza vaccine effectiveness in a B mismatch season: Preliminary results from the 2017/2018 season in Portugal

Background and objectives

Vaccination has become one of the main public health measure for influenza control, its role in reducing the risk of developing the disease and post-infection complications[1] is widely recognised. Influenza vaccination is recommended for the elderly, for individuals with chronic conditions, the pregnant and health professionals. Due to the continuous changes of the influenza virus, the seasonal flu vaccine composition is reformulated annually, to match viruses that are expected to circulate in that season. Early in the season influenza vaccine effectiveness (IVE) estimate is an important indicator of the need for further public health measures, it is critical when the IVE is low.

This study aimed to provide early 2017/2018 seasonal IVE using data from the Portuguese influenza surveillance system.

Methods

This analysis included patients with influenza-like illness (ILI) from primary care and emergency departments swabbed for the detection of influenza using RT-PCR and reported to the National Influenza Surveillance System (NISS)[2] between weeks 38/2017 to 5/2018. We used the test-negative case–control study design,[3] where influenza laboratory confirmed incident ILI patients (Cases) were compared to laboratory influenza negative ILI patients (Controls). A medical doctor collected demographic and clinical data, ILI signs and symptoms, onset and swab collection dates and vaccination status during the consultation or through the clinical record. An ILI patient was considered vaccinated if the 2017/2018 influenza vaccine uptake occurred 14 days before symptom onset. IVE analysis was restricted to ILI patients with symptoms compatible with the European Union ILI definition,[4] i.e., with sudden onset of at least one systemic and one respiratory symptom. Chi-square test was used to compare baseline characteristics between Cases and Controls. Crude IVE, design adjusted for calendar time, was estimated using 1-odds ratio (OR) of being vaccinated in Cases vs. Controls and was further adjusted for confounding by age group and presence of chronic condition.

Results

A total of 732 ILI patients were reported to the NISS and approximately 74% adhered to the ILI definition (Table 1).

Statistical significant differences were verified in the age group distribution between Cases and Controls (Table 1). Cases presented a lower proportion of at least one chronic condition and vaccine coverage.

Using data updated up to week 5 (Table 2), adjusted IVE was estimated in 59.6% (95%CI: 22.1–78.4%). Considering the weekly IVE monitoring, results observed at the end of the period were very similar to the ones obtained at the beginning of the epidemic period (week 2) (even though with low precision). This result highlights the potential of having very early indicative estimates using surveillance data.

Discussion

The 2017/2018 season in Portugal has been characterised by A(H1)pdm09, AH3 and B viruses co-circulation, with predominance of B/Yamagata lineage. Considering the composition of the seasonal trivalent vaccine, which contains B/Victoria component, this constitutes a lineage mismatch which potential affects IVE.

However, our results indicate that the 2017/2018 seasonal vaccine conferred moderate protection against medically attended influenza. Given that the majority of cases were positive for B/Yamagata (61%), this could reflect some cross-lineage protection. Similar results were already reported in Canada, where IVE against B cases was estimated in 55% (95% CI: 38–68%), also in a context of B/Yamagata virus dominance.[5] The results obtained this season are also in line with meta-analysis of IVE by virus subtype.[6]

Our results were estimated using surveillance data, not collected from IVE estimates, with missing information on some relevant factors. For this reason, from the initial sample of ILI patients, 74% were included in the analysis. In addition, this limited the number of variables that could be included in the model as confounders, particularly in earlier weeks due to low sample size. Nevertheless, and besides this limitation, when comparing week 2 with week 5 estimates (which were adjusted for more variables), IVE point estimates remained stable.

Table 1 Description of notified ILI patients and comparison of Cases and Controls according to sex, age group, presence of chronic condition with indication to vaccine uptake, setting, influenza vaccine uptake and ILI clinical definition.

	ILI patients		Controls		Cases		*p*-Value*
	n	%	*n*	%	*n*	%	
Sex							0.986
Female	402	55.2	132	56.2	135	56.3	
Male	326	44.8	103	43.8	105	43.8	
Total	728		235		240		
Age group							0.001
<18	115	16.1	24	10.4	52	22.3	
18–44	256	35.9	85	36.8	84	36.1	
45–64	213	29.9	71	30.7	69	29.6	
65+	129	18.1	51	22.1	28	12.0	
Total	713		231		233		
Chronic illness							0.027
No	487	66.5	148	62.7	174	72.2	
Yes	245	33.5	88	37.3	67	27.8	
Total	732		236		241		
Setting							0.252
Primary care[a]	299	40.9	125	52.9	115	47.7	
Emergency rooms[b]	433	59.2	111	47.0	126	52.3	
Total	732		236		241		
Influenza vacination							
No	548	84.6	158	74.5	200	90.9	<0.001
Yes	100	15.4	54	25.5	22	9.9	
Total	648		212		222		
ILI EU definition							
No	188	25.7					
Yes	544	74.3					
Total	732						

[a] Includes general practitioners from the Rede Médicos Sentinela.
[b] Includes emergency rooms from hospitals and obstetrician wards.
* *p*-Value of chi-square test for comparison of Cases vs. Controls.

Table 2 Crude and adjusted IVE against medically attended influenza, week 1 to week 5.

	Virus subtype or lineage	% (*n*)	EV crude[a] (%) (95%CI)	EV adjusted[b] (%) (95%CI)
Week 1	A(H1)pdm09	12.6 (13)		
	A(H3)	2.9 (3)	66.3%	57.4%
	B/Vic	13.6 (14)	25.2% to	-5.2% to
	B/Yam	41.8 (43)	84.8%	82.7%
	B lineage not ascribed	29.1 (30)		
Week 2	A(H1)pdm09	13.8 (20)		
	A(H3)	4.8 (7)	69.0%	61.7%
	B/Vic	12.4 (18)	37.7% to	13.9% to
	B/Yam	49.0 (71)	84.6%	82.9%.
	B lineage not ascribed	20.0 (29)		
Week 3	A(H1)pdm09	13.2 (22)		
	A(H3)	4.2 (7)	59.1%	48.1%
	B/Vic	13.2 (22)	23.5% to	-7.0% to
	B/Yam	57.5 (96)	78.1%	74.9%.
	B lineage not ascribed	12.0 (20)		

Table 2 (*Continued*)

	Virus subtype or lineage	% (*n*)	EV crude[a] (%) (95%CI)	EV adjusted[b] (%) (95%CI)
Week 4	A(H1)pdm09	15.3 (33)	64.9% to 80.2%	56.7% to 77.4%
	A(H3)	5.1 (11)		
	B/Vic	11.6 (25)		
	B/Yam	56.5 (122)		
	B lineage not ascribed	11.6 (25)		
Week 5	A(H1)pdm09	15.8 (38)	68.6% to 81.7%	59.6%[c]
	A(H3)	6.6 (16)		22.1% to 78.4%
	B/Vic	10.8 (26)		
	B/Yam	61.0 (147)		
	B	5.8 (14)		

[a] Adjusted for calendar time.
[b] Adjusted for calendar time, age group (0–64; 65 and more years) and presence of at least one chronic condition with indication for the vaccine uptake (chronic respiratory, cardiovascular, renal or kidney condition; diabetes; immunocompromising condition).
[c] Adjusted for calendar time modelled by restricted cubic spline with 3 knots, age group (<18, 18–44, 45–64, 65 and more years), setting and presence of at least one chronic condition with indication for the vaccine uptake.

Conclusions

In a season with B/Yamagata dominance and with vaccine lineage mismatch, the 2017/2018 trivalent seasonal influenza vaccine conferred moderate protection against medically attended influenza.

The use of surveillance data constituted a useful tool to have early in the season IVE estimates.[7] These results assist modifications to health interventions, such as using antiviral treatment in high-risk patients, reinforcement of social eviction and individual hygiene measures to reduce risk of influenza transmission, regardless of the vaccination status.

Conflicts of interest

The authors have no conflict to declare.

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