Estimates of influenza vaccine coverage from Victorian surveillance systems based in the community, primary care and hospitals

Benjamin Coghlan, Heath A Kelly, Sandra J Carlson, Kristina A Grant, Karin Leder, Craig B Dalton, Allen C Cheng

Introduction

Victoria has a number of complimentary surveillance systems for influenza. Flutracking,[1] an online national community influenza-like illness (ILI) surveillance system, includes Victorian participants; the Victorian Sentinel Practice Influenza Network (VicSPIN)[2] records patients attending general practice clinics throughout the state; and 4 large Victorian hospitals contribute to an Australia-wide adult hospital-based sentinel surveillance system, the Influenza Complications Alert Network (FluCAN).[3] Although these systems primarily collect data on influenza cases to inform public health action, they also collect influenza vaccine status in non-cases, which allows estimation of vaccine coverage and effectiveness.

Comparing data between systems, however, is not straightforward given differences in patient recruitment, processes to determine vaccine status, and means of distinguishing cases and non-cases (controls). Use of a valid control population is one element central for valid estimates of vaccination coverage since controls should ideally represent the broader population at risk. We recently found that vaccine coverage among elderly test-negative controls in primary care and hospitalised patients was similar over 2010 to 2014. However, this does not preclude the possibility of a selection bias in both systems due to the propensity to seek medical care (unpublished data). In this current study, we examined estimates of vaccine coverage in elderly Victorian control patients across all 3 of these influenza surveillance systems, community, primary care and hospitals, to assess whether together they might offer a simple means of estimating vaccine coverage in the broader elderly population at risk. This could be a useful ancillary function of these surveillance systems given that there is presently no routine means of measuring influenza vaccination coverage among groups that are eligible for publicly funded vaccine in Victoria or Australia.

Methods

We compared the proportion of non-cases/control participants aged 65 years or over who had received the influenza vaccine during the influenza season. In Flutracking, vaccine coverage was estimated as the proportion of all Victorian participants aged 65 years or over who reported being vaccinated but did not report an ILI by the end of the influenza season defined as a period of 24 to 26 weeks, typically between April and October in each year. Participants needed to have responded to at least 1 weekly online survey. In VicSPIN, vaccination coverage was estimated as the proportion of all elderly patients with an ILI recruited from a Victorian sentinel general practitioner (GP) site during the influenza season, who were vaccinated according to GP records and who were test-negative for influenza on nucleic acid testing. In FluCAN, vaccination coverage was estimated as the proportion of all elderly patients admitted with an acute respiratory infection to a Victorian sentinel hospital site who reported being vaccinated and were test-negative for influenza on nucleic acid testing.

The Hunter New England Human Research Ethics Committee approved Flutracking surveillance. The FluCAN study was approved by Human Research Ethics Committees of all participating hospitals and from the Australian National University. The *Victorian Public Health and Wellbeing Act 2008* and Public Health and Wellbeing Regulations 2009 provide the legislative authority to collect VicSPIN data.

Results

In Victoria over the 2010 to 2014 seasons, vaccination coverage was similar across all 3 surveillance systems for people aged 65 years or over although the number of participants was small in some years (Table). Flutracking had more participating controls aged 65 years or over than attended VicSPIN GP clinics in all years and more than FluCAN in 3 of the 5 years. Vaccine ascertainment was complete for Flutracking as compared with FluCAN where around 30% of control patients admitted to hospitals did not report vaccination status (unpublished data).

The consistency of these estimates provides reassurance that all systems are likely to be making

Table: Influenza vaccine coverage among Victorian participants aged ≥65 years without influenza from three surveillance systems, 2010 to 2014

Influenza season	Proportion of controls vaccinated by surveillance system					
	Flutracking – online community*		VicSPIN – primary care†		FluCAN – hospitals†	
	(95% CI)	n	(95% CI)	n	(95% CI)	n
2010	90.2 (76.9–97.3)	41	76.9 (46.2–95.0)	13	78.8 (67.0–87.9)	66
2011	77.9 (66.2–87.1)	68	68.4 (43.4–87.4)	19	81.7 (69.6–90.5)	60
2012	80.5 (72.0–87.4)	113	84.4 (67.2–94.7)	32	76.2 (69.0–82.4)	168
2013	83.7 (76.7–89.3)	147	80.8 (60.6–93.4)	26	81.5 (68.6–90.7)	54
2014	79.8 (73.1–85.4)	178	82.8 (64.2–94.2)	29	80.7 (72.3–87.5)	114
2010–14	81.5 (78.0–84.7)	547	79.8 (71.5–86.6)	119	79.0 (75.0–82.6)	462

* No report of ILI (cough + fever) by end of influenza season.

† Tested negative for influenza by nucleic acid detection using polymerase chain reaction.

unbiased estimates of vaccine coverage in this key target group in whom vaccine is publicly funded. Flutracking participants, however, are known to have different education levels from the general population[4] and information on confounders, other than age and sex, is not collected. Unlike VicSPIN and FluCAN then, estimates of vaccine coverage (and vaccine effectiveness) from Flutracking cannot be adjusted for important factors, including medical illnesses, pregnancy and Indigenous status that also define eligibility for free vaccination in Australia (and the likelihood of severe influenza). Flutracking does ask about Indigenous status, but there are currently few Indigenous participants. In addition, the low specificity of the syndromic case definition of ILI used by Flutracking as opposed to the high specificity of nucleic acid tests[5] has been shown to bias estimates of vaccine effectiveness downwards, particularly if the attack rate of influenza ILI decreases relative to that of non-ILI.[6–9]

Documenting vaccine coverage is important to determine if the program is reaching those targeted for influenza vaccination. Although a whole-of-life vaccine registry has recently been announced, implementation is likely to take several years and the reliability of such a registry for an annually administered vaccine is uncertain.[10] The Australian Institute of Health and Welfare periodically conducts large nationally representative computer assisted telephone surveys of influenza vaccination coverage among adults.[11] However, the last study was in 2009 and findings are typically unavailable until years after data collection, reducing the utility of these data for public health action.

These 3 surveillance systems could together provide more timely estimates of vaccine coverage for high-risk adult groups. The continual expansion of Flutracking, however, could alter the makeup of participants, diverging vaccine coverage estimates from these systems would raise questions about their accuracy (although inaccurate estimates might still be useful to detect changes in vaccine coverage if a surveillance system is consistently under or overestimating vaccine coverage). Estimates for some groups eligible for free vaccine, such as pregnant women and Indigenous Australians, are likely to remain limited as only small numbers are currently recorded by these 3 systems. Specific efforts to recruit particular sub-populations may be necessary.

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Contribution of authors

BC designed the study and, with AC, performed the analysis and drafted the manuscript. KG provided VicSPIN data and SC provided Flutracking data. All authors provided input into the analysis and interpretation of results.

Author details

Dr Benjamin Coghlan[1,2]
Professor Heath A Kelly[3]
Ms Sandra J Carlson[4]
Ms Kristina A Grant[5]
Professor Karin Leder[6]
Dr Craig B Dalton[4,7]
Professor Allen C Cheng[1,8]

1. Department of Epidemiology and Preventive Medicine, Monash University, Melbourne, Victoria
2. Centre for International Health, Melbourne, Victoria
3. College of Medicine, Biology and Environment, Australian National University, Canberra, Australian Capital Territory
4. Hunter New England Population Health, Newcastle, New South Wales
5. Victorian Infectious Diseases Reference Laboratory, Melbourne, Victoria
6. Department of Medicine, Monash University, Melbourne, Victoria
7. School of Medicine and Public Health, University of Newcastle, Newcastle, New South Wales
8. Infection Prevention and Healthcare Epidemiology Unit, The Alfred Hospital, Melbourne, Victoria

Corresponding author: Dr Ben Coghlan, Burnet Institute, 85 Commercial Road, MELBOURNE VIC 3004. Telephone: +61 0416 339 952. Facsimile: +61 3 9282 2144. Email: coghlan@burnet.edu.au

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