Flutracking weekly online community survey of influenza-like illness annual report, 2010

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Abstract

Flutracking is a national weekly online survey of influenza-like illness (ILI) completed by community members. Flutracking integrates participants' ILI symptom information with their influenza vaccination status to monitor influenza activity and field vaccine effectiveness (FVE). This report summarises results from the 2010 Flutracking season compared with previous seasons. Nationally, participation in Flutracking has more than doubled between 2008 and 2010, with 5,346 new participants enrolled or recruited in 2010 and a peak weekly participation of 10,773. By the end of the 2010 season, 5,904 of 9,109 (64.8%) participants had received the monovalent pandemic vaccine and/or the 2010 seasonal vaccine. From 2007 to 2010 FVE calculations demonstrated that the seasonal vaccine was effective except in 2009 during the pandemic. Peak 2010 ILI activity occurred in early June and August, and peak weekly 2010 ILI rates (4.2% among unvaccinated participants) were lower than the peak ILI rates during the 2009 pandemic (6.0% among unvaccinated participants). However, the decrease in laboratory notifications was much larger than the decrease in Flutracking rates. In summary, the number of Flutracking participants continued to steadily increase over the 2010 influenza season. The system has shown value in providing weekly vaccination uptake data during and beyond the 2009 influenza pandemic, as well as rapid FVE estimates that are qualitatively aligned with findings from other analyses of vaccine efficacy. Flutracking has also provided estimates of weekly community ILI activity that were not biased by health seeking behaviour and clinician testing practices. *Commun Dis Intell* 2011;35(4):288–293.

Keywords: influenza, surveillance, syndromic surveillance, influenza-like illness, survey, Flutracking.

Background

Influenza activity in the Australian community is monitored by the Australian Government Department of Health and Ageing using a variety of surveillance systems.[1] Flutracking is a national weekly online survey of influenza-like illness (ILI) completed by community members.[2–5] Flutracking was originally trialled in 2006 in the Hunter New England regional health service of New South Wales with a view to contributing broader population information on ILI. Flutracking was progressively expanded nationally in 2007, and by 2010 approximately 9,000 community members participated each week.

The main aims of Flutracking are to:

1. compare ILI syndrome rates between vaccinated and unvaccinated participants to detect inter-pandemic and pandemic influenza and provide early confirmation of vaccine effectiveness or failure;
2. provide consistent surveillance of influenza activity across all jurisdictions and over time unbiased by health seeking behaviour or patient testing practices;
3. provide a year-to-year comparison of the timing, incidence, and severity of influenza; and
4. from 2011, construct a burden of illness pyramid for influenza.

Flutracking integrates participants' ILI symptom information with their influenza vaccination status to detect influenza activity and monitor vaccine efficacy. Surveys take less than 15 seconds to complete and it is the only ILI surveillance system that provides comparable data across Australia's states and territories. Flutracking surveillance has correlated well with other Australian influenza surveillance systems in describing the timing and scale of the 2007 and 2008 seasonal influenza epidemics.[3,4] During the 2009 influenza pandemic, Flutracking was able to accurately detect the timing and peak of community ILI with less influence from treatment seeking behaviour and laboratory testing protocols than health-system based surveillance.[5]

This article will report on the 2010 findings from the Flutracking ILI surveillance system, including participation numbers compared with previous years, participant vaccination uptake for both the H1N1 pandemic (H1N1) 2009 monovalent and seasonal trivalent influenza vaccines, field vaccine effectiveness (FVE) estimates, weekly estimates of ILI and comparison of these estimates with other Australian influenza surveillance systems.

Methods

Survey methodology

In a typical influenza season, Flutracking operates from May to October. However, due to the 2009 influenza pandemic, the Flutracking surveillance system remained operational from May 2009 through to October 2010 in case of a second pandemic wave. All participants received an email advising that they could opt out between November 2009 and April 2010 and rejoin in winter of 2010.

Recruitment methodology

The methodology for recruitment in 2010 was similar to that used in 2007–09.[2] From 2008 recruitment expanded to allow a household member to respond to the survey on behalf of other members of their household of any age, and for children 12 years of age and above to complete their own survey online. However, in 2010 more focus was placed on recruitment of state-based government organisations rather than national organisations. Organisations in Western Australia, South Australia, the Northern Territory and the Australian Capital Territory were targeted in 2010, with a view to expanding Flutracking to be a truly national surveillance system to improve its representativeness and allow ILI rate comparison across states and territories. In 2010, 156 organisations were contacted and requested to participate in Flutracking.

The methodology for weekly data collection in 2010 was similar to that used in 2007–09.[5] However, in October 2009 an additional question was included in the online questionnaire asking whether the participant had been vaccinated with the pandemic (H1N1) 2009 monovalent vaccine to coincide with the roll-out of the national Pandemic (H1N1) 2009 Vaccination Program.

Participation and vaccination rate

Participation numbers were reported for the 2010 peak week in Flutracking (the week with the highest number of participants) at the national and state or territory level and compared with 2008 participation numbers. The rate of participation (per 100,000) in the Australian population was calculated using 2010 Flutracking participation numbers in the peak week of participation and the June 2010 Estimated Resident Population for each state and territory from the Australian Bureau of Statistics.[6]

Vaccination rates were calculated for the monovalent pandemic vaccine on a weekly basis at both the national and state or territory level from the time the vaccine was made available in October 2009. The denominator was the number of persons who completed at least one survey since the release of the H1N1 pandemic vaccine. The numerator was the number of participants who had received the monovalent pandemic vaccine since it became available. Once the 2010 trivalent seasonal vaccine, which included the pandemic (H1N1) 2009 strain, became available in April 2010, a combined vaccination rate for the seasonal and monovalent pandemic vaccine was reported at the national level on a weekly basis.

Field vaccine effectiveness

An FVE analysis was conducted for 2010 using New South Wales data, which has the highest concentration of participants in Flutracking, and compared with results from 2007, 2008 and 2009. As 2007 data did not include persons under the age of 18 years, FVE analyses for all years of data were restricted to participants 18 years of age or older. FVE was calculated as follows:

FVE = 100 x (1 – relative risk)
= 100 x (1 – (ILI rate in vaccinated group/ILI rate in unvaccinated group))

The ILI rate was calculated as the proportion of participants who had both fever and cough during the peak influenza period for each year. The peak influenza period was defined as the four consecutive weeks with the highest weekly Flutracking ILI rates. In 2007, this period included the Flutracking survey week ending 29 July to survey week ending 19 August, in 2008 this period included the Flutracking survey week ending 17 August to survey week ending 7 September, in 2009 this period included the Flutracking survey week ending 5 July to survey week ending 26 July, and in 2010 this period included the Flutracking survey week ending 15 August to survey week ending 5 September.

The denominators for the ILI rates over each of these peak periods was defined as the number of participants who had completed at least one survey during the peak influenza period in the unvaccinated and vaccinated groups. The numerators for the ILI rates for the peak influenza periods was defined as the number of participants who experienced at least one episode of fever and cough during the peak influenza period in the unvaccinated and vaccinated groups. A participant was defined as being vaccinated if they responded 'yes' to the survey question about influenza vaccination at the beginning of the peak influenza period. Participants who changed their vaccination status during the peak influenza period were excluded

from the VE analysis. The 95% confidence intervals for each VE estimate were calculated using method B, outlined in Ewell (1996).[7]

Weekly influenza-like illness attack rates and comparison with national laboratory influenza notifications

An analysis of the difference in ILI attack rates amongst vaccinated and unvaccinated participants was conducted at both the national level and state or territory level for states and territories with greater than 1,000 participants. Vaccination was defined as having received either the monovalent pandemic vaccine since it was made available or the seasonal vaccine in 2010. ILI rates were reported using a definition of fever and cough in the preceding week. The unstratified (by vaccination status) ILI rates were compared with laboratory confirmed influenza notifications from the National Notifiable Diseases Surveillance System[8] for 2009 to 2010.

Results

Participation in 2010

Flutracking has achieved a marked increase in the number of participants between 2008 and 2010 (Table 1). Nationally, participation has more than doubled. At a state or territory level, increases have been most marked in the Northern Territory, South Australia, and Queensland. Tasmania has the highest rate of Flutracking participation per 100,000 persons, followed by South Australia and the Northern Territory.

Table 2 shows the number of participants who joined the Flutracking survey in 2010, as compared with 2009. Most participants registering for the first time in 2010 did so in May and June, most likely as a direct result of targeted recruitment strategies.

Overall, compared with 2009, there was an 18.5% increase in the number of participants who registered to participate in Flutracking for the first time in 2010. Of the 12,603 participants who completed at least one survey in 2010, 58% have participated for more than one season.

Comparing the average number of weekly participants before and after the 2009/2010 summer opt-out option was introduced, 81% (5,541/6,850) of participants remained active over summer.

Vaccination rates

By the end of 2009 (data for the week ending 13 December 2009), 2,121 participants (or 27.9% of those who responded to at least one survey since the 2009 H1N1 pandemic) had received the monovalent pandemic vaccine. Of the 1,975 Flutrackers who worked face-to-face with patients, 799 (40.5%) had received this vaccine. Figure 1 shows that by

Figure 1: Per cent of participants vaccinated for pandemic (H1N1) 2009, February to April 2010, by state and survey week

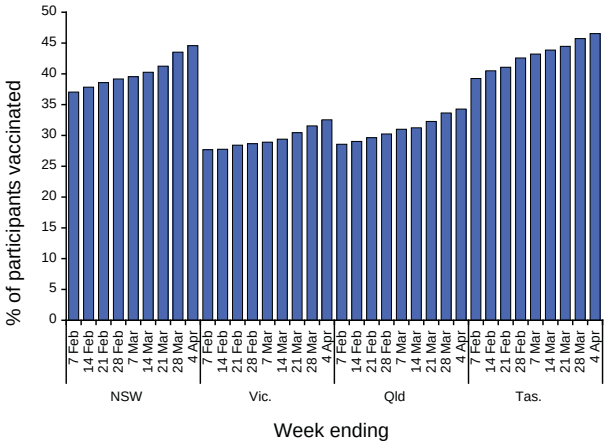


Table 1: Recruitment to Flutracking, 2008 to 2010, by state or territory

State or territory	Number of respondents (peak week) 2008	Number of respondents (peak week) 2010	Percentage positive change	Population (from June 2010 ERP,* ABS†)	Rate of Flutracking participation per 100,000 population
ACT	159	229	44.0	358,571	63.9
NSW	2,689	3,216	19.6	7,232,589	44.5
NT	2	329	16,350.0	229,711	143.2
Qld	158	1,077	581.6	4,513,850	23.9
SA	52	2,694	5,080.8	1,644,582	163.8
Tas	1,235	1,296	4.9	507,643	255.3
Vic	404	1,495	270.0	5,545,932	27.0
WA	128	437	241.4	2,293,510	19.1
Total	4,827	10,773	123.2	22,328,847	48.2

* Estimated Resident Population

† Australian Bureau of Statistics

Table 2: Number of participants who registered for themselves (primary respondents) and other household members to participate in Flutracking for the first time in 2009 and 2010

Month of registration	Total joined in 2009	Primary respondents joined in 2010	Household members of primary respondents joined in 2010	Total joined in 2010	% change in registration by month from 2009 to 2010
Jan	2	14	18	32	1,500.0
Feb	412	17	19	36	–91.3
Mar	39	200	94	294	653.8
Apr	611	93	68	161	–73.6
May	2,710	2,224	680	2,904	7.2
Jun	428	741	400	1141	166.6
Jul	123	62	59	121	–1.6
Aug	70	526	123	649	827.1
Sep	52	10	5	15	–71.2
Oct	32	3	8	11	–65.6
Nov	21	0	0	0	–100.0
Dec	26	0	0	0	–100.0
Total	4,526	3,890	1,474	5,364	18.5

April 2010 (soon after the 2010 seasonal influenza vaccine was made available) Flutracking participants from New South Wales and Tasmania had the highest vaccination rates against pandemic (H1N1) 2009 for those states with sufficient Flutracking participants to allow a stable analysis.

By the end of the 2010 season (week ending 17 October 2010), 5,904 of 9,109 (64.8%) participants had received the monovalent pandemic vaccine and/or the 2010 seasonal vaccine. Of the 2,059 participants who identified as working face-to-face with patients, 1,596 (77.5%) received one or both of these vaccines.

Field vaccine effectiveness

From 2007 to 2010 our FVE calculation for New South Wales participants demonstrated that the seasonal vaccine was effective except in 2009 during the pandemic (Figure 2).

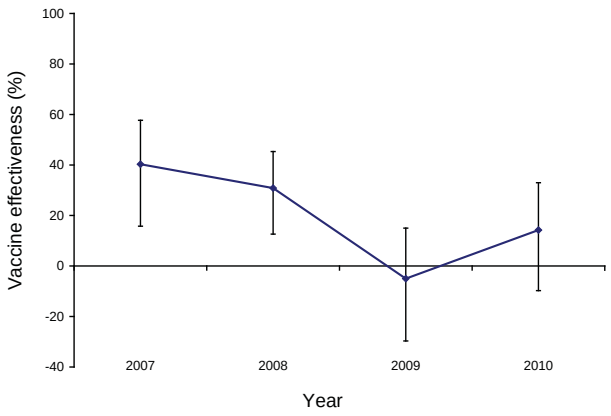
Detection of influenza-like illness

Figure 3 shows the 2010 weekly ILI rates stratified by vaccination status. This figure shows that the divergence between the vaccinated and unvaccinated participant's ILI rates was largest in early June and August, and that peak 2010 ILI rates (4.2% among unvaccinated participants) were much lower than the peak ILI rates during the 2009 pandemic (6.0% among unvaccinated participants).

Comparison with national laboratory influenza notifications

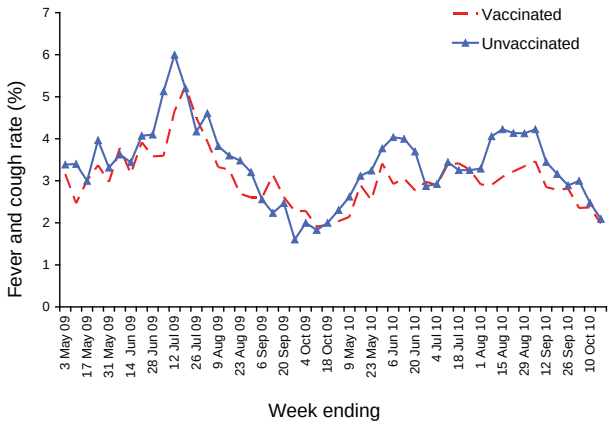
From Figure 4 it can be seen that there was a substantial reduction in weekly notified cases of influenza from 2009 to 2010. Although Flutracking also

Figure 2: Field vaccine effectiveness for peak four weeks in New South Wales in participants greater than or equal to 18 years of age



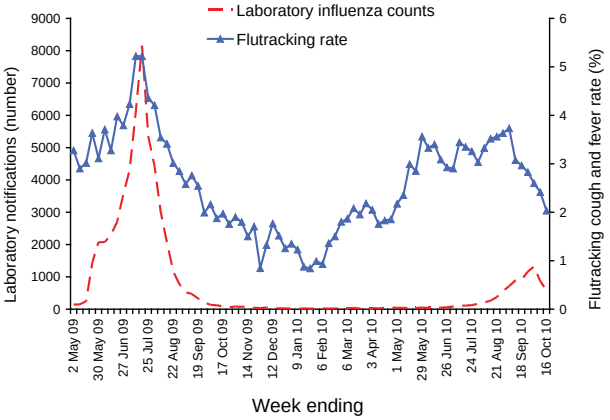
95% confidence intervals are represented by the bars in the figure.

Figure 3: Weekly national fever and cough rates stratified by vaccination status, 2009 to 2010



showed a reduction in ILI attack rates from 2009 to 2010, this decrease was small compared with the decrease seen in laboratory notifications.

Figure 4: Percentage with fever and cough among Flutracking participants compared with influenza laboratory notifications, by week, Australia, 2009 to 2010



Discussion

Participation in the Flutracking survey has continued to grow during 2010 in each state and territory. The rate of recruitment to Flutracking compares favourably with other online influenza surveillance systems globally including Italy, which has grown to 3,454 participants from 2008[9] and Portugal, which has accumulated 2,538 participants since the 2005–06 influenza season.[9] Flutracking has a larger participant cohort than any of the online influenza surveillance systems in Europe[9] or the United States of America[10] apart from the Netherlands with a cohort of 17,952 participants.[9] However, the Dutch participant base has decreased over the last few years while Flutracking has increased. The United Kingdom Flusurvey decreased from 5,500 in 2009–10 to 703 in 2010–11.[9]

The steady growth in participants of Flutracking is most likely due to a combination of organic growth in participants who enrol due to referrals from existing participants, discovering the program on the Internet and enrolment from direct recruitment activities, including media releases and promotion of organisational email invitations.

Flutracking was the only surveillance system providing weekly updates of vaccination uptake when the new monovalent pandemic vaccine was released. The Flutracking surveillance system was able to identity differences in community uptake of pandemic vaccine at the jurisdictional level on a week by week basis.

The FVE calculated for 2010 was much lower than in 2007 and 2008, despite the vaccine composition matching the circulating strains.[11] Flutracking calculates an FVE using a clinical case definition which provides a lower estimate of FVE than a laboratory confirmed case definition and the effectiveness estimate will be even lower in years when influenza activity is low relative to other causes of ILI, which appears to be the case in 2010. Additionally, high rates of asymptomatic infection occurred with the pandemic (H1N1) 2009 influenza virus in 2009, likely leading to high rates of immunity in 2010.[12,13] High levels of naturally acquired immunity to influenza in 2010 combined with low attack rates could further blunt the calculated FVE. At the very least it appears that Flutracking FVE calculations are able to differentiate between a vaccine that is protective versus a vaccine failure/mismatch as occurred in 2009 due to the circulating novel pandemic strain.

The Flutracking FVE estimates have been qualitatively aligned with findings from other analyses of vaccine efficacy, which is reassuring, but being a symptom based case definition it cannot provide the same quantitative estimates that a laboratory confirmed outcome produces. The main benefit of Flutracking's FVE calculations are that they can provide a rapid qualitative indication of FVE, as occurred during the pandemic, if there was a significant vaccine failure.

Based on Flutracking data, the community attack rates in the 2010 influenza season were lower than 2009, and lower than most other Flutracking surveillance years. This suggests that a high rate of community immunity (either through vaccination or natural infection) led to low community ILI rates in 2010.

While there was a large reduction in laboratory notified cases of influenza from 2009 to 2010, a corresponding reduction was not seen in Flutracking data. We believe this indicates that much of the surge in laboratory notifications in 2009 was mediated by clinical and health seeking behaviour rather than community influenza rates. The enhanced laboratory testing of 2009 appears to have reverted back to more routine practice in 2010.

Based on the comparison with other surveillance systems, it appears that Flutracking data is not as biased by health seeking behaviour and clinician testing practices as emergency department and laboratory surveillance for ILI.[5] Flutracking will implement new questions for 2011 that identify the proportion of participants who seek health care and have swabs collected for influenza testing. These data will be important for further assessing health seeking and testing biases and understanding the

burden of influenza illness in Australia. Because influenza testing practices have changed since 2009, further work is required to understand how the year to year variation in laboratory confirmed influenza notifications should be interpreted.

Authors' contributions

Craig Dalton conceived and designed the project, oversaw the statistical analysis, and contributed to writing of the manuscript; Sandra Carlson contributed to the statistical analysis and writing of the manuscript; Michelle Butler contributed to the statistical analysis, John Fejsa; contributed to the design of the project and had primary responsibility for the online software and database development, as well as questionnaire design; Elissa Elvidge contributed to the daily operational running of the system; and David Durrheim contributed to the design of the project, statistical analysis, and writing of the manuscript.

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