Flutracking weekly online community survey of influenza-like illness: 2013 and 2014

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Abstract

Flutracking is a national online community influenza-like illness (ILI) surveillance system that monitors weekly ILI activity and severity. This article reports on the 2013 and 2014 findings from Flutracking. From 2013 to 2014 there was a 14.0% increase in participants who completed at least 1 survey to 21,021 participants. By the end of the 2013 and 2014 seasons, respectively 59.7% and 59.1% of all participants had received the seasonal influenza vaccine. The 2013 Flutracking national ILI weekly incidence peaked in late August at 4.3% in the unvaccinated group, 1 week earlier than national counts of laboratory confirmed influenza. The 2014 Flutracking national ILI weekly incidence also peaked in late August at 4.7% in the unvaccinated group, in the same week as national counts of laboratory confirmed influenza. A lower percentage of Flutracking participants took 2 or more days off from work or normal duties in 2013 (peak level 1.6%) compared with 2014 (peak level 2.5%) and sought health advice in 2013 (peak level of 1.1%) compared with 2014 (peak of 1.6%). Flutracking ILI surveillance suggests that 2014 was a moderately more intense season than 2013 and similar to 2012. *Commun Dis Intell* 2015;39(3):E361–E368.

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

Introduction

There are a number of surveillance methods that contribute to influenza surveillance in Australia each year.[1] Integrating data from each of these systems is vital in creating a timely and accurate picture of influenza activity as each surveillance method has its strengths and limitations.[2] The Flutracking surveillance system makes an important contribution to Australian influenza surveillance by providing weekly community level influenza-like illness (ILI) attack rates that are not biased by health seeking behaviour, clinician testing practices or differences in jurisdictional surveillance methods.[3–6] The Flutracking surveillance system has been incorporated into the weekly Australian Influenza Surveillance Report since 2009.[1]

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; and
3. provide year to year comparison of the timing, incidence, and severity of influenza.

This article reports on 2013 and 2014 Flutracking ILI surveillance. We report on participation numbers compared with previous years, participant vaccination uptake for the seasonal influenza vaccine, field vaccine effectiveness (FVE) estimates, weekly ILI estimates and comparison of these estimates with Australian laboratory influenza notifications, and burden of illness estimates.

Methods

The Flutracking surveillance system was in operation for 26 weeks in 2013, from the week ending 28 April to the week ending 20 October 2013 and for 25 weeks in 2014 from the week ending 4 May to the week ending 19 October 2014. Unless Flutracking participants unsubscribe, the cohort of participants is maintained year to year and is boosted by an annual recruitment drive which usually runs from March to May. The recruitment methods in 2013 were similar to those used in 2007 to 2012 except for some enhanced social media promotions.[3] Recruitment in 2014 was focused on email and social media promotions. Recruitment took place from 23 April to 17 May 2013 and from 10 April to 19 May 2014.

The weekly survey questions have evolved from 2007 to 2012.[3,7] No changes were made to the survey questions for 2013 and 2014.

Participation and vaccination rate

Peak weekly participation numbers using the peak week of national ILI for each year were reported for 2013 and 2014 at the national and state or territory level. The participation rate (per 100,000) was calculated using participant number in the national peak ILI week and June 2014 Estimated Resident Population (ERP) for each state and territory from the Australian Bureau of Statistics.[8] Participation numbers were documented from 2006 to 2014.

The percentage of participants reporting fever, cough, fever and cough, and fever and cough and sore throat in the national peak week of ILI for 2013 and 2014 were compared (peak week determined using the number of participants with fever and cough in the unvaccinated group divided by the total number of participants for that week in the unvaccinated group).

Field vaccine effectiveness

FVE analyses for New South Wales participants 18 years of age or older were conducted for 2013 and 2014 using the same method as previously reported.[9]

The FVE was calculated for the peak influenza period defined as the 4 consecutive weeks for New South Wales participants aged 18 years or over with the highest weekly Flutracking ILI percentages for unvaccinated participants. Table 1 shows peak influenza periods used in yearly vaccine effectiveness calculations.

Weekly influenza-like illness prevalence and comparison with national laboratory influenza notifications

Weekly ILI prevalence is defined as the percentages of participants with both fever and cough. The unstratified (by vaccination status) ILI percentages were compared with national laboratory influenza notifications for 2009 to 2014.

Burden of illness (index of severity)

The weekly percentage of participants from 2011 to 2014 who had 1) fever and cough and two or more days off work or normal duties and 2) who visited a general practitioner, emergency department or stayed as a hospital inpatient due to fever and cough was calculated.

Table 1: Peak 4 week influenza periods used in yearly vaccine effectiveness calculations, New South Wales, 2007 to 2014

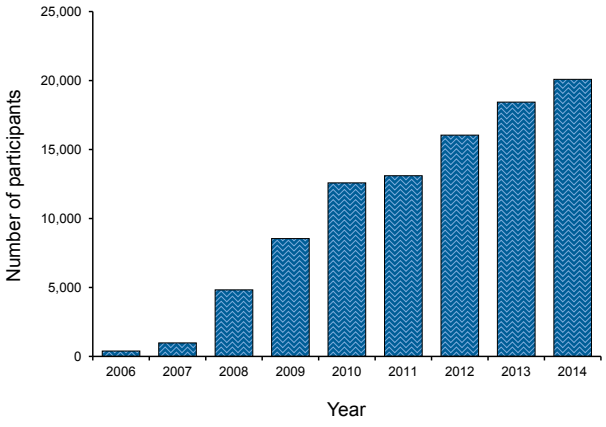
Year	Peak influenza period (week ending) for 18 years or over
2007	29 July – 19 August
2008	17 August – 7 September
2009	5 July – 26 July
2010	15 August – 5 September
2011	22 May – 12 June
2012	27 May – 17 June
2013	18 August – 8 September
2014	10 August – 31 August

Results

Participation and recruitment in 2013 and 2014

Of the 16,831 participants who completed a survey during the first 4 survey weeks of 2013, 43.1% completed all available surveys, and 69.7% of participants completed more than 90% of available surveys. Of the 19,740 participants who completed a survey during the first 4 survey weeks of 2014, 61.1% completed all available surveys, and 79.7% of participants completed more than 90% of available surveys. There were 20,087 participants who completed at least 1 survey in 2014, compared with 18,440 in 2013 (an 8.9% increase) (Figure 1). At the state and territory level, increases in peak week participation were most marked in the Australian Capital Territory, New South Wales and Western Australia. In 2013 and 2014, Tasmania had the highest Flutracking participation rate, followed by the Northern Territory and South Australia (Table 2).

Figure 1: Number of participants who completed at least one survey, Australia, 2006 to 2014, by year



The most successful recruitment strategy in 2013 and 2014 was recruitment through previous participants. On 22 April 2013, a *Welcome Back to Flutracking* email was sent to all active participants with a suggestion that participants invite 3 people to join the survey. On 22, 23 and 24 April, respectively 1,071, 263, and 290 participants enrolled. There were an additional 106 participants recruited on 6 May: this spike corresponds to the date the first Flutracking survey email was sent to participants and a Flutracking media release on 'Man-flu' based on an analysis of severity of ILI symptoms by gender on 7 May (Figure 2).[10]

A total of 529 organisations were invited to participate in Flutracking in 2013. Of these, 206 agreed

Table 2: Recruitment to Flutracking, 2013 and 2014, by state or territory

State or territory	2013		2014		
	Number of respondents (peak week)	Rate of Flutracking participation per 100,000 population	Number of respondents (peak week)	Percentage positive change	Rate of Flutracking participation per 100,000 population
ACT	526	136.3	662	25.9	171.5
NSW	5,163	68.7	6,357	23.1	84.6
NT	669	272.9	801	19.7	326.8
Qld	1,528	32.4	1,726	13.0	36.5
Tas.	1,775	344.8	2,012	13.4	390.8
SA	2,651	157.3	2,840	7.1	168.5
Vic.	2,398	41.0	2,844	18.6	48.7
WA	869	33.8	1,045	20.3	40.6
Total	15,579	66.3	18,287	17.4	77.8

Figure 2: Significant Flutracking recruitment events and impact, 2013

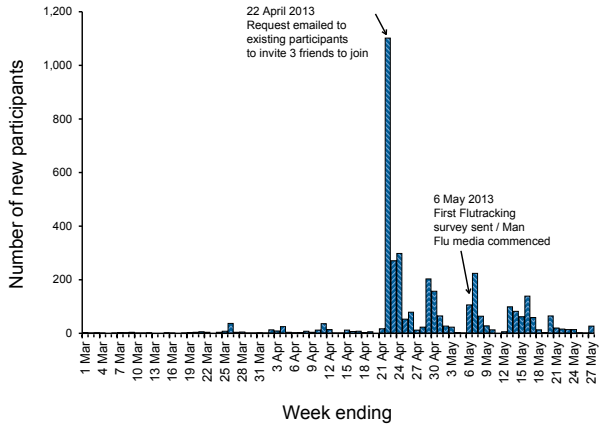
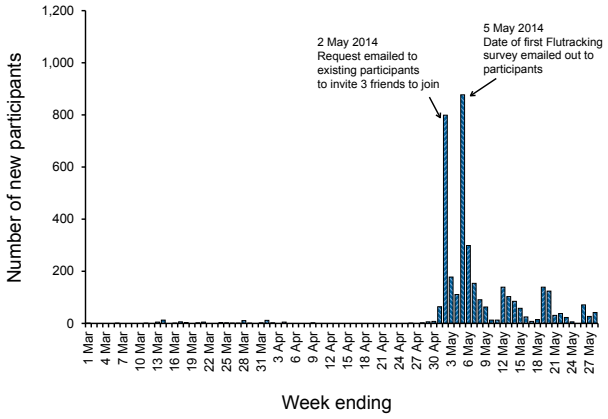


Figure 3: Significant Flutracking recruitment events and impact, 2014



to be emailed additional information regarding employee invitations to the survey, 29 accepted the invitation and agreed to invite their employees and 24 declined.

On 2 May 2014, an email to participants with a request to invite 3 friends (similar to 2013) was sent. On 2, 3, and 4 May, respectively 799, 178, and 111 participants enrolled. There were an additional 877 participants recruited on 5 May 2014: this spike corresponds to the date the first Flutracking survey email was sent to participants (Figure 3).

Facebook advertising and engagement with participants via emailed survey links and the survey website resulted in an increase in page 'likes' from 69 'likes' (4 April 2013) to 992 'likes' (21 May 2013) and an increase from 1,136 'likes' (30 April 2014) to 2,432 'likes' (23 May 2014).

As a result of the above recruitment strategies and media coverage a total of 4,446 participants joined the survey in 2013 (an 11.9% increase from 2012) and 5,085 joined the survey in 2014 (a 14.4% increase from 2013).

Socio-demographic characteristics

Of the participants who completed at least 1 survey and responded to each of the demographic questions, almost two thirds (63% and 61% in 2013 and 2014 respectively) were aged 35–64 years, and almost two-thirds (63% and 61% in 2013 and 2014 respectively) were female. Sixty per cent in 2013 and 59% in 2014 had completed a bachelor degree, graduate diploma/certificate or postgraduate degree, and 1.3% in 2013 and 1.4% in 2014 identified as Aboriginal and/or Torres Strait Islander (Table 3).

Percentage of participants vaccinated

Seasonal vaccination levels were higher in 2013 and 2014 than most prior years. By the end of the 2014 season (week ending October 19, 2014),

Table 3: Socio-demographic characteristics of Flutracking participants, 2012 to 2014

Age (years)	2012		2013		2014	
	Frequency	Per cent	Frequency	Per cent	Frequency	Per cent
0–15	1,854	11.6	2,081	11.3	2,638	12.6
16–34	2,902	18.1	3,258	17.7	3,754	17.9
35–49	4,544	28.3	5,016	27.2	5,405	25.7
50–64	5,623	35.0	6,538	35.5	7,311	34.8
65 or over	1,123	7.0	1,547	8.4	1,909	9.1
Total participants	16,046	100.0	18,440	100.0	21,017	100.0
Gender						
Male	4,882	36.4	6,097	37.0	7,461	38.6
Female	8,516	63.6	10,386	63.0	11,867	61.4
Total reported	13,398	100.0	16,483	100.0	19,328	100.0
Education						
Year 10 or below (or equiv)	918	7.2	1,070	7.3	1,325	7.9
Year 11 (or equivalent)	392	3.1	451	3.1	529	3.1
Year 12 (or equivalent)	912	7.2	1,071	7.3	1,299	7.7
Certificate I/II/III/IV	1,211	9.5	1,347	9.2	1,563	9.3
Advanced diploma/Diploma	1,190	9.3	1,363	9.3	1,538	9.1
Enrolled bachelor degree	428	3.4	494	3.4	612	3.6
Completed bachelor degree	2,871	22.5	3,328	22.8	3,801	22.6
Grad diploma/Grad certificate	1,762	13.8	2,017	13.8	2,265	13.4
Postgraduate degree	3,071	24.1	3,477	23.8	3,921	23.3
Total reported (15 years or over only)	12,755	100.0	14,618	100.0	16,853	100.0
Aboriginal and/or Torres Strait Islander						
Yes	102	1.2	167	1.3	235	1.4
No	8,698	98.8	13,033	98.7	16,309	98.6
Total reported	8,800	100.0	13,200	100.0	16,544	100.0

58.5% (9,742/16,642) of participants had received the 2014 seasonal vaccine, compared with 59.7% (8,939/14,968) of participants by the end of 2013. Of the 3,418 participants who identified as working face-to-face with patients in 2014, 2,697 (78.9%) received the vaccine compared with 77.9% by the end of 2013. In 2014, 14.2% of participants less than 10 years of age whose parents completed a survey on their behalf were vaccinated with the seasonal influenza vaccine by the end of the season, compared with 18.3% in 2013 (Table 4).

Percentage of participants with influenza-like illness symptoms

Of participants who completed a survey in the national peak week of ILI for 2014, 4.7% reported fever and cough compared with 3.6% in 2013 and 4.7% in 2012. Of participants who completed at least 1 survey in the national peak 4 weeks of ILI for 2014 12.4% reported fever and cough, compared with 9.6% in 2013 and 12.1% in 2012 (Table 5).

Field vaccine effectiveness

From 2007 to 2014 our field FVE calculation for New South Wales participants demonstrated that the seasonal vaccine was effective against all reported ILI except in 2009 during the pandemic and in 2014. The FVE calculated for 2014 was less than the 2009 FVE estimate (Figure 4).

Detection of influenza-like illness

Figure 5 shows the 2009 to 2014 weekly ILI prevalence by vaccination status. Peak ILI activity for 2014 was during the week ending 24 August (5.0% in the unvaccinated group). However, divergence between the vaccinated and unvaccinated participants' ILI prevalence was highest during the week ending 29 June. Peak ILI activity for 2013 was during the week ending 25 August (4.3% in the unvaccinated group). This is also when divergence between the vaccinated and unvaccinated participants' ILI prevalence was highest.

Table 4: Number and percentage of participants vaccinated with the seasonal influenza vaccine at the final survey of each year, by participant characteristics

Participant group	2007	2008	2009	2010	2011	2012	2013	2014
All participants								
Received vaccine (%)	52.9	50.8	58.4	54.0	56.1	54.2	59.7	58.5
Number of participants	726	3,921	6,753	9,934	10,899	13,196	14,968	16,642
Participants working face to face with patients								
Received vaccine (%)	73.3	71.3	76.8	68.6	73.1	73.3	77.9	78.9
Number of participants	221	1,159	1,741	2,317	2,588	2,785	3,139	3,418
Participants less than 10 years of age								
Received vaccine (%)	N/A	18.2	18.5	16.1	9.4	12.1	18.3	14.2
Number of participants	N/A	77	200	360	466	730	905	1,151

Table 5: Percentage of participants with influenza-like illness symptoms in the peak week of influenza-like illness and peak 4 weeks of influenza-like illness, Australia, 2012 to 2014

Influenza-like illness symptoms	Peak influenza-like illness week						Peak 4 weeks of influenza-like illness					
	2012*		2013†		2014‡		2012§		2013‖		2014¶	
	n	%	n	%	n	%	n	%	n	%	n	%
Fever	785	5.7	742	4.8	1,067	5.8	2,206	14.9	2,130	12.5	2,920	15.2
Cough	2,254	16.4	2,208	14.2	2,957	16.2	4,814	32.4	4,816	28.3	6,212	32.4
Fever and cough	646	4.7	558	3.6	852	4.7	1,795	12.1	1,634	9.6	2,385	12.4
Fever, cough and sore throat	449	3.3	430	2.8	618	3.4	1,377	9.3	1,263	7.4	1,775	9.3

* Week ending 15 July 2012, N= 13,707

† Week ending 25 August 2013, N=15,579

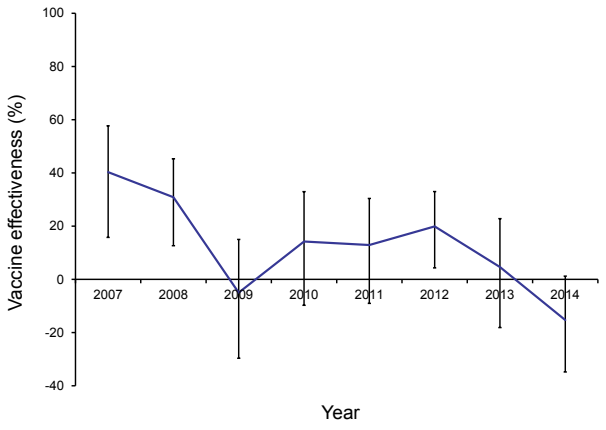
‡ Week ending 24 August 2014, N=18,287

§ Weeks ending 1 to 22 July 2012, N=14,851

‖ Weeks ending 11 August to 1 September 2013, N=16,988

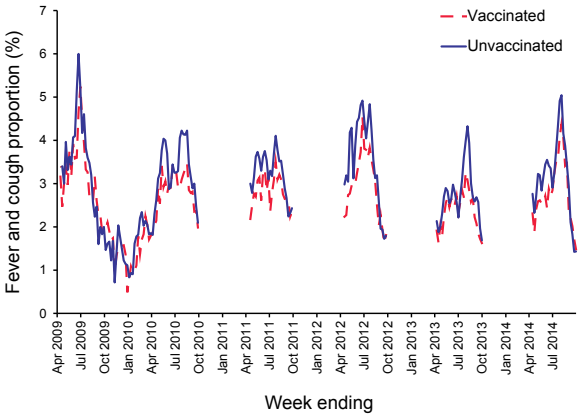
¶ Weeks ending 10 August to 31 August 2014, N=19,188.

Figure 4: Field vaccine effectiveness against all influenza-like illness for peak 4 weeks for participants greater than 18 years of age, New South Wales, 2007 to 2014



Vertical bars represent 95% confidence intervals.

Figure 5: National fever and cough percentage stratified by vaccination status, 2009 to 2014, by week



The levels of ILI seen in 2014 were similar to the 2012 season. The 2013 season was milder than levels of ILI seen in 2014, 2012, and similar to levels of ILI seen in 2011 and 2010.

Comparison with national laboratory influenza notifications

There was an increase in the number of laboratory confirmed cases of influenza from 2,381 notifications in the peak week of 2013 to 7,170 notifications in the peak week of 2014. The peak weekly percentage of Flutracking participants with ILI for 2014, unstratified by vaccination status, was 4.7% compared with 3.6% in 2013 (Figure 6). In 2014 the timing of the peak week of Flutracking ILI levels was the same as the timing of the peak week of laboratory notifications of influenza. However, in 2013 the peak week of Flutracking ILI levels was 1 week earlier than the peak week of laboratory notifications of influenza.

Index of severity

There were higher percentages of participants taking time off work or normal duties in 2014 compared with 2013 (peak level of 2.5% in 2014 compared with a peak level of 1.6% in 2013) and seeking health advice (peak level of 1.6% in 2014 compared with a peak of 1.1% in 2013) (Figure 7).

Discussion

The number of participants completing at least 1 survey during the year continues to increase each year, and in each state and territory. This is welcome as it is resulting in higher population participation rates and broader geographic reach.

Direct marketing of Flutracking via telephone to organisations to invite the participation of their members/employees is becoming less relevant as the size of the cohort increases. It is more efficient to request Flutracking participants to invite their friends and colleagues to join and this has been very successful – Flutracking is now the largest weekly survey of influenza-like illness in the world.

Flutracking participants continue to be predominantly of working age and higher educational status. While a decreased reliance on workplace recruitment will assist to broaden the participant base, requesting existing participants to recruit their friends and colleagues will likely result in them recruiting people from their own demographic base.

The FVE calculated for both 2013 and 2014 demonstrated low vaccine effectiveness compared with 2010, 2011 and 2012. The 2014 FVE estimate

Figure 6: National fever and cough prevalence, April through October (not stratified by vaccination status) compared with national influenza laboratory notifications, 2007 to 2014, by week

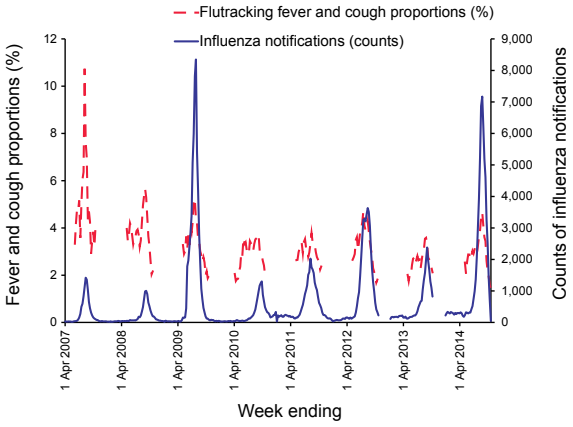
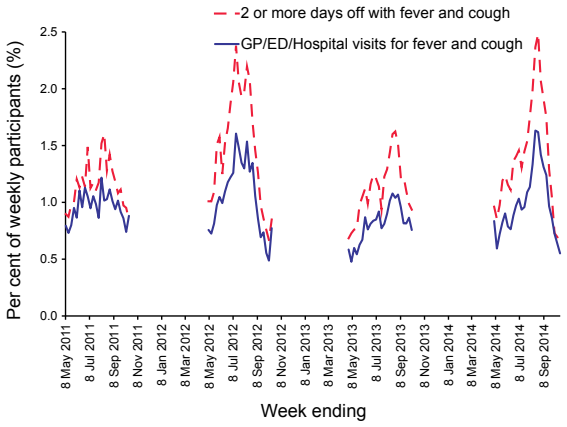


Figure 7: Weekly index of severity: Participants with fever and cough plus two or more days off work, and participants who sought medical advice from a general practitioner, emergency department or as a hospital inpatient, Australia, May 2011 to October 2014



was even lower than that calculated in 2009. New South Wales experienced predominantly A(H3N2) strains of influenza in 2014.[11] The low 2014 FVE estimate may reflect a decreased match between circulating viruses and the 2014 A(H3N2) vaccine strain.[12,13] A symptom based case definition, such as that used by Flutracking, cannot be expected to provide the same quantitative estimates of a laboratory confirmed outcome. Despite its limitations, it appears to concur, at least qualitatively, with conventional test negative vaccine effectiveness methods. The main benefit of Flutracking's FVE calculations may be that of offering a rapid qualitative indication of FVE as was provided during the 2009 influenza pandemic.

Based on Flutracking fever and cough weekly percentages, the community attack rates in the 2014 season were higher than the attack rates in the 2013 season, but similar to the 2012 attack rates. National influenza laboratory notifications also showed an increase in cases of influenza from 2013 to 2014. This increase was much larger than the increase seen in the Flutracking ILI percentages, which may reflect the ongoing increases in laboratory testing occurring year to year. Flutracking burden of illness data suggested higher levels of ILI in the community in 2014 compared with 2013, with higher rates of time off normal duties and health care seeking behaviour. Influenza A(H1N1)pdm09 re-emerged in 2013 and represented over 15% of all influenza notifications nationally, compared with <1% of notifications in 2012, and the proportion of influenza B was higher in 2013 than in recent years.[14] Additionally in 2013, influenza A(H1N1)pdm09 was the predominant subtype in New South Wales and other eastern jurisdictions, where a large proportion of Flutracking participants reside. Influenza A(H1N1)pdm09 also predominated across most states and territories throughout the 2014 season. However, in New South Wales and the Australian Capital Territory A(H3N2) was predominant, and there were late increases in A(H3N2) notifications in Queensland, Western Australia, Tasmania and the Northern Territory.

With an increasing number of participants across each jurisdiction each year, Flutracking is becoming a more reliable comparison measure of ILI timing and severity between Australian jurisdictions. Flutracking is aiming to further improve the representativeness of the data through targeted recruitment strategies to increase the proportions of participants in the 0–15 years age group and 65 years or over age group, Aboriginal and Torres Strait Islander participants, and participants in regional areas of Australia.

Nationally, in 2014 Flutracking contributed to the influenza surveillance by balancing the high levels of laboratory influenza notifications seen in 2014 with community level data showing more moderate levels of ILI. Increased laboratory testing may have been responsible for as much as two-thirds of the reported year over year increase in laboratory notifications.[15] Flutracking and other syndrome surveillance systems can provide situational awareness to assist with the interpretation of the more specific influenza surveillance provided by laboratories

Authors' contributions

Sandra Carlson led the writing of the manuscript, Lisa McCallum and Sandra Carlson both contributed to the statistical analysis, Craig Dalton conceived and designed the project, oversaw the statistical analysis, contributed to and oversaw writing of the manuscript, Michelle Butler also 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 in 2013, David Durrheim contributed to the design of the project, statistical analysis, and writing of the manuscript.

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