# An evaluation of the Australian Sentinel Practice Research Network (ASPREN) surveillance for influenza-like illness

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## Abstract

**The Australian Sentinel Practice Research Network (ASPREN) is a national network of general practitioners (GPs) who collect and report data on selected conditions, including influenza-like illness (ILI). The Australian Government Department of Health and Ageing initiated an evaluation of ASPREN, aiming to assess its potential to contribute to surveillance of emerging infectious diseases including pandemic influenza. System attributes and utility for decision-making were elucidated from stakeholder surveys. ASPREN ILI data for 2002 to 2004 were compared with ILI data from South Australia and New South Wales. In 2004, 50 GPs participated in the ASPREN surveillance, with proportionately more in New South Wales (30%) and South Australia (30%) than in other states. The majority (78%) of GPs were in metropolitan practices. Compliance with the manual data collection system was not optimal, nor consistent by state. ASPREN ILI data compared favourably with that of other surveillance systems. No formal structures were in place by which to assess data trends, provide alerts or initiate public health action. To maximise the contribution to biosecurity surveillance, ASPREN would require targeted GP recruitment to achieve geographic representativeness; exploration of alternative technologies for data collection and reporting; provision of committed resources adequate for system operation; and negotiation with state-based public health reference laboratories to provide laboratory support. The main potential of ASPREN is to permit rapid dissemination of a syndromic case definition and acquisition of nationwide community level clinical presentation data. These evaluation findings will be used to inform redevelopment of ASPREN as part of the Biosecurity Surveillance System project. *Commun Dis Intell* 2005;29:231–247.**

*Keywords: evaluation, influenza, disease surveillance, biosecurity*

## *Introduction*

Influenza, a communicable disease that spreads rapidly, is an important global public health problem. While seasonal activity poses an ongoing burden on medical resources through increased numbers of general practitioner (GP) consultations and hospital admissions, and on the community through lost days of work, the ever-present threat of a pandemic has heightened awareness of the need for influenza surveillance.

The implications of an influenza pandemic are extreme, with the global attack rate for the 1918–1919 pandemic estimated to be 25 per cent.[1] In Australia, the most recent pandemic of 1968 had a similar attack rate of 25–30 per cent, predominantly affecting those aged over 65 years.[1] In order to lessen the impact of pandemics and enable planning measures to be rapidly implemented, much effort has been spent on early or rapid detection of influenza epidemics and characterisation of circulating virus strains. The need for pandemic planning and an effective national surveillance system has been highlighted recently by infection of humans in Viet Nam and Thailand with highly pathogenic avian influenza that has shown evidence of limited person-to-person transmission.[2,3]

The World Health Organization (WHO) established a global influenza surveillance network in 1952 that now comprises 112 institutions in 83 countries.[4] Australia participates in the WHO global network through the WHO Collaborating Centre for Influenza Reference and Research in Melbourne and three

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designated national influenza centres in Melbourne, Perth and Sydney. There are also several influenza surveillance systems operating in Australia that inform national and jurisdictional public health authorities about influenza epidemiology.[1,5]

Laboratory-confirmed influenza was listed as a nationally notifiable disease in 2001.[6] De-identified data from each state and territory are collated and reported to the National Notifiable Diseases Surveillance System.[7] The Laboratory Virology and Serology Reporting Scheme (LabVISE) also collects data on laboratory-confirmed diagnoses from participating laboratories.[8]

Sentinel practice surveillance systems aim to monitor influenza activity in the community. Cases are ascertained by diagnosis of clinical influenza-like-illness (ILI), defined since 2004 by the nationally adopted ILI case definition of fever, cough and fatigue.[9] State-specific sentinel practice surveillance systems are also operated in New South Wales, the Northern Territory, Queensland, Victoria and Western Australia. Laboratory confirmation of influenza in a sample of ILI diagnoses reported is an additional component of the Victorian and Western Australia systems.[10] The Australian Sentinel Practice Research Network (ASPREN) aims to conduct surveillance across all states and territories.

## *Evaluation framework*

This evaluation commissioned by the Australian Government Department of Health and Ageing, aimed to assess the utility of ILI surveillance conducted by ASPREN, in the context of the Biosecurity Surveillance System requirements.

### Aim and objectives

The evaluation was conducted between December 2004 and March 2005 with objectives to:

1. provide a comprehensive summary of how the surveillance system operates through information provided by ASPREN representatives;
2. assess the simplicity, flexibility, acceptability, timeliness and stability of ASPREN ILI surveillance from information provided by ASPREN representatives, GPs who participate or have participated in ASPREN, and users of ASPREN data;
3. assess the data quality of the system by examination of ASPREN data from 2002 to 2004;
4. assess the representativeness of the system by comparison of ASPREN data from 2002 to 2004 with other influenza-like illness surveillance systems in New South Wales and South Australia, and
5. make recommendations to improve the system consistent with existing uses.

## *Methods*

This evaluation of ASPREN, with particular reference to ILI surveillance, was conducted using the principles from the Centers for Diseases Control and Prevention *Updated Guidelines for Evaluating Public Health Surveillance Systems*[11] and the *Framework for Evaluating Public Health Surveillance Systems for Early Detection of Outbreaks.*[12]

The processes and operation of the system at the administrative level were elucidated by informal interviews with: staff at the Royal Australian College of General Practitioners (RACGP) in Adelaide; the ASPREN director in the Department of General Practice, the University of Adelaide; and two previous ASPREN directors. Additional stakeholders were identified from the data distribution list and asked standard questions to ascertain the current use of ASPREN data.

A postal survey of current (2004) and former ASPREN-participating GPs assessed the system performance attributes of usefulness, acceptability and stability. The survey also collected information about GPs' opinions for improving the system and whether its expansion to collect data on additional conditions would be acceptable.

Data analyses comparing ILI diagnoses and laboratory-confirmed influenza data by time and age group (where available) between ASPREN and other influenza surveillance system data in South Australia and New South Wales were performed using MS Excel and STATA version 8. Sentinel practice locations were categorised as metropolitan or regional according to Australian Metropolitan Postcodes.[13] Population data were accessed from the Australian Bureau of Statistics for the 2004 mid-year estimated resident population,[14] and the National Regional Profile and Remoteness Structure from the 2001 census.[15] We defined two geographical categories: 'metropolitan' included major cities and inner regional areas; and 'regional' included the three remaining categories of outer regional, remote and very remote.

Published and unpublished reports using ASPREN data were reviewed. Evaluation reports for other Australian influenza surveillance systems were reviewed (New South Wales,[16] South Australia,[17] Western Australia,[18] NNDSS[7] and Victoria[19]) and the recommendations from these evaluations were considered for their applicability to ASPREN.

## *Purpose and operation of the system*

The Australian Sentinel Practice Research Network is a surveillance system that is owned and operated by the RACGP and managed by its South Australian

and Northern Territory Faculty in Adelaide. Since the mid-1990s, the Director of ASPREN has been based in the Department of General Practice at the University of Adelaide but maintains strong links with, and is a member of, the RACGP. Since 2004, the University of Adelaide has made a financial contribution to the running of ASPREN and is considered a full partner in the enterprise by the RACGP. The current director of ASPREN is a member of the RACGP National Standing Committee on Research.

**Objective**

ASPREN was established by the RACGP as a national surveillance system in 1991. Each year, a meeting of interested bodies—including RACGP members, academic GPs and epidemiologists—selects 10 to 12 conditions for surveillance. The original objectives of the surveillance program were to:

- provide a rapid monitoring scheme for infectious diseases that can also serve to warn public health officials of epidemics in their early stages;
- provide information about conditions that are seen in general practice;
- measure changes over time for conditions that present to medical practitioners;
- help answer research questions; and
- measure the impact of public health campaigns.

Some conditions such as ILI and measles were listed for surveillance with the intention for ongoing inclusion, whereas others, such as those to answer research questions, were short-term. ILI has been included in the list of reported conditions annually since 1991.

**Stakeholders**

Stakeholders of ASPREN include:

- The Royal Australian College of General Practitioners;
- current and former Directors of ASPREN;
- current and former participants in ASPREN;
- the Department of General Practice, the University of Adelaide.

The users of the ASPREN data include:

- the Editor of *Communicable Diseases Intelligence,* Australian Government Department of Health and Ageing;
- Communicable Disease Control Branch, Department of Health, South Australia;
- the WHO Collaborating Centre for Influenza Reference and Research;
- researchers from the Department of General Practice, Flinders University; and
- researchers from the University of Western Australia and the University of Melbourne.

**Recruitment of GPs**

Participation of GPs in ASPREN is voluntary and has been since the program's inception in 1991. For the 2002 to 2004 triennium this activity was approved for 20 RACGP QA-CPD category 1 (clinical audit) points and 56 GPs received points for completing the requirements. In instances where GPs did not complete the contribution, points were awarded on a pro rata basis. The RACGP is yet to make a determination on the points to be awarded for ASPREN participation in the forthcoming 2005 to 2007 triennium, or on the precise requirements for achieving approved points. However, it is likely that a minimum of 30 points will be awarded for the full triennium participation.

Active recruitment of GPs for ASPREN has not been undertaken for several years due to uncertainties about the future of ASPREN and lack of resources. Previously, GP recruitment occurred via bulletins and mail-outs to practices, and advertisements in the RACGP's 'Friday Fax' bulletin to its members. Due to the decline in participating GPs it has been inappropriate and not possible to exclude participants in order to improve the representation by location.

**Reportable conditions**

The list of reportable conditions and their specific case definitions are mailed to participating GPs at the start of each year along with documentation describing the ASPREN system and reporting requirements. In most years there have been 12 reportable conditions, although there were 13 in 2003 and 14 in 2000.

**Data collection**

In addition to the list of reportable conditions and associated documentation, each participating GP receives three-monthly batches of reporting forms, with the week number, GP's name and doctor code already completed, and a supply of reply-paid envelopes. For each patient meeting one of the ASPREN condition criteria, the GP is required to record the sex, age bracket and ASPREN-reportable condition by filling in boxes on the form. There are 40 columns

into which patients with ASPREN reportable conditions can be recorded each week. The doctor must also record the total number of consultations made in that week. The form is then folded in a particular way (marks are provided on the form where folds should be made so they scan correctly) and mailed back in the reply-paid envelope. Electronic reporting is not available and forms cannot be returned by facsimile as they cannot be scanned.

The end of the surveillance week is Sunday, and most data collection forms are returned to the RACGP by the following Wednesday. The RACGP administration officer manually checks each form prior to scanning to ensure data points will scan. Records that do not scan properly are amended and an output generated in Microsoft DOS. A report is then automatically generated in both Microsoft Word and Excel formats that provide the number of patients and rates of ILI diagnoses and other ASPREN reportable conditions (measured per 1,000 consultations). The report stratifies the rates by state/territory and age-group and sex.

There is no legal authority for the collection of ASPREN data. No approval to conduct ASPREN surveillance has ever been sought from Human Research Ethics Committees. This is largely based on historical precedent but has also been justified on the grounds that participation in ASPREN is voluntary and the limited patient data collected are anonymous. However, ethics approval or provision of informed patient consent to collect and use their data may need to be considered in light of increasingly stringent privacy provisions.

**Reporting and dissemination**

The reports generated in Microsoft Word format are disseminated to those on the mailing list on the same day as the data entry process. Recipients of the data include: the Surveillance Section of the Australian Government Department of Health and Ageing; the Communicable Disease Control Branch, Department of Health, South Australia; university researchers from Departments of General Practice and Rural Health; a medical news reporter from Medical Observer; a representative from CSL; and, the administration officer from the WHO Collaborating Centre for Reference and Research on Influenza.

ASPREN data are published quarterly in *Communicable Diseases Intelligence* (monthly publication prior to 2001). An ASPREN annual report provides an overview of statistical data, including reporting practices of GPs and reported rates for the conditions under surveillance. These data may be stratified into age-, sex- or state/territory-specific rates and compared to rates observed in previous years as part of more in-depth analysis. The reporting format was upgraded in 2002 and is reflected in some of the evaluation analyses. Selected ASPREN findings have been published in the *Australian Family Physician*; however, this is not a regular occurrence.[20,21]

ASPREN ILI data are one of four data sources reported in the National Influenza Surveillance Scheme.[22] Graphical presentation of ASPREN ILI data per 1,000 consultations is available via the Australian Government Department of Health and Ageing (DoHA) website, which is updated fortnightly during the influenza season (http://www.health.gov.au/internet/wcms/Publishing.nsf/Content/cda-surveil-ozflu-flucurr.htm).

**Resources required to operate system**

Three personnel contribute part-time to the management and operation of ASPREN. The clinical director of ASPREN is based at the Department of General Practice, the University of Adelaide and spends approximately one to two hours per week working on ASPREN, although this may be more during production of the annual report and mail-outs, and less at other times in the year. The day-to-day operation involves two RACGP staff members based in the South Australian and Northern Territory Faculty office in Adelaide and overseen by the Faculty manager. The administrative officer spends approximately three to four hours per week receiving, checking and scanning the data collection forms and emailing the reports to those on the distribution list and the project officer spends approximately one day per month troubleshooting computer problems, coordinating mail-outs of annual reports and data collection forms and liaising with the ASPREN administrator and Director. Technical support and maintenance of the scanner is provided by a contract computer technician/programmer; the annual cost for which is from $3,000 to $4,000 per annum.

There is little direct financial support provided for the operation of ASPREN. The ASPREN director's time spent working on the system is voluntary and the unit of the RACGP of which ASPREN is part absorbs salaries for the RACGP personnel. In 2004, the Department of General Practice at the University of Adelaide (in which since 1996, the two ASPREN directors have worked) provided $5,000 from a Primary Healthcare Research Education and Development grant to the RACGP to help cover the administrative costs of maintaining the system. The GPs who participate in the surveillance do not receive payment for their time.

## *Data analysis*

### GP participation and reporting practices

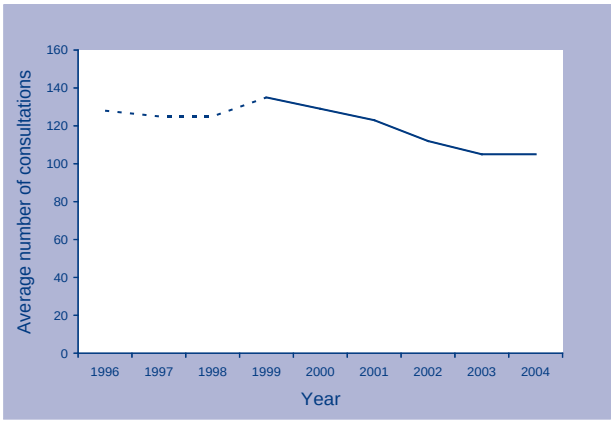
ASPREN annual reports from 1992 to 2002 were available for review. Preliminary data analysis completed in preparation for the 2003 annual report was provided by the ASPREN director, in addition to raw data for 2003 and 2004. Due to changes in the annual report format, and therefore the information available, comparisons were made from 1996 to 2004 with more detailed analysis done for 2003 and 2004.

The number of GPs participating each year has declined from a peak of 110 (1994) to 51 (2004). The average number of weekly consultations per GP has also declined (Figure 1). Data about the total number of consultations monitored were not collected from 1996 to 2001; however, a decline of 41 per cent between 2002 (296,342) and 2004 (173,870) was observed, possibly a reflection of increased consultation length.

As the number of participating GPs has declined, so has the number of forms returned each year (Table 1). The form return rate varied by week throughout the year. The lowest weekly return rate occurred consistently in weeks 52 and one, which correspond to the Christmas and New Year period (Figure 2).

The number of participating GPs decreased from 73 in 2003 to 51 in 2004. The average form return rate varied between 81 and 87 per cent from 1996 to 2000, but had declined to 60 per cent in 2004 (Table 1).

**Figure 1. Average number of consultations per general practitioner per week,* 1996 to 2004**




* Interrupted line indicates estimated value as reported in the respective annual report.

**Figure 2. Number of report forms returned each week, ASPREN, 2003 and 2004**

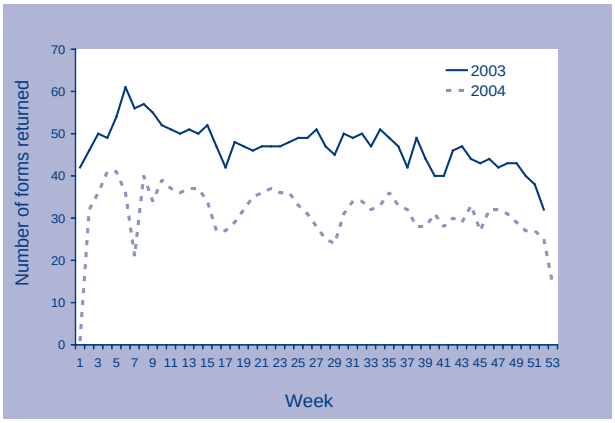



**Table 1. Number of participating general practitioners and average number of forms returned per general practitioners, ASPREN, 1996 to 2004**

| Year | Number of forms returned | Number of participating general practitioners | Average number of forms returned per general practitioners | |
|---|---|---|---|---|
| | | | n | % |
| 1996 | 3,427 | 81* | 42 | 81 |
| 1997 | 3,168 | 71* | 45 | 87 |
| 1998 | 2,763 | 62* | 45 | 85† |
| 1999 | 2,397 | 55* | 44 | 85 |
| 2000 | 2,821 | 66* | 43 | 83 |
| 2001 | 2,754 | 71* | 39 | 75 |
| 2002 | 2,654 | 91 | 29 | 56 |
| 2003 | 2,456 | 73 | 34 | 65 |
| 2004 | 1,654 | 50* | 33 | 60† |

* When the number of participating general practices was not specifically stated in the annual report the figure was estimated from the maximum number of general practitioners reporting in any one week.

† Years with 53 weeks.

The form return rates were not consistent across states; South Australian, Queensland and Australian Capital Territory GPs had a twofold higher rate than Tasmania (Table 2).

The majority of GPs participating in ASPREN have been practising in metropolitan areas. Participation, as determined by the form return rate, was the same for both groups, although regional GPs had a lower average number of consultations per week (Table 3).

As a proportion of all consultations, those in which an ASPREN-reportable diagnosis was made was approximately 10 per cent during 1996 to 1999 but varied more in subsequent years, ranging from a high of 12.8 per cent in 2002 to a low of 5.7 per cent in 2004. Given that there were 13 reportable conditions in 2004, this drop in the proportion of ASPREN reportable conditions may be an indication of incomplete data collection by the participating GPs.

### ASPREN surveillance for influenza-like illness

ILI diagnoses are presented as rates (measured as cases per 1,000 consultations). The peak rate usually occurred around week 30 (end of July) of each year, although outliers included week 23 in 1992 and week 37 in 2000 (Table 4). In general, the ILI season was observed between weeks 15 and 40 each year.

**Table 4. Peak rates of influenza-like illness reported by ASPREN, 1991 to 2003**

| Year | Peak rate of influenza-like illness per 1,000 consultations* | Peak week number | Proportion of influenza cases diagnosed in those aged greater than 64 years |
|---|---|---|---|
| 1991 | 24.9 | 30 | n/a |
| 1992 | 18.5 | 23 | n/a |
| 1993 | 22.0 | 34 | n/a |
| 1994 | 37.2 | 31 | n/a |
| 1995 | 28.4 | 25 | n/a |
| 1996 | 30.8 | 29 | n/a |
| 1997 | 33.8 | 31 | 8.1 |
| 1998 | 34.5 | 27 | 7.7 |
| 1999 | 17.5 | 34 | 8.2 |
| 2000 | 25.0 | 37 | 7.3 |
| 2001 | 15.5 | 30 | 5.6 |
| 2002 | 16.9 | 28 | 4.4 |
| 2003 | 25.0 | 34 | 6.3 |

* ASPREN case definition (see Box 1).

n/a Not available.

**Table 2. Number of participating general practitioners and form return rate, ASPREN, 2004, by state**

| State | Number of participating general practitioners | Number of forms returned | Average number of forms per general practitioner | Proportion of all possible forms returned % |
|---|---|---|---|---|
| ACT | 1 | 45 | 45 | 85 |
| NSW | 15 | 488 | 33 | 61 |
| Qld | 5 | 193 | 39 | 73 |
| SA | 15 | 543 | 36 | 68 |
| Tas | 4 | 73 | 18 | 34 |
| Vic | 9 | 247 | 27 | 52 |
| WA | 2 | 65 | 33 | 61 |
| Total | 51 | 1654 | 32 | 60 |

**Table 3. Comparison of metropolitan and regional based ASPREN participating general practitioners, 2004**

| | Number of general practitioners | Total consultations | Average consultations per week | Average number of forms returned per general practitioner (%) | |
|---|---|---|---|---|---|
| | | | | n | % |
| Metropolitan | 37 | 132,564 | 110 | 32 | 60 |
| Regional | 14 | 41,306 | 91 | 32 | 60 |
| Ratio M:R | 2.6:1 | 3.2: 1 | 1.2: 1 | – | – |

M = Metropolitan.

R = Regional

**Box 1. International Classification of Health Problems in Primary Care influenza-like illness case definition**

*Inclusion requires one of the following:*

a. viral culture or serological evidence of influenza virus infection; or

b. influenza epidemic, plus *four* of the criteria in (c); or

c. *six* of the following:

i. sudden onset (within 12 hours);

ii. cough;

iii. rigors or chills;

iv. fever;

v. prostration and weakness;

vi. myalgia, widespread aches and pains;

vii. no significant respiratory physical signs other than redness of nasal mucous membrane and throat;

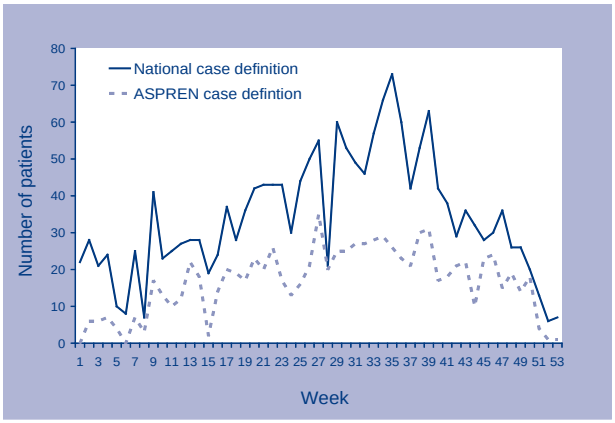
viii. influenza in close contacts.

### Influenza-like illness case definition

Since its inception, ASPREN has used the International Classification of Health Problems in Primary Care (ICHPPC-2) ILI case definition (Box 1).[23] During 2004, ILI was reportable using either or both of two different case definitions; patients meeting the ASPREN case definition as above and/or the 2004 nationally agreed ILI surveillance case definition of fever, cough and fatigue.[9]

The nationally agreed ILI case definition, included in the 2004 ASPREN surveillance alongside the previous ICPPHC-2 case definition, increased the number of ILI diagnoses reported. Whilst the new case definition was apparently less specific, the overall seasonal pattern of ILI did not change (Figure 3).

**Figure 3. Comparison of the two clinical influenza-like illness case definitions used in 2004**

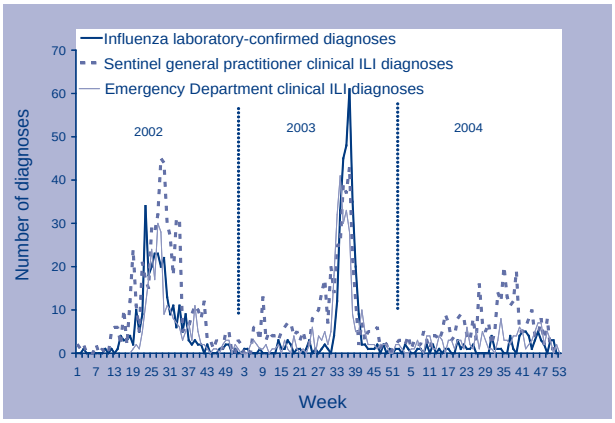



### Comparison of ASPREN influenza-like illness surveillance with state-based influenza-like illness surveillance in New South Wales and South Australia

ASPREN ILI data were compared with data from the New South Wales and South Australian influenza surveillance programs; these two states having the highest proportion of ASPREN GPs. ASPREN ILI data recorded using the national case definition were used for the 2004 comparison.

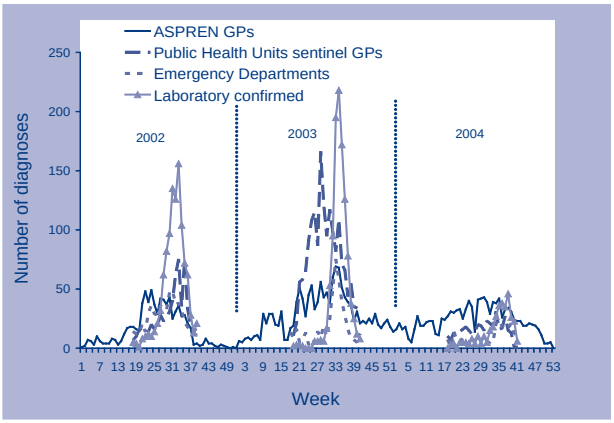
Influenza activity in South Australia is monitored through notifications of laboratory-confirmed influenza and clinical diagnoses of ILI in emergency department attendees in addition to the ASPREN ILI data. ASPREN ILI data provided the earliest indication of the onset of seasonal influenza for each of the three years in the review period (2002 to 2004) (Figure 4). However, as the case definition for ILI is non-specific, the increased activity indicated by sentinel practitioner diagnoses in 2004, which was not supported by a rise in laboratory-confirmed influenza notifications, may have been due to non-influenza respiratory illness.

**Figure 4. Influenza clinical and laboratory diagnoses, South Australia, 2002 to 2004, by week**



New South Wales influenza surveillance comprises diagnoses of clinical ILI by sentinel GPs through the public health units (PHU) and GPs participating in ASPREN; 12 hospital emergency departments from within the greater Sydney region; and laboratory-confirmed influenza diagnoses collected via the direct virological surveillance system (the latter ceased in 2003) (Figure 5). Surveillance via the PHU sentinel GPs and emergency departments is conducted from May to October each year. In 2004 the PHU sentinel GPs used the nationally agreed ILI case definition; prior to 2004 ILI was defined using an ASPREN-like case definition of: cough and myalgia and no abnormal respiratory physical signs other than redness of nasal mucous membranes and throat; and two of the following: sudden onset; rigours or chills or fevers; prostration or weakness; or influenza in close contact.

**Figure 5. Influenza clinical and laboratory diagnoses, New South Wales, 2002 to 2004, by week**



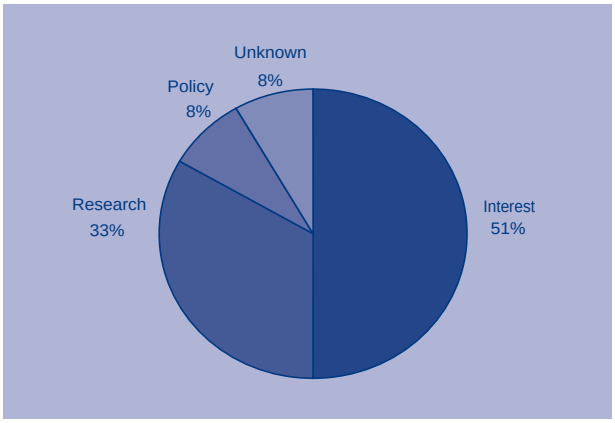

## *Surveillance system attributes*

System attributes were elucidated from stakeholder interviews conducted with the current and former operators of the system; 11 of the 12 individuals or institutions that received ASPREN data each week; and a postal survey of current and former participating GPs. The GP survey response rate was 93 per cent (91/98) overall with 98 per cent (49/50) of current and 88 per cent (42/48) of former ASPREN GPs responding (three were no longer at the same address, therefore data were available for 39 former GPs).

### Usefulness

Only one research paper using ASPREN data cited in published literature was identified;[20] however, the system operators perceive that ASPREN data are accessed and used by researchers in support of their work. The 1999 and 2000 ASPREN annual reports listed specific requests for ASPREN data having been received from pharmaceutical companies (influenza), a RACGP training programme registrar (rubella, measles, pertussis and Ross River virus), the Monash Medical School Clinical Research Centre for Water Quality and Treatment (gastroenteritis in Melbourne) and the New South Wales Department of Health (influenza). Of those receiving weekly data, the majority (6/12) do so for personal interest. Four receive the data specifically to support research activities and one institution utilises the data to inform policy, primarily in regard to identification of at-risk groups for vaccination campaigns (Figure 6).

**Figure 6. Primary use of ASPREN data, ASPREN, 2004, by weekly recipient list**




ASPREN data are published in the quarterly *Communicable Diseases Intelligence* publication and posted on the Communicable Diseases Australia website. The WHO Influenza Centre include ASPREN influenza data in their bi-annual WHO reports. It was not possible to determine how these published data are utilised, however, there is anecdotal evidence of media interest in data accessible via the DoHA website (personal communication: Paul Roche, DoHA).

Due to its biased geographic representativeness (see below) and its current format, it is likely that ASPREN data are neither as useful nor as well utilised as they might be.

### Simplicity

ASPREN has been operating for 15 years and is administered with minimal resources, indicating the simplicity of the system. Participating GPs were well aware of the objectives of the system and 80 per cent (39/49) of current GPs perceived participation to be easy. Although only 28 per cent (11/39) of former GPs perceived participation to be easy, the main issue was finding time to do administrative tasks within a busy practice schedule, rather than the complexity of the system itself.

Completion of the forms is uncomplicated, however, remembering the detailed criteria for a reportable condition was an issue raised by both current and former GPs.

**Flexibility**

Each year new forms, listing the reportable conditions for that year, are prepared and distributed to the participating GPs. In theory the system has the capacity to add reportable conditions at three-month intervals. There is therefore potential flexibility to add new conditions (such as emerging infections) not included in the annual review, although this has never been tested. The process of reprinting and mailing revised data collection forms to all participating GPs would not only require considerable expense, but may also result in confusion among the GPs due to duplicate versions of the form and therefore poorer data quality.

The majority, (80%, 39/49) of current participating GPs were willing to extend surveillance to additional conditions (such as SARS) if requested to do so. This could be facilitated by leaving a blank section in the conditions list that could be used for other new or urgent conditions to be added upon request.

**Data quality**

Returned forms are checked manually and problems relating to ability to scan the forms are resolved at that time. Data recording issues identified include:

- total number of consultations missing;
- total consultations equal the number of patients reported with ASPREN conditions;
- age-category missing; and
- condition category missing.

The data quality will also be affected by the adherence to the specific case definition criteria for the reportable conditions; it was not possible to assess this. Equally it was not possible to assess completeness of data collection. However, the decline in the proportion of ASPREN reported conditions compared to total consultations, from an average of 10 per cent between 1996 and 2003 to 5.7 per cent in 2004 could be indicative of incomplete reporting, or alternatively that fewer or less common conditions were selected for surveillance in that year.

Initiatives to improve GP reporting and data quality have not been undertaken recently. The system should be adequately resourced to permit follow-up of incorrect or incomplete forms. The clarity of condition definitions should be considered carefully to facilitate rapid and accurate recall, particularly if the condition is rare.

**Acceptability**

Acceptability was ascertained from three sources: retention of participating GPs; the number of forms returned by participating GPs; and through the responses to direct questioning in the survey of current and former participating GPs.

The number of participating GPs has declined by 45 per cent over recent years from 91 in 2002 to 50 in 2004. The decision to leave ASPREN was, for the majority (76%, 28/37) of former participants surveyed, due to time constraints rather than dissatisfaction with the system. More than a quarter (26%, 7/27) of these respondents cited specific events such as retiring or ill health that prevented their continued participation. Most (85%, 73/86) former and current participants described the importance of ASPREN as either very or somewhat important. The main reason given for participating was an interest in public health (80%, 70/88) and also to gain CPD points (51%, 45/88) [Note that more than one reason to participate could be cited].

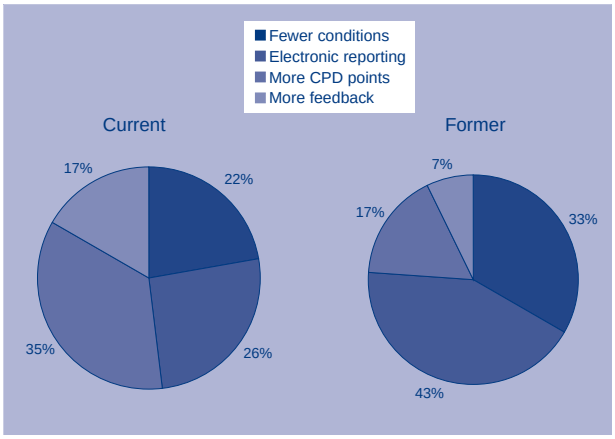
The highest form return rate for any year was 87 per cent (45/52) in 1997; however, this had steadily declined to 60 per cent (32/53) by 2004. Without mandatory zero reporting, it is not possible to account for this decline. GPs should be encouraged to return their forms even if they have not seen patients in that week.

The majority, 73 per cent (36/49), of practices use email and have access to the Internet (83%), mainly by broadband (54%). Whilst the majority, 63 per cent (31/49), of current participants were satisfied with the paper-based method of data reporting, 31 per cent (15/49) of current and 54 per cent (21/39) of former participants would be interested in electronic reporting. Antiquated data collection forms (boxes must be filled in) and collation methods (using a scanner) have become less appealing as familiarity with computer technology in practices has increased.

The level of GP satisfaction with the timeliness, content and delivery method of feedback was good; 82 per cent (40/49) and 74 per cent (29/39) of current and former GPs respectively stated they were either very satisfied or satisfied with these system attributes. The most frequently desired improvements were electronic reporting and electronic feedback (Figure 7).

In summary, ASPREN has a high level of acceptability, with the decline in participation being predominantly due to lack of resources to maintain recruitment. Increased use of technology may be required to maintain the level of acceptability.

**Figure 7. Desired improvements to ASPREN identified by current and former ASPREN participants**




### Sensitivity

Sensitivity is the proportion of actual cases detected by the surveillance system and the ability to detect outbreaks and changes in the activity of influenza over time. The sensitivity is a function of diagnostic reliability and recording compliance and is therefore likely to be compromised by the behaviour of both patients and the participating GP. Although a disease of public health importance, individual clinical presentation of influenza may vary from mild to severe or atypical, affecting the treatment seeking behaviour of the individual patient and hence the opportunity to be detected by ASPREN surveillance. In addition, the manual paper-based method of data collection relies on GPs remembering to mark the appropriate boxes on the data collection forms when they see a patient who meets the case definition. There may be multiple factors that prevent this occurring, including how busy the doctor is, the ease of finding the ASPREN data collection form and the form's ability to act as a visual prompt.

Sensitivity is also dependent on the case definition used. In 2004 ASPREN moved towards using the nationally agreed case definition of fever, cough and fatigue. This case definition was determined to be 44–71 per cent sensitive and 47–80 per cent specific for influenza, over two influenza seasons characterised by influenza A H3N2 circulation in Victoria and Western Australia.[9]

### Specificity

Increasing the sensitivity of an ILI case definition may compromise specificity; however, this can be overcome by combining clinical ILI surveillance data with laboratory-confirmed influenza data. State-based ILI surveillance systems in Victoria and Western Australia collect nose and throat swabs (NTS) from a sample of patients presenting with ILI to a sentinel practitioner. Sampling is either at the GPs' discretion (Victoria) or from the first ILI patient presenting on specified days (Western Australia). NTS are transported to the state reference laboratory in viral transport medium and analysed by multiplex polymerase chain reaction for viral respiratory pathogens, including influenza.[10] Data from the Victorian influenza surveillance program has demonstrated that up to 50 per cent of patients with an ILI will have laboratory-confirmed influenza.[24,25] While laboratory support provides the specificity that syndromic case definitions lack it also requires resources and coordination. When such conditions cannot be met laboratory supported surveillance is not recommended.[16] The use of rapid, point-of-care, influenza diagnostic platforms may revolutionise the capacity to confirm ILI diagnoses, or at least to exclude influenza when the test result is negative.[26] However, rapid point-of-care tests are generally not yet sensitive or specific enough, except for use where other tests are not available.

The ability to obtain NTS from a representative sample of ASPREN ILI reported cases and/or presentation of ASPREN ILI data alongside laboratory-confirmed influenza data sourced from other surveillance systems, or from rapid tests, should be considered.

### Positive predictive value

The positive predictive value (PPV) is the proportion of cases reported by the system that actually have influenza. PPV is dependent on the laboratory tests used and the prevalence of disease: when influenza is prevalent in the community the PPV of clinical signs and symptoms increases. There is no international consensus on a case definition for ILI, although several exist, including those of WHO. The ILI case definition nationally accepted for Australia in 2004, was determined to have a PPV between 25 and 60 per cent in a setting of H3N2 influenza circulation.[9] A similar case definition of fever, cough and rapid onset was determined to have a higher PPV (35%) compared to the ICHPPC-2 case definition (18%) previously used by ASPREN, thereby confirming the validity of the new simpler case definition, at least in the elderly.[23]

Different strains of influenza, for example H1N1 and influenza B, may have milder presentations with less systemic symptoms and may therefore be systematically under-evaluated.[27] Non-respiratory symptoms must also be considered; gastroenteritis may be a clinical feature of human H5H1 avian influenza cases and SARS.[28–30] Modification to the case definition may be required when more specific information on the circulating subtype and clinical syndrome becomes known.

### Representativeness

ASPREN, although aiming to be a national surveillance system, captures data predominantly from south-eastern Australia with New South Wales and South Australia having the highest number of sentinel practices in the network (Figure 8). This has been recognised with the following statement included in the 1998 to 2000 annual reports.

> 'Analysis of the reports on a weekly basis indicated that it is only possible to make comments on New South Wales, South Australia, Victoria and Queensland with any degree of reliability, as the other states have intermittent reporting.'

However, representativeness is misleading when assessed as the number of sentinel GPs per state. New South Wales and South Australia have the highest number of participating GPs, but when sentinel practices are considered against the resident population, South Australia and Tasmania are the only two states to reach the influenza pandemic plan target for metropolitan areas of one sentinel practice per 200,000[1] (Table 5). When viewed as a proportion of consultations monitored, South Australia has by far the highest percentage and Tasmania and New South Wales fall to third and fourth positions respectively: a reflection of the low rate of form return by the Tasmanian participants (Table 2).

The ratio of sentinel GPs in metropolitan and regional practices in 2004 of 2.6:1 approximates the ratio of metropolitan to rural resident population of 2.3:1.[15] No analysis to determine representativeness by socioeconomic status was undertaken.[31]

In order to improve geographic representativeness GP recruitment must consider the state, urban or regional locality and the number of consultations that will be monitored each year, in addition to a commitment to weekly reporting.

Representativeness of the participating GPs and the patients that they see compared to the general GP and Australian populations is also an important consideration but is not analysed further in this report.

ASPREN is managed by the RACGP with GP incentive provided through the award of RACGP CPD points. The RACGP has approximately 11,000 members, including over 3,000 in rural and remote Australia. A separate college, the Australian College for Rural and Remote Medicine (ACRRM) was established in 1997 (www.acrrm.org.au). ACRRM has approximately 2,000 members, representing approximately 50 per cent of rural medical practitioners in Australia. The ACRRM professional development program was formally accepted in its own right for maintenance of vocational recognition in 2002. ACRRM and RACGP use the same professional development triennium period: however, the award categories and required number of points per triennium differ. Points are not interchangeable.

**Figure 8. Location of ASPREN participating general practitioners, 2004**

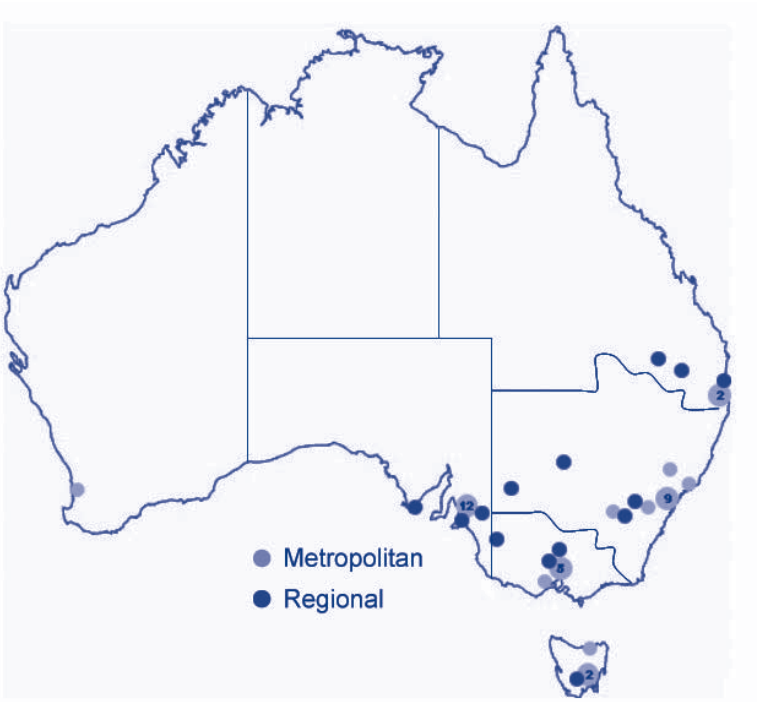


**Table 5. Sentinel practices and consultations monitored through ASPREN, 2004, by state**

| State | Sentinel practices | Consultations | Population (ERP 2004) | Practices per 100,000 | Consultations per 100,000 | Practices required to attain one per 200,000 or (100,000)* |
|---|---|---|---|---|---|---|
| ACT | 1 | 6,072 | 324,021 | 0.31 | 1,874 | 5 (2) |
| NSW | 15 | 56,836 | 6,731,295 | 0.22 | 844 | 67 (34) |
| Qld | 5 | 21,234 | 3,882,037 | 0.13 | 547 | 37 (19) |
| SA | 15 | 48,943 | 1,534,250 | 0.98 | 3,190 | 15 (8) |
| Tas | 4 | 8,845 | 482,128 | 0.83 | 1,835 | 5 (2) |
| Vic | 9 | 25,941 | 4,972,779 | 0.18 | 522 | 50 (25) |
| WA | 2 | 5,999 | 1,982,204 | 0.10 | 303 | 20 (10) |
| Total | 50 | 173,870 | 19,908,714 | 0.25 | 873 | 199 (100) |

* Pandemic planning target is one per 100,000 for regional and one per 200,000 for metropolitan areas.

ERP Estimated residential population. (ABS)

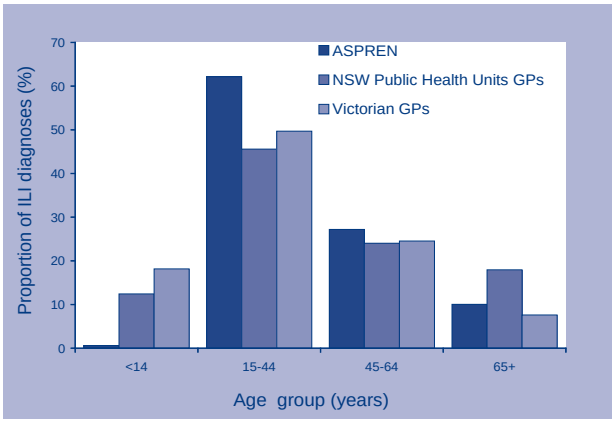
Recruitment of rural GPs is important to provide geographic representation; therefore it is also important that recruitment and incentives not be limited to a single professional organisation.

It is difficult to speculate if the poor representativeness of GP sentinel sites impacts on the representativeness of ILI reported by ASPREN compared to ILI cases presenting at GP surgeries across the country. However, the seasonal pattern of ASPREN ILI data is similar to that of the New South Wales and Victorian influenza sentinel GP surveillance programs (Figure 5),[32] and the age-group distribution of ASPREN is similar to that of the New South Wales and Victorian sentinel GP programs with the exception of under-representation of children in the ASPREN data (Figure 9). The ratio of male to female ILI diagnoses was also similar between the three surveillance systems (ASPREN 1:1, New South Wales 0.9:1, Victoria 0.8:1). This implies that the type of ILI patient seen by ASPREN GPs is not dissimilar to those seen by other GPs, except perhaps in the under-representation of children.

### Timeliness

Retrospective analysis of influenza data from 2002 to 2004 indicates that ASPREN can achieve timely detection of increased influenza activity. However, data collection and reporting methods do not allow this information to be accessed in a timely way. Despite the manual paper-based data collection methods that ASPREN employs (forms returned by mail, scanning of forms) the turnaround from data collection to reporting of two weeks is quite reasonable. However, the timeliness of the system could be vastly improved by the adoption of new technologies such as web-based reporting or data extraction directly from practice software. This would also alleviate the problem created by slow return of data collection forms.

**Figure 9. Proportion of influenza-like illness diagnoses, 2004, by age-group and sentinel GP surveillance system**




### Stability

ASPREN surveillance is a stable system that has operated for 15 years. The low turnover of administrative staff has facilitated consistency of the system.

Data have been collected by a loyal group of GPs with more than half (52%, 25/48) of current participants estimating their ongoing commitment to ASPREN being for 6 to 10 years or longer. The decline in participation over recent years has been compounded by cessation of active recruitment due to the uncertainty of resource availability for ASPREN to continue. If recruitment remains suspended the sustainability of the system may be compromised. The RACGP had implicitly recognised this situation and had appointed a project officer in 2004 to improve and expand the network, including reviewing the feasibility of electronic reporting. However, work had not commenced at the time of this evaluation.

Despite the personal commitment of the current administrative staff and participating GPs, without formal financial provisions to support necessary resources, the continued stability of ASPREN may be placed in jeopardy.

## *Discussion*

ASPREN provides an established and stable framework for syndromic surveillance that is currently useful for monitoring selected endemic diseases in some areas of Australia. The potential for the system to contribute to national bioterrorism surveillance or detect an emerging infectious disease is dependent on the:

- ability to improve the system's representativeness;
- appropriate case definition attributes;
- timeliness and utilisation of data for decision-making; and
- availability of adequate resources for system redevelopment and management.

The findings of this evaluation provided 12 primary recommendations to maximise the potential ASPREN ILI surveillance contribution to the national Biosecurity Surveillance System (Box 2).

### Representativeness and recruitment of sentinel practices

ASPREN currently provides ILI data comparable to other surveillance systems operating in south-eastern Australia. To be representative of communities throughout Australia, intensive recruitment will be required, with specific targeting of particular locations, accompanied by acceptable and appropriate incentives. Opening the recruitment process to the rural college ACRRM, may assist in ensuring geographical representativeness. Currently geographic representativeness is measured as practices per population; however, this measure is not evidence based and does not account for the type of practice, number of consultations or number of GPs within the practice. Investigation into the most appropriate method to measure sentinel site representativeness of community population is needed.

**Box 2. Summary of recommendations**

*Representativeness and recruitment of sentinel practices*

1. Expand the network to improve representativeness
2. Link ASPREN with existing sentinel GP networks
3. Maintain or increase the professional incentive

*Case definition sensitivity, specificity and positive predictive value*

4. Consider inclusion of laboratory support to improve ability to analyse specificity
5. Use the national ILI case definition (fever + cough + fatigue)

*Data timeliness and utility for decision-making*

6. Explore risks and benefits of automated data extraction and electronic reporting
7. Develop a structure for analysis and presentation of surveillance data
8. Enhance dissemination of feedback and summary data analysis

*System coordination and resources*

9. Consider alternative models for coordination of biosecurity surveillance in general practice
10. Provide minimum annual funding commitment for a minimum defined period of time
11. Explore risks and opportunities for income generation
12. Consider the privacy legislation and ethical implications of current and proposed surveillance systems

Maintaining a stable body of participating GPs is important for system stability and continuity. The provision of professional incentives was deemed important by participating GPs. Exploration of educational opportunities through meetings or research projects may attract additional points. Alternatively direct payment to GPs for participation in surveillance could be considered. However, this evaluation highlighted that compliance with the current manual data collection system was not optimal, nor was it consistent by state. Compliance to explicit reporting requirements, for example zero reporting, should be a condition of participation and award of professional incentives or payment.

Conformity to the nationally agreed ILI case definition permits comparison across ASPREN and state-level ILI surveillance systems. This conformity may also permit amalgamation of the data from state-level ILI surveillance systems to provide national ILI surveillance complimentary to ASPREN. For example, ASPREN could specifically recruit GPs from states and territories with no influenza surveillance systems or where coverage is limited, and combine these data with that from GPs participating in state-based systems such as Victoria and New South Wales. Ultimately, the question will arise whether ILI surveillance should be conducted centrally, removing the need for state-based systems, or whether a collaboration of national and state systems can function efficiently.

**Case definition sensitivity, specificity and positive predictive value**

The evidence supports universal adoption of the nationally agreed ILI case definition of fever, cough and fatigue.[9] However, inclusion of laboratory support to confirm influenza diagnosis or comparison of ILI surveillance data with confirmed influenza data sources is necessary to assure appropriate interpretation of sentinel ILI surveillance data. Evidence based reviews are required to investigate the case definition applicability when influenza strains other than H3N2 predominate and utility of the case definition when applied to children.

**Data timeliness and utility for decision-making**

This evaluation identified poor timeliness of data collation and reporting as an issue. Electronic data collection methods, with their advantage of timeliness and automation are an obvious alternative to current paper-based methods. However, several limitations such as: the ability to identify incident cases from follow-up visits; application of a standard case definition; the cost of establishing the system, including capital costs; and compliance to federal and state privacy legislation for accessing health data, need to be overcome.

Automated data extraction from a database such as Medical Director only permits access to a summary diagnosis field stating derivations of 'influenza' based upon the opinion of the treating physician and not necessarily conforming to a prescribed case definition. However, evaluation of electronic syndromic GP surveillance system in New Zealand concluded that ILI data extracted corresponded well with their manual paper-based GP ILI surveillance,[33] as did evaluation of a medical locum service ILI surveillance used in Victoria.[34]

One systematic review and critical evaluation of published literature about surveillance systems for illnesses and syndromes related to bioterrorism identified 13 systems that collected influenza-related data; five of these have been described in peer-reviewed evaluation reports. These reports did not provide sufficient evidence to favour any given source of ILI data (school absenteeism, sick-leave prescriptions, GP consultations for ILI) or method of collection or analysis. There was an indication that electronic reporting methods were more timely than manual systems.[35]

By focusing on symptoms, rather than confirmed diagnoses, syndromic surveillance aims to detect bioterrorism events or newly emerging diseases earlier than would be possible from traditional surveillance systems. The clinical presentation of ILI can be loosely considered as a bioterrorism-related syndrome: anthrax and respiratory agents may present with fever, cough and fatigue with rapid onset.[35] However, there is limited evidence, based on evaluation of surveillance systems specifically designed for collecting and analysing data for the early detection of bioterrorism events, that they will be effective in detecting such events.[35,36] American studies demonstrated that only 5 per cent of outbreaks, and none of five recent examples of emerging infectious diseases, were detected via surveillance.[37,38] WHO estimates 65 per cent of the world's first news about infectious disease events come from informal sources such as press reports and the Internet.[39]

There is presently a high risk for emergence of a new influenza strain to cause a pandemic. ILI surveillance in Victoria has demonstrated good capacity for monitoring endemic influenza seasonal activity;[40] however, ability to detect a new strain in a timely fashion is untested. ASPREN ILI surveillance does not include, nor is it linked to, provision of laboratory support to confirm influenza diagnoses. In addition to confirming the proportion of ILI that is attributable to influenza, laboratory support provides the opportunity to test influenza negative samples for other respiratory viruses or emerging diseases.[41,42] The more samples that are tested the higher likelihood there may be of detecting a new respiratory virus or influenza virus drift. Provision of an established link

between surveillance and laboratories will facilitate collaboration and coordination in an outbreak or emerging infectious disease situation.

There are no formal structures within ASPREN, such as thresholds or specified periods at which to review data,[40,43] to facilitate the ability of ASPREN to inform and impact on decision-making and initiate public health action. The poor timeliness of data acquisition and reporting equally impacts on data utility for decision-making, with the exception of retrospective comparisons to validate trends observed from different influenza surveillance data sources.

However, the stability of the network provides a potential platform for the rapid gathering of national community-level data for a known or hypothesised syndrome. Flexibility can be easily enhanced to permit rapid dissemination of additional condition case definitions in the instance of a bioterrorism or pandemic event. These capacities should be recognised and developed immediately and prior to any comprehensive redevelopment of ASPREN.

**System coordination and resources**

ASPREN, in its current format, is under-resourced and heavily reliant on the goodwill of its director and the institution in which it is housed. The resources required will be dependent on the level of redevelopment undertaken and whether laboratory support is included. Allocation of resources to support initiatives to maximise the quality of data collected should also be included. The Victorian Influenza Surveillance Program, including laboratory support, has an estimated annual operating cost of $125,000 for approximately 40 sentinel practices and testing 500 specimens.[19] Extrapolating from this estimate, ASPREN would require up to $300,000 annually to support 100 to 199 sentinel practices with state-based laboratory support. Capital costs to establish electronic data extraction, analysis and reporting systems would be additional.

## *Conclusions*

ASPREN comprises a small group of dedicated GPs and administrators providing consistent data on select conditions. The network is not representative of Australia. Compliance to the current manual data collection system is not optimal. Resource input is minimal. Redevelopment to maximise the potential to contribute to biosecurity surveillance would require targeted intensive recruitment of GPs to achieve geographic representativeness by state and between rural and urban areas and exploration of alternative technology for data collection. The main potential of ASPREN is to permit rapid dissemination of a syndromic case definition and acquisition of nationwide community level clinical presentation data.

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