A comparison of data sources for the surveillance of seasonal and pandemic influenza in Victoria

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Abstract

Understanding the characteristics of available influenza or influenza-like illness (ILI) surveillance systems is important for seasonal influenza surveillance and pandemic preparedness. We compared five influenza or ILI data sources in Victoria: notifications of laboratory-confirmed influenza to the Victorian Department of Human Services; hospital emergency presentations and hospital admissions; sentinel general practitioner surveillance; and medical locum service surveillance. Seasonal trends for influenza and ILI activity were similar for all data sources. Community ILI surveillance, operating as sentinel GP, locum service or hospital emergency department surveillance, in conjunction with notification of laboratory-confirmed influenza, would provide adequate inter-pandemic surveillance for influenza in Victoria and, by extension, in any Australian jurisdiction. Other surveillance systems would be needed for early pandemic case or cluster detection, while pandemic monitoring would be better achieved by a more automated system. *Commun Dis Intell* 2006;30:345–349.

Keywords: disease surveillance, influenza, pandemic

Introduction

Each year, influenza is responsible for significant mortality and morbidity in Australia.[1] Community surveillance monitors seasonal activity due to influenza or influenza-like illness (ILI) and may facilitate influenza pandemic preparedness, although different surveillance systems may be needed in inter-pandemic or pandemic periods.

The Victorian general practitioner (GP) sentinel surveillance scheme is an established surveillance scheme for monitoring ILI.[2,3] Thresholds related to seasonal ILI activity allow a quick assessment of the level of circulating influenza and an indication of when community ILI activity may coincide with increases in hospital presentations.[4,5] However, coordination is resource intensive for both participating sentinel practitioners and the surveillance team.[2] During 2003 and 2004 a pilot study using a medical out of hours locum service, the Melbourne Metropolitan Locum Service (MMLS), concluded that trends of ILI seasonal activity from GP sentinel surveillance and from the locum service were comparable.[6] Other data sources for influenza and/or ILI currently available in Victoria include hospital emergency department presentations, in-patient discharges and laboratory-confirmed notifications. Automated syndromic surveillance is being developed.

This study compares the utility of all available influenza or ILI data sources to support surveillance during epidemic and pandemic periods in Victoria.

Methods

Data sources

Five influenza or ILI data sources were compared: GP sentinel surveillance, the MMLS, the Victorian Emergency Minimum Dataset (VEMD), the Victorian Admitted Episodes Dataset (VAED) and notifications of laboratory-confirmed influenza to the Department of Human Services, Victoria (DHS).

Laboratory supported general practitioner sentinel surveillance, operational in Victoria during the influenza season (May to September) since 1998, records the number of patients fulfilling the ILI case definition of cough, fever and fatigue, and the total

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number of patients seen each week. Respiratory specimens taken from a proportion of cases permit diagnosis of laboratory-confirmed influenza or other respiratory viruses.[2,7]

MMLS was established in 1980 as a deputising GP service, with locum doctors attending patients in their homes within an approximately 35-kilometre radius of the Melbourne metropolitan area. Demographic and clinical information from patients seen by doctors from the MMLS are routinely entered into a database within 24 hours of a consultation. A final diagnosis free text including either the term 'flu' or 'influenza' is extracted from this database as an alternative form of ILI surveillance.[6]

The VAED, maintained by the Victorian DHS, collates hospital discharge data compiled by individual private and public hospitals in Victoria.[8] This dataset contains demographic and clinical information on each episode of patient care, with the clinical information coded in the format of the International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Australian Modification (ICD-10-AM).[9,10] Similarly the VEMD collates information from presentations to Victorian hospital emergency departments. Persons admitted to hospital via the emergency department will be recorded in both the VEMD and the VAED.[11]

DHS collates notifications of diagnoses of laboratory-confirmed influenza, as required under the *Health (Infectious Diseases) Regulations 2001.*[12] These data include laboratory-confirmed diagnoses recorded from GP sentinel surveillance and the VAED as well as diagnoses confirmed by the 11 Victorian laboratories that conduct influenza confirmatory testing.

Data extraction and comparisons

GP sentinel surveillance, MMLS and notification data were extracted for the period January 2001 to December 2005 by either week of consultation or date of notification as applicable. VAED and VEMD data were available from January 2001 to July 2004 and were extracted by date of admission or date of emergency department presentation respectively. Data extraction from VAED and VEMD were restricted to ICD-10-AM codes for laboratory-confirmed influenza (J10) and influenza-like illness (J11).

Seasonal influenza activity was compared by number and age group of cases for each data source from January 2001 to July 2004. Comparisons were extended to December 2005 for GP sentinel surveillance, MMLS and laboratory-confirmed notification data. Age groups analysed were less than 15 years (school age), 15–44 years (young adult), 45–64 years, (adult) and 65 years and older (older adult).

A summary comparison of the relative strengths and weaknesses of each of the five surveillance systems was made, based on the criteria of:

- ease of access of data (to the surveillance coordinator at VIDRL);
- timeliness of data;
- potential for year-round surveillance; and
- facility for laboratory testing of respiratory specimens from patients with ILI.

Results

Seasonal activity

A clear seasonal trend for ILI or laboratory-confirmed influenza over the winter months was apparent from each data source (Figure 1). The marked seasonal peak of ILI activity during August 2001 was evident from VEMD, VAED, MMLS and GP sentinel surveillance. Notification data indicated this seasonal peak a month later. The seasonal peak in 2002 was detected by GP sentinel surveillance and VEMD in June and a month later by the other data sources. For 2003, the seasonal peak was observed in August by all data sources. Only GP sentinel surveillance and VEMD indicated any increase in activity during the low influenza season of 2004 whereas in 2005, the three available data sources all detected the seasonal peak in August.

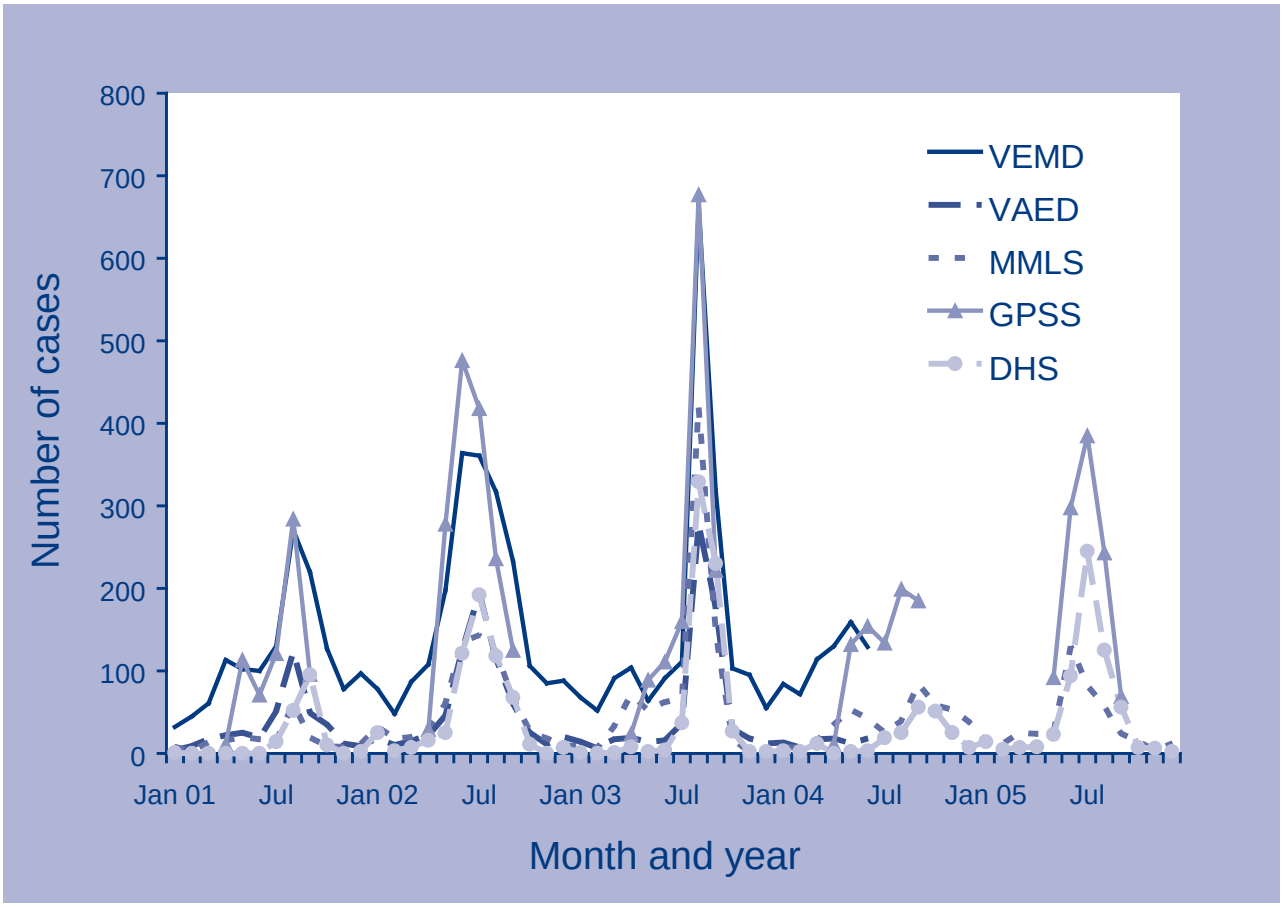
Age

Comparisons between the five data sources classified according to age group are presented in Figure 2. Patients in the 15–44 year age group comprised the highest proportion of notifications in GP sentinel surveillance and the VEMD. Emergency departments notified a higher proportion of children (≤14 years) than other data sources. Children also formed a relatively high proportion of laboratory-confirmed notifications. The elderly comprised a higher proportion of locum service notifications or hospital admissions.

Strengths and weaknesses

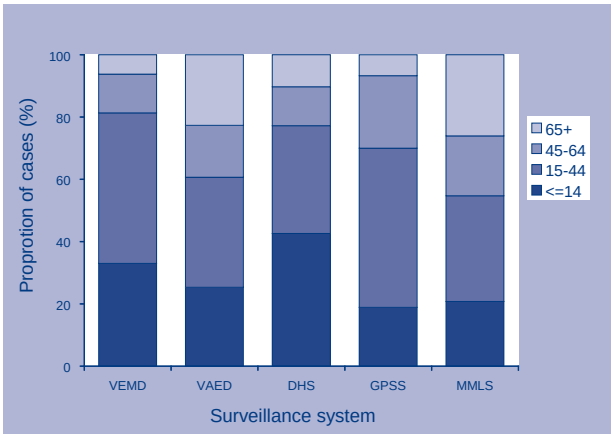
The strengths and weaknesses of the five surveillance systems are presented in the Table. MMLS surveillance was timely, easily accessed and available all year but could not confirm influenza by laboratory testing. Laboratory confirmed data, while available from each of the other data sources, were only available in a timely manner from GP sentinel surveillance and DHS notifications. GP sentinel surveillance was relatively labour intensive. As currently

Figure 1. Number of influenza-like illness or confirmed influenza cases, Victoria, 2001 to 2005, by data source



DHS	Department of Human Services (notifications)	GPSS	General Practitioner Sentinel Surveillance
MMLS	Melbourne Medical Locum Service	VAED	Victorian Admitted Episodes Data
VEMD	Victorian Emergency Department Data		

Figure 2. Proportion of ILI or influenza cases, Victoria, 2001 to 2004, by age group and data source



DHS Department of Human Services (notifications)

GPSS	General Practitioner Sentinel Surveillance
MMLS	Melbourne Medical Locum Service
VAED	Victorian Admitted Episodes Data
VEMD	Victorian Emergency Department Data

available on a routine basis, the delay in availability of hospital data (VAED and VEMD) renders these systems unsuitable for timely surveillance.

Discussion

Data from Victorian hospitals, sentinel GP surveillance, a medical locum service and influenza notifications to DHS are all useful indicators of influenza activity. Despite similar overall trends in activity, community-based ILI data sources demonstrated increased activity prior to notifications of laboratory-confirmed influenza in three of the five influenza seasons studied, and at the same time for the other two seasons. This is likely to reflect the time taken to process a specimen, confirm the presence of influenza and forward the notification to DHS.

While this retrospective analysis permits observation of similarities in the data sources, not all data sources are available in a time period that would support rapid decision-making. MMLS and DHS notification data are available daily. GP sentinel

Table. Comparison influenza and influenza like illness data source features, Victoria

System	Laboratory-confirmed influenza	Influenza-like illness	Data available by period	Ease of data access by surveillance coordinator at VIDRL	Potential for year round surveillance
MMLS	No	Yes	Daily	Can be downloaded from MMLS website at any time	Available all year round
GPSS	Partial	Yes	Weekly	Surveillance tally sheets faxed to VIDRL each week	Available during influenza season but could be expanded to non-influenza season
DHS	Yes	No	Daily	Available on DHS website and updated daily	Available all year round
VAED	Partial	Yes	Monthly*	Accessible for DHS, otherwise available only with >12 month lead-time	Available all year round but lacking timeliness
VEMD	Partial	Yes	Twice monthly*	Accessible for DHS, otherwise available only with >12 month lead-time	Available all year round but lacking timeliness

* Data availability for approved surveillance purposes only.
DHS Department of Human Services (laboratory-confirmed notifications)
GPSS General Practitioner Sentinel Surveillance
MMLS Melbourne Medical Locum Service
VAED Victorian Admitted Episodes Data
VEMD Victorian Emergency Department Data
VIDRL Victorian Infectious Diseases Reference Laboratory

surveillance data are available weekly. Hospital data, either from admissions or emergency presentations, although collected at individual institutions in real time, have an approximate 18-month delay to collation and availability for dissemination to agencies other than DHS. However, monthly VAED and fortnightly VEMD preliminary data can be made available for approved surveillance purposes. New South Wales has developed a system for the timely use of hospital data for ILI surveillance.[13]

Although MMLS data are the most accessible, they do not provide the opportunity for laboratory sampling. This can lead to reduced specificity, as several other respiratory viruses may present as an influenza-like illness in the absence of laboratory confirmation.[7,14,15]

There are other potential influenza surveillance data sources not considered as part of this study. These include mortality data and workplace absenteeism. Several studies have highlighted the difficulty of interpreting mortality data for influenza activity, as only the primary cause of death may be recorded without the attributing complication by influenza.[16] Likewise workplace absenteeism surveillance is difficult to interpret in light of the non-specific nature of absenteeism.[17,18]

Community ILI surveillance, operating as sentinel GP,[2] locum service[6] or hospital emergency department[13] surveillance, in conjunction with notification of laboratory-confirmed influenza,[12] would provide adequate inter-pandemic surveillance for influenza in Victoria and, by extension, in any Australian jurisdiction. Using more than one surveillance system improves the age range of patients captured by surveillance and allows validation of surveillance findings.

Community surveillance is, however, unlikely to detect the first case or cluster of cases in a pandemic, given the very low proportion (as few as 1%–2%) of all consultations that need to be monitored to describe seasonal influenza activity. This small proportion is unlikely to be sufficiently sensitive to detect an early case or cluster of a new viral sub-type.[19] Hospital-based surveillance is likely to capture more severe illness but will only be useful in detecting early cases or a cluster if it is timely.[13] Early case detection may rely on targeted border surveillance or the investigation of unusual disease clusters.[20] Other options will need to be considered. Pandemic monitoring will best be achieved by automated surveillance systems, such as those provided by the locum service in Victoria and hospital emergency department in New South Wales, that will be able to operate when there is the potential for high workforce absenteeism. Strengthening these surveillance systems in the inter-pandemic period should assist pandemic preparedness.

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