

# Implementing a system of enhanced surveillance for measles in Victoria

*The Enhanced Measles Surveillance Working Party*

## Abstract

**In response to identified deficiencies in the passive surveillance system for measles in Victoria and the move towards local disease elimination and global disease eradication, a system of enhanced measles surveillance was introduced in 1997. Each case is contacted and a structured telephone questionnaire is completed, collecting information on symptomatology and encouraging serological confirmation, if not already performed. The introduction of a paediatric phlebotomy service to collect serum specimens in the case's home, has led to a dramatic increase in the proportion of cases where testing is performed, reaching nearly 90 per cent by the end of 1998. The median time from notification to specimen collection is one day. The Victorian approach to the enhanced surveillance of measles provides a framework for similar systems as Australia approaches disease elimination. *Commun Dis Intell* 1999; 23:51-54**

## Introduction

In 1996, the Centers for Disease Control and Prevention (CDC), the Pan American Health Organization (PAHO), and the World Health Organization (WHO), jointly acknowledged the importance of surveillance in measles elimination and that laboratory confirmation of measles will play an increasingly important role as incidence declines.<sup>1</sup> They recommended that surveillance data be collected on a case-by-case basis at an early stage of the elimination program, and that all single cases of measles and at least one case from each chain of transmission be laboratory confirmed.

In 1997, the Enhanced Measles Surveillance Working Party was established to oversee the running of measles surveillance in Victoria. This is a collaborative group with representatives from the Department of Human Services (DHS), the Microbiological Diagnostic Unit (MDU), and the Victorian Infectious Diseases Reference Laboratory (VIDRL). We report details of the methods used to enhance passive surveillance of measles in Victoria.

## Enhanced surveillance methods

In Victoria, medical practitioners and laboratories are required to notify DHS immediately on initial diagnosis of measles whether presumptive or confirmed. In addition to this, informal reports are frequently received from other sources, such as child care centres and schools. These informal reports are followed up and those patients who have not consulted a medical practitioner are advised to do so. Medical practitioners who have diagnosed measles but failed to notify are contacted to both verify the diagnosis and advise of the requirement to notify.

For each notification of measles, we attempted to interview the case or the case's guardian using a structured telephone questionnaire. We collected a range of detailed information including: clinical symptoms of suspected measles as specified by the National Health and Medical Research Council;<sup>2</sup> self-reported immunisation history and past history of disease. We confirmed demographic details and, if not already performed, encouraged serological confirmation of disease. After the first six months we enhanced our efforts to obtain serological confirmation by

offering the services of an experienced paediatric phlebotomist who collected clinical specimens in the case's home at no charge to the patient.

We established an enhanced measles surveillance database to collate the detailed information from interviews and test results. We review the measles database for completeness and accuracy at a weekly meeting between DHS and VIDRL staff.

## Laboratory methods

### Specimens

Specimens for laboratory confirmation of clinical measles are collected during a nurse's visit immediately upon notification to DHS, Victoria. A 5 mL tube of clotted blood for serology is always collected subject to consent. Since mid 1998, specimens for recovery of measles viruses have been sought. A further 5 mL tube of anticoagulated blood and a 5-10 mL specimen of urine are collected for viral culture and/or direct polymerase chain reaction (PCR) if these can be obtained within one week of rash onset. The nurse was also equipped to obtain a nasopharyngeal aspirate, or failing this a throat swab if these can be obtained within five days of rash onset.

When neither measles IgM or IgG antibody are detected in serum obtained within four days of rash onset, and in the absence of an alternative laboratory diagnosis, a second tube of clotted blood for convalescent serology is sought approximately three weeks after rash onset.

### Serology

Sera are tested for measles specific IgM and IgG antibodies on the day of specimen receipt by enzyme immunoassay (EIA) (Behring Enzygnost). Sera in which measles specific IgM is not detected are tested for IgM and IgG antibodies to parvovirus B19 by EIA (Biotrin), to rubella by EIA (Sorin BioMedica and PanBio respectively) and human herpes virus type 6 by in house IFA using standard methods.

### Viral Culture

Measles virus culture is undertaken from urine, nasopharyngeal aspirates, throat swabs and peripheral blood leucocytes (PBLs) using a primate lymphocyte cell

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line (B95a) as previously described.<sup>3</sup> Cells are examined for cytopathic effect for up to 14 days incubation and presence of measles virus is confirmed using PCR. Measles virus RNA is purified from cell culture isolates and directly from clinical specimens using standard methods. RT-PCR is performed using PCR primers targeting the COOH terminal 450bp of the nucleoprotein gene as previously described.<sup>4</sup>

### Is it measles?

We established a decision tree in order to classify suspected cases as measles in one of five categories: laboratory confirmed, rejected, epidemiologically linked to a laboratory confirmed case, compatible or not compatible (Figure 1). For reporting purposes we consider all cases to be measles unless proven otherwise (that is, classified as 'rejected' or 'not compatible').

Our aim is to classify all suspected cases as either 'laboratory confirmed' or 'rejected' but this is not always possible, particularly if no specimen has been collected. If serum is collected early (within 72 hours of rash onset), 23 per cent of true measles cases may not have developed an IgM response.<sup>5</sup> These cases can be rejected if they are measles IgG positive but some cases are both measles IgM and IgG negative and have no alternate diagnosis. In this situation we classify cases on the basis of their clinical symptoms<sup>2</sup> and attempt to obtain convalescent sera for those considered clinically 'compatible'. Detection of measles virus may assist in resolving the status of some of these cases since the collection of suitable specimens commenced in mid 1998.

Although measles IgM positive, we classify cases who have been vaccinated within 45 days of specimen collection as 'rejected' (unless they are epidemiologically linked to a laboratory confirmed case) as the antibody response is considered due to the vaccine virus.

### Monitoring surveillance quality

In this issue of *Communicable Diseases Intelligence*, the National Centre for Immunisation Research and the Surveillance of Vaccine Preventable Diseases (NCIRS) presents a framework for measles surveillance as Australia approaches disease elimination.<sup>6</sup> Part of this framework suggests specific process measures to be used for monitoring surveillance quality. The four suggested process measures are:

1. the proportion of all cases that are subjected to laboratory testing for measles;
2. the median time from rash onset to specimen collection;
3. the median time from specimen collection to notification of the local/state health authority; and

4. percentage of cases with data on immunisation status.

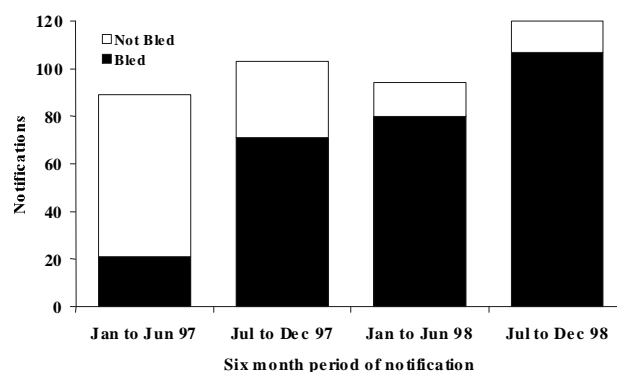
These measures appear to be designed for a system where the normal sequence of events is rash onset, specimen collection, and then notification. With the introduction of enhanced surveillance in Victoria, the normal sequence of events is rash onset, notification, and specimen collection arranged by DHS. For this reason we present modified process measures 2 and 3:

2. the median time from reported onset date to notification; and
3. the median time from notification to specimen collection.

Data are presented in six month time periods from the introduction of the paediatric phlebotomy service, July 1997.

There were 317 notifications of measles received from medical practitioners and laboratories by DHS between 1 July 1997 and 31 December 1998 (Table 1). Following introduction of the paediatric phlebotomy service, the proportion of cases who had serum collected has increased dramatically (Figure 2). We now obtain specimens from almost 90 per cent of notified cases. The specimens are collected with a median delay of one day from notification, and we have the results within 24 hours. Throughout the period the median delay from onset to notification has remained in the vicinity of six days. For those cases identified as 'laboratory confirmed' the median delay from onset to notification is 14 days.

**Figure 2. Measles notifications by six month period of notification and serology status, Victoria, 1997 to 1998**



**Table 1. Process measures for measles notifications in Victoria, July 1997 to December 1998**

Six month period	Serum collected	Median delay illness onset - notification (number)	Median delay Notification - specimen collection (number)	Data on immunisation status
Jul 97 to Dec 97	71 / 103 (69%)	7 days (103)	1 day (57)	97 / 103 (94%)
Jan 98 to Jun 98	80 / 94 (85%)	8 days (94)	1 day (58)	92 / 94 (98%)
Jul 98 to Dec 98	107 / 120 (89%)	6 days (120)	1 day (92)	119 / 120 (99%)
Total	258 / 317 (81%)	7 days (317)	1 day (207)	308 / 317 (97%)

## Discussion

Surveillance for measles in Victoria has been enhanced substantially through collaboration between the Victorian Department of Human Services and the Victorian Infectious Diseases Reference Laboratory. We believe a structured approach to each notification of measles and accurate recording of laboratory testing is necessary to determine when local transmission of disease has been interrupted and should be an essential component of a national strategy for elimination in Australia.

The use of process measures to monitor program quality is important. We know from our data that we are collecting specimens from a very high proportion of notified cases and that these are being collected within a day of notification (seven days from onset of illness). We consider that surveillance of measles in Victoria is now very high quality but we still need to reduce reporting delay.

A number of changes have been proposed to further augment the enhanced surveillance system, and to improve the quality of the data being collected. We intend to contact all laboratories in Victoria, making them aware of the enhanced measles surveillance program, and inviting their cooperation in providing measles IgM positive serum to VIDRL for confirmatory testing. With this contact, we will also identify those laboratories who perform in-house measles serology, and ask them to collect a core minimum dataset for each measles test performed. This will provide important supplementary information about testing patterns for measles virus in Victoria.

Finally, we intend to develop a pilot study involving active surveillance for rash illness. This study will be conducted in sentinel general practices and child care centres. The aim of this study is to identify the cause of rash illness in our community, and to ascertain if there are cases of measles going unrecognised by the current passive surveillance system.

The outcomes of the serological testing, and how these relate to various case definitions, are still being examined. However, in keeping with findings in the United Kingdom<sup>7</sup> and Finland,<sup>8</sup> the vast majority of notified cases who have testing performed are in fact not measles.

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## Early influenza A outbreak in a Sydney nursing home

Reported by Mark Ferson, Director, South Eastern Sydney Public Health Unit

South Eastern Sydney Public Health Unit is investigating an outbreak of acute respiratory illness among residents of a local nursing home.

Of the 70 residents, 35 were affected with fever, cough and lethargy with onset between 11 and 20 February 1999. Eight residents have been hospitalised with pneumonia. Throat swabs collected on 13 February were processed at SEALS Virology Laboratory and to date influenza A has been isolated from three of 14 specimens. Serological studies are also in hand. A small number of deaths have occurred.

A vaccination program for residents and staff has been conducted. The use of amantadine was being considered but decided against.

(Due to delayed publication it has been possible to provide this recent information.)