Editorial
Measles elimination – a case definition to enhance surveillance

The end of the 20th century was greeted by a ground-swell of optimism that measles eradication was theoretically and technically feasible with the tools already available.[1,2]

This enthusiasm was galvanised by the reduction in measles incidence and mortality in many parts of the world, and progress towards elimination of indigenous measles transmission in the Americas.[3] The latter used the strategy of combining a single mass 'catchup' campaign for children 9 months to 15 years of age with high coverage through routine vaccination of infants, plus intensive surveillance and follow-up campaigns to prevent excessive build-up of susceptible individuals.[4]

In Australia, progress towards measles elimination has recently seen a shift from an 'outbreak control' phase to an 'elimination phase' with the publication of supportive comprehensive guidelines;[5] this is encouraging. Strategies accompanying this change in policy are similar to those adopted in the Americas and include modification of the vaccination schedule to improve coverage rates through earlier routine two-dose childhood vaccination, a once-off school-based mass campaign in 1998, protection of high-risk groups, and rapid response to outbreaks.

Improved surveillance is necessary to demonstrate the termination of wild virus circulation and to detect outbreaks.[6] This is of particular relevance to Australia as this country will remain vulnerable to importation of disease from countries where measles virus continues to circulate. The threat of measles outbreaks in people aged 16-30 years (the group not captured during mass vaccination campaigns and not enjoying immunity due to exposure to wild measles virus) has recently been recognised.[7,8] Thus the commitment to achieving measles elimination demands an intensified surveillance strategy so that outbreaks and importation of infection can be detected rapidly, and timely intervention initiated.

Enhanced surveillance has a number of components, including assuring the availability and accessibility of a laboratory network capable of serologically confirming all suspected measles cases.[9] This is important because, as elimination approaches, clinical 'measles-like' cases will more often be other rash-associated conditions, particularly those due to viruses, such as rubella, parvovirus B19, dengue, and human herpesvirus-6.[10,11,12] The value of the laboratory system is, however, dependent on the ability of the health system to detect all possible measles cases and submit appropriate specimens for confirmation. This demands a high level of awareness amongst health personnel of the need for immediate

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detection and reporting of measles-compatible clinical disease.

As the costs of missing a single measles case can be enormous, the phase of elimination demands a case-definition with a sensitivity approaching 100 per cent. The selected case-definition should also be standardised and unambiguous.[13]

The case-definition included in the current *Guidelines for the control of measles outbreaks in Australia* defines a suspected measles case as *'an illness with all of the following features: morbilliform rash, cough and fever present at the time of rash onset'*.[5] This case-definition has three potential attendant problems. Firstly, the description of the rash as 'morbilliform' is tautological since the term means 'measles-like'. However, this semantic irritation is not as important as the second potential consequence of describing the rash as 'morbilliform'. Historically, when measles was common, most clinicians would have recently seen the typical maculopapular skin rash and thus would have been able to recognise it reliably. As measles has become less common, many clinicians will fail to recall accurately features of the measles rash or may have never seen it; thus describing a rash as 'morbilliform' will be of dubious value.[14,15,16]

The third problem inherent in the present Australian case-definition is the mandatory inclusion of cough before clinical illness may be considered as '*possibly due to measles'*. This appears to be largely based on a study of 49 patients notified to the Eastern Sydney Public Health Unit with a clinical diagnosis of measles. In this study the Centers for Disease Control and Prevention (CDC) case-definition had a high sensitivity (92%) but a low specificity (24%) due to the false-positive rate of 51 per cent.[17] By including cough as a prerequisite for a modified measles case-definition, specificity was increased to 57 per cent but with no apparent change in sensitivity. However, the conclusion that there was no change may be invalid as their new proposed case-definition was applied to patients detected using the CDC definition and any statements on sensitivity should thus be guarded.[18]

The clinical picture of measles in older children and adults may differ from younger children, and measles is often more severe in older children.[19,20] With the changing epidemiology of measles susceptibility in Australia, to ensure a sensitive case-definition, attention needs to be paid to the clinical presentation in older individuals.

The precedent for evolving a measles case-definition towards greater sensitivity has already been set. Although the original measles case-definition for national surveillance in the United States of America was *'an illness characterised by all of the following features: a generalised maculopapular rash lasting three or more days; and a fever exceeding 38.3^{0}C; and cough or coryza or conjunctivitis'*, the Immunization Practices Advisory Committee has since recommended that all rash illness with fever should be investigated as possible measles.[21] Similarly, although the World Health Organization clinical measles case definition includes *'any person with: fever, and maculopapular (ie. non-vesicular) rash, and cough, coryza (ie. runny nose) or conjunctivitis (ie. red eyes*)', health care workers are instructed to suspect measles infection and respond accordingly in all patients presenting with fever and generalised maculopapular rash.[2,22] This definition is similar to that used in Mpumalanga Province, South Africa, where a public health response is catalysed by *'any patient with fever and a non-blistering generalized skin rash*'.[23]

Surveillance is rightly recognised as 'the key to eradication' of measles.[24] Thus, as elimination is neared in Australia, to prove the absence of indigenous measles and to contain transmission from any imported case, it may be necessary to change the current case-definition. This may indeed formalise the working approach already prevalent in certain States and Territories. Such a modified case-definition should have maximal sensitivity for detecting possible measles cases and be unambiguous. An enhanced case-definition that is unambiguous and captures all cases eg '*fever and generalised maculo-papular rash'* or *'fever and non-blistering generalised skin rash*', may be necessary to achieve this. We believe that such a case definition would increase the sensitivity for detecting cases of measles and that the decreased specificity due to such a case definition would be justified.

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