CIDM centre for infectious diseases & microbiology Public Health

THE BROAD STREET PUMP

A recent measles outbreak in Western Sydney – diagnosis and population vaccination status

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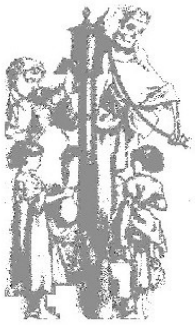

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Australia has declared elimination of endemic measles transmission since 2005. This claim is supported by the existence of quality surveillance systems reporting low measles incidence (annual incidence of <1 – 6 cases/million population since 2005),[1] high vaccine coverage rates as recorded by the Australian Childhood Immunisation Register (ACIR), and the absence of an endemic measles genotype. This final point is supported by the fact that outbreaks from the early 1990's to 2006 were associated with several different virus genotypes, suggestive of multiple imported strains.[2] However, Australia has continued to experience measles outbreaks to the present day.

From early February until the end of March 2011, 26 confirmed cases of measles were reported to the Parramatta Public Health Unit (PHU). It was the first outbreak in the Western Sydney Local Health District area since 2006. There was no history of contact of the index case with an ill person, but the household did have frequent visitors from overseas and interstate. Among the 26 people affected, ages ranged from 8 months to 35 years, 13 were male and one was indigenous. All those affected experienced a fever (frequently > 38°C) and skin rash, with 92% and 88% experiencing cough and coryza respectively.

All affected individuals resided within the Blacktown local government area, 22 within one of four postcode areas. Twelve patients were children/teenagers of Pacific Islander ethnicity (nine were Australian born) and, of these, eight were part of an outbreak of 10 cases at a single high school. A mass vaccination clinic was held at the high school on the 8th of March at which 492 students and 42 staff were vaccinated. No further cases were reported amongst the students after the clinic although tertiary cases associated with the school had occurred by that time.

Three sporadic cases during the outbreak period were in returned travellers from the Philippines and another may have resulted from a separate overseas contact, as measles genotyping revealed a unique genotype.

No confirmed case had documented evidence of two doses of a measles containing vaccine; three had evidence of a single dose. Parental recall of their children's immunisations was non-specific and often could not be validated by the ACIR (despite a birth-date after 1997, indicating eligibility to be on the register) or child health record.

Due to its rarity in Australia, measles cases were not immediately recognised by health professionals at the start of the outbreak, especially during the non-specific prodromal phase. Frequently, patients attended general practice or a hospital emergency department, often on more than one occasion, during their infectious period. This generated a large number of contacts which PHU staff followed up according to NSW Health measles control guidelines.[3] Fortunately, towards the latter stages of the outbreak, cases were recognised and patients were isolated earlier, as awareness of the disease increased amongst health care providers within the affected area. No confirmed cases arose amongst contacts that were identified and provided with prophylaxis within six days of initial exposure.

Measles cases were confirmed using the NSW Health case definition;[3] 22 cases met the definition of a typical clinical syndrome with definitive laboratory results, four cases satisfied the alternative criterion of a typical clinical syndrome with an epidemiological link to a confirmed case. Depending on the time of notification in relation to symptom onset, PHU staff advised notifying clinicians, who suspected measles, to send blood for measles IgM (and IgG if a suspected case may have

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received previous measles vaccine), a nasopharyngeal swab (NPS) or aspirate (NPA) and urine (20mls) for measles virus antigen detection by immunofluorescence (IF).

Same day results are possible with IF tests (which can be done within an hour of receipt of the specimen, if necessary). Serology results are generally available by the following day. As prophylaxis must be given within 144 hours (6 days) of first contact with an infectious case to be effective, timely laboratory confirmation is essential for effective public health action in any cases without a clear epidemiological link or with atypical presentation, as it is not feasible or desirable to undertake the extensive contact tracing required for all suspected cases.

One patient, who had received a single dose of measles vaccine fifteen years ago, required repeat serological testing to confirm the diagnosis of measles. On the day of rash onset, IF tests and IgM were negative and IgG was equivocal, raising the possibility of pre-existing immunity and therefore a non-measles aetiology for the patient's symptoms. However IgM can be falsely negative in the first three days after rash onset in 30% of cases.[4] Three days later both IgM and IgG were clearly positive, confirming the diagnosis.

Measles virus RNA can also be detected by polymerase chain reaction (PCR) at rash onset but it is no more sensitive, overall, than IF and it less rapid and considerably more expensive. It is useful for a small proportion of cases in which other tests are inconclusive and can be used to test plasma or serum (as well as upper respiratory and urine samples).

An alternative diagnostic tool is saliva-based measles serology. This test may provide more convenient confirmation of measles, particularly in babies and young children. There is often reluctance amongst general practitioners and parents to subject very young children to venepuncture. Those willing to have blood tests are often sent to a pathology collection centre or hospital emergency department to access technicians proficient in obtaining blood, which can contribute to delayed measles diagnosis and increases the potential for exposure of other patients and staff to measles infection. Testing of saliva for IgM antibody has been shown to be as sensitive and specific as serology within a similar time frame in relation to rash onset.[5] However, it is relatively difficult to validate and has not been widely implemented for routine diagnostic use.

The Victorian Infectious Diseases Reference Laboratory in Melbourne performed molecular typing on isolates from eight cases in this outbreak. Genotype D9 (endemic in Indonesia, Singapore and Japan) was detected in seven. The other was genotype D8 (endemic in India, Nepal and Bangladesh)[6], who had no discernible epidemiological link to any other cases.

This recent outbreak highlights a potential problem for sustaining measles elimination in Australia; that is, (likely) importation of measles virus followed by secondary spread amongst a sub-population with inadequate measles vaccination coverage*. To maintain long-term measles elimination in Australia and reduce the risk of outbreaks due to secondary transmission of any imported virus, residual population susceptibility to measles, after a 2-dose schedule needs to remain below 5%.[7]

Since measles remains uncommon in Australia, despite periodic outbreaks from imported cases, the numbers of naturally immune individuals will fall with time to a negligible level. Consequently, the maintenance of measles elimination status will be even more reliant on high levels of two dose vaccine coverage across the population. The described outbreak highlights the need to constantly strive for greater than 95% measles vaccination coverage to maintain herd immunity. This may require catch up programs for particular birth cohorts amongst specific sub-populations and routinely offering measles vaccine prior to overseas travel, in addition to focusing on all pre-school aged children and strengthening of the routine childhood immunisation program. Measles vaccine is provided at no cost in NSW to people born during or after 1966.

* Data obtained from ACIR giving 1st and 2nd dose MMR coverage rates for assessment years 1998 to 2005 for the four postcode areas most affected by the outbreak (2761,2766,2767,2770).

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Staff Profile ……

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We would like to welcome Georgia Longden as a new member to our team. Georgia is the Executive Support Officer working for Sydney Emerging Infections & Biosecurity Institute (SEIB), as well as Centre for Research Excellence in Critical Infectious Diseases (CRE). Georgia and her family have recently moved to Sydney from Adelaide, where she was the Contracts Manager within the IT department at the University of Adelaide. She has experience in high level administration and has been involved in establishing new policy and procedure within complex organizations. Georgia has managed major leasing and services contracts for a large retail outlet, and brings experience in financial and budget management.

Georgia is working closely with Professor Tania Sorrell on SEIB, and will be involved in website management, reporting, event coordination and the promotion of SEIB.

Upcoming Events…

'Are we ready for the next bio-threat – natural, accidental or deliberate?' ***19 & 20 August 2011***

A CIDM-PH and SEIB symposium on recognition and management of dangerous micro-organisms and their effects.

Program details coming soon….

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