

Short reports

PUBLIC HEALTH RESPONSE TO A MEASLES OUTBREAK IN A LARGE CORRECTIONAL FACILITY, QUEENSLAND, 2013

Madhumati Chatterji, Anne M Baldwin, Rajendra Prakash, Susan A Vlack, Stephen B Lambert

Abstract

This report documents the prompt, co-ordinated and effective public health response to a measles outbreak in Queensland in 2013. There were 17 cases in a large, high-security, regional correctional facility, a setting with unique challenges. Recommendations are provided to reduce the likelihood and magnitude of measles outbreaks in correctional facilities. *Commun Dis Intell* 2014;38(4):E294–E297.

Keywords: measles, prisoner, justice, correctional, offender, outbreak, epidemic, Queensland, guidelines, vaccination

Background

The World Health Organization recently declared that Australia has been in a period of sustained measles elimination since at least 2009.¹ However this does not mean an absence of cases; imported cases continue to occur in returned international travellers, and those exposed to them whilst infectious, leading to local outbreaks. By early October 2013, Queensland had experienced more year-to-date notifications (20) than the annual average of the previous 5 years (15), with an ongoing outbreak of 13 cases in South East Queensland.² This report documents the public health response to an outbreak of measles in a correctional facility. Measles is a highly contagious disease transmitted by droplet and airborne routes.³ Correctional facilities present unique challenges for communicable disease control, for reasons including the close living conditions, and number and turnover of prisoners and staff.⁴

Outbreak

On 29 October 2013, the treating physician of a South East Queensland, high-security correctional facility (capacity approximately 1,000 males) notified the local public health unit (PHU) of 4 prisoners with fever and rash suspected to be measles.

Presentations were atypical. One case had a rash starting in the left thoracic area. Another had a protracted flu-like illness with severe cough for

7 days and a rash that started on an elbow before progressing to the rest of the body. The third had diffuse spots with maculopapular rash starting the same day as high fever. The fourth had a flu-like illness for 2 days with a transient 'spotty' rash on the chest. The following day, a 5th prisoner was notified with a classical measles rash. Measles virus was detected by polymerase chain reaction (PCR) testing of upper respiratory tract swabs from each case.

Review of case notes for prisoners with recent rash and fever was undertaken to identify the primary case. Approximately 2 weeks previously, a prisoner was diagnosed with a drug rash from antibiotics administered for a respiratory tract infection. Following look-back, measles virus was detected by PCR in a sample taken from the prisoner. Airborne transmission of the virus is possible and this case had moved widely in the correctional facility, sharing facilities with each of the 5 cases and others during the infectious period. The exposure period, movements and genotype (G3) suggest the prisoner acquired the infection from a community outbreak² before entering the correctional facility.

Overall, 17 cases were linked to the outbreak (Table). Cases were laboratory confirmed by PCR, with the exception of 1 confirmed by measles-specific immunoglobulin M in serum. Exposure and infectious periods suggest the correctional facility's primary case infected 8 cases who in turn infected 7 cases (Figure). Vaccine-strain virus was detected in 1 further case who was vaccinated in the mass vaccination program. One staff case produced documentation of 1 previous dose of measles vaccine. Prisoners' vaccination histories were not available.

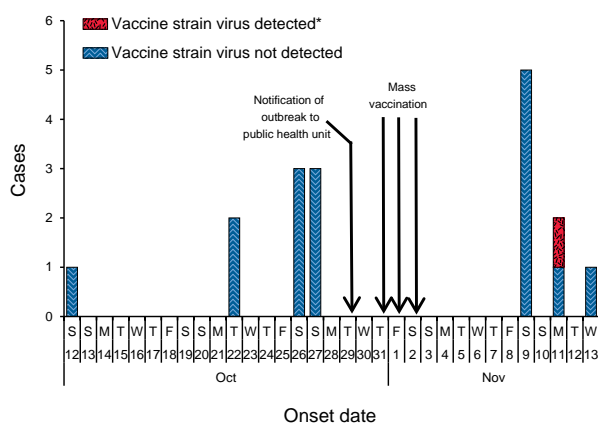
The outbreak was declared over when 36 days (2 maximum expected incubation periods) since the last case's infectious period had passed without a new, epidemiologically-linked case.

As this response and release of data are provided for under the *Public Health Act 2005*,⁵ human research ethics committee approval was not required.

Table: Demographic characteristics of measles cases associated with the correctional facility (n=17)

Age	Range	18–41 years
	Median	28 years
Sex	Female	3 cases
	Male	14 cases
Indigenous status	Indigenous	1 case
	Non-Indigenous	13 cases
	Unknown	3 cases
Group	Prisoner	14 cases
	Correctional centre staff	3 cases

Figure: Symptom onset dates of measles cases associated with the correctional facility, 12 October 2013 to 13 November 2013 (n=17)



* This result does not preclude infection with wild-type virus.

Response

On 29 October 2013, suspected cases of measles were isolated, advice was provided to staff and staff and prisoner movements were restricted. On 30 October following laboratory confirmation, an outbreak control team (OCT) of staff from the state justice department including the correctional facility, state department of health, public health laboratory, local PHU, hospital pharmacy and other hospital and health service (HHS) teams, was assembled.

As prisoners and visitors shared air space via grilles in visitation stalls, prisoner visits were cancelled on 1 November. No admissions of new prisoners were accepted. Prisoners recently transferred out were monitored for symptoms at receiving facilities. Transfers of non-immune prisoners were suspended state-wide.

With around 900 prisoners and 450 staff potentially exposed, individual contact tracing and immune status determination were not considered feasible or sufficiently timely. Consistent with public health recommendations for the management of measles outbreaks in large institutions,^{6,7} a mass vaccination approach was adopted.

The department of health procured sufficient vaccine (M-M-R© II, bioCSL/Merck) within 24 hours of planning the activity. The HHS mobilised nurses to vaccinate alongside correctional facility staff, and provided consumables. Pre-vaccination assessment, informed consent, standing orders⁸ and adverse event procedures, documents and other resources were developed. The standing orders enabled the measles vaccine administration without a prescription for each prisoner. Key messages regarding measles' infectiousness, complications, prevention and control were disseminated to prisoners, staff, visitors and the general public. State health hotline staff were briefed and the service publicised for enquiries.

On 31 October, approximately 80 staff were vaccinated. Over the next 2 days, approximately 1,150 vaccinations of staff and inmates were administered. In the following week, correctional facility staff conducted mop-up vaccinations, and movement and visitor restrictions were gradually lifted. All were vaccinated except 1 prisoner and 3 staff who refused. These were isolated or excluded from work until the maximum expected incubation period (18 days) had elapsed without symptom onset.

Discussion

Measles in institutional settings can result in explosive outbreaks with large numbers of cases, and difficulties in containing successive waves of infection. The response to this correctional facility measles outbreak was rapid and highly coordinated, limiting further cases.

The clinical suspicion of measles in the first 4 identified but atypical cases was crucial to the immediate diagnostic testing and implementation of control activities. It is known that a proportion of all measles cases will not present with classic symptoms—the reason for the clustering of unusual presentations in this outbreak is unknown.

Swift commencement of mass vaccination meant most prisoners and staff received a vaccine within 3 days of the outbreak identification.

The early assembly and central co-ordination of an OCT of key stakeholders and experts meant that

those best placed to provide expertise contributed to decision-making and facilitated speedy deployment of interventions.

No subsequent community cases were epidemiologically linked to this outbreak. Most cases with onset after the mass vaccination were most likely already incubating the disease.

Timely and appropriate communication ensured that the situation and associated risks were well communicated. Surveillance for cases and movement restrictions within the correctional facility allowed rapid responses when new cases were identified. Safety, security and order were maintained.

There were challenges. A higher clinical suspicion of measles in the primary case, given the local outbreak,² may have enabled better containment.

Correctional facilities are advised to isolate prisoners with infectious diseases to minimise transmission, where appropriate.⁹ Specific guidance for measles outbreak management in correctional facilities is however, absent from national⁷ and state⁶ health and correctional guidelines,⁹ leading to some dependence on expert advice regarding interpretation and implementation of generic guidelines for this setting. As with most measles responses, success came from relying on first principles: timely contact immunisation, case isolation and limiting the movements of exposed individuals.

There are no specific measles immunity data available for Queensland prisoners. However, they are more likely than the general adult population to be born since 1966, thus less likely to have pre-existing natural immunity.^{10–12} Additionally, 14% of prison entrants in New South Wales in 2010 who were born since 1969 and tested, were susceptible to measles, compared with 8%–9% of the general population of similar age.^{13,14} For a highly contagious virus like measles in a confined institutional setting, this represents a high risk of serial waves of transmission if initial cases are not promptly recognised, and the outbreak response is not swift and comprehensive.

Although measles vaccine is funded in Queensland,¹⁵ it is not routinely offered to prisoners, nor is there screening for measles immunity on prison entry. Immunity and vaccination records were also not readily available during this outbreak, preventing rapid identification of susceptible prisoners.

The setting presented logistical difficulties. Floor plans were unavailable to the OCT for security reasons, preventing the usual outbreak mapping of case movements. It was not feasible for public health staff

to directly interview cases. Standard immunisation procedures needed to be modified to maintain correctional facility security and staff safety.

To reduce the likelihood of outbreaks in correctional facilities and improve public health responses, it is recommended that:

1. specific guidance for managing correctional facility measles outbreaks is developed and included in prison and health guidelines;
2. measles vaccination is routinely provided to Queensland's susceptible prisoners; and
3. a high degree of clinical suspicion for measles is maintained, particularly during community outbreaks.

Acknowledgement

The authors acknowledge all who contributed to this response.

Author details

Dr Madhumati Chatterji¹

Ms Anne M Baldwin²

Dr Rajendra Prakash³

Dr Susan A Vlack⁴

Assoc Prof Stephen B Lambert⁵

1. Public Health Physician, Central Queensland Public Health Unit, Central Queensland Hospital and Health Service; Senior Lecturer, Faculty of Medicine and Biomedical Sciences, The University of Queensland, Brisbane, Queensland
2. Senior Epidemiologist, Sunshine Coast Public Health Unit, Sunshine Coast Hospital and Health Service, Maroochydore, Queensland
3. Visiting Medical Officer, Queensland Health, Brisbane, Queensland
4. Public Health Physician, Metro North Public Health Unit, Metro North Hospital and Health Service; Senior Lecturer, Faculty of Medicine and Biomedical Sciences, The University of Queensland, Brisbane, Queensland
5. Senior Medical Officer, Communicable Diseases Unit, Queensland Health; Medical Epidemiologist, Queensland Children's Medical Research Institute, The University of Queensland, Brisbane, Queensland

Corresponding author: Ms Anne Maree Baldwin, PO Box 577, MAROOCHYDORE QLD 4558. Telephone: +61 7 5409 6609. Email: annemaree.baldwin@health.qld.gov.au

References

1. World Health Organization (Western Pacific Region). Four Western Pacific countries and areas are the first in their Region to be measles-free. [Online]. Press release. 20 March 2014. Accessed on 25 July 2014. Available from: <http://www.wpro.who.int/mediacentre/releases/2014/20140320/en/>
2. Queensland Health. Statewide weekly communicable diseases surveillance report, 7 October 2014 (for reporting period 30 September 2013 – 6 October 2013). [Online]. Accessed on 3 September 2014. Available from: http://www.health.qld.gov.au/ph/cdb/sru_data.asp

3. Strebel PM, Papania MJ, Fiebelkorn AP, Halsey NA. Measles vaccine. In: Vaccines. Plotkin SA, Orenstein WA, Offit PA, editors. 6th edn. Elsevier Saunders; 2013. p. 352–387.
4. Health Protection Agency and Department of Health. Prevention of communicable disease and infection control in prisons and places of detention: a manual for healthcare workers and other staff. [Online]. Accessed on 5 September 2014. Available from: <http://www.wales.nhs.uk/sites3/documents/457/Prevention%20of%20communicable%20diseases%20in%20prisons%20HPA%20guidance1.pdf>
5. *Public Health Act 2005* (Queensland). [Online]. Accessed on 5 September 2014. Available from: https://www.legislation.qld.gov.au/LEGISLTN/SUPERSED/P/PubHealA05_130923.pdf
6. Queensland Health. Measles: Queensland Health guidelines for public health units. [Online]. Accessed on 25 July 2014. Available from: <http://www.health.qld.gov.au/cdcg/index/measles.asp>
7. Communicable Diseases Network of Australia. Measles – national guidelines for public health units. [Online]. Accessed on 25 July 2014. Available from: <http://www.health.gov.au/internet/main/publishing.nsf/Content/cdna-song-measles.htm>
8. Health (Drugs and Poisons) Regulation 1996 (Queensland). [Online]. Accessed on 25 July 2014. Available from: https://www.legislation.qld.gov.au/LEGISLTN/SUPERSED/H/HealDrAPoR96_131001.pdf
9. Corrective Services ACT, Corrective Services NSW, Northern Territory Correctional Services, Correctional Services SA, Queensland Government, Victoria Department of Justice, et al. Standard guidelines for corrections in Australia. [Online]. Accessed on 25 July 2014. Available from: http://www.correctionalservices.nt.gov.au/Documents/useful_links/aust-stand_2012.pdf
10. Australian Bureau of Statistics. Australian demographic statistics, Jun 2013. [Online]. Accessed on 25 July 2014. Available from: <http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/3101.0Main+Features1Jun%202013?OpenDocument>
11. Australian Bureau of Statistics. Prisoners in Australia, 2013 [Online]. Accessed on 25 July 2014. Available from: <http://www.abs.gov.au/ausstats/abs@.nsf/mf/4517.0/>
12. Department of Health and Ageing. *The Australian Immunisation Handbook* 10th edn 2013. Canberra: Department of Health and Ageing; 2013.
13. Andrews N, Tischer A, Siedler A, Pebody RG, Barbara C, Cotter S, et al. Towards elimination: measles susceptibility in Australia and 17 European countries. *Bull World Health Organ* 2008;86(3):197–204.
14. Larney S, Monkley DL, Indig D, Hampton SE. A cross-sectional study of susceptibility to vaccine-preventable diseases among prison entrants in New South Wales. *Med J Aust* 2013;198(7):376–379.
15. Queensland Government. National Immunisation Program Schedule Queensland, March 2014. [Online]. Accessed on 5 September 2014. Available from: http://www.health.qld.gov.au/immunisation/documents/nips_antigens.pdf