

Pertussis: adults as a source in healthcare settings

Clinical record

In 2001, an outbreak of *Bordetella pertussis* infection occurred in a hospital special care nursery. The index case, Parent A, had a two- to three-week history of non-productive cough without paroxysms, whooping or vomiting. She was admitted to hospital in labour and gave birth to Baby A on Day 0 in early January 2001. The baby was born four weeks prematurely and remained in the special care nursery for 15 days. The mother spent several hours there each day handling her infant and occasionally assisted with the care of infants in adjoining cots. Serum taken 19 days after she developed cough was negative for *Bordetella pertussis* IgA and IgM and equivocal for IgG (Figure) by enzyme-linked immunosorbent assay (ELISA).

On Day 15, Baby B (in the cot adjacent to Baby A) developed a cough and respiratory distress. Initial investigations did not reveal a cause. A nasopharyngeal aspirate collected on Day 23 was positive for *B. pertussis* by direct fluorescent antigen testing.

On Day 18, a nurse who had cared for Baby A developed a cough. Her serum was positive for *B. pertussis* IgA on Day 31 by ELISA; she commenced roxithromycin therapy.

On Day 31, serum collected from Parent A was positive for *B. pertussis* IgA. On Day 39, Baby A developed a respiratory illness despite a seven-day prophylactic course of erythromycin. A

nasopharyngeal aspirate was positive for *B. pertussis* by polymerase chain reaction (PCR) on Day 43. Both received erythromycin.

On Day 41, a nasopharyngeal aspirate collected during contact tracing from Baby C (in the nursery from Day 0 to 6) grew *B. pertussis*. She had not received chemoprophylaxis and had a mild cough. She was treated with erythromycin.

Contact tracing

Contact tracing of infants, parents and staff was undertaken. The incubation period of pertussis is six to 21 days, and is generally less than 10 days.¹

The parents of all 19 babies who had been in cots adjoining Baby A were notified, and erythromycin prophylaxis was recommended. Eleven babies received prophylaxis. Parents of other babies in the nursery were contacted and advised to notify the hospital if they or their babies developed a cough over the following 21 days. No further cases were identified.

Fifty-three staff with close contact with the cases were screened using direct fluorescent antigen testing of nasopharyngeal aspirates and serum IgA testing. Thirty-three received antibiotic prophylaxis. No staff had illness consistent with acute pertussis or developed infection, as shown by nasopharyngeal and serum IgA tests.

	Parent A	Parent A admitted to hospital Baby A born	Baby B	Nurse	Baby A	Baby C
Symptom onset:	Mid-December	Day 0	Day 15	Day 18	Day 39	Day 40
Test results:	IgA-, IgM-, IgG equivocal (Day 19) IgA + (Day 31)		Nasopharyngeal aspirate (NPA) + (Day 23)	IgA + (Day 31)	NPA + (Day 43)	NPA + (Day 41)

THERE WERE 10 339 NOTIFICATIONS of pertussis in 1999–2000 in Australia.² People aged 15 years and over comprised 62% of these notifications.² Studies indicate that 12% to 32% of cases of prolonged cough (over two weeks' duration) in adolescents and adults are due to *B. pertussis*.³ Recent articles highlight reasons for the apparent shift in disease burden.^{3–6}

Although adolescents and adults are the primary reservoir of the disease and the main source of infection in infants and unvaccinated children, pertussis often goes unsuspected in these age groups.^{3,4,7} Pertussis in adults is difficult to detect clinically. Delays and errors in diagnosis occur because the presentation is commonly mild or atypical, and may be asymptomatic.⁷ This may be a result of immunological recall. As past vaccination or illness does not confer lifelong immunity to pertussis, reinfection is common.⁸ Detection in adults is further impeded by the poor sensitivity of culture and serological tests,¹ particularly if performed several weeks after onset of cough.⁶ Polymerase chain reaction of nasopharyngeal swabs or aspirates improves detection.⁶

Deaths from pertussis average one per year in Australia, and almost all involve neonates and unvaccinated infants.² These groups acquire pertussis in a range of settings, including hospitals,^{9,10} parents, visitors and healthcare staff are a source of nosocomial outbreaks.⁷ During the events described here, there was no concurrent epidemic of pertus-

sis in the community (Dr B McCall, Director, Brisbane Southside Public Health Centre, personal communication).

Hospitalised infants exposed to pertussis are at high risk of morbidity and mortality, as maternal antibodies provide inadequate protection, while infants less than four weeks old are too young to commence vaccination.¹¹ While erythromycin is the prophylaxis of choice,¹¹ it has been associated with hypertrophic pyloric stenosis in neonates.¹²

Preventing nosocomial transmission

B. pertussis is spread via mucosal contact with infectious respiratory droplets and secretions.¹³ We suggest the following standard and transmission-based infection control precautions to protect hospitalised infants:

- limit access of staff and visitors to nurseries;
- provide adequate space between open cots (at least one metre);
- discourage parents from contact with infants other than their own; and
- perform hand antisepsis before entering the nursery and before and after patient contact.

Surgical masks are chiefly designed to protect the wearer from exposure to blood and body fluids; it is suggested that they may also reduce the opportunity for onward transmission of infections spread via large droplets.¹³

Lessons from practice

- Pertussis should be considered in adults and older children with a cough lasting over two weeks regardless of a past history of pertussis vaccination or infection.
- If pertussis is suspected, a nasopharyngeal aspirate or swab should be tested by polymerase chain reaction. Serological testing may also be useful when symptoms have been established for longer than two weeks.
- Adolescents and adults are the primary reservoir of the disease and the main source of infection in infants and unvaccinated children.
- Hospitalised infants are at high risk for morbidity and mortality from pertussis. Infection control measures are paramount, and targeted vaccination of adults should be considered.

Other important measures include educating staff and visitors to report coughs, diagnosing their aetiology, and providing treatment and prophylaxis. A diagnosis of pertussis can be confirmed by nasopharyngeal aspirate (culture, direct fluorescent antigen testing or PCR) or serological testing (IgA).⁷ Erythromycin is the treatment and prophylaxis of choice at all ages.¹¹

Targeted booster vaccination of parents and healthcare workers in contact with infants has been recommended, although not universally adopted.³⁻⁶ An acellular pertussis vaccine is available for this purpose, but its efficacy and duration of protection remain to be determined.³⁻⁵ Australia's pertussis immunisation schedule is restricted to infants and young children.¹¹

Infection control measures are important because of the difficulty in prohibiting all people with coughs from entering hospital nurseries, and the cost implications of vaccinating all adults in contact with infants.

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