Infection control and public health aspects of a case of pertussis infection in a maternity health care worker

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Introduction

The potential for nosocomial outbreaks of pertussis is well recognised. Waning adult immunity to pertussis, failure to recognise the symptoms of adult pertussis infection and delayed introduction of control measures are important contributing factors.[1] This report describes the response to a case of pertussis infection diagnosed in a health care worker (HCW) in a busy antenatal/postnatal unit in a large metropolitan hospital and the results of interventions.

Background

In Australia between 1993 and 2000, there were 10 deaths from pertussis infection in infants under one year of age.[2] The serious sequelae of pertussis infection include pneumonia, hypoxic encephalopathy, seizures and death, with mortality in children under 6 months of age reported at 0.5 per cent.[3] These serious outcomes often occur among children who are too young to be protected by vaccination.[4] The age of children involved in the antenatal/ postnatal setting places them at increased risk of the serious consequences of pertussis infection. Therefore, it is important to prevent exposure of young infants to pertussis, to identify potential exposures promptly and to carry out public health interventions when they occur. Key strategies include surveillance, awareness of the symptoms of pertussis in older children and adults (particularly among HCW and new parents), timely vaccination of infants and use of chemoprophylaxis when indicated. In very young infants the use of the standard agent for chemoprophylaxis, erythromycin, is further complicated by an associated increased risk of Infantile Hypertrophic Pyloric Stenosis (IHPS).[5,6,7]

On 7 June 2002, the Public Health Unit and the Director of Microbiology were separately notified of a positive serum pertussis IgA result in a HCW from an antenatal/postnatal unit of a large tertiary hospital. An incident control team consisting of microbiology, infection control, infectious diseases, maternity and public health unit staff, was formed to identify strategies to prevent further pertussis cases amongst staff or patients. The HCW provided a history of onset of illness on 17 May 2002 with non-productive paroxysmal cough since 22 May 2002. Symptoms were not relieved by regular nebulised salbutamol. The 4-year-old fully vaccinated child of the HCW was admitted to the children's ward of the same hospital on 5 June 2002 with a productive cough. Pertussis IgA serology collected from the child on 6 June 2002 was negative. However, the HCW had stayed overnight with the child in a shared hospital room with other paediatric patients.

The HCW had provided educational sessions in antenatal classes (ANC) and worked in the maternity ward during the infectious period of her illness (17 May 2002 to 6 June 2002). Decisions about contact definition for chemoprophylaxis were based on an assessment of the extent of exposure to the respiratory secretions of the case and the subsequent risk to the individual.[8] The incident control team classified risk groups as:

1. Neonates potentially exposed to the respiratory secretions of the HCW during the infectious period.

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2. Mothers, partners and family members rooming with mothers on the maternity ward with exposure to the respiratory secretions of the HCW during the infectious period.
3. Pregnant women and partners who attended educational sessions at the ANC during the infectious period. In these people the onset of pertussis may have coincided with the delivery of their child or the immediate neonatal period.
4. Other HCWs with exposure to the respiratory secretions of the case (shared shifts, prolonged ward contact).
5. Paediatric patients (and family members rooming with the patients) sharing ward accommodation with the hospitalised child and HCW.

Intervention

The assistance of the patients' medical practitioners was sought in communicating the risk of pertussis exposure and the required intervention. Erythromycin chemoprophylaxis and information on pertussis infection was offered to all in categories one to five with the exception of one group of ANC attendees whose exposure was outside the incubation period of pertussis (more than 20 days). The latter group was provided with written information and advised to seek medical attention immediately should symptoms develop. Chemoprophylaxis was provided to parents, families and staff via the maternity ward. Parents of neonates were informed of the possible risk of IHPS in their infants and cautioned to seek medical advice should symptoms occur. All maternity staff were instructed to report the development of any upper respiratory tract symptoms during the next month and symptomatic staff were reassigned duties or excluded from patient contact until the results of investigations were finalised.

Results

Eight family groups had direct exposure to the HCW in the maternity ward. Seven families (including six neonates) were provided erythromycin by the hospital and one family received erythromycin from their private practitioner. Eighteen pregnant women and their partners were exposed to the HCW during the infectious period and were offered chemoprophylaxis. Six of these obtained it from the ward, 11 from their private practitioner and one couple declined prophylaxis. Ten pregnant women and their partners attended ANC during the infectious period but were only provided with written information because the incubation period had been exceeded. Twenty-three staff members were offered chemoprophylaxis, of which 14 took erythromycin, 2 took cotrimoxazole and 7 took roxithromycin because of a known prior adverse reaction to erythromycin. Six staff developed symptoms of respiratory tract infection. All six of these were negative on IgA serology and *Bordetella pertussis* PCR (n=4) and culture (n=1) of nasopharyngeal aspirate. One shared hospital room contact of the child and HCW received erythromycin.

No cases of pertussis infection have been reported in any of the people provided with chemoprophylaxis. No further cases of pertussis infection were identified among staff members. No health problems have been reported in the children who received erythromycin.

Discussion

This case of pertussis infection in a HCW demonstrates the importance of pertussis surveillance within high-risk health care settings such as maternity and paediatric units. The standard approach to the prevention of nosocomial transmission of pertussis includes early diagnosis, treatment and isolation (droplet precautions) of patients with clinical infection, investigation and treatment of all symptomatic staff with exclusion from contact with susceptible patients until they have received 5 days of antibiotic treatment, and post-exposure prophylaxis for all asymptomatic exposed employees.[9] In this situation, the potential for cases to occur in exposed neonates, their parents, near term pregnant females and their partners, warranted the extension of chemoprophylaxis to this group. Four months later there has been no evidence of nosocomial transmission or complications associated with the use of erythromycin.

The introduction of an adult booster dose of pertussis vaccine has potential to prevent or reduce the impact of nosocomial pertussis infection in high risk health care settings.[10,11] The extent to which the introduction of a booster dose of acellular pertussis vaccine for HCW in

these settings will prevent nosocomial outbreaks is unknown. Acellular pertussis booster vaccines may prevent cases arising in health care workers, but in the absence of evidence of the protective efficacy and duration of protection from adult acellular pertussis boosters, chemoprophylaxis of staff with erythromycin or alternatives such as azithromycin will remain a principal component of control measures.[12,13] Above all, this incident confirms the requirement for education of health care staff on the resurgence of pertussis in the community and the recognition of pertussis in adults.

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