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Outbreak of pertussis among healthcare workers in a hospital maternity unit

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Abstract

In December 2015, an outbreak of pertussis was detected among staff working in the Maternity Unit of a district general hospital in Hampshire. This occurred in the background of increased pertussis activity in the community. The outbreak occurred over the Christmas holiday period causing staff shortages at a time when the departments were already overstretched. The high prevalence of upper respiratory tract infections at the time were difficult to distinguish from pertussis. This paper describes the outbreak, infection control measures implemented and the learning points.

Keywords

Infection control, public health, outbreak

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Introduction

Pertussis is a highly contagious respiratory infection caused by *Bordetella pertussis*, which usually manifests as a prolonged coughing illness with young infants being the most vulnerable to severe complications and death. It is endemic in the community with epidemic cycles occurring every three to four years. A successful vaccination programme was introduced in the UK in the 1950s; however, both vaccine-induced and natural immunity wane over time leaving adolescents and adults susceptible and at risk of transmitting the infection to neonates that are too young to have received their vaccinations. A large increase in laboratory confirmed cases of pertussis in the UK led to the declaration of a national outbreak in April 2012, prompting the introduction of a temporary immunisation programme for pregnant women. The vaccination programme has proved to be highly effective in preventing illness in vulnerable neonates and has been extended until 2019 (Amirthalingam et al., 2014; Public Health England [PHE], 2014).

Pertussis outbreaks have been reported from a variety of healthcare settings, including neonatal wards, surgical units and residential homes (Addiss et al., 1991; Pascual et al., 2006; Yasmin et al., 2001). They can result in considerable morbidity, disruption to the daily functioning of the wards, staff shortages and a significant financial cost.

On 17 December 2015, an obstetric trainee, Case A, working on the Maternity Unit consisting of 30 beds and eight side rooms at a district general hospital in Hampshire was diagnosed with pertussis based on positive serology. The diagnosis was suspected after they complained of a paroxysmal cough lasting over two weeks, and they were started on a treatment course of clarithromycin and excluded from work. On 19 December Case B, a midwife on the unit who had significant contact with Case A, developed a coughing illness and positive serology confirmed pertussis. Outbreak measures were immediately put in place.

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This outbreak occurred on a background of an increase in notification of pertussis to PHE in the local community.

The aim of this paper is to describe the outbreak and infection control measures implemented to curtail it and to highlight the learning points. Ethical approval and patient consent was not required.

Investigation and outbreak response

The Infection Prevention and Control Team, consisting of two infection doctors and two Band 7 infection nurses, acted quickly to identify significant contacts of both staff members. An outbreak control team was convened comprising PHE consultants, medical microbiologists, the Director of Infection Prevention and Control, infection control nurses, occupational health, senior obstetric clinicians, midwives and maternity unit managers, pharmacists and Head of External Affairs and Communications. A significant contact was classified as someone who had unprotected direct face-to-face contact with one of Case A or B within a 2-m distance for greater than a cumulative period of 1 h as per PHE guidelines (PHE, 2012). Of particular concern were women more than 32 weeks pregnant who had not received a pertussis vaccination during their pregnancy and healthcare workers (HCW) who had not received a pertussis containing vaccination within the previous five years; these two groups were at greatest risk of transmitting the disease to vulnerable neonates.

Significant patient contacts

A thorough review of theatre and outpatient lists, the delivery suite and maternity wards identified 17 women as having had possible contact with the affected HCW. Of these, 15 had been vaccinated during their current pregnancies and so the risk to both them and their unvaccinated babies was extremely low. They were not offered prophylactic antibiotics but were sent a letter informing them of their possible exposure to pertussis, that the risk to them and their baby was low and advice on what to do should they develop symptoms compatible with pertussis. Fortunately, Cases A and B did not have significant contact time with any newborn babies. In addition, a letter was sent to all women who had delivered at the affected unit in December, outlining the low risk and advising them of potential symptoms, noting that pertussis was also currently circulating in the community.

Of the remaining two patients who had not been vaccinated, one did not have significant contact time with the positive cases. The other patient had declined vaccination during pregnancy and declined it again when it was offered following this latest exposure. The patient did, however, accept a course of prophylactic antibiotics and was given written advice on what to do should she or her baby develop symptoms.

Significant staff contacts

Fifty staff members were identified as having been in contact with Cases A and B. Of these, 33 had significant contact time with the two affected HCW and of these 30 had not been vaccinated within the past five years and were offered prophylactic clarithromycin. Thirteen staff members had respiratory symptoms resembling the catarrhal stages of pertussis and were excluded from work for five days after starting appropriate antibiotics. All symptomatic HCW were tested using serology, with culture and / or PCR added if symptoms were less than two weeks. The availability and turn-around time of reference lab PCR testing over the holiday period determined whether this was carried out or not. Serology and culture were readily available over the bank holiday as they are carried out in-house.

Outcome

No patients or further HCW subsequently developed pertussis and all symptomatic staff members tested negative. Although the outbreak was formally declared as over on 9 January, 21 days following the last symptomatic case, an intense surveillance period continued for a further 21 days, which is double the maximum incubation period for *B. pertussis*. During this period, there were no further cases reported to the PHE or to the local infection department that could be linked to these two cases.

The reduction in staff numbers created a significant challenge for the functioning of the maternity unit, which was especially difficult as the outbreak occurred over the Christmas holiday period. Each HCW who was a potential contact needed to be interviewed to identify if they were a significant contact, had been vaccinated or were symptomatic, which was a lengthy process and took staff members away from their regular duties. As the outbreak occurred over the winter months there were abundant respiratory tract infections circulating which were often hard to distinguish from the symptoms of pertussis. Due to the number of HCW started on prophylactic antibiotics, packs of clarithromycin were made available on the ward involving significant input from the pharmacy department. Specimens needed to be processed quickly placing an extra burden on laboratory workers over the Christmas period when staff numbers were low.

The uptake of the pertussis vaccination in pregnancy appeared to be high in the patients involved in the outbreak with only one patient declining vaccination. In order to increase the awareness of pertussis and encourage vaccination within the appropriate patient groups, information posters were displayed in the maternity, emergency, outpatient and paediatric departments across all clinical sites and letters were sent to relevant HCW including General Practitioners.

Long-term plan following the outbreak

The current PHE guidelines do not advocate pro-active vaccination of HCW; however, post-exposure vaccination is recommended as part of the control of an outbreak. Following this outbreak, it was decided that all midwifery, neonatal and obstetric staff in the Trust should be offered the pertussis vaccination to protect patients and staff members from future outbreaks and this decision was supported by the PHE. Staff members were initially prioritised to receive the vaccination according to the risk of them passing the disease to vulnerable patients with a plan to eventually vaccinate all relevant HCW.

Conclusion

A higher incidence of pertussis in the susceptible adolescent and adult population has direct relevance for HCW in maternity and paediatric settings, as they are most likely to be exposed to the disease and serological studies have shown that the annual rate of unrecognised *B. pertussis* infection in HCW is significant (Deville et al., 1995). Diagnosis is usually delayed in adults as it is often thought of as a childhood disease, increasing the risk of transmission.

Managing outbreaks in a maternity healthcare setting can have a major impact on staffing levels and service efficiency, especially during holiday periods, but most importantly it can have major clinical implications for susceptible neonates. The financial implications of an outbreak of pertussis in the healthcare setting can also be substantial, and although several studies have suggested that vaccinating HCW could provide cost savings and benefits, further work needs to be done to explore this further (Calugar at al., 2006; Greer and Fisman, 2011). Such outbreaks can cause a strain on services with staffing numbers being reduced and in this instance having a rapid multiplex PCR test to distinguish pertussis from other respiratory infections may have been beneficial in allowing staff to return to work sooner.

One limitation to this study is that both cases were diagnosed with pertussis based on serology and so culture and typing were not possible. However, given the close contact between the two cases it is very likely that Case B contracted her infection from Case A.

There has been an increase in the notification of pertussis in the community and this infection can easily be spread to healthcare facilities and quickly transmitted among staff, relatives and patients. Increasing awareness among staff and the public is important to reach an early diagnosis, which can be difficult given the similarities to other respiratory infections. Proactive vaccination of staff caring for high-risk patients may assist in minimising the risk of a future outbreak.

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