Advocating for Childcare Employee Single-Dose Tdap Vaccination to Combat Infant Pertussis

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ABSTRACT

Incidence rates of pertussis have been higher over the past 5 years than at any time since the first pertussis vaccine became widely available, with infants younger than 12 months old being particularly vulnerable. Once infected, infants may experience severe respiratory symptoms and incur high rates of hospitalization, and they account for the vast majority of pertussis-related deaths each year. With the diminished effectiveness of herd immunity, experts increasingly rely on cocooning to protect at-risk populations against infectious diseases such as pertussis. Cocooning calls for vaccination of all close contacts of vulnerable individuals, including childcare employees. Despite government recommendations, only 11 states address employee tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis (Tdap) vaccination in their childcare regulations. Advanced practice nurses can play a significant role in protecting infants younger than 12 months old through initiating and supporting advocacy efforts at the state level for childcare employee Tdap vaccination. This article explores initial advocacy steps to be taken by advanced practice registered nurses to address this important issue. J Pediatr Health Care. (2016) ■, ■-■.

KEY WORDS

Advocacy, childcare, cocooning, infant, pertussis, Tdap

INTRODUCTION

Much interest has been raised in the news media in the recent past regarding incidence rates of measles. The Centers for Disease Control and Prevention (CDC) reported a total of 173 new cases of measles in the United States from January through May 2015—almost 70% of which were linked to a single outbreak in a California amusement park—with no reported deaths (Centers for Disease Control and Prevention, 2015a). However, comparatively little national attention has been paid to the incidence rates of a far more prevalent disease in the US—pertussis, also known as whooping cough. From January through May 2015, California alone reported 2,552 cases of pertussis (almost 15 times the number of new cases of measles nationally), including one death (an infant younger than 3 weeks old at disease onset; California Department of Public Health, 2015). In 2012, the CDC reported 48,277 cases, the highest number since the pertussis vaccine became widely available in the 1950s (CDC, 2015b). Twenty pertussis-related deaths occurred in that year, primarily in infants younger than 3 months old (CDC, 2015b).

Pertussis infection presents in a cyclic pattern, peaking every 3 to 5 years (Top & Halperin, 2015). Incidence

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Conflicts of interest: None to report.

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0891-5245/$36.00

http://dx.doi.org/10.1016/j.pedhc.2016.10.003

rates reached a cyclic high in 2012, leading one to predict the next cycle to peak between 2015 and 2017. In keeping with the expected cyclic trend, the CDC reported 32,971 cases of pertussis nationwide in 2014, a 15% increase from the recent low of 28,639 cases in 2013 (CDC, 2015b). The general trend of incidence rates continues to increase, with new cases reported in higher quantities than have been seen for over 50 years (CDC, 2015b). If this movement continues, the next cyclic peak could have incidence rates higher than have been seen since the introduction of the pertussis vaccine several generations ago.

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WHAT IS PERTUSSIS?

Pertussis, a vaccine-preventable disease, is a respiratory infection caused by the *Bordetella pertussis* bacteria. This highly communicable disease is spread via large respiratory droplets and results in a difficulty or inability to clear lung secretions. In adults, initial symptoms include a low-grade fever and mild cough. After the first week, the fever typically resolves, but the cough lingers and may devolve into a paroxysmal cough with an inspiratory whoop, posttussive emesis, cyanosis, and exhaustion (Top & Halperin, 2015). The cough is often more severe in children, particularly those younger than 1 year old. Because of the mild nature of the initial symptoms, pertussis can be transmitted without individuals even knowing they are infected.

AN AT-RISK POPULATION

Individuals across the lifespan can contract pertussis. However, infants younger than 1 year of age are particularly vulnerable because they have not yet been fully vaccinated against the disease. Thus, infants contract pertussis at a rate 20 to 80 times greater than adults (CDC, 2015b). Recommended pediatric pertussis vaccinations comprise a five-dose DTaP (diphtheria and tetanus toxoid, and acellular pertussis) series, with one additional Tdap (tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis) booster in adolescence (CDC, 2016; Table 1). Although one dose of the DTaP vaccine provides partial protection, infants remain at greatest risk for pertussis infection and its serious complications (Forsyth, Plotkin, Tan, & von Konig, 2015). Approximately 50% of infected infants require hospitalization, with many experiencing negative sequelae such as secondary pneumonia, significant apneic episodes, convulsions, encephalopathy, and death (CDC, 2015b; Table 2.) Of the 13 reported pertussis-related deaths in 2013, 12 were infants younger than 3 months old (CDC, 2015b).

TABLE 1. CDC/ACIP pediatric and adolescent pertussis immunization schedule

Diphtheria and tetanus toxoid, and acellular pertussis (DTaP)	
Dose 1	2 months old
Dose 2	4 months old
Dose 3	6 months old
Dose 4	15–18 months old
Dose 5	4–6 years old
Tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis (Tdap)	
Booster	11–12 years old

Note. *ACIP, Advisory Committee on Immunization Practices; CDC, Centers for Disease Control and Prevention.*
Source: CDC, 2016.

PREVENTION OF INFANT PERTUSSIS

Unimmunized adults may serve not only as sources of immediate infection for infants but also as reservoirs of pertussis infection (Top & Halperin, 2015). Since 2005, the CDC has recommended single-dose Tdap vaccinations for unvaccinated mothers and family members of neonates. In 2011, these recommendations were expanded to include a single dose of Tdap for all adults who "have or anticipate having close contact with an infant aged <12 months," specifically noting childcare providers (CDC, 2011; Table 3). This recommendation supports cocooning, a strategy also endorsed by the Global Pertussis Initiative, to protect unvaccinated or undervaccinated children against acquiring vaccine-preventable diseases by ensuring that their close contacts maintain an appropriate immunization status (CDC, 2011; Guiso, Liese, & Plotkin, 2010; see Box).

TABLE 2. Secondary comorbidities in hospitalized infants

Secondary comorbidity	%
Significant apnea[a]	60
Pneumonia	23
Convulsions	1
Encephalopathy	<1
Death	1

[a]*Increased risk for refractory pulmonary hypertension.*
Source: CDC, 2015b.