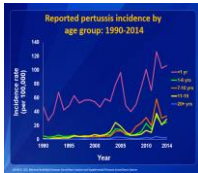


Perioperative Pertussis In A Newborn

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Epidemiology & Pathophysiology

- Bordetella pertussis* infection results in an estimated 294,000 global pediatric deaths annually (1)
- 20th century US vaccine campaigns successfully reduced the incidence of infection
- Infants are at an increased risk for severe complications; 46 of the 56 reported pertussis-related deaths between 2012-2016 were in children < 1 year (2)



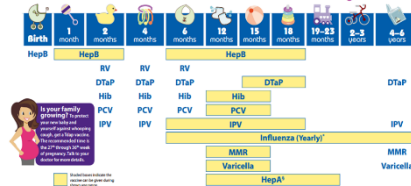
- Pertussis is a respiratory infection with toxin mediated pathogenesis
- Toxins produced by bacteria inhibit respiratory cilia from clearing pulmonary secretions and induce inflammation
- Accumulated necrotic epithelium in the airway result in tenacious secretions, contributing to ventilation/perfusion defects and exacerbate hypoxemia
- Secondary pulmonary hypertension and cardiac failure may develop
- Pertussis may cause weakening bactericidal function of immune cells, leaving patients vulnerable to secondary infections, which is primary global cause of death from pertussis (3)

Case Discussion

A 39 day old infant with two week history of worsening cough, difficulty feeding, and weight loss presented to the operating room for direct laryngoscopy, bronchoscopy, and esophagoscopy. Initial symptoms of congestion, coughing, and irritability were reported to the pediatrician on day 22 of life. Parents reported coughing spells resulting in the patient's "nose turning a little blue." Physical exam was unremarkable other than intermittent cough. Coughing spells increased over the subsequent two weeks leading to multiple pediatrician and emergency department visits and investigative studies: chest x-ray, RSV testing, and esophagoduodenoscopy. He was admitted on day 37 of life for increasing cough, dehydration, and weight loss. During admission he would have up to 12 coughing spells per day lasting approximately 60 seconds, resulting in severe hypoxemia (SpO2 <70%). Flexible fiberoptic laryngoscopy performed on hospital day 2 was unremarkable. Direct laryngoscopy, bronchoscopy, and esophagoscopy performed on hospital day 3 revealed normal anatomy and the patient tolerated an uneventful general anesthetic. Post procedure, patient was started on azithromycin while awaiting a pertussis PCR result obtained upon admission. Patient's symptoms showed progressive improvement and he was discharged on hospital day 5.

Current Vaccine Recommendations

2017 Recommended Immunizations for Children from Birth Through 6 Years Old



- The Advisory Committee on Immunization Practices, American College of Obstetrics and Gynecology, and the American Academy of Pediatrics recommend Tdap booster with *each* pregnancy
- Maternal antipertussis antibodies peak during the month following vaccination and decay to levels ineffective to provide infants passive immunity within 2 years
- Immunizing pregnant women to boost maternal antibody more effective in protecting infants than "cocooning", the practice of vaccinating close contacts (4,5)

Vaccine Hesitancy and Waning Immunity

- Vaccine hesitancy has increased over the past two decades (6)
- Demographics of non-vaccinators
 - Caucasian
 - Two parent household
 - College educated
 - Household income > 75K
- Nonmedical exemption rationale:
 - Unsafe
 - Low efficacy
 - Disease susceptibility
 - Distrust in government



- Late 1990's, U.S. switched to an acellular pertussis vaccine (DTaP) for first 5 doses plus a booster for adolescents (Tdap)
- U.S. and other countries who made the switch experienced increased pertussis disease in the years following
- Among those who have only received acellular pertussis vaccine (DTaP), booster vaccines (Tdap) provide initial protection, followed by waning immunity to <10% after 4 years (7)

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 6. Sidiqi M, Salmon DA, Omer SB. Epidemiology of vaccine hesitancy in the United States. *Humor Vaccines & Immunotherapeutics*. 2013;9(12):2643-2648. doi:10.4161/hv.27243.
 7. Waning Tdap Effectiveness in Adolescents. Nicola P. Klein, Joan Bartlett, Bruce Ferman, Roger Baxter. *Pediatrics* Mar 2016, 137(3):e2015324; DOI:10.1542/peds.2015.327436.