Using the EMR to
Improve Tdap
Vaccination Rates in
Pregnant Women

Webinar Guidelines

• 1 hour presentation including a Q&A
discussion period at the end.

• Send your questions at any time during the
presentation via the chat box on your screen.

Webinar Guidelines

• This webinar will be recorded and available
‘on demand’ for future viewing at
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• Turn on your computer speakers for sound

• Handouts are available to download:
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Non-Conflict of Interest Statement

• The planners, moderators, and presenters for this webinar series do not have any financial arrangements or affiliations with any commercial entities whose products, research or services may be discussed in this presentation.
• Funding for this program is provided by the New York State Department of Health.
• No commercial funding has been accepted for this activity.

Learning Objectives

By the end of the webinar participants will be able to:
• Recognize the impact of pertussis in the modern era
• Discuss the Tdap immunization recommendations for pregnant women
• Describe both the barriers to vaccination and methods to overcome these barriers
Pertussis “Whooping Cough”

- *Bordetella pertussis*: small, aerobic gram-negative rod
  - Pertussis toxin, filamentous hemagglutinin, agglutinogens, adenylate cyclase, pertactin and tracheal cytotoxin
- Before the pertussis vaccine was developed, it caused > 200,000 cases annually
  - Incidence has decreased > 80% with the vaccine
- Highly communicable with secondary attack rates of 80%

Background

- Pertussis peaks every 3-5 years but the overall incidence has been steadily rising since the 1980s
  - 2012 48,277 cases in the U.S. with 20 attributed deaths
  - Infants bear a disproportionate burden, most younger than 2 months of age (too young to vaccinate)
Pertussis Complications by Age

*Cases reported to CDC 1997-2000 (N=28,187)  www.cdc.gov  2010
Pertussis Pathogenesis

- Primarily a toxin-mediated disease
- Bacteria attach to the cilia of respiratory epithelial cells
- Inflammation occurs which interferes with clearance of pulmonary secretions
- Pertussis antigens allow evasion of host defenses (lymphocytosis promoted but impaired chemotaxis)

Pertussis Clinical Features

- Incubation period 5-10 days (range 4-21 days)
- Insidious onset, similar to minor upper respiratory infection with nonspecific cough
- Fever is usually minimal throughout the course of illness
- Milder illness in adults – may be asymptomatic but can still transmit

Pertussis Clinical Stages

- Catarrhal Stage (1-2 weeks)
  - Insidious onset of coryza, sneezing, low-grade fever and a mild cough
- Paroxysmal Cough Stage (1-6 weeks)
  - Bursts or paroxysms of numerous rapid coughs, followed by an inspiratory whoop. Frequently vomiting and exhaustion after the episode. More common at night
- Convalescence Stage (weeks to months)
  - Very slow, gradual recovery
Pertussis Diagnosis

- Clinical symptoms

- Pertussis culture from a nasopharyngeal swab and/or aspirate still the gold standard
  - Fastidious growth requirements
  - Best timing in the catarrhal and early paroxysm stage
  - May take up to 2 weeks for a positive culture

Pertussis Diagnosis

- Polymerase chain reaction (PCR) – excellent sensitivity but specificity varies so culture verification important. False-positive and false-negative results do occur

- Serologic tests variable (vaccine can induce an IgA, IgM and IgG response). Better for later stage disease (2-8 weeks after cough onset).

Management of Pertussis

- Mainly supportive

- Early treatment vital (treat prior to test results if clinically suspicious in a high risk group)
  - Treat persons >1 year within 3 weeks cough onset
  - Treat infants <1 year and pregnant women within 6 weeks cough onset
  - Erythromycin, clarithromycin or azithromycin drugs of choice
    - Eradicates the bacteria from secretions

- Prophylaxis to all close contacts, regardless of age or vaccination status
  - Erythromycin, azithromycin, trimethoprim-sulfamethoxazole
Pertussis Vaccines

- Whole cell vaccine
  - 70-90% effective, immunity lasts 5-10 years

- Acellular pertussis vaccines
  - DTaP (Pediatric formulation) up to age 7
  - Tdap (adolescent and adult)
    - Licensed in 2005
    - Tetanus and diphtheria toxoid (Td) plus several pertussis components
    - Used as a single booster dose for persons who already completed childhood series

Tdap Vaccines

- Boostrix (GlaxoSmithKline)
  - Approved for persons 10 through 64 years of age
  - 3 Pertussis antigens

- Adacel (sanofi pasteur)
  - Approved for persons 11 through 64 years of age
  - 5 Pertussis antigens

Vaccine Adverse Event Reporting System (VAERS)

- Tdap in Pregnancy
  - VAERS and 2 pregnancy registries
  - Available data did not suggest any elevated frequency or unusual patterns of adverse events in pregnant women receiving Tdap
  - ACIP concluded administration after 20 weeks gestation is preferred to minimize the risk for any low-frequency event
    - Prevent a spurious association being considered causative
Tdap and Pregnancy

Table

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Accepted Tdap (n=7,152)</th>
<th>Declined Tdap (n=226)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (y)</td>
<td>29 (3-64)</td>
<td>27 (16-77)</td>
<td>.400</td>
</tr>
<tr>
<td>Less than 15</td>
<td>18 (5-45)</td>
<td>20 (11-77)</td>
<td>.124</td>
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<tr>
<td>15 or older</td>
<td>1,285 (38)</td>
<td>37 (17-75)</td>
<td>.047</td>
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<td>Ethnicity</td>
<td>746 (11)</td>
<td>66 (27)</td>
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<tr>
<td>White</td>
<td>520 (26)</td>
<td>83 (46)</td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>6,039 (88)</td>
<td>147 (84)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>234 (3)</td>
<td>7 (3)</td>
<td></td>
</tr>
<tr>
<td>BMI, weight (kg/m2)</td>
<td>29 (23-40)</td>
<td>29 (23-40)</td>
<td>.971</td>
</tr>
<tr>
<td>Less than 25</td>
<td>40% (7)</td>
<td>20 (3)</td>
<td></td>
</tr>
<tr>
<td>25 to less than 30</td>
<td>25 (10)</td>
<td>89 (36)</td>
<td></td>
</tr>
<tr>
<td>30 to less than 35</td>
<td>2,563 (96)</td>
<td>63 (28)</td>
<td></td>
</tr>
<tr>
<td>35 to less than 40</td>
<td>1,224 (47)</td>
<td>54 (15)</td>
<td></td>
</tr>
<tr>
<td>40 to less than 45</td>
<td>77 (2)</td>
<td>3 (1)</td>
<td></td>
</tr>
<tr>
<td>≥45</td>
<td>1,914 (25)</td>
<td>53 (22)</td>
<td>.834</td>
</tr>
<tr>
<td>Cardiovascular disease</td>
<td>137 (2)</td>
<td>21 (9)</td>
<td>.007</td>
</tr>
<tr>
<td>Diabetes</td>
<td>783 (11)</td>
<td>24 (12)</td>
<td>.734</td>
</tr>
<tr>
<td>Chorionic hypoplasia</td>
<td>224 (3)</td>
<td>19 (9)</td>
<td>.004</td>
</tr>
<tr>
<td>Retarded or small fetus</td>
<td>5,032 (56)</td>
<td>205 (92)</td>
<td>.638</td>
</tr>
</tbody>
</table>

Data are mean (standard deviation) or n (%) unless otherwise specified.

Pregnancy outcomes after antepartum tetanus, diphtheria, and acellular pertussis vaccination. Morgan et al 2015

Recommmendations

- 2005 ACIP: Tdap vaccine be offered to all immediately postpartum women and the family members who would be in close contact with the newborn (Cocooning)
  - Very difficult to implement and no significant benefit
- 2011 ACIP: Tdap vaccine to all previously unvaccinated women for passive immunization
  - Poor compliance
  - Antibody sustainability issues
Recommendations

• 2012 ACIP: All pregnant women should receive a Tdap booster between 27 and 36 weeks gestation regardless of vaccination status
  – Every pregnancy
  – Optimum time for pertussis antibody development and transfer to the fetus

The obvious problem...

• Pregnant women notoriously have poor vaccination uptake, with rates 10 - 34% nationwide
  – Safety concerns: Pregnant women and their medical providers
  – Cost/reimbursement
  – Confusion regarding the recommendations

• Enter the Electronic Medical Record and the ability to do “alerts” at set times
Methodology

- Before-after study
  - Prior to June, 2013 women were offered vaccination postpartum
- June 2013 we started offering all antepartum pregnant women Tdap vaccine
  - Best Practice Alert (BPA) “fired” at 32 weeks
    - If accept, it sent the provider straight to the order screen
    - If decline, had to document the reason for the patient declining
      - If declined, the BPA would fire at every visit to remind the provider to readdress tdap vaccination

Methodology

- We went out to all our outlying clinics as well as our OB Complications Clinic and educated our providers on the epidemiology, the clinical disease in infants, children and adults and the benefits of vaccination
- Worked extensively with our EPIC BPA builders

Methodology

- The BPA in EPIC allowed us to track
  - Acceptance rates
  - Providers and clinic vaccination rates
  - Reasons for declination
  - Demographic, pregnancy and delivery information as well as neonatal follow-up

Original Research
Pregnancy Outcomes After Antepartum Tetanus, Diphtheria, and Acellular Pertussis Vaccination
Jamie L. Morgan, MD, Sangameshwar R. Baggari, MBA, Donald D. McIntire, PhD, and Jeannie S. Sheffield, MD Obstet and Gynecol 2015
Results

• Epoch 1: the 17 months prior to starting the BPA
  – Availability of complete pertussis ascertainment data from the Dallas County Health Department

• Epoch 2: June, 2013 to July, 2014 (13 months)

Results

• Epoch 1
  – Accepted the vaccine postpartum 48%

• Epoch 2
  – 10,201 women had the BPA fire (were in prenatal care and made it to 32 weeks)
  – Vaccination rate 97%

Results

• Average gestational age at vaccination 34.3 ± 2.4 weeks

• Patients delivered a mean of 35.3 ± 17.3 days after vaccination
  – Enough time to develop antibodies and provide passive immunity
Results

• During the same time period, the Dallas County Health Department reported
  – Epoch 1
    • 61 cases of pertussis in children < 2 years of age
    • Parkland incidence 13 cases per 10,000 deliveries
  – Epoch 2
    • 22 cases in the same cohort
    • Parkland incidence 7 per 10,000 deliveries
      – All vaccinated (majority antepartum)
      » CDC reports a 70% efficacy rate
      – Will continue to track – these are early data

Conclusions

• Even in a county hospital-based prenatal care setting where the majority of pregnant patients are indigent, medically underserved, and receive Medicaid benefits, the Electronic Medical Record can be vital in improving vaccination rates.

Other aspects to the success of the BPA

• This was a single academic institution
  – Protocol driven, homogenized care
  – Advanced practice nurses (Nurse practitioners and midwives), residents and faculty physicians
  – Extensive education
• Streamlining the order entry and administration process
• The community push for vaccination at the time this was rolled out
Other compelling evidence for the use of the EMR to improve vaccination rates

• The use of the electronic medical record has been shown to be associated with increased influenza vaccination rates in several high-risk groups in various health care settings
  – Klatt and Hopp: Influenza vaccination rates increased with the use of a BPA (42% to 61%)
Questions?
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More immunization training resources at:
www.vaccinateny.org
Public Health Live! Webcast
The Importance of Maternal Immunization
Originally presented on July 21, 2016
- Available at www.vaccinateny.org
- Continuing Education Credits are available

Recorded Webinar
Management of Vaccination Programs for OB-GYN Practices
Originally aired November 9, 2016
Continuing Education Credits are available

After watching this webinar participants will be able to:
- Describe the role and responsibilities of a vaccine champion.
- Identify vaccine storage and handling best practices.
- Discuss the use of Tdap and Influenza vaccines in ob-gyn practices.
- Recognize strategies for vaccination coding/billing procedures.

Prenatal Care Provider Survey
If you are a prenatal care provider, we invite you to take this short 15-minute survey. Your responses will be used to develop additional training on this topic and are confidential.

Click here https://goo.gl/HKNZBi to take the survey, or visit www.vaccinateny.org.