Cocooning Strategies

Preventing Pertussis Infection in Infants

Elizabeth Rosenblum, MD
Department of Family & Preventive Medicine
UCSD Medical Center
**COCOON**

*noun \kə- kʊn\*

1

*a*: an envelope often largely of silk which an insect larva forms about itself and in which it passes the pupa stage *b*: any of various other protective coverings produced by animals

2

*a*: something suggesting a cocoon especially in providing protection or in producing isolation

<wrapped in a *cocoon* of safety>
What is cocooning?

Recommendations of the Advisory Committee on Immunization Practices (ACIP)
MMWR December 15, 2006 / Vol. 55 / No. RR-17

The CDC recommends a strategy of ‘cocooning’ to protect infants from pertussis by ensuring all family members and close contacts receive Tdap vaccine.
## Tdap Coverage in the U.S.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Adults*</td>
<td>8.2%</td>
</tr>
<tr>
<td>Adolescents**</td>
<td>68.7%</td>
</tr>
</tbody>
</table>

* National Health Interview Survey (NHIS), MMWR March 3, 2012  
** National Immunization Survey (NIS-Teen) MMWR Aug 26, 2011
Facts to Consider

- Infants are hardest hit by pertussis
Facts to Consider

• Infants are hardest hit by pertussis
• Immunization schedule 2-4-6 months
Facts to Consider

- Infants are hardest hit by pertussis
- Immunization schedule 2-4-6 months
- Infants contract pertussis from family members
Infants Contract Pertussis from Family Members

From Bisgard et al. *Ped Infect Dis J.* 2004
The theoretical foundation for cocooning resides on the concept of herd immunity.
herd immunity?
Herd Immunity

The principle of community immunity applies to control of a variety of contagious diseases
No one is immunized.

Contagious disease spreads through the population.
No one is immunized.

Contagious disease spreads through the population.

Some of the population gets immunized.

Contagious disease spreads through some of the population.
No one is immunized.

Contagious disease spreads through the population.

Some of the population gets immunized.

Contagious disease spreads through some of the population.

Most of the population gets immunized.

Spread of contagious disease is contained.
Cocooning Strategy: protect infants from disease by establishing a familiar herd immunity around them
How has the cocooning concept been implemented?
Has it been shown to be effective?
Immunizing Postpartum Mothers
Impact of Maternal Postpartum Tdap Immunization on Infant Pertussis Infection


• Cross sectional study in Houston, TX (predominantly Hispanic)

• Intervention: vaccinating postpartum women

• Findings: Immunizing only postpartum mothers with Tdap did not reduce pertussis illness in infants ≤ 6 months of age

• Conclusions: Efforts should be directed at immunizing all household and key contacts of newborns with Tdap, not just mothers.
UCSD Tdap Clinic
Family Maternity Care Center

• Evening visiting hours, six days per week
• Held on postpartum floor
• Immunization Leaders/Nurse Educators
• Short registration form
• Free vaccine
## Tdap Vaccines Given on FMCC

<table>
<thead>
<tr>
<th></th>
<th>July 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inpatients (Postpartum Moms)</td>
<td>119</td>
</tr>
<tr>
<td>Family Members of Inpatients</td>
<td>0</td>
</tr>
</tbody>
</table>
## Tdap Vaccines Given on FMCC

<table>
<thead>
<tr>
<th></th>
<th>July 2010</th>
<th>August 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inpatients (Postpartum Moms)</td>
<td>119</td>
<td>117</td>
</tr>
<tr>
<td>Family Members of Inpatients</td>
<td>0</td>
<td>541</td>
</tr>
</tbody>
</table>
Tdap Vaccine Had Better Coverage in the Households of Intervention Group Than the Ones in the Control Group

Number of the People in the Home with the Infant Received a Tdap Vaccine

Implementation of Cocooning against Pertussis in a High-Risk Population


The Infant Cocoon (N=2303)

- Mean: 58%
- Median: 50%

Percentage of Individual Cocoon Completed
Results: Immunization of Other Infant Contacts

- 2303 of 3445 (67%) mothers interviewed

<table>
<thead>
<tr>
<th></th>
<th>Median</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household contacts</td>
<td>4</td>
<td>1-15</td>
</tr>
<tr>
<td>External contacts</td>
<td>0</td>
<td>0-7</td>
</tr>
<tr>
<td>Contacts Eligible for Tdap</td>
<td>3</td>
<td>1-11</td>
</tr>
<tr>
<td>Contacts given Tdap</td>
<td>2</td>
<td>0-10</td>
</tr>
</tbody>
</table>

* Age 11-64 yrs; no prior Tdap; no medical contraindication

- 1332 families (58%) had ≥ 1 contact immunized
- 1860 contacts immunized
  - One adverse event unrelated to Tdap
  - 55% did not know date of their last tetanus
“In summary, our study demonstrates that, although it is possible to achieve high Tdap vaccination rates for hospital-based cocooning, such a program requires a significant investment of resources to achieve its goals.”

Is cocooning cost-effective?
• Mathematical data modeling

• Conclusions: to prevent one infant death, at least one million parents would need to be vaccinated.

• Accompanying editorial points out that these findings may not apply to areas with high rates of pertussis or with areas with large Hispanic communities.
Model showed Tdap vaccination during pregnancy would prevent more infant cases, hospitalizations, and death compared with a postpartum dose.

Earlier protection to mother, thereby protecting infant at birth.

Vaccination in late pregnancy maximizes transfer of maternal antibodies to infant.
Do We Have Evidence that Cocooning Works?
I'm not saying no. I'm just saying not yet.
Support for Our Working Hypothesis

Scientific Process:
- Problem: What is the question?
- Hypothesis: What do we think will happen?
- Materials: What did we use?
- Procedure: What did we do?
- Observations: What did we see?
- Conclusion: What did we learn?
Lesson from maternal flu immunizations


• Compared incidence of influenza in infants born to women who did and did not receive flu vaccine during pregnancy

• There was a 41% reduction in influenza infection for infants born to flu-vaccinated women.
California Experience

- 2010 Pertussis Epidemic
- Free vaccine to hospitals to cocoon newborns
- State law mandating Tdap for all 7th-12th graders (now at 98% coverage!)
A sharp decrease in pertussis infections
9154 cases (2010) vs 2795 cases (2011)

No pertussis-related deaths in 2011 (for the first time since 1991)
• Do we have all the data we need? No

• Is cocooning likely to be the one and only answer to preventing infant pertussis? No

• Can we support cocooning programs? Yes
Strategies for designing and implementing a cocooning program

Texas Department of State Health Services

La pertusis (tos ferina) es una grave amenaza para los bebés.
Rodea de protección a tu bebé. Haz que toda tu familia se vacune.

Protect Babies. Get Vaccinated.
Strategies

• Get a Champion and Leadership Buy-In
Strategies

• Get a Champion and Leadership Buy-In

• Establish standing orders
Standing Orders for Administering Td/Tdap to Adults

Purpose: To reduce morbidity and mortality from tetanus, diphtheria, and pertussis by vaccinating all adults who meet the criteria established by the Centers for Disease Control and Prevention’s Advisory Committee on Immunization Practices.

Policy: Under these standing orders, eligible nurses and other healthcare professionals (e.g., pharmacists), where allowed by state law, may vaccinate adults who meet the criteria below.

Procedure
1. Identify adults in need of vaccination against tetanus, diphtheria, and pertussis based on the following criteria:
   a. lack of documentation of at least 3 doses of tetanus- and diphtheria-containing toxoids
   b. lack of documentation of pertussis-containing vaccine given since age 7 years in adults who
      • are younger than age 65 years, including pregnant women in the third or late second trimester (after 20 weeks gestation)
      • are age 65 years or older who have or anticipate having contact with an infant younger than age 12 months or are a healthcare worker
   c. completion of a 3-dose primary series of tetanus- and diphtheria-containing toxoids with receipt of the last dose being 10 years ago or longer
   d. recent deep and dirty wound (e.g., contaminated with dirt, feces, saliva) and lack of evidence of having received tetanus toxoid-containing vaccine in the previous 5 years
   e. age 65 years or older and wanting to be protected against pertussis
2. Screen all patients for contraindications and precautions to tetanus and diphtheria toxoids (Td) and, if applicable, pertussis vaccine (Tdap):
   a. Contraindications:
Strategies

• Get a Champion and Leadership Buy-In

• Establish standing orders

• **Monitor Cost of Carrying and Administering Vaccine**
A formula for calculating Relative Value Units for immunization administration can be found at:

www.aap.org/immunization --> pediatricians --> practice management --> financing --> The Business Case
Strategies

• Get a Champion and Leadership Buy-In
• Establish standing orders
• Monitor Cost of Carrying and Administering Vaccine

• Create Patient Demand
Create Patient Demand: Posters

The very people who love your baby also have the power to protect him.

Most babies get whooping cough from a family member.

Ask your friends and family to get the whooping cough vaccine.

www.VaccinateYourFamily.org
It’s time to bring your child back!

¡Es tiempo de que traiga a su niño!
Strategies

• Get a Champion and Leadership Buy-In
• Establish standing orders
• Monitor Cost of Carrying and Administering Vaccine
• Create Patient Demand

• Train Staff
Train Staff

• Ensure staff is trained to promote and answer questions about Tdap/Cocooning

• Ensure all staff is vaccinated with Tdap

• Establish clinic/hospital policy for HCP’s who have direct contact with infants
Strategies

• Get a Champion and Leadership Buy-In
• Establish standing orders
• Monitor Cost of Carrying and Administering Vaccine
• Create Patient Demand
• Train Staff

• Order Vaccine
Ordering Vaccine

- Switching to Tdap if still carrying Td
- Use of commercial-grade refrigeration unit
- Maintain insurance for catastrophic loss
- Train staff to monitor inventory and storage temperature
- Accounting for cost of using alarm company for off-hours to monitor the cold chain
Strategies

• Get a Champion and Leadership Buy-In

• Establish standing orders

• Monitor Cost of Carrying and Administering Vaccine

• Create Patient Demand

• Train Staff

• Order Vaccine

• Screen and Vaccinate Patients and Close Contacts
Finding the Cocoon

• Immunize all pregnant patients

• “Who do you anticipate will be helping you most with your new baby?”

• Set up systems to vaccinate family and close contacts during office visits, prenatal classes, and ultrasound exams
*Innovation is Key to Immunizing Close Contacts!*

- Use a short-form patient registration for non-patients
- Establish a self-pay system for non-patient vaccinations
- File non-patient records within chart of primary patient (mother or infant)
- Provide stop-in vaccination clinics within hospital during visiting hours
got TDaP?
“Never doubt that a small group of thoughtful, committed citizens can change the world. Indeed, it is the only thing that ever has.”

-Margaret Mead
US anthropologist (1901 - 1978)
FEED ME