Practical Pediatric and Adolescent Immunization in the Office Update

James Loehr, MD, FAAFP

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Founder/Family Physician, Cayuga Family Medicine, Ithaca, New York

Dr. Loehr has practiced as a family physician in Rochester and Ithaca, New York, for the past 29 years. He graduated from Cornell University in Ithaca, earned his medical degree from Baylor College of Medicine in Houston, Texas, and completed his residency training in Rochester. In 2000, he founded Cayuga Family Medicine, a practice with four physicians and two nurse practitioners providing outpatient care to patients of all ages, from birth to death. Dr. Loehr became especially interested in vaccines while discussing the topic with vaccine-hesitant families in Ithaca, which has been described as “10 square miles surrounded by reality.” After writing a book about vaccines to share his perspective with his patients (The Vaccine Answer Book: 200 Essential Answers to Help You Make the Right Decisions for Your Child), he did a part-time vaccine fellowship with the AAFP. In addition, he served as the AAFP liaison to the Advisory Committee on Immunization Practices (ACIP) from 2011 to 2015 and is still an at-large representative on the ACIP Influenza Work Group.
Learning Objectives

1. Follow the updated ACIP recommendations for children and adolescent vaccination schedules; understand how to provide catch-up vaccination schedules.

2. Establish evidence-based vaccine administration procedures and protocols.

3. Counsel parents of children and adolescents, using available patient education resources and motivational interviewing about vaccine safety and efficacy.

4. Participate in available childhood immunization programs, and administer using a standardized process.

Audience Engagement System

Step 1

Step 2

Step 3
Presentation Outline

1. New pediatric and adolescent vaccine information
2. Logistics of giving vaccines in the office
3. Vaccine hesitancy
Recommended Child and Adolescent Immunization Schedule

Put out yearly by ACIP and CDC
Harmonized with AAP, AAFP, ACOG

- Reminder about content syndication
  - automatic web updates


Recommended Child and Adolescent Immunization Schedule

- Vaccines on the left (red oval)
- Months and years at the top (blue oval)
  - Example - DTaP #5 at 4-6 yrs (green oval)
- Explanatory colors at the bottom
- When not clear, refers reader to notes (purple oval)
**Structural Changes**

In 2019 new format

- Explanatory cover page
  - Helpful Information links (red circle)
  - Abbreviations, trade names (blue oval)
- Note the CDC Vaccine App
Structural Changes

- More colors under Medical Indications (Table 3)
- The indications I refer to most are pregnancy, asplenia, diabetes
- Note the red boxes - live virus vaccines
  - Reminder to check for pregnancy with MMR and Varicella
  - LAIV with lots of red boxes so mostly for healthy people
Structural Changes

- Old Footnotes are now called Notes and are in alphabetical order
  - Reminder that hyphen means “through”
    - DTaP#4 says 15-18 months is “through” 18 months
  - 4 weeks = 28 days and 16 weeks does not equal 4 months
  - Four day grace period explained
    - not valid for rabies or spacing of different live vaccines (except oral rotavirus or oral typhoid)
  - General recommendations
    - [https://www.cdc.gov/vaccines/hcp/acip-recs/general-recs/downloads/general-recs.pdf]
Vaccine Specific Changes - HIB & pneumococcal

- Table 2 or Catch Up Schedule
  - Minor changes to understand when no further doses are needed for HIB or pneumococcal vaccines

- The catch up schedule is the schedule I consult the most
Vaccine specific changes - LAIV

- LAIV - ACIP approved in 2018 and AAP in 2019
  - 2018 AAFP prefers IIV unless pt won’t vaccinate
- LAIV better than IIV 2004-2008 children ages 2-8 yrs
  - But LAIV worse 2009-2015
  - LAIV equal IIV Great Britain 2017-18
- Ages 2 through 49 years
- Not for pregnancy, immunosuppressed
- Not for wheezing ages 2-4, asthma
Vaccine specific changes - Hep A & Hep B

• Hep A now recommended for homeless
  – And for 6-11 mo travelers - but does not count for two dose series
  – And close contact with certain international adoptees

• Hep A - Hep B (Twinrix) vaccine available for >= 18 years
• CpG-adjuvanted Hep B vaccine (Heplisav-B) for >= 18 years

Vaccine specific changes - Tdap

• Children who receive Tdap ages 7-10 years should still get booster at age 11-12 years

• Still recommending Tdap at 27-36 weeks with each pregnancy

• These are the only recommendations for repeat Tdap
Hexavalent Vaccine

- VAXELIS = DTaP, IPV, Hep B, and HIB
  - DTaP, HIB, IPV from Sanofi = Pentacel
  - Hep B from Merck = Recombivax
- FDA approval December 2018
- Three dose series between ages 6 weeks and 4 years
  - Usually 2, 4, 6 months
- ACIP approval June 2019, available 2021?
- CPT code ???, CVX code 146

Poll Question 1

Which of the following statements is correct regarding a 6 1/2 year old patient receiving Dtap-IPV vaccine as a fifth dose?

A. The Dtap vaccine is considered delayed.
B. The IPV vaccine is considered delayed.
C. Both are considered delayed.
D. Both are considered on schedule.
Presentation Outline

1. New pediatric and adolescent vaccine information
2. Logistics of giving vaccines in the office
3. Vaccine hesitancy

Many of the following slides courtesy of Immunization Action Coalition
www.immunize.org

Poll Question 2

How many of you are:

A. Primarily responsible for vaccine decisions such as ordering, buying equipment, writing protocols
B. Involved but not the final decision maker?
C. Public Health?
D. Not involved at all?
E. Other?
How to set up a vaccine process in your office

• **Starting from scratch:** Vaccinating Adults: A Step by Step Guide - [http://www.immunize.org/guide/](http://www.immunize.org/guide/)
• Aimed at adults but useful for children
• Also useful as refresher - Are you doing it right?
• Table of contents includes
  – Setting up your office
  – Storage and handling
  – How to administer vaccines
  – Documentation and Billing
Refrigerator, Freezer, and Temperature Monitoring

- Separate refrigerator and freezer
  - Avoid combination units because less reliable
  - If using combination unit, don’t use freezer
- No food!
- Temperature monitoring
  - VFC now requires an electronic log of temps
  - CDC recommends continuous monitoring and probe in glycol solution
Hot topic: Shoulder injury related to vaccine administration (SIRVA)

- Defined as musculoskeletal injury from injection into tendons, ligaments, bursae instead of intramuscular injection
- Chapter 5 - instructions on adult vaccine admin
  - Useful for staff training
- IAC - instructions on pediatric vaccine administration

How to Administer Intramuscular and Subcutaneous Vaccine Injections

Administration by the Intramuscular (IM) Route

Administer these vaccines via IM route:
- Diphtheria tetanus pertussis (DTP, Td)
- Polio (IPV)
- Haemophilus influenzae type b (Hib)
- Hepatitis B (HepB)
- Human papillomavirus (HPV)
- Inactivated influenza (IV)
- Measles/mumps/rubella (MMR)
- Meningococcal conjugate A,C,W,Y (MenACWY)
- Varicella zoster virus (VarV)
- Pneumococcal conjugate (PCV)
- Rotavirus (RV)

Administer inactivated polio (IPV) and pneumococcal polysaccharide (PPS23) vaccines when IM or subcutaneously (S/C).

### IM Dose Schedule

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Injection Site</th>
<th>Needle Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diphtheria</td>
<td>Anterior deltoid</td>
<td>1/2” (5-15 gauge)</td>
</tr>
<tr>
<td>Tetanus</td>
<td>Anterior deltoid</td>
<td>1/2” (5-15 gauge)</td>
</tr>
<tr>
<td>Pertussis</td>
<td>Anterior deltoid</td>
<td>1/2” (5-15 gauge)</td>
</tr>
<tr>
<td>Polio</td>
<td>Anterior deltoid</td>
<td>1/2” (5-15 gauge)</td>
</tr>
<tr>
<td>Haemophilus influenzae type b</td>
<td>Anterior deltoid</td>
<td>1/2” (5-15 gauge)</td>
</tr>
<tr>
<td>Hepatitis B</td>
<td>Anterior deltoid</td>
<td>1/2” (5-15 gauge)</td>
</tr>
<tr>
<td>Shingles</td>
<td>Anterior deltoid</td>
<td>1/2” (5-15 gauge)</td>
</tr>
<tr>
<td>Inactivated influenza</td>
<td>Anterior deltoid</td>
<td>1/2” (5-15 gauge)</td>
</tr>
<tr>
<td>Measles/mumps/rubella</td>
<td>Anterior deltoid</td>
<td>1/2” (5-15 gauge)</td>
</tr>
<tr>
<td>Meningococcal conjugate A,C,W,Y</td>
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<td>Varicella zoster virus</td>
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</tr>
<tr>
<td>Pneumococcal conjugate</td>
<td>Anterior deltoid</td>
<td>1/2” (5-15 gauge)</td>
</tr>
<tr>
<td>Rotavirus</td>
<td>Anterior deltoid</td>
<td>1/2” (5-15 gauge)</td>
</tr>
</tbody>
</table>

### Needle Insertion

1. Use a needle long enough to reach deep into the muscle.
2. Insert needle at a 90° angle to the skin with a quick thrust.
3. Multiple injections given in the same extremity should be separated by a minimum of 1.5 cm, if possible.

### Intramuscular (IM) Injection Site

- **Infants (0-12 months):** Anterior deltoid
- **Children (1-2 years):** Anterior deltoid
- **Children (3-11 years):** Anterior deltoid
- **Children (12 years and older):** Anterior deltoid

### Intramuscular (IM) Injection Sites for Children and Adults

- **Infant:** Anterior deltoid
- **Child:** Anterior deltoid
- **Adult:** Anterior deltoid

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**Needle Insertion**

Insert needle at a 90° angle to the skin with a quick thrust.

**Injection Sites**

- **Infant:** Anterior deltoid
- **Child:** Anterior deltoid
- **Adult:** Anterior deltoid
Standing orders

- Allows vaccines to be given to a patient based on a written protocol instead of an individual patient order.
- Delegating authority but physician ultimately responsible
- Commonly used for flu clinics
- Who can legally administer vaccine does not change
  - In New York an MA cannot give vaccines
  - AND an LPN cannot implement a standing order!
- In New York, pharmacists need an MD to sign off on protocol

Benefits of standing orders

- Strong evidence of increased vaccination
  - 35 studies, average inc 16-27% over various categories
  - Mostly adults but four studies in children with 28% increase
  - Wide variety of settings so like widely applicable
- Also improved efficiency and flow of busy offices
- Mean increased income from flu, Tdap, pneumococcal standing orders was around $24 per patient
- No harms noted

https://www.cdc.gov/mmwr/preview/mmwrhtml/rr4901a2.htm
Barriers to Standing Orders

- State laws limit implementation
- Physicians unwilling to delegate
- Staff uncomfortable with lack of a specific patient order
- Additional workload for staff with more vaccines given
- Patients unwilling to accept vaccines before seeing physician

Elements of a standing order

- Who is eligible for the vaccine?
- Indications, contraindications?
- How to manage emergencies?
How to implement standing orders

  - Leadership support
  - Materials and Strategies
  - Make it happen
- Emphasizes how to create necessary structure for implementation - more useful for larger practices
How to implement standing orders

• Create your own workflow
  – Flu clinics
    • Checklist for contraindications (next slide)
    • Five minute appointments
    • Two staff: one for injection, one for documentation
  – Regular visits
    • Staff reviewing vaccines needed, getting consent
    • Nurse administering vaccines before patient seen by MD

Screening Checklist for Contraindications to Inactivated Injectable Influenza Vaccination

For patients (both children and adults) to be vaccinated: The following questions will help us determine if there is any reason we should not give you or your child inactivated injectable influenza vaccination today. If you answer "yes" to any question, it does not necessarily mean you (or your child) should not be vaccinated. It just means additional questions must be asked. If a question is not clear, please ask your healthcare provider to explain it.

1. Is the person to be vaccinated sick today?
2. Does the person to be vaccinated have an allergy to a component of the vaccine?
3. Has the person to be vaccinated ever had a serious reaction to influenza vaccine in the past?
4. Has the person to be vaccinated ever had Guillain-Barré syndrome?

FORM COMPLETED BY: __________________________ DATE: ____________
FORM REVIEWED BY: __________________________ DATE: ____________
Finding pre-made standing orders

- Immunization Action Coalition - [www.immunize.org](http://www.immunize.org)
- Over 30 different forms for most common vaccines
- The IAC Express is a weekly email that keeps you up to date on all things related to vaccines


Vaccine Reminder Systems

- Start with your EMR
  - Talk to your IT staff, EMR vendor
- State vaccine registry
  - Pediatrics
  - Adults?
- Pre-visit planning
  - Review vaccines due for the day at huddle
Vaccine Information Sheets (VIS)

- The IAC website also has VIS (Vaccine Information Sheets) in English and several other languages.
- Plus the VIS page has a list of all current VIS and the date of the most recent VIS. You can use this list to stay up to date.
Vaccine Billing

- Bill for the vaccine and the administration code
- Pediatric admin codes require counseling at visit
  - Bill by component of vaccine
    - MMR has 3 components
    - Hexavalent DtaP-HepB-IPV-HIB has 6!
      - CPT codes 90460 (first), 90461 (second+)
    - If no counseling, need to bill with adult codes
      - CPT codes 90470 (first), 90471 (second+)
Vaccine Billing

- Kindergarten vaccines = MMRV, DTaP-IPV
  - MMRV & DTaP-IPV each 90460x1 + 90461x3
  - 90460 pays $45, 90461 pays $27.50
- Payment
  - 90460 x 2 x $45 = $90
  - 90461 x 6 x $27.50 = $165
- Total Payment = $255

Vaccine Billing

- But without counseling
  - 90471 first vaccine ($45) + 90472 2nd ($27.50)
  - Total = $72.50

- *** Compare $255 vs $72.50 if counseling ***

- More relevant if combination vaccines, I don’t use with flu clinic
- Immunizations: How to Protect Patients and the Bottom Line
Poll Question 3

Which of the following statements is true regarding standing orders?

A. They allow staff members who otherwise are not allowed to give vaccines legal permission to give immunizations.
B. They increase vaccination rates.
C. They relieve the physician from litigation risk when staff are giving vaccines.
D. They require extra work to review for contraindications.

Presentation Outline

1. New pediatric and adolescent vaccine information
2. Logistics of giving vaccines in the office
3. Vaccine hesitancy
Vaccine Hesitancy - What?

- Plan to defer or decline vaccines despite easy availability
- Spectrum of attitudes
  - Unsure vs delay vs refusal vs trying to convince you
- Vaccine delay (19%) vs refusal (3%)
  - Some patients/families will never be convinced
  - BUT questions and concerns do not equal refusal
    - Do not overestimate resistance
Vaccine Hesitancy - Why?

- WHO - Issues of confidence, complacency, convenience
- Common parental concerns focus on safety
  - Fear of side effects, both immediate and long term
  - Overloading immune system, too many vaccines
  - Fear of ingredients (thimerosal, aluminum)
  - Pain for children
  - Mistrust of medicine, government, Big pharma
  - Natural disease is better
  - Healthy kids don’t need protection
  - Diseases no longer present, not dangerous

Vaccine Hesitancy - Response

- One response might be to try motivational interviewing
  - Empathy: I understand where you are coming from
    - Seek common ground - We both care for your child
  - Discrepancy: What they would do if traveling overseas?
  - Adjust to resistance but don’t fight
    - Answer questions with simple language
    - But ok to say you encourage vaccination
  - Support self-efficacy: Ultimately they make the decision
Vaccine Hesitancy - Responses

• Some specific responses to specific concerns
  – Fear of side effects
  – Overloading immune system
  – Fear of ingredients (thimerosal, aluminum)
  – Pain for children
  – Mistrust of medicine, government, pharma
  – Natural disease is better
  – Healthy kids don’t need protection
  – Diseases no longer present, not dangerous

Vaccine Hesitancy - Responses

• Fear of side effects
  – Side effects are real so don’t discount them BUT
  – Most side effects listed on VIS are minor
  – The few serious ones are rare
  – And some are so rare unclear if related to vaccine

The risk of dying in a car accident is 1/10,000 per year. Many of the risks listed are higher than that.
Vaccine Hesitancy - Responses

- Overloading immune system
  - More antigens daily from environment than from vaccine(s)

Vaccine Hesitancy - Responses

- Fear of ingredients (thimerosal, aluminum)
  - Thimerosal no longer in children’s vaccines
  - Aluminum only relevant if
    - Renal disease
    - Neonatal TPN
  - Otherwise you are able to excrete it
  - More aluminum in diet than in vaccines
Vaccine Hesitancy - Responses

• Pain for children
  – Children cry for many reasons
  – This is a safety issue
  – Do you let child out of car seat if crying?

Vaccine Hesitancy - Responses

• Mistrust of medicine, government, pharma
  – I trust the CDC
    • Rotavirus vaccine taken off market in 1999
      – VAERS, Rapid response vaccine review
    • LAIV not recommended when not effective 2015
  – I trust the FDA
    • Regulations re manufacturing
    • 3 years to test before changing caps of vaccines approved
  – I trust the data
    • Studies show no increase sig side effects with vaccines
Vaccine Hesitancy - Responses

• Natural disease is better
  – But natural disease has its own side effects
  – Ex - risks of measles
    • 10-30% hospitalized
    • 1/1000 die

Vaccine Hesitancy - Responses

• Healthy kids don’t need protection
  – Ex - Meningococcal disease in previously healthy teen
Vaccine Hesitancy - Responses

• Diseases no longer present, not dangerous
  – Pertussis California 2010, >10,000 cases, 10 deaths
  – Measles 2019

Vaccine Hesitancy - Responses

• But do responses work?
Poll Question 4

Which of the following interventions has been shown to improve vaccination rates?

A. Making a strong recommendation in favor of giving the vaccine
B. Showing parents pictures of a child infected with a vaccine-preventable disease
C. Teaching physicians better communication skills re: vaccines
D. Providing parents written information about the dangers of vaccine-preventable disease

Vaccine Hesitancy - What Works?

- Many articles
  - A strong recommendation from the child’s doctor is the most important reason a patient accepts a vaccination
  - A presumptive approach (“We have these shots today”) is better than participatory (“Which vaccines do you want today”)
  - Removing vaccine exemptions (92.8 to 95.1% California)
  - Persistence - 33-47% of parents who initially refused finally accepted vaccines
Vaccine Hesitancy - What doesn’t work?

• Cochrane review - face-face interventions lacking in impact and generally low quality studies.
• Better quality studies show no significant benefit
• For example:
  • Cluster randomized trial of MD communication training
    – 56 clinics, >300 mothers
    – No detectable effect

Vaccine Hesitancy - What doesn’t work?

• Randomized trial, 5 messages, >1700 parents
• Messages included
  – Info that MMR vaccine not linked to autism
  – Info re: dangers of diseases prevented by MMR vaccine
  – Images of diseases
  – Dramatic narrative of an infant who almost died from measles
  – No intervention
Vaccine Hesitancy - What doesn’t work?

• None of the interventions increased intent to vaccinate
  – First message dec misperceptions about MMR/autism link
    • BUT also decreased intent to vaccinate
  – Images increased concerns about MMR/autism link
  – Dramatic narrative about disease increased concerns about side effects about vaccine

Vaccine Hesitancy - What doesn’t work?

• Conclusions: Current public health communications about vaccines may not be effective. For some parents, they may actually increase misperceptions or reduce vaccination intention. Attempts to increase concerns about communicable diseases or correct false claims about vaccines may be especially likely to be counterproductive.
  
  • https://www.researchgate.net/publication/260485891_Effective_Messages_in_Vaccine_Promotion_A_Randomized_Trial
Vaccine Hesitancy and Statistics

• Blah, blah, blah

• Statistics don’t persuade people
  – (or at least very few and they were already on board with vaccines)

Vaccine Hesitancy - What Else?

• Non-proven recommendations include
  – Emphasize social norms - >95% people vaccinate
  – Discuss herd immunity: protecting the community
  – Bundle and sandwich HPV vaccine with Tdap and mening
  – Refusal waiver

When all else fails, consider a delayed schedule

Reference - Countering Vaccine Hesitancy, Pediatrics
https://pediatrics.aappublications.org/content/138/3/e20162146.long
Vaccine Exemptions from School

• **Increased exemptions linked to increased incidence of disease**
  - *very good data*

• Medical exemptions (ex: anaphylaxis) - all 50 states
  – Five states only allow medical exemptions
  – California rates increased after removing religious exemptions

• About 30 states allow religious exemptions
  – No major religion opposes vaccinations

• Philosophical or personal - 15 states

Vaccine Exemptions from School

• **My (anecdotal) experience**
  – Most parents would vaccinate if exemptions unavailable
  – Most parents would vaccinate if diseases more common
  – Exemptions not relevant for <5 yrs unless day care included

• **Unintended consequences**
  – More homeschooling
  – Socio-economic issues of who can afford to homeschool
  – Clustering of non-immunized children

• The AAFP, AAP, AMA, and IDSA are advocating for only allowing medical exemptions
Practice Recommendations

• What you can do immediately:
  – Start or expand use of standing orders
  – Make sure you are using pediatric vaccine administration codes 90460 and 90461
  – Make strong recommendations for vaccines
  – Advocate for only medical exemptions for vaccines

Contact Information

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