2019 FMX Hematology Immune Handouts

Adult Immunization Update: Are you Ready for your Vaccine Today? (CME094-095)

Anticoagulation Management Update: Through Thick & Thin (CME096-097)

Increasing Your Knowledge of Immunization Policies Through AAFP Vaccine Science Fellows (CME333-334)

Zika Virus Update: The Forgotten Pandemic (CME098-099)
Adult Immunization Update: Are you Ready for your Vaccine Today?

David Glenn Weismiller, MD, ScM, FAAFP

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Dr. Weismiller is a graduate of Jefferson Medical College of Thomas Jefferson University in Philadelphia, Pennsylvania, and completed his residency at the University of Virginia Health Sciences Center in Charlottesville. Subsequently, he completed a fellowship in maternal-child health and earned a graduate degree in epidemiology at Brown University School of Medicine, Providence. A professor of family medicine at the new medical school of the University of Nevada, Las Vegas, he provides full-scope care that includes inpatient and maternity care. A proponent of “reflection in practice” and “learner-centered instruction,” he is recognized nationally for his work in continuing medical education and faculty development.

Having taught board review programs for the AAFP for more than 20 years, Dr. Weismiller is the founding and current chair of the AAFP Family Medicine Board Review Express™, as well as the AAFP’s annual Family Medicine Update live course. He is a frequent presenter at AAFP Family Medicine Experience (FMX) and teaches American Board of Family Medicine (ABFM) Knowledge Self-Assessments throughout the country. He is the author of numerous publications on issues related to women’s and children’s health, and he is an advocate for empowering individuals to make sound health care choices.
Learning Objectives

1. Establish standardized adult immunization status screening during patient encounters.

2. Integrate current AAFP/ACIP adult immunization recommendations into current practice.

3. Develop standardized processes to address special populations and contraindications.

4. Counsel adult patients, using available patient education resources and motivational interviewing about vaccine safety and efficacy.

Audience Engagement System

**Step 1**

**Step 2**

**Step 3**
Background

- Vaccines are considered one of the greatest public health achievements of the last century for their role in:
  - Eradicating smallpox
  - Controlling polio, measles, mumps, rubella and other infectious diseases
- Despite their effectiveness in preventing and eradicating disease, substantial gaps in vaccine uptake persist
- **WHO**
  - One of the most cost-effective ways of avoiding disease
  - Prevents 2-3 million deaths per year
  - 1.5 million deaths could be avoided if global coverage of vaccinations improved

Comparison of 20th Century Annual Morbidity and Current Morbidity: *Vaccine-Preventable Diseases*

<table>
<thead>
<tr>
<th>Disease</th>
<th>20th Century Annual Morbidity</th>
<th>2016 Reported Cases</th>
<th>Percent Decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smallpox</td>
<td>29,005</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Diphtheria</td>
<td>21,053</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Measles</td>
<td>530,217</td>
<td>85</td>
<td>&gt;99</td>
</tr>
<tr>
<td>Mumps</td>
<td>162,244</td>
<td>6,369</td>
<td>&gt;96</td>
</tr>
<tr>
<td>Pertussis</td>
<td>200,752</td>
<td>19,972</td>
<td>90</td>
</tr>
<tr>
<td>Polio (paralytic)</td>
<td>16,316</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Rubella</td>
<td>47,745</td>
<td>1</td>
<td>&gt;99</td>
</tr>
<tr>
<td>Congenital rubella syndrome</td>
<td>152</td>
<td>2</td>
<td>98</td>
</tr>
<tr>
<td>Tetanus</td>
<td>580</td>
<td>34</td>
<td>94</td>
</tr>
<tr>
<td>Haemophilus influenzae</td>
<td>20,000</td>
<td>2,085</td>
<td>90</td>
</tr>
</tbody>
</table>
WHO – 30% global increase in cases of measles – a disease that had been nearly wiped out in some countries.

New York tackles 'largest measles outbreak' in state's recent history as cases spike globally

-- 2019
MMR Vaccine and Autism

- 1998 – Wakefield and colleagues
  - Ultimately retracted paper claimed there was direct connection

Mainstream Studies
Consistently pointed toward a lack of association between MMR vaccine and autism


1998 – Wakefield and colleagues
  - Ultimately retracted paper claimed there was direct connection

March 2019*
  - Nationwide Cohort Study, 657,461 children born in Denmark from 1999 through 31 December 2010, with follow-up from 1 year of age and through 31 August 2013
  - Results
    - During 5,025,754 person-years of follow-up, 6,517 children were diagnosed with autism (incidence rate, 129.7 per 100,000 person-years).
    - Comparing MMR-vaccinated with MMR-unvaccinated children yielded a fully adjusted autism hazard ratio of 0.93 (95% CI, 0.85 to 1.02).
    - Similarly, no increased risk for autism after MMR vaccination was consistently observed in subgroups of children defined according to sibling history of autism, autism risk factors (based on a disease risk score) or other childhood vaccinations, or during specified time periods after vaccination.
  - Conclusion
    - Strongly supports that MMR vaccination does not increase the risk for autism, does not trigger autism in susceptible children, and is not associated with clustering of autism cases after vaccination.
    - It adds to previous studies through significant additional statistical power and by addressing hypotheses of susceptible subgroups and clustering of cases.

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Anti-Vaxers

• Vaccines cause autism and other diseases
• Distrust of government and pharmaceutical companies
• Individual rights
• Religious freedoms
• CDC – No vaccination by age 2*
  • Born in 2011 – 0.9%
  • Born in 2015 – 1.3%

Vaccine Refusal

• AAFP
  • Does NOT support immunization exemption policies except in cases of allergic and medical contraindication
  • Sign a refusal to vaccinate form, declination should be documented with provision of vaccine information statement

• AAP
  • Has developed form that can be used to document vaccine refusal

• Dismiss from practice?
  • CDC recommends AGAINST dismissing the patient or family from the practice if they refuse vaccination
  • AAP now accepts this practice if done in a conscientious way

School Vaccine Exemption Laws

• Full vaccination of students enhances the safety of all, but states vary in regard to acceptable reasons for parental vaccination refusal.
• The choice of some parents not to immunize increases the infection risk for all children, INCLUDING those who are immunized.*


According to the American Academy of Pediatrics, at least 20 states have introduced bills this year that would –
• broaden the reasons why parents can exempt kids from getting vaccines even if there isn’t a medical need
• require doctors to provide more information on the risks of vaccines

Even with measles outbreaks across the US, at least 20 states have proposed anti-vaccination bills

*From News by and Norton Gregg, MD
Updated 4-15-2011, Last Revised 3-2010
CDC Estimates

• Estimated that 50,000 adult lives could be saved per year if the ACIP immunization schedule was followed
• Among children born in the past 20 years
  • Prevent >21 million hospitalizations
  • Prevent 730,000 deaths
Unvaccinated Adults and the US Economy

• A toll on the US
  • $7.1 billion in 2015
  • 80% of a total cost-of-illness burden of $8.95 billion for vaccine-preventable diseases
• For every $1 invested in vaccines in the U.S., $10.20 is saved in direct medical costs


Of this almost 9 Billion cost of Illness burden…

Greatest Cost*

<table>
<thead>
<tr>
<th>Disease</th>
<th>Amount of 2015 direct and indirect expenditures</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influenza</td>
<td>5.79 million</td>
<td>16.6 million</td>
</tr>
<tr>
<td>Pneumococcus</td>
<td>1.86 billion</td>
<td>283,000 cases</td>
</tr>
<tr>
<td>Herpes Zoster</td>
<td>782 million</td>
<td>1.1 million cases</td>
</tr>
<tr>
<td>HPV-linked conditions</td>
<td>333 million</td>
<td>447,000 cases</td>
</tr>
</tbody>
</table>

*In- and Outpatient costs represented 95% of burden, and lost productivity 5%

AES Question 1
Which one of the following is the greatest influence on a patient’s decision to undergo vaccination?

A. Information from websites
B. Recommendation from a pharmacist
C. Recommendation from family and friends
D. Recommendation from physician

Who Most Influences Adults’ Decisions to Get Immunized?

<table>
<thead>
<tr>
<th>Who</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal physician</td>
<td>69%</td>
</tr>
<tr>
<td>Family member</td>
<td>19%</td>
</tr>
<tr>
<td>Celebrity physician, public figure, other</td>
<td>7%</td>
</tr>
<tr>
<td>None of the above</td>
<td>4%</td>
</tr>
<tr>
<td>No answer</td>
<td>1%</td>
</tr>
</tbody>
</table>

Key Reasons for Low Vaccination Rates Among US Adults

<table>
<thead>
<tr>
<th>PHYSICIAN FACTORS</th>
<th>PATIENT FACTORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Do not recommend to patient</td>
<td>• Misconceptions about vaccines</td>
</tr>
<tr>
<td>• Recommend but without conviction</td>
<td>• Not effective</td>
</tr>
<tr>
<td>• Lack knowledge about current guidelines</td>
<td>• Not needed because the diseases they prevent no longer exist</td>
</tr>
<tr>
<td>• Unavailable in physicians’ offices</td>
<td>• Not needed by healthy individuals who live healthy lives</td>
</tr>
<tr>
<td>• Do not use patient reminder systems</td>
<td>• Are unsafe</td>
</tr>
<tr>
<td>• Do not use EHR to identify patients who need vaccines</td>
<td>• Cause disease</td>
</tr>
<tr>
<td></td>
<td>• Are expensive</td>
</tr>
<tr>
<td></td>
<td>• Lack of awareness about need for vaccines</td>
</tr>
</tbody>
</table>

Addressing Concerns About Vaccination

Communication

<table>
<thead>
<tr>
<th>Unhelpful</th>
<th>Helpful</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Directing style – “This is what you should do”</td>
<td>• Guiding style – “May I help you?”</td>
</tr>
<tr>
<td>• Righting reflex – using information and persuasion to achieve change</td>
<td>• Care with body language</td>
</tr>
<tr>
<td>• Missing cues</td>
<td>• Eliciting concerns</td>
</tr>
<tr>
<td>• Using jargon</td>
<td>• Asking permission to discuss</td>
</tr>
<tr>
<td>• Discrediting information source</td>
<td>• Acknowledging/listening/empathizing</td>
</tr>
<tr>
<td>• Overstating vaccine safety</td>
<td>• Determining readiness to change</td>
</tr>
<tr>
<td>• Confrontation</td>
<td>• Informing about benefits and risks</td>
</tr>
<tr>
<td></td>
<td>• Giving or signposting appropriate resources</td>
</tr>
</tbody>
</table>
Barriers

*What to do?*

• Successful dialogue
  • Take time to LISTEN
  • Solicit and welcome questions
  • Keep the language simple and uniform
  • Clear cohesive voice of vaccine safety
  • Keep the conversation going

• Every visit is an opportunity for primary prevention
• Trust develops when patients identify both competence and caring in their physician

Current Immunization Schedules

• Advisory Committee on Immunization Practices (ACIP) of the Centers for Disease Control and Prevention – develops a vaccination schedule for adults that is approved annually by the AAFP and other professional organizations

• Information about these schedules is available at [http://cdc.gov/vaccines](http://cdc.gov/vaccines)
  • Frequently monitor CDC websites for the most current recommendations

• ACIP Immunization Advisory App (free for Apple devices)
  • [http://immunization.acponline.org/app(immunization.acponline.org)](http://immunization.acponline.org/app(immunization.acponline.org))

• CDC Immunization Advisory App (free for Android devices)
  • [http://www.cdc.gov/vaccines/schedules/hcp/schedule-app.html](http://www.cdc.gov/vaccines/schedules/hcp/schedule-app.html)
Key Points to the 2019 Schedule

(Adult)

- Any licensed influenza vaccine appropriate for a patient’s age and health status may be now administered.
  - The recommendation supersedes those for the previous two seasons, in which the use of the intranasal live attenuated influenza vaccine (LAIV), such as FluMist Quadrivalent (AstraZeneca), was not recommended.

- **Homeless individuals** are the latest addition to the list of those who should be routinely vaccinated against hepatitis A. They can receive a two-dose series of single-antigen hepatitis A vaccine (Havrix, GlaxoSmithKline; Vaqta, Merck) or a three-dose series of combination hepatitis A and B vaccine (Twinrix, GlaxoSmithKline).
  - The addition came after the CDC received reports of an outbreak of hepatitis A in multiple states in October 2018. There were 2500 cases and most occurred among people who were homeless, drug users, or both.

- For adults aged 19 years and older, ACIP recommends use of a new yeast-based single-antigen recombinant hepatitis B vaccine (Heplisav-B, Dynavax), which contains the novel cytosine-phosphate-guanine oligodeoxynucleotide 1018 adjuvant.
  - Approved by the US Food and Drug Administration in November 2017, the vaccine offers the advantage of a more rapid dosing schedule and a shorter time to protection. “It’s effective with two doses given 1 month apart and can also be used as part of a series with older vaccines. It costs about twice as much as its older counterparts, however.”
  - There is an absence of safety data on use during pregnancy, and pregnant women should not receive Heplisav-B.

Where are we with Adults in 2019?

- MMR
- Influenza
- Hepatitis B
- Prevnar 13
- Gardasil
- Shingrix

(Matthew Busch/For The Washington Post)
MMR

https://www.cdc.gov/vaccines/vpd/mmr/hcp/recommendations.html#risk-factors

Adults

• Should be up to date on MMR with either 1 or 2 doses depending on risk factors UNLESS they have presumptive evidence of immunity
• During measles outbreaks, health departments MAY provide additional recommendations to protect their communities.
• In healthcare facilities serving a measles outbreak area, two doses or MMR vaccine are recommended for health care personnel, regardless of birth year, who lack other presumptive evidence of measles immunity
Presumptive Evidence of Immunity

May be established in any of the following ways:

• Written documentation of $\geq$1 doses of a measles-containing vaccine administered on or after the first birthday for preschool-age children and adults not considered high risk

• Written documentation of two doses of measles-containing vaccine for school-age children and adults at high risk, including students at post-high school secondary educational institutions, healthcare personnel, and international travelers

• Laboratory evidence of immunity

• Laboratory confirmation of disease

• Birth before 1957
  • Considered acceptable evidence of immunity, in routine circumstances, healthcare facilities should consider vaccinating healthcare personnel born before 1957 who lack laboratory evidence of immunity or laboratory confirmation of disease.

High risk adults

Certain adults are considered to be at high risk for either acquiring measles and/or transmitting disease to vulnerable persons

• High-risk adults need written documentation of two doses of MMR vaccine (each dose separated by at least 28 days), or other presumptive evidence of immunity
  • Students at post-high school educational institutions
  • Healthcare personnel
  • International travelers to any country outside the United States

CDC - Measles Outbreak Toolkit for Health Care Providers

- https://www.cdc.gov/measles/toolkit/healthcare-providers.html
- Post-exposure Prophylaxis (PEP)
  - People exposed to measles who cannot readily show that they have evidence of immunity against measles should be offered PEP or be excluded from the setting (school, hospital, childcare).
  - To potentially provide protection or modify the clinical course of disease among susceptible persons, either administer MMR vaccine within 72 hours of initial measles exposure, or immunoglobulin (IG) within six days of exposure.
  - Do not administer MMR vaccine and IG simultaneously, as this practice invalidates the vaccine.
  - If many measles cases are occurring among infants younger than 12 months of age, measles vaccination of infants as young as 6 months of age may be used as an outbreak control measure.
    - Note that children vaccinated before their first birthday should be revaccinated when they are 12 through 15 months old and again when they are 4 through 6 years of age.

Influenza
**Myths**

- The influenza vaccine can cause influenza
- Healthy people don’t need an influenza vaccine
- Influenza is just a “bad cold”
- The influenza vaccine isn’t effective
- It's too late to get an influenza vaccine

**Influenza Vaccine Recommendations**

- In the Northern Hemisphere, all persons aged 6 months or older should receive influenza vaccine annually by the end of October, if possible.
  - Influenza vaccination should not be delayed to procure a specific vaccine preparation if an appropriate one is already available.
- Persons with a history of egg allergy who have experienced only hives after exposure to egg should receive influenza vaccine.
  - Inactivated influenza virus cell culture–based (ccIIV4; Flucelvax) or trivalent or quadrivalent recombinant influenza vaccine (RIV; Flublok) should be used
  - RIV may be used for persons aged 18 years or older who have no other contraindications

**Regardless of allergy history, all vaccines should be administered in settings in which personnel and equipment for rapid recognition and treatment of anaphylaxis are available.**

**Previous severe allergic reaction to influenza vaccine**, regardless of the component suspected of being responsible for the reaction, is a contraindication to future receipt of the vaccine.

Effectiveness of Seasonal Flu Vaccines from the 2008 – 2018 Flu Seasons

Source: https://www.cdc.gov/flu/professionals/vaccination/effectiveness-studies.htm
Influenza Vaccine 2018-2019

• Effectiveness* (reducing a person's risk of becoming sick enough to see a physician)
  • Adults 50%
  • Children 61%
    • Strain this season tended to affect children more than other age groups
  • Older Adults 8%
• Deaths 16,000
  • Relatively high for season considered to be “low severity.”
• When effectiveness is about 50% – see a large decrease in illness, hospitalizations, and death

*MMR, by comparison, is about 97% effective with two doses
Influenza

Treatment and Chemoprophylaxis

• In the United States, prescription antiviral drugs approved for treatment and/or chemoprophylaxis of influenza and are active against recently circulating subtypes of influenza
  • Baloxavir marboxil (Xofluza)
    • 1 dose 40 mg (40-80 kg)
    • 1 dose 80 mg (>80 kg)
  • Oseltamivir
  • Peramivir
  • Zanamivir


Xofluza

• Indicated for the treatment of acute uncomplicated influenza in patients 12 years of age and older who have been symptomatic for no more than 48 hours.
  • In the primary endpoint in Trial 2, XOFLUZA reduced duration of flu symptoms to just 2.3 days compared with 3.3 days with placebo
  • In a secondary endpoint in Trial 2, in subjects aged 20-64 years, reduction of duration of flu symptoms was similar with XOFLUZA compared with oseltamivir

Baloxavir marboxil (Xofluza)

• Oral antiviral
• Indication:
  • Management of influenza >12yo and up if given within 48h of symptoms
• Dose:
  • 40-79kg use 40mg x 1 dose
  • ≥80kg use 80mg x 1 dose
• Efficacy:
  • Appears similar to a 5d course of oseltamivir
  • Possibly greater reduction in virus levels at 24h & a shorter duration of virus detection
  • CAPSTONE -2 trial focused on high risk and showed shorter duration of symptoms vs. placebo
  • Data lacking for oseltamivir-resistant influenza or transmission within households/outbreaks
• Safety:
  • Diarrhea, Possible increased viral resistance
  • Avoid cations like Calcium- decreases absorption
  • No dosage adjustment in CKD
• Cost:
  • $90/dose vs $100 for 5 days oseltamivir

Hepatitis B
Immunization

• **Who to vaccinate:** all medically stable infants weighing 2,000 g (4 lb, 6 oz) or more within 24 hours of birth (ACIP 2018), unvaccinated infants and children, and unvaccinated adults requesting protection from hepatitis B or who are at increased risk of infection

• **Three-Dose Hepatitis B Vaccine Schedule of Administration**
  - Engerix-B (GlaxoSmithKline), Recombivax HB (Merck)
  - Three-dose series on a 0, 1, and 6-month schedule. The recommended doses depend on the vaccine brand and the person's age

• **Two-Dose Hepatitis B Vaccine Schedule of Administration (Adults Only)**
  - Heplisav-B (Dynavax)
  - Two-dose vaccine approved and recommended in the U.S. for use in adults aged 18 and older. The vaccine is administered as two doses given one month (at least 28 days) apart

Post-vaccination Testing?

• **Only recommended** in individuals who may not elicit a complete response to the vaccine based on risk factor assessment
  - Persons on hemodialysis
  - Persons who are immunocompromised
  - Sex partners of persons positive for HBsAg
  - Health care personnel

• Testing for anti-HBs should be performed **one to two months following the completion** of the vaccine series

• A responder is defined as a person with an anti-HBs level of 10 mIU per mL

• If the anti-HBs level is less than 10 mIU per mL after the initial vaccine series, revaccination is indicated


Revaccination

- (Method 1) Administer second complete hepatitis B vaccine series followed by anti-HBs testing one to two months later
- (Method 2) Administer a single hepatitis B vaccine dose followed by anti-HBs testing one to two months later
  - If anti-HBs <10 mIU per mL after a single dose, complete the series then test for anti-HBs one to two months after completing the series
  - A nonresponder is defined as a person with an anti-HBs level of less than 10 mIU per mL after six doses or more of the hepatitis B vaccine
- The CDC does not recommend administration of more than two complete hepatitis B vaccine series

Streptococcus pneumoniae
Prevnar 13  
ACIP June 26, 2019

- **Reversal** of 2014 recommendation
- Do NOT recommend the 13-valent pneumococcal conjugate vaccine (Prevnar 13, Pfizer; PCV13) for ALL adults age 65 or older who have NOT previously received it
- Recommend decision based on shared decision making in adults ≥ 65 years who do not have an immunocompromising condition
- Recommendation follows continued reductions in PCV 13-type disease due to the indirect effects from Pediatric PCV13 use which ACIP foresaw as potentially limiting the 2014 recommendation

Immunocompromising Conditions

- Congenital or acquired immunodeficiency (B or T lymphocyte deficiency, complement deficiencies, phagocytic disorders other than chronic granulomatous disease)
- HIV infection
- Generalized malignancy (e.g., metastatic disease, disease treated with chemotherapy)
- Hematologic malignancy (e.g., leukemia, Hodgkin lymphoma, non-Hodgkin lymphoma, multiple myeloma)
- Solid organ transplant
- Iatrogenic immunosuppression, including long-term systemic glucocorticoids or radiation
- Chronic renal failure (or Chronic kidney disease)
- Nephrotic syndrome
Trends in invasive pneumococcal disease among children aged < 5 years old, 1998-2016

https://www.cdc.gov/abcs/reports-findings/survreports/spneu-types.html; July 2018

Trends in invasive pneumococcal disease among adults aged > 65 years old, 1998-2016

https://www.cdc.gov/abcs/reports-findings/survreports/spneu-types.html; July 2018
HPV (Gardasil)

Seven of the 9 HPV types included in the vaccine are responsible for 90% of HPV related cancers

Background to HPV

• More than 120 HPV types
  • Cutaneous epithelial cells: Common warts; majority
  • Mucosal epithelial cells: genitals, mouth, throat; 40 types
• Most HPV infections are asymptomatic; resolve spontaneously or become undetectable
• Persistent infections with high-risk (oncogenic) HPV types
  • Cancers of the anus, cervix, penis, vulva, vagina; oropharynx
  • Most common high risk types are 16 and 18

<table>
<thead>
<tr>
<th>Cancer</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cervical</td>
<td>Nearly all</td>
</tr>
<tr>
<td>Anal</td>
<td>&gt;90%</td>
</tr>
<tr>
<td>Oral, throat, and neck</td>
<td>&gt;70%</td>
</tr>
<tr>
<td>Penile</td>
<td>&gt;60%</td>
</tr>
</tbody>
</table>


Head and Neck Cancers

• Probably 70% caused by HPV, likely spread by oral sex
• Men may be up to six times more likely than women to develop an oral infection with the highest risk strain of HF
• Oropharyngeal cancer is now the most common HPV-associated cancer and is rising in males (ACIP – February 2018)
Screening for Oropharyngeal Cancer

- No studies have shown that screening for oral cavity, pharyngeal, or laryngeal cancer would decrease the risk of dying from this disease
- > 50% of oral cancers have nodal or other areas of extension by the time they are found
- Look for lesions
  - Leukoplakia
  - Erythroplakia

If You Find an Oral Lesion...

- **Toluidine blue stain**: lesions in the mouth are coated with a blue dye. Areas that stain darker are more likely to be cancer or become cancer.

  - A dark blue (royal or navy) stain is considered positive
  - Light blue staining is considered doubtful
  - No color absorbed by the lesion is a negative stain
If You Find an Oral Lesion…

• **Toluidine blue stain**: lesions in the mouth are coated with a blue dye. Areas that stain darker are more likely to be cancer or become cancer.

• **Fluorescence staining**: lesions in the mouth are viewed using a special light. After the patient uses a fluorescent mouth rinse, normal tissue looks different from abnormal tissue when seen under the light.

• **Exfoliative cytology**: collect cells from the oral cavity. A piece of cotton, a brush, or a small wooden stick is used to gently scrape cells from the lips, tongue, or mouth. The cells are viewed under a microscope to find out if they are abnormal.

• **Brush biopsy**: The removal of cells using a brush that is designed to collect cells from all layers of a lesion. The cells are viewed under a microscope to find out if they are abnormal.

HPV Vaccine

• Begin series **BEFORE age 15** (well known – antibody response STRONGER in young children)
  • Two dose vaccine series
  • Time zero and 6-12 months

• Routine vaccination at age 11-12
  • Can begin as young as age 9 REGARDLESS of whether they have a history of sexual assault or abuse (**Starting at a younger age helps take the question of sexual activity out of the discussions?**)

• To be considered immunized, 5 or more months MUST have passed between the first and second doses, otherwise third dose should be given at 6 months

• Immunocompromised persons (regardless of age) and ANYONE starting series **AFTER age 15**, 3 doses (Time 0, 1-2 months, six months)

Efficacy of Vaccine (Meta-analysis)

- 65 studies in 14 high-income countries
- 13 years since the vaccine was approved, a "substantial" decrease in HPV infections, precancerous cervical lesions, and anogenital warts
  - Cases of HPV types 16 and 18 (cause 70% of cervical cancer) - decreased by 83% among girls ages 13-19 and by 66% among women 20-24
  - Dramatic decreases in cases of precancerous cervical lesions among screened teenage girls and young women
  - Decreases in anogenital warts across all age groups of men and women.
- Herd Immunity – as you vaccinate more and more people, the ability to spread disease also decreases

Drolet M, Benard E, Perez N, Brisson M, et. al. Population-level impact and herd effects Following the introduction of human papillomavirus vaccination programmes: updated Systematic review and meta-analysis. Published online June 26, 2019

https://doi.org/10.1016/S0140-6736(19)30298-3

Changes in the prevalence of HPV infections between pre-vaccination and post-vaccination periods

<table>
<thead>
<tr>
<th>Studies</th>
<th>Risk ratios (95% CI)</th>
<th>Heterogeneity</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPV 16 and 18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Girls 13-15 years</td>
<td>0.30 (0.21-0.44)</td>
<td>P&lt;0.001</td>
</tr>
<tr>
<td>6</td>
<td>0.37 (0.28-0.49)</td>
<td>P&lt;0.001</td>
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<tr>
<td>11</td>
<td>0.26 (0.24-0.86)</td>
<td>P&lt;0.001</td>
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<tr>
<td>5</td>
<td>0.16 (0.09-0.29)</td>
<td>P&lt;0.001</td>
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<tr>
<td>Women 20-24 years</td>
<td>0.34 (0.33-0.49)</td>
<td>P&lt;0.001</td>
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<tr>
<td>6</td>
<td>0.26 (0.20-0.37)</td>
<td>P&lt;0.001</td>
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<tr>
<td>8</td>
<td>0.21 (0.15-0.29)</td>
<td>P&lt;0.001</td>
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<tr>
<td>Women 25-39 years</td>
<td>0.15 (0.09-0.24)</td>
<td>P&lt;0.001</td>
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<tr>
<td>6</td>
<td>0.13 (0.08-0.19)</td>
<td>P&lt;0.001</td>
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<tr>
<td>5</td>
<td>0.10 (0.06-0.15)</td>
<td>P&lt;0.001</td>
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<tr>
<td>HPV 31, 33, and 45</td>
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<tr>
<td>Girls 13-15 years</td>
<td>0.09 (0.08-0.11)</td>
<td>P&lt;0.001</td>
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<tr>
<td>6</td>
<td>0.06 (0.05-0.07)</td>
<td>P&lt;0.001</td>
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<td>0.04 (0.03-0.05)</td>
<td>P&lt;0.001</td>
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<tr>
<td>Women 20-24 years</td>
<td>0.04 (0.03-0.06)</td>
<td>P&lt;0.001</td>
</tr>
<tr>
<td>6</td>
<td>0.04 (0.03-0.06)</td>
<td>P&lt;0.001</td>
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<tr>
<td>11</td>
<td>0.03 (0.02-0.05)</td>
<td>P&lt;0.001</td>
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<tr>
<td>Women 25-39 years</td>
<td>0.02 (0.01-0.03)</td>
<td>P&lt;0.001</td>
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<tr>
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<td>0.02 (0.01-0.03)</td>
<td>P&lt;0.001</td>
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<td>5</td>
<td>0.01 (0.01-0.03)</td>
<td>P&lt;0.001</td>
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<tr>
<td>High-risk non-vaccine HPV types</td>
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<tr>
<td>Girls 13-15 years</td>
<td>1.13 (0.99-1.29)</td>
<td>P=0.06</td>
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<tr>
<td>6</td>
<td>1.12 (0.98-1.27)</td>
<td>P=0.06</td>
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<tr>
<td>Women 20-24 years</td>
<td>1.11 (1.00-1.23)</td>
<td>P=0.05</td>
</tr>
<tr>
<td>6</td>
<td>1.09 (0.98-1.20)</td>
<td>P=0.05</td>
</tr>
<tr>
<td>8</td>
<td>1.07 (0.96-1.19)</td>
<td>P=0.05</td>
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<tr>
<td>Women 25-39 years</td>
<td>1.00 (0.92-1.09)</td>
<td>P=0.38</td>
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<tr>
<td>6</td>
<td>0.97 (0.90-1.05)</td>
<td>P=0.38</td>
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<tr>
<td>5</td>
<td>0.94 (0.87-1.02)</td>
<td>P=0.38</td>
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</table>

The Lancet DOI: 10.1016/S0140-6736(19)30298-3
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Changes in CIN2+ among screened girls and women during the first 7 years after the introduction of girls-only human papillomavirus vaccination, in countries with multi-cohort vaccination and high vaccination coverage

HPV Vaccine Safety Information

- Most common (≥10%) local and systemic adverse reactions in females were injection-site pain, swelling, erythema, and headache
- Most common (≥10%) local and systemic reactions in males were injection-site pain, swelling, and erythema
- Vaccinees may develop syncope, sometimes resulting in falling with injury, observation for 15 minutes after administration is recommended
  - Syncope, sometimes associated with tonic-clonic movements and other seizure-like activity, has been reported following HPV vaccination.
  - When syncope is associated with tonic-clonic movements, the activity is usually transient and typically responds to restoring cerebral perfusion
Gardasil 9 for Use in Women and Men Aged 27-45 Years

• FDA
  • “…approval represents an important opportunity to help prevent HPV-related diseases and cancers in a broader age range” (October 5, 2018)

• ACIP
  • June 26, 2019
  • 10-to-4 vote, the advisory committee agreed to recommend HPV vaccination for women and men ages 27 to 45 who are not adequately vaccinated, through “shared clinical decision-making.”

• Effectiveness
  • Study: 3200 women aged between 27 and 45 years followed for an average of 3.5 years
  • Gardasil was 88% effective in preventing the combined endpoint of persistent infection, genital warts, vulvar and vaginal precancerous lesions, cervical precancerous lesions, and cervical cancer related to HPV types covered by the vaccine

Who needs it?

• Public health experts agree that for adults up to age 45, the decision should be based on each person’s sexual experiences and expectations.

• Example
  • A middle-aged person reentering the dating scene who had FEW previous sexual partners could become exposed to the virus for the first time and therefore might benefit form the vaccine.
CDC

Epidemic Intelligence Service (April 2019)

• National Health and Nutrition Examination Survey (4vHPV)-type
  • 4,674 females in the pre-vaccine (2003-2006) and vaccine (2013-2016) eras
• Very encouraging
  • Within 10 years (2006) of vaccine introduction, HPV prevalence decreased
    • 86% among females aged 14-19 years
      • Prevalence decreased from 11.5% to 1.8%
    • 71% in women aged 20-24
      • Prevalence decreased from 18.5% to 5.3%

• Conclusion
  • Vaccine prevents HPV infection and the POTENTIAL of HPV vaccination to reduce cervical
cancers and other cancers caused by HPV in all women in the future.

McClung NM, et al. Human papillomavirus prevalence among females in the United States, overall and by race/ethnicity, National
April 29-May 2, 2019; Atlanta.

National Center for Health Statistics

2017

• Cross-Sectional Study (*in the absence of clinical trials*)
  • Data from the National Health and Nutrition Examination Survey
    (NHANES) collected from 2627 young adults aged 18 to 33 years during
    the period 2011-2014.
  • Study: Analyzed oral rinse samples collected by mobile health facilities.
    • Comparing individuals who had received the HPV vaccine (29.2% of women and
      6.9% of men; P <.001) to those who had not, the analysis found the prevalence of
      oral HPV infections covered by the vaccine (HPV-16, -18, -6, and -11) was
      significantly lower in the vaccinated group (0.11% vs. 1.61%; P = 0.008).
    • The most significant reduction was seen in men. None of those whom had been
      vaccinated had an HPV infection of the types for which vaccinations were available,
      compared to 2.1% of unvaccinated men (P = 0.007).

Annual Meeting of the American Society of Clinical Oncology, 2017
What Does This Mean?

• Estimate – in an unvaccinated population about a million young adults would have oral HPV infection by types 16, 18, 6 or 11.
• Universal vaccination would prevent >900,000 of the infections

Summary

• In the US, HPV vaccination rates have been rising, but at a much slower pace – and not fast enough to curb the rising rates of HPV related cancers
  • Inadequate access and education
  • Reluctance on the part of health care providers.
• CDC
“Mixed Messages?”

- Communication approach and agreement to same-day HPV vaccination
  - Analysis of audio recordings – Pediatrician, 11- to 12-year old patient and caregiver

- Acceptance
  - 73% WITH presumptive language (HPV vaccine at the end of the list for which the child was “due”
  - Only 22% when presumptive language was NOT used

- Caregivers agreed to vaccinate
  - 82% of time when delay was not mentioned
  - Only 6% when delay was offered or recommended

- Conclusions
  - Unambivalent recommendations could help to reduce mixed messages
  - Providing skills from motivational interviewing for talking with hesitant parents may be helpful

Sturm et. Al., J Adolescent Health, 25 April 2017

Announcements versus Conversation

- Brewer et al. (2017)
  - Announcements, or statements that assumed parents were ready to vaccinate helped normalize HPV vaccination for parents
  - Address parents' questions and use their questions as an opportunity to discuss helping to prevent certain HPV-related cancers later in life
  - "Your child needs 3 vaccines today: one to help prevent meningitis, one that prevents certain HPV-related cancers, and a Tdap booster"
  - This straightforward, matter-of-fact approach to recommending HPV vaccination can help improve vaccination rates in 11- and 12-year old patients

AES Question 3
Which of the following statements is true regarding the Herpes Zoster Subunit Vaccine?

A. It is a live recombinant subunit vaccine
B. The efficacy for prevention of Zoster is 90%
C. It is recommended in individuals ≥60 years of age
D. Local and systemic side effects are exceedingly rare following administration
Herpes Zoster Subunit Vaccine

- Shingrix Vaccine (Zoster Vaccine Recombinant Adjuvanted)
  - GlaxoSmithKline
  - FDA Approved October 23, 2017 – Adults aged 50 years and older
    - 1 million cases of shingles in US each year
  - Developed specifically to overcome the age-related decline in immune response
    - Combines an antigen, glycoprotein E, and an adjuvant system, AS01B, intended to generate a strong and long-lasting immune response that can help overcome the decline in immunity as people age

- **Non-live**, recombinant subunit vaccine
  - Given IM
  - Two doses (Time 0 and 2-6 months later)

- Efficacy across all age groups in prevention of shingles
  - >90%; over 4-year follow-up
  - Decreased overall incidence of postherpetic neuralgia

Efficacy and Duration of Protection

**Zostavax**

<table>
<thead>
<tr>
<th>Study</th>
<th>Efficacy for prevention of Zoster</th>
<th>Efficacy for prevention of PHN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shingles prevention study</td>
<td>51%</td>
<td>67%</td>
</tr>
<tr>
<td>38,546 subjects</td>
<td>4.9 year follow-up</td>
<td></td>
</tr>
<tr>
<td>Short-term persistence substudy</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>14,270 subjects</td>
<td>4-7 years follow-up</td>
<td></td>
</tr>
<tr>
<td>Long-term persistence study</td>
<td>21%</td>
<td>35%</td>
</tr>
<tr>
<td>6,687 subjects</td>
<td>7-10 years follow-up</td>
<td></td>
</tr>
</tbody>
</table>

*The effectiveness of HZ vaccine administered to patients >60 years for preventing zoster beyond 5 years remains uncertain.*


Shingrix

- Unprecedented demand
  - October 2017 – June 2018: 3.2 million doses distributed
  - [https://www.cdc.gov/shingles/vaccination.html](https://www.cdc.gov/shingles/vaccination.html) (Patient Information)
- 99% of shingles vaccine market
- Local and systemic reactions to Shingrix are quite common
  - In trails, a reaction to the first dose DID NOT predict a reaction to the second dose


Reactions
(Most are self-limited and resolve in 2-3 days)

• Local
  • Administer IM; SubQ administration much more likely with injection site reaction – pain, redness, or swelling
  • Eight clinical trials (>10,000 people)
    • 78% pain near injection site
    • 38% redness
    • 26% swelling

• Systemic
  • 1 in 10 severe enough to limit activity
    • Myalgia
    • Fatigue
    • HA
    • Shivering
    • Fever
    • GI Illness

Summary
Best Practice Recommendations

• Offer immunizations at every visit
• Use a Guiding Style of language
• "Your child needs 3 vaccines today: one to help prevent meningitis, one that prevents certain HPV-related cancers, and a Tdap booster."
  • HPV vaccination provides safe, effective, and long-lasting protection against cancers caused by HPV
• Are you ready for your [influenza] vaccine today?”
• The recombinant zoster vaccine preferred to prevent shingles in adults age 50 and older
• PCV13 recommended based on shared decision making in adults > 65 years who do not have an immunocompromising condition

Speaker Contact Information

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References

- Kim DK, Hunter P. Advisory Committee on Immunization Practices Recommended Immunization Schedule for Adults Aged 19 Years or Older — United States, 2019. MMWR Morb Mortal Wkly Rep 2019;68:115–118. DOI: http://dx.doi.org/10.15585/mmwr.mm6805a5

Thank you
Questions
Anticoagulation Management Update: Through Thick & Thin

David T. Walsworth, MD, FAAFP

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David T. Walsworth, MD, FAAFP

Associate Professor, Department of Family Medicine, College of Human Medicine, Michigan State University (MSU), East Lansing

Dr. Walsworth earned a medical degree at Wayne State University School of Medicine, Detroit, Michigan. He completed his family medicine residency at Oakwood Hospital & Medical Center, Dearborn, Michigan, and an Office of Medical Education Research and Development (OMERAD) Primary Care Faculty Development Fellowship at MSU. During more than 20 years as a family physician, he has gained experience in private practice, residency teaching practice, and academic practice. In his current role, Dr. Walsworth manages MSU’s Family Health Center; cares for a wide range of patients; teaches medical students, residents, and peers; and studies the determinants of provider resilience and burnout. He serves on the board of directors for the Michigan Academy of Family Physicians.
Learning Objectives

1. Utilize a systematic process of care, including initiation and assessment of therapy and dosing adjustments, to optimize effectiveness and minimize adverse effects of patients taking warfarin.

2. Consider new agents in patients, with atrial fibrillation and at least one other risk factor for stroke, that do not require frequent laboratory monitoring are as effective as warfarin for prevention of stroke or systemic embolism and have comparable risks of major bleeding.

3. Develop collaborative care plans with patient education to counsel patients on safe and effective self-administration of anticoagulants, emphasizing self-monitoring (when appropriate) to prevent complications.

4. Establish or revise existing practice-level protocols for anticoagulation management, based on current evidence-based recommendations and guidelines, including having clearly defined staff roles and responsibilities.

Audience Engagement System
Special Slide Icons

Look up here for one of the following:

- Treatment or practice guideline(s)
- Performance measure(s)
- Practice tool(s)
- Key recommendation(s) for practice
- Choosing Wisely
- Overcoming barriers to change
- Monday morning “To Do List”
- Best Practice Recommendations
48 Year Old Male with New Onset Atrial Fibrillation

• New patient presenting to ED with abdominal pain, HR 170 irregularly irregular, BP 170/110
• History of OSA managed with CPAP, morbid obesity, laparoscopic appendectomy for ruptured appendix 3 years earlier, no HTN (last BP 110/70 6 months earlier)
• No medications
• Married with 3 children
• Active, Cub Master, avid camper
• Family history of atrial fibrillation, diabetes, HTN, Alzheimer’s dementia, no bleeding or clotting problems
• CT abdomen shows non-obstructive clot in superior mesenteric artery trunk

AES Question 1
Does he need anticoagulation?

A. Yes
B. No
CHA$_2$DS$_2$-VASc Score for Atrial Fibrillation Stroke Risk

- **Age in Years**
  - (0) < 65
  - (1) 65-74
  - (2) ≥ 75
- **Sex**
  - (0) Male
  - (1) Female
- **(1) CHF History**
- **(1) HTN History**
- **(2) Stroke/TIA/Thromboembolism History**
- **(1) Vascular Disease History**
- **(1) Diabetes Mellitus**

- **Interpretation**
  - 0 – Low risk for thromboembolic event (0% per year)
  - 1 – Intermediate risk for thromboembolic event (0.6% per year) – consider antiplatelet or anticoagulant therapy
  - 2+ – High risk for thromboembolic event (3% per year) – recommend anticoagulant therapy

HAS-BLED Score for Major Bleeding Risk

- **(1) Uncontrolled HTN (SBP>160)**
- **(1) Dialysis, Renal Transplant, Cr>2.26 mg/dl**
- **(1) Cirrhosis, Bilirubin>2xULN, AST/ALT/AP>2xULN**
- **(1) Stroke History**
- **(1) Prior Major or Predisposition to Bleeding**
- **(1) Labile INR (Time in target range < 60%)**
- **(1) Age > 65 years**
- **(1) Antiplatelet or NSAID use**
- **(1) ≥ 8 EtOH drinks/week**

- **Interpretation**
  - 0-1 – Anticoagulation should be considered
  - 2 – Anticoagulation can be considered
  - 3-9 – Alternatives to anticoagulation should be considered due to bleeding risk
AES Question 2
Hypercoagulability Work Up

If he had presented with SMA trunk thromboemolus without AF, which of the following should be included in the hypercoagulability work up, if one is done?

A. Activated protein C resistance +/- factor V Leiden mutation testing
B. Prothrombin G20210A mutation testing
C. Lupus anticoagulant and Antiphospholipid antibodies
D. Protein C and S activity
E. All of the above

Risk-Based Work Up: Thrombophilias

• First episode with risk factors without family history (Low Risk) None
• Age > 50 years, first episode, without risk factors or family history
  • Activated protein C resistance +/- factor V Leiden mutation testing
  • Prothrombin G20210A mutation testing
  • Lupus anticoagulant
  • Anti-phospholipid antibodies
  • Plasma homocysteine
• Age < 50 years without risk factors, recurrent thrombosis, or family history of thromboembolism
  • All of the above, plus
  • Antithrombin assay
  • Protein C assay
  • Protein S assay

AES Question 3
PE and DVT Prevention in A-Fib

Which of the following are indicated for preventing PE and DVT following previous PE or DVT?

A. Warfarin (Coumadin, Jantoven)
B. LMWH (Arixtra, Fragmin, Lovenox)
C. Factor Xa Inhibitors (Bevyxxa, Eliquis, Savaysa, Xarelto)
D. Direct Thrombin Inhibitor (Pradaxa)
E. All of the above

Choice of Anticoagulant

• LMWH
  • Active Cancer
  • Pregnancy

• Warfarin
  • CrCl < 30
  • Mechanical heart valve
  • Childs-Pugh B or C hepatic impairment
  • DOAC not covered

• DOAC
  • Unstable diet, health status
  • Frequent antibiotics or procedures

2016. MAQI2. Anticoagulation Toolkit v1.6, reviewed and updated 6/13/16. Downloaded on 4/2/17 from:
Duration of Treatment:
INR target 2.5 (2.0-3.0)

First episode (proximal DVT or PE)
• 3 months
  • Perioperative (1B)
  • Other reversible risk factors (1B/2B)
  • Distal DVT perioperatively or with reversible risk (1B/2C)
  • Idiopathic (high bleeding risk) (1B)
  • Idiopathic distal DVT (1B/2B)
• Long-term - Idiopathic (low or moderate bleeding risk) (2B)

Second episode (both unprovoked)
• 3 months (high bleeding risk) (2B)
• Long-term (low or moderate bleeding risk) (1B/2B)

Active Cancer and PE
• Long-term (1B/2B) depending on bleeding risk

Anti-phospholipid antibody with arterial or venous thrombosis
• Long-term (2B)

Elective total hip or knee replacement and hip fracture
• 10-14 days minimum (2B)
• 35 days for major orthopedic (2B)
• LMWH preferred over warfarin for total hip and knee (2C)

Atrial fibrillation or flutter
• 3 weeks prior and 4 weeks following elective cardioversion (1B/2C)
• Indefinite
  • Intermediate (CHADS$_2$=1) to high risk (CHADS$_2$>2 of stroke (1B)
  • Mitral stenosis (1B)

Stent placement and high risk of stroke
• Bare metal - one month
• Drug-eluting – 3-6 months with aspirin and clopidogrel (2C), then warfarin alone for total of 12 months (2C), and ongoing thereafter (2C)

Coronary Heart Disease
• 3 months - High risk with MI without stent (1B)
• High risk with MI with stent (2C)
  • Bare metal – warfarin + low-dose aspirin + clopidogrel in month 1, then warfarin + single antiplatelet agent in months 2-3

Valvular Heart Disease
• 3 months – Bio prosthetic valves
• Long-term
  • Rheumatic mitral valve with atrial fibrillation, embolism, or atrial thrombus (1A); sinus rhythm and atrial diameter > 55 mm (2C)
  • Mechanical valves - aortic
Duration of Treatment: INR target 3.0 (2.5-3.5)

Long-term

• Mechanical valves – mitral

AES Question 4
PE and DVT Prevention in A-Fib

Which of the following are indicated for initiating warfarin preventing PE and DVT following previous PE or DVT (INR Target 2-3)?

A. 5 mg daily at 6:00 PM, adjusting dose based on INR, continuing LMH until INR in target range
B. 10 mg daily for 2 days at 6:00 PM, adjusting dose based on INR, continuing LMH until INR in target range
C. 10 mg daily at 6:00 PM, adjusting dose based on INR, continuing LMH until INR in target range
D. A and B
E. All of the above
Warfarin Initiation

- After starting UFH/LMHW
- Continue LMWH until INR in therapeutic range (minimum 5 days overlap)
- Starting Dose
  - 2.5 mg / day
    - Patients at high risk of bleeding
    - Longer to therapeutic range
  - 5 mg / day
    - Possibly longer to therapeutic range
  - 10 mg / day
    - 2C recommendation from ACCP Guideline
    - 2 days, then per INR
    - Possibly more over-anticoagulation

Anticoagulation Management Coding

- 99363 – Initial 90 days
  - Must document at least 8 INRs in 90 days
- 99364 – Subsequent 90 day periods
  - Must document at least 3 INRs in 90 days
  - Also used if warfarin is started during an inpatient or facility stay
- No payment by Medicare or Medicaid
- Covers telephone and electronic contact to manage warfarin during the 90 day period
- Z79.01 – Long term (current) use of anticoagulants
Perioprocrocedure Management
(Interrupting and/or Bridging)

• Anticoagulant
  • Warfarin
  • DOAC

• Anticoagulant indication
  • Atrial fibrillation
  • Venous thromboembolic event (DVT, PE)
  • Mechanical heart valve

• Patient clotting risk
• Patient bleeding risk
• Procedure bleeding risk


Perioprocrocedure Management
(Patient Clotting Risk)

• Only considered in warfarin treated patients

• Low
  • AF: \( \text{CHA}_2\text{DS}_2\text{-VASc} \leq 4 \text{ AND no CVA or systemic embolism} \)
  • VTE: VTE > 12 months ago \text{AND} no other risk factors
  • MHV: Bileaflet aortic valve prosthesis w/o AF or other CVA risk factors

Perioperative Management  
(Patient Clotting Risk)

- Only considered in warfarin treated patients
- Moderate
  - AF: $\text{CHA}_2\text{DS}_2\text{VASc} \geq 5-6$ OR CVA or systemic embolism ≥ 3 months ago
  - VTE: VTE 3-12 months ago, non-severe thrombophilia (heterozygous Factor V Leiden or Thrombin G20210 mutations), recurrent VTE, active cancer (within 6 months)
  - MHV: Bileaflet aortic valve prosthesis with risk factor(s)
    - Atrial fibrillation
    - Prior CVA or TIA
    - HTN
    - DM
    - CHF
    - Age > 75 years


Perioperative Management  
(Patient Clotting Risk)

- Only considered in warfarin treated patients
- High
  - AF: $\text{CHA}_2\text{DS}_2\text{VASc} \geq 7$ OR CVA or systemic embolism < 3 months ago
  - VTE: VTE < 3 months ago, severe thrombophilia (deficiency of protein C, Protein S, or antithrombin; antiphospholipid ab; multiple anomalies)
  - MHV: Any mitral valve prosthesis, caged-ball or tilting disc aortic valve prosthesis, CVA or TIA ≤ 6 months

Perioperative Management (Patient Bleeding Risk)

- Major bleeding or ICH < 3 months
- Platelet abnormality (includes ASA use)
- Prior bleeding during previous bridging


- CYP3A4 Inhibitors
  - Grapefruit juice
  - Clarithromycin* / telithromycin
  - Nefazodone*
  - Itraconazole* / ketoconazole*
  - Atazanavir / darunavir / indinavir nelfinavir* / ritonavir* / saquinavir / tipranavir
  - Fluoxetine / fluvoxamine
  - Amiodarone
  - Diltiazem / verapamil

- P-gp Inhibitors
  - Cyclosporine
  - Ketoconazole
  - Quinidine
  - Reserpine
  - Ritonavir / lopinavir / Saquinavir / tipranavir
  - Tacrolimus
  - Verapamil
  - Propafenone
  - Ranolazine

Periopremarkure Management (Procedure Bleeding Risk) - Minimal/Not Clinically Significant

- Minor dental procedures
  - Extraction of 1-2 teeth
  - Periodontal surgery
  - Abscess incision
- Superficial surgeries
  - Abscess incisions
  - Dermatologic excisions
- Diagnostic gastrointestinal endoscopy with or without biopsy
- Central catheter removal

Periopremarkure Management (Procedure Bleeding Risk) - Low

- Pacemaker/defibrillator placement
- AF ablation (transvenous)
- D&C
- Cervical bx
- Prostate bx
- Angiography/PCI (transradial)
- Breast or axillary node FNA
- Nerve block, peripheral (superficial, compressible)
Perioprocure Management (Procedure Bleeding Risk) - Moderate

- LE arterial revascularization (femoral, popliteal, tibial)
- LE deep venous reconstruction
- Hysterectomy
- Left atrial appendage occlusion (WATCHMAN)
- Angiography/PCI (transfemoral)
- ORIF LE fx
- Complex dental procedures
  - Extract > 3 teeth
  - Dental implants
- Lung bx (percutaneous needle)
- Chest drain placement (larger drain)
- Nerve block (peripheral, noon-compressible


Perioprocure Management (Procedure Bleeding Risk) - High

- Surgeries/procedures in highly vascular organs
  - Kidney
  - Liver
  - Spleen
- Major surgery with extensive tissue injury
  - Cancer surgery
  - Joint arthroplasty
  - Reconstructive surgery
- Bowel resection
- Cardiac, intracranial, or spinal surgeries
- Urologic surgeries
- Abdominal vascular surgery
- Left atrial appendage occlusion (Lariat)
- Lumbar puncture
- ICD/pacer lead extraction
- Neuraxial block (spinal, epidural)
- Most major surgeries > 45 minutes

Perioprocedure Management (Procedure Bleeding Risk) - Uncertain

- Esophageal bx
- Pericardiocentesis

Always discuss with proceduralist regardless of anticipated risk

Direct Oral Anticoagulants (DOACs):
Indications

- Factor Xa Inhibitors
  - Apixiban (Eliquis)
  - Betrixaban (Bevyxxa)
  - Endoxaban (Savaysa)
  - Rivaroxaban (Xarelto)
- Thrombin Inhibitors
  - Dabigatran (Pradaxa)

- Thromboembolism / stroke prophylaxis (non-valvular atrial fibrillation)
- DVT prophylaxis (hip or knee replacement)
- DVT/PE prophylaxis (recurrent)
- DVT/PE treatment
- Cardiovascular risk reduction
  - Dabigatran (Pradaxa) 2.5 mg BID + ASA 75-100 mg daily
  - For patients with CAD or PAD

Anticoagulation Reversal

- Heparin – Protamine
- Warfarin – Vitamin K1 (phytonadione)
- Thrombin Inhibitors – Idarucizumab (Praxbind)
  - Dabigatran (Pradaxa)
- Factor Xa Inhibitors – Coagulation Factor Xa Recombinant, inactivated (Andexxa)
  - Apixaban (Eliquis)
  - Endoxaban (Savaysa)
  - Rivaroxaban (Xarelto)

Procoagulant Factors

- Prothrombin Complex Concentrate
  - 4 factor PCC (II, VII, IX, X,)
    - Kcentra, also has Protein C, Protein S
  - Feiba
  - 3 factor PCC (II, IX, X)
- Factor VIIa
  - Recombinant
- Factor VIII/von Willenbrand
  - Human Concentrate
  - Recombinant
- Factor IX
  - Human Concentrate
  - Recombinant
- Factor XIII
  - Human Concentrate
  - Recombinant A-subunit
Key Recommendations

SORT A

• In patients with atrial fibrillation and at least one other risk factor for stroke, newer agents (rivaroxaban [Xarelto] and dabigatran [Pradaxa]) that do not require frequent laboratory monitoring are as effective as warfarin for prevention of stroke or systemic embolism and have comparable risks of major bleeding.

• Compared with usual clinic-based care, patient self-testing for international normalized ratios, with or without self-dosing of warfarin, is associated with significantly fewer deaths and thromboembolic complications without any increase in bleeding complications for a selected group of motivated patients who have completed appropriate training.

SORT B

• Patients taking warfarin should be treated using systematic processes of care to optimize effectiveness and minimize adverse effects. Health care professionals skilled in the initiation and assessment of therapy and dosing adjustments can dramatically influence outcomes.


AES Question 5
Outpatient DVT and PE Treatment

Uncomplicated PE and DVT may be treated in the outpatient setting?

A. True
B. False
Primary Hypercoagulable States

• Common
  • Factor V Leiden mutation
  • Prothrombin 20210 mutation
  • Homocysteinemia

• Uncommon Causes
  • Antithrombin III deficiency
  • Protein C deficiency
  • Protein S deficiency
  • Increased Factor VIII
  • Fibrinolysis
  • Dysfibrinogenemia

Secondary Hypercoagulable States

• Antiphospholipid Antibody Syndrome
• Pregnancy
• Trauma
• Infection (sepsis)
• Malignancy
• Myeloproliferative disorders
• Hyperlipidemia
• Homocystinuria
• Lupus inhibitor (anticoagulant)
• Nephrotic Syndrome

• Medications
  • Estrogen sources
    • Oral contraceptives
    • Estrogen replacement therapy
    • Tamoxifen
  • Phenothiazines
  • Procainamide
DVT Probability: Wells Score System

- Paralysis, paresis or recent orthopedic casting of lower extremity (1 point)
- Recently bedridden (more than 3 days) or major surgery within past 4 weeks (1 point)
- Localized tenderness in deep vein system (1 point)
- Swelling of entire leg (1 point)
- Calf swelling 3 cm greater than other leg (measured 10 cm below the tibial tuberosity) (1 point)
- Pitting edema greater in the symptomatic leg (1 point)
- Collateral non varicose superficial veins (1 point)
- Active cancer or cancer treated within 6 months (1 point)
- Alternative diagnosis more likely than DVT (Baker’s cyst, cellulitis, muscle damage, superficial venous thrombosis, post phlebitic syndrome, inguinal lymphadenopathy, external venous compression) (-2 points)

DVT Risk Score Interpretation

- 3-8 Points: High Probability of DVT
- 1-2 Points: Moderate Probability of DVT
- -2-0 Points: Low Probability of DVT

2016, UW Health Inpatient and Outpatient Committees. Venous Thromboembolism Diagnosis and Treatment – Adult – Inpatient/Ambulatory/Emergency Department – Clinical Practice Guideline. Downloaded on 7/28/19 from https://www.uwhealth.org/files/uwhealth/docs/anticoagulation/venous_thromboembolism_management_ED.pdf

DVT Diagnostic Algorithm

- Low probability Wells Score (DVT)
  - D-Dimer negative – DVT excluded
  - D-Dimer positive – Check duplex ultrasound
    - Ultrasound positive – proceed to treatment
- Moderate or high probability Wells Score (DVT)
  - Duplex ultrasound negative – excluded
  - Duplex ultrasound positive – proceed to treatment

2016, UW Health Inpatient and Outpatient Committees. Venous Thromboembolism Diagnosis and Treatment – Adult – Inpatient/Ambulatory/Emergency Department – Clinical Practice Guideline. Downloaded on 7/28/19 from https://www.uwhealth.org/files/uwhealth/docs/anticoagulation/venous_thromboembolism_management_ED.pdf
PE Probability: Wells Score System

- Symptoms of DVT (3 points)
- No alternative diagnosis better explains the illness (3 points)
- Tachycardia with pulse > 100 (1.5 points)
- Immobilization (> 3 days) or surgery in the previous four weeks (1.5 points)
- Prior history of DVT or PE (1.5 points)
- Presence of hemoptysis (1 point)
- Presence of malignancy (1 point)

PE Risk Score Interpretation

- > 7 Points: High Probability of PE
- 2-6 Points: Moderate Probability of PE
- < 2 Points: Low Probability of PE

Pulmonary Embolism Rule-Out Criteria (PERC)

- Age > 49 years
- HR > 99 bpm
- SpO2 < 95% on room air
- Hemoptysis present
- Taking exogenous estrogen
- History of VTE
- Recent surgery or trauma requiring intubation or hospitalization in the previous 4 weeks
- Unilateral leg swelling

PERC Interpretation

- The presence of any criteria suggest the need for further consideration of PE

2016, UW Health Inpatient and Outpatient Committees. Venous Thromboembolism Diagnosis and Treatment – Adult – Inpatient/Ambulatory/Emergency Department – Clinical Practice Guideline. Downloaded on 7/28/19 from https://www.uwhealth.org/files/uwhealth/docs/anticoagulation/venous_thromboembolism_management_ED.pdf
**PE Diagnostic Algorithm**

- **Wells Score (PE)**
  - Low risk with negative PERC – PE excluded
  - Moderate with negative D-Dimer – PE excluded
  - Moderate with positive D-Dimer – Perform CT
    - CT negative / non-diagnostic with negative bilateral leg DUS – Repeat DUS in 1-2 weeks
    - CT positive or negative with positive DUS – proceed to treatment

---

**Simplified PE Severity Index (sPESI)**

- Age > 80 years
- HR > 110 bpm
- SBP < 100 mmHg
- SaO2 < 90% on room air
- Cancer (active or history)
- CHF or chronic lung disease

- **sPESI Interpretation**
  - The presence of any criteria suggest the need for inpatient treatment of PE
Treatment of DVT and PE

- **Inpatient**
  - **Criteria**
    - Medical or social reasons for acute hospitalization
    - CrCl < 30 ml/min
    - Severe Liver disease
    - If PE, sPESI > 0
  - **Treatment**
    - IV unfractionated heparin until medically stable and procedures completed

2017, Treatment of Acute Venous Thromboembolism. UW Medicine VTE Treatment Taskforce. Downloaded on 7/28/19 from https://depts.washington.edu/anticoag/home/sites/default/files/VTE%20Treatment%20Pathway%20July%202017_0.pdf

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Treatment of DVT and PE

- **Outpatient**
  - **Criteria**
    - No inpatient criteria present
  - **Treatment**
    - Rivaroxaban 15 mg BID x 3 wks, then 20 mg daily
      - Avoid if CrCl < 30 ml/min
      - Avoid if potentially interacting meds
      - Limited data in morbidly obese
    - Apixaban 10 mg BID x 7 days, then 5 mg BID
      - Avoid if CrCl < 30 ml/min
      - Avoid if potentially interacting meds
      - Limited data in morbidly obese
    - Enoxaparin 1 mg/kg SQ q 12 hrs x 5-10 days, then dabigatran 150 mg BID
      - Adjust enoxaparin if CrCl < 60 ml/min
      - Avoid if CrCl < 50 ml/min
      - Avoid if potentially interacting meds
      - Limited data in morbidly obese
    - Enoxaparin 1 mg/kg SQ q 12 hrs + warfarin (stop enoxaparin when INR > 2 after a minimum of 5 days overlap)
      - Adjust enoxaparin if CrCl < 60 ml/min
      - Start warfarin on same day as enoxaparin

2017, Treatment of Acute Venous Thromboembolism. UW Medicine VTE Treatment Taskforce. Downloaded on 7/28/19 from https://depts.washington.edu/anticoag/home/sites/default/files/VTE%20Treatment%20Pathway%20July%202017_0.pdf
AES Question 6
Anticoagulation in Pregnancy

Which of the following are indicated for preventing PE and DVT in pregnancy following previous PE or DVT?

A. Factor Xa Inhibitor (Eliquis, Savaysa, Xarelto)
B. Warfarin (Coumadin, Jantoven)
C. Direct Thrombin Inhibitor (Pradaxa)
D. LMWH (Arixtra, Fragmin, Lovenox)

Clotting Disorders in Pregnancy

- Virchow’s Triad
  - Hypercoagulation
  - Vascular damage
  - Venous stasis
- Relative risk of 4.3
- Half of pregnant women with VTE have a thrombophilia
- VTE risk factors
  - Age > 35 years
  - BMI > 30
  - Grand multiparity
  - Family history of VTE or thrombophilia
  - Immobility ≥ 4 days
  - Dehydration
  - Medical conditions
  - Cesarean section

Anticoagulation in Pregnancy

- LMWH generally preferred agent
- Start as early in pregnancy as possible
- Stop six weeks postpartum
  - Provoked DVT or PE without thrombophilia (controversial)
  - Unprovoked DVT or PE without thrombophilia (unless recurrent or life threatening)
  - No past DVT or PE with thrombophilia
    - Anti-phospholipid antibodies – ASA +/- LMWH
- Long-term prophylaxis may be required
  - Past DVT or PE with thrombophilia


Key Recommendations

SORT A
- LMWHs are the agents of choice for antenatal thromboprophylaxis.

SORT B
- LMWHs are recommended for the treatment of acute DVT and PE in pregnancy because of equivalent or superior effectiveness and safety compared with unfractionated heparin.

SORT C
- Multidetector-row (spiral) CT is the imaging modality of choice to evaluate for PE in pregnancy because, in nonpregnant patients, the diagnostic accuracy is equivalent to pulmonary angiography, and radiation exposure to the fetus is less than with a V/Q scan.

### Drug Risk in Pregnancy, Lactation, and Reproduction

#### Warfarin
- **Pregnancy**
  - Contraindicated during pregnancy unless pt with mechanical heart valve, then weigh risk/benefit
  - Risk of fetal harm including IUGR, teratogenicity, and fetal death based on animal data
- **Lactation**
  - May use while lactating
  - No known risk of infant harm based on limited human data and drug properties
  - No human data to assess affects on milk production

#### LMWH
- **Pregnancy**
  - May use during pregnancy, though caution advised with benzyl alcohol injectable forms
  - Consider holding 24 hours before delivery
  - No known risk of fetal harm based on human data
- **Lactation**
  - May use while lactating
  - No known risk of infant harm based on limited human data and drug properties
  - No human data to assess affects on milk production
  - No data for fondaparinux
Drug Risk in Pregnancy, Lactation, and Reproduction

Factor Xa Inhibitors

- **Fertility**
  - Use alternative
  - No human data available
  - No known risk of fetal harm
  - Risk of maternal bleeding based on animal data up to 4x for rivaroxaban, 19x MRHD for apixaban, 44x for betrixaban, 49x for edoxaban
  - Risk of maternal hemorrhage during delivery and fetal bleeding based on drug’s mechanism of action

- **Lactation**
  - Use alternative
  - No human data to assess risk of infant harm or effects on milk production
  - Possible excretion in breast milk with endoxaban

Thrombin Inhibitors

- **Fertility**
  - Avoid use in pregnancy
  - No human data available
  - Risk of embryo-fetal toxicity and death
  - Risk of maternal bleeding near delivery based on animal data at 2.6-3x MRHD
  - Risk of maternal hemorrhage and fetal bleeding based on drug’s mechanism of action

- **Lactation**
  - Caution advised
  - No human data available
  - Low risk of infant harm based on drug properties
  - No human data available to assess effects on milk production

Choosing Wisely

- American Association of Blood Banks
  - Don’t routinely use blood products to reverse warfarin

- American College of Chest Physicians and American Thoracic Society
  - Don’t perform chest computed tomography (CT angiography) to evaluate for possible pulmonary embolism in patients with a low clinical probability and negative results of a highly sensitive D-dimer assay.

- American Physical Therapy Association
  - Don’t recommend bed rest following diagnosis of acute deep vein thrombosis (DVT) after the initiation of anti-coagulation therapy, unless significant medical concerns are present.

- American Society for Clinical Pathology
  - Do not test for Protein C, Protein S, or Antithrombin (ATIII) levels during an active clotting event to diagnose a hereditary deficiency because these tests are not analytically accurate during an active clotting event.

- Society for Vascular Surgery
  - Don’t use IVC filters as primary prevention of pulmonary emboli in the absence of an extremity clot or prior pulmonary embolus.

Choosing Wisely

• American Society of Hematology
  • Don't test for thrombophilia in adult patients with venous thromboembolism (VTE) occurring in the setting of major transient risk factors (surgery, trauma or prolonged immobility).
  • Don't use inferior vena cava (IVC) filters routinely in patients with acute VTE.
  • Don't administer plasma or prothrombin complex concentrates for non-emergent reversal of vitamin K antagonists (i.e. outside of the setting of major bleeding, intracranial hemorrhage or anticipated emergent surgery).
  • Don't treat with an anticoagulant for more than three months in a patient with a first venous thromboembolism (VTE) occurring in the setting of a major transient risk factor.
  • Don't test or treat for suspected heparin-induced thrombocytopenia (HIT) in patients with a low pre-test probability of HIT.
  • Don't treat patients with immune thrombocytopenic purpura (ITP) in the absence of bleeding or a very low platelet count.

• Society for Maternal-Fetal Medicine
  • Don't do an inherited thrombophilia evaluation for women with histories of pregnancy loss, intrauterine growth restriction (IUGR), preeclampsia and abruption.

Performance Improvement Reporting

Atrial Fibrillation and Atrial Flutter - Measure 326 (NQF: 1525)

• All patients aged 18 years and older with a diagnosis of nonvalvular AF or atrial flutter who do not have a documented CHA2DS2-VASc risk score of 0 or 1
• Numerator - Patients who had a risk assessment for falls completed within 12 months
  • G8967 – Warfarin or other FDA-approved oral anticoagulant prescribed
  • G8968 – Documented medical reason for not prescribing oral anticoagulant
• Denominator exclusions
  • G9929 – Patient with transient or reversible cause of AF
  • G9930 – Patient receiving comfort care only
  • G9931 – Patient with CHA2DS-VASc risk score of 0 or 1
Performance Improvement Benchmarking

MIPS PY2017 Data with PY2019 Eligibility

- Atrial Fibrillation and Atrial Flutter: Chronic Anticoagulation Therapy (MIPS 326)
  - Claims (Topped out, 7 point cap)
    - Average: 89.5% (SD 20.6%)
    - Decile 3: 84.13-95.28%
    - Decile 4: 95.29-98.79%
    - Decile 5: 98.80-99.99%
    - Decile 10: 100%

MIPS PY2017 Data with PY2019 Eligibility

- Atrial Fibrillation and Atrial Flutter: Chronic Anticoagulation Therapy (MIPS 326)
  - Registry/QCDR
    - Average 81.2% (SD 18%)
    - Decile 3: 69.54-75.10%
    - Decile 4: 75.11-78.89%
    - Decile 5: 78.90-83.08%
    - Decile 6: 83.09-88.16%
    - Decile 7: 88.17-94.93%
    - Decile 8: 94.94-99.99%
    - Decile 10: 100%


Barriers to Anticoagulation Management

- Diagnostic tests may or may not be covered under insurance plans
- Medications may or may not be covered under insurance plans
- Costs of monitoring programs may or may not be covered under insurance plans
- All require patient adherence and compliance, some more than others
Key Practice Recommendations (Recap SORT A & B)

SORT A

- In patients with atrial fibrillation and at least one other risk factor for stroke, newer agents (rivaroxaban [Xarelto] and dabigatran [Pradaxa]) that do not require frequent laboratory monitoring are as effective as warfarin for prevention of stroke or systemic embolism and have comparable risks of major bleeding.

- Compared with usual clinic-based care, patient self-testing for international normalized ratios, with or without self-dosing of warfarin, is associated with significantly fewer deaths and thromboembolic complications without any increase in bleeding complications for a selected group of motivated patients who have completed appropriate training.

- LMWHs are the agents of choice for antenatal thromboprophylaxis.

SORT B

- Patients taking warfarin should be treated using systematic processes of care to optimize effectiveness and minimize adverse effects. Health care professionals skilled in the initiation and assessment of therapy and dosing adjustments can dramatically influence outcomes.

- LMWHs are recommended for the treatment of acute DVT and PE in pregnancy because of equivalent or superior effectiveness and safety compared with unfractionated heparin.

Monday Morning “To Do” List

- Use evidence-based guidelines for diagnosing and treating conditions requiring anticoagulation
  - Check health system and payor anticoagulation guidelines
  - Consider office registries for patients treated with warfarin and other anticoagulants
  - Check personal performance against benchmarks
- Check on payor requirements for anticoagulation management
- Check on formulary status of various anticoagulation medications for common payors
  - Consider GoodRx
  - Consider NeedyMeds

[References]


Author Recommended Electronic Tools

• MAQI2 Anticoagulation Toolkit App
  • [http://maqi2.org/](http://maqi2.org/)

• MAQI2 Anticoagulation Toolkits
  • Provider
    • [http://anticoagulationtoolkit.org/providers](http://anticoagulationtoolkit.org/providers)
  • Patient
    • [http://anticoagulationtoolkit.org/patients](http://anticoagulationtoolkit.org/patients)

• Choosing Wisely App
  • [http://www.choosingwisely.org](http://www.choosingwisely.org)

• Michigan Quality Improvement Consortium Guideline App
  • [http://mqic.org](http://mqic.org)

• GoodRx App
  • [https://www.goodrx.com/](https://www.goodrx.com/)

• NeedyMeds
  • [https://www.needymeds.org/](https://www.needymeds.org/)
Questions
Answer Key

1. A
2. E
3. E
4. D
5. A
6. D

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Increasing Your Knowledge of Immunization Policies Through AAFP Vaccine Science Fellows

John Epling, MD, MS, FAAFP

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John Epling, MD, MS, FAAFP

Professor/Medical Director of Research, Department of Family and Community Medicine, Virginia Tech Carilion School of Medicine, Roanoke; Medical Director of Employee Health and Wellness, Carilion Clinic, Roanoke, Virginia; Member, U.S. Preventive Services Task Force (USPSTF)

Dr. Epling earned his medical degree from Tufts University School of Medicine in Boston, Massachusetts. He completed an internship at the U.S. naval hospital in Charleston, South Carolina, and a family medicine residency at the Medical University of South Carolina in Charleston. He also completed a faculty development fellowship in evidence-based practice, policy, and education at State University of New York (SUNY) Upstate Medical University in Syracuse and a vaccine science fellowship with the AAFP. Dr. Epling maintains an active clinical family medicine practice and has taught family medicine, evidence-based medicine, and clinical prevention to all levels of learners throughout his career. His principal research interests include evidence-based medicine; translation of research into practice; quality improvement and human performance technology; and technology integration in medical education and practice. His clinical research areas of focus include clinical preventive services (i.e., screening, vaccination, preventive medication, behavioral risk counseling) and intimate partner violence. He has participated in several vaccination-related work groups on the state and national levels, and he joined the USPSTF in January 2016.
Learning Objectives

1. Briefly explain the vaccine development, and identify the FDA as the regulatory agency responsible for vaccine licensing.
2. Describe the function and make-up of the Advisory Committee on Immunization Practice (ACIP) at CDC.
3. Identify two main ways that vaccine safety is continuously monitored after licensing and ACIP approval.
4. Understand AAFP policies/recommendations regarding immunization.

Audience Engagement System

Step 1

Step 2

Step 3
Why understand vaccine policy?

- Know sources of clinical guidelines
- Combat vaccine hesitancy
- Counsel patients on vaccine safety infrastructure
- Help spread correct information in an era of misinformation

Family Physicians and Vaccines

- Prevention, especially primary prevention, is integral to family medicine
- Help patients establish healthy habits across the lifespan
Vaccine Coverage Data

• National Immunization Survey
  – Children through 35 months
  – Adolescents
• School Vaccination Assessment Reports
• Behavioral Risk Factor Surveillance System


https://www.cdc.gov/vaccines/imz-managers/coverage/childvaxview/data-reports/7-series/trend/index.html
Poll Question 1
What is one source of data used by CDC to track immunization coverage in the US?

A. Pharmaceutical company tracking
B. The EHRs actually all communicate well with each other
C. Medical Expenditure Panel Survey
D. School Vaccination Assessment Reports
2010 – National Prevention Strategy

- Develop new and improved vaccines
- Enhance understanding of the safety of vaccines and vaccination practices
- Support informed vaccine decision-making
- Improve access to and better use of recommended vaccines.


ACIP Child Immunization Schedule
### ACIP Adult Immunization Schedule

#### Age-based

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>19-39 years</th>
<th>40-64 years</th>
<th>65+ years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influenza (IIV or Fluzone)</td>
<td>1 dose annually</td>
<td>1 dose annually</td>
<td>1 dose annually</td>
</tr>
<tr>
<td>Tetanus, diphtheria, pertussis (Tdap)</td>
<td>1 dose every 10 years</td>
<td>1 dose every 10 years</td>
<td>1 dose every 10 years</td>
</tr>
<tr>
<td>Measles, mumps, rubella</td>
<td>1 dose every 10 years</td>
<td>1 dose every 10 years</td>
<td>1 dose every 10 years</td>
</tr>
<tr>
<td>Varicella</td>
<td>2 doses if born in 1990 or later</td>
<td>2 doses if born in 1990 or later</td>
<td>2 doses if born in 1990 or later</td>
</tr>
<tr>
<td>Pneumococcal conjugate PCV13</td>
<td>1 dose</td>
<td>1 dose</td>
<td>1 dose</td>
</tr>
<tr>
<td>Haemophilus influenzae (Hib)</td>
<td>1 dose</td>
<td>1 dose</td>
<td>1 dose</td>
</tr>
<tr>
<td>Hepatitis A</td>
<td>2 doses if born in 1990 or later</td>
<td>2 doses if born in 1990 or later</td>
<td>2 doses if born in 1990 or later</td>
</tr>
<tr>
<td>Hepatitis B</td>
<td>2 doses if born in 1990 or later</td>
<td>2 doses if born in 1990 or later</td>
<td>2 doses if born in 1990 or later</td>
</tr>
<tr>
<td>Meningococcal A, C, Y, W (MenACWY)</td>
<td>2 doses if born in 1990 or later</td>
<td>2 doses if born in 1990 or later</td>
<td>2 doses if born in 1990 or later</td>
</tr>
<tr>
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<td>2 doses if born in 1990 or later</td>
</tr>
</tbody>
</table>

#### Condition-based

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>19-39 years</th>
<th>40-64 years</th>
<th>65+ years</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCV13</td>
<td>1 dose</td>
<td>1 dose</td>
<td>1 dose</td>
</tr>
<tr>
<td>PPV23</td>
<td>1 dose</td>
<td>1 dose</td>
<td>1 dose</td>
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<tr>
<td>Hpv &amp; Hdp</td>
<td>2 doses if born in 1990 or later</td>
<td>2 doses if born in 1990 or later</td>
<td>2 doses if born in 1990 or later</td>
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<tr>
<td>MenB</td>
<td>2 doses if born in 1990 or later</td>
<td>2 doses if born in 1990 or later</td>
<td>2 doses if born in 1990 or later</td>
</tr>
</tbody>
</table>

---

*Recommended vaccines for adults with underlying medical conditions.*
*Healthcare providers should also consider individual risk factors.*
*No recommendation.*

---

*Recommended vaccines for adults with underlying medical conditions.*
*Healthcare providers should also consider individual risk factors.*
*No recommendation.*

---

*Recommended vaccines for adults with underlying medical conditions.*
*Healthcare providers should also consider individual risk factors.*
*No recommendation.*

Who recommends vaccines?

• FDA licensure
  – Center for Biologics Evaluation and Research (CBER)
  – Based on clinical studies
    • Phase 1 – immunogenicity and safety – tens
    • Phase 2 – dose-ranging – hundreds
    • Phase 3 – effectiveness and safety – thousands

Who recommends vaccines?

• FDA licensure (continued)
  – Vaccines and Related Biological Products Advisory Committee
  – Phase 4 - safety monitoring – hundreds of thousands
Who recommends vaccines?

• Advisory Committee on Immunization Practices
  – Commissioned/supported by CDC
  – Federal Advisory Committee – Advise to director of CDC
  – Experts in medicine and public health
  – Evaluates use of new vaccines upon licensure

Who recommends vaccines?

• ACIP Membership
  – 15 voting members (including 1 consumer)
  – 8 ex-officio members
  – 30 liaisons

• Evolution of ACIP recommendations
  – Consensus/expert-based to evidence-based
  – GRADE framework → “Evidence to Recommendations” (EtR) framework
Example – HPV age extension

ACIP Meeting June 2019
• Universal recommendation 9-26
  • Both sexes
• Shared decision making 27-45
  • Both sexes

Example – New PCV 13 Recommendations
• Prevention is complicated sometimes.
• ACIP: planned re-evaluation of PCV13 after 2014 recommendation
• PCV 13 after 65 only after shared decision-making process (if not immune compromise)
Poll Question 2

Which entity is responsible for changing the PCV13 vaccine recommendation, after we finally got the hang of it?

A. ACIP  
B. FDA  
C. OMB  
D. NASA

How to keep up with ACIP

• AAFP news outlets (Liaison: Dr. Pam Rockwell)
• New schedule made yearly (February)
• CDC/ACIP website (takes a while for new info after meetings)
  – https://www.cdc.gov/vaccines/acip/
Vaccine Safety

• Rates
• FDA licensure
• Vaccine Adverse Event Reporting System (VAERS)
• Vaccine Safety Datalink (VSD)

VAERS

• Adverse event vs. side effect
• All reports – related or not
• Anyone can report
• Output signals to be followed up
VSD

- 9 large managed care organizations connected electronically (9.8 mil people)
- Capability for studies of vaccine-related events – new methodologies invented
- Rapid cycle analysis – near real-time monitoring

https://www.cdc.gov/vaccinesafety/ensuringsafety/monitoring/vsd/
AAFP Immunization Policies

- Vaccine Coding
- AAFP Immunization Schedule
- AAFP Immunization Policies

Vaccine Coding

- Z23 – for all vaccines
- Well child
  - Z00.120, Z00.129 PLUS Z23
- Other CPT/administration codes
Vaccine Coding - Medicare

• Part B
  – Only influenza, pneumococcal, Hep B*
  – Injury-related (tetanus, rabies, etc.)
• Part D (depending on health plan)
  – Tdap, RZV (regardless of ACIP recs)

  * Deductible and co-pay apply

AAFP Immunization Schedule

• AAFP immunization schedule?
• Harmonization – AAFP, AAP, ACP
  – Started in 1995

Vaccine History Timeline:
http://www.immunize.org/timeline/
AAFP Policies

- Access – for all
- Cost – lower risk of vaccine inventory
- Coverage – universal, first-dollar
- Medical Home – information flow
- Payment – for vaccine and admin
- Supply – ensure supply to primary care

Poll Question 3

Which of the following is NOT an AAFP immunization policy?

A. Universal access
B. First-dollar coverage
C. No vaccines given at pharmacies
D. Ensuring a supply to primary care
Other Vaccine Policy Things

• National Vaccine Program - HHS
• National Vaccine Advisory Committee
• National Vaccine Injury Compensation Program

National Vaccine Program

• Under Asst Secretary for Health
• Strategy for Vaccination
  – Research and development
  – Licensure, production, distribution
  – Safety, effectiveness, adverse events
• National Vaccine Plan
National Vaccine Advisory Committee

- (under National Vaccine Program)
- Ensures adequate supply of safe and effective vaccination products
- Research priorities for Director of the National Vaccine Program to enhance the safety and efficacy of vaccines.
- Advises the Director of the Program in implementation of sections 2102 and 2103 of the Public Health Service Act.
- Ensures government agency cooperation in implementing sections 2012/3

National Vaccine Injury Compensation Program

- "No-fault" hearing process for people suffering injury thought to be due to vaccines
- Created for market stabilization
- Funded by excise tax on vaccines
- HHS medical reviewer -> opinion to DOJ
- ~6600 people compensated (20K filed)
NVICP details

- 2006 to 2017 - 3.4 billion doses of covered vaccines were distributed in the U.S.
- 6,314 petitions adjudicated - 4,328 compensated
- 1 individual compensated per 1 million doses
- Since 1988
  - 20,728 petitions have been filed
  - 17,923 petitions have been adjudicated
  - 6,597 of those determined to be compensable
  - 11,326 were dismissed.
- Total compensation over the life of the program is approximately $4.1 billion.

Beware...

Searching: “AAFP” and “Vaccination”
Online Vaccination Resources

- [https://www.cdc.gov/vaccines/](https://www.cdc.gov/vaccines/)
- [http://www.nfid.org/about-vaccines](http://www.nfid.org/about-vaccines)

AAFP Vaccine Science Fellowship

- Develop a cadre of family physicians interested in and knowledgeable about vaccines - ultimate goal of increasing immunization rates.
- 10^{th} anniversary in 2019!
- ~20 family physicians completed
- Work in local, state and national positions
Practice Recommendations

• Read over the ACIP schedules each February for new vaccine information
• Do one VAERS report in the next year for an adverse reaction from vaccine
• Review your coding/billing practices to get compensated for vaccinating!

Contact Information

• John Epling
• jwepling@carilionclinic.org
Questions
Zika Virus Update: The Forgotten Pandemic

Naushad Amin, MD, FAAFP

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Naushad Amin, MD, FAAFP

Assistant Professor, Department of Family Medicine, University of Central Florida College of Medicine, Orlando

Dr. Amin earned his medical degree at Dow Medical College, Karachi, Pakistan, where he was an avid polio campaigner for the World Health Organization (WHO). He completed his family medicine residency at Florida Hospital South, Orlando. Following residency, he worked as a hospitalist and served as vice-chairman of the Department of Family Medicine at Holmes Regional Medical Center, Melbourne, Florida. In 2017, he completed a global health fellowship at the University of San Francisco California, Contra Costa. As an assistant professor of family medicine at the University of Central Florida (UCF) College of Medicine, Orlando, he has been involved with multidisciplinary student-run outpatient clinics and the annual UCF Global Health Conference.

Within the field of global health, Dr. Amin is focused on medical education, capacity building, and research, with an emphasis on noncommunicable disease. Increasingly, his passion for global health has led him to work extensively with marginalized populations in countries including Peru, Malawi, Uganda, and Kenya. As a point-of-care ultrasound (POCUS) instructor, he has conducted several POCUS workshops, both in the United States and abroad. He is also a frequent presenter at international global health conferences.
Learning Objectives

1. Counsel patients planning on traveling to areas with known cases of Zika virus to take necessary precautions to prevent infection.

2. Recognize clinical manifestations of Zika viral infection, distinguishing it from other infections (e.g., dengue fever, West Nile), and diagnose accordingly.

3. Establish detailed, practice-based plans for responding to complex medical emergencies that include protocols to report notifiable diseases in the community of practice.

4. Counsel patients who are in relationships that might lead to pregnancy and who are planning on traveling to areas with known cases of Zika virus to take necessary precautions to prevent infection, both during and after travel.

Audience Engagement System

Step 1

Step 2

Step 3
Case Study

A 44 year old school teacher, started feeling fatigued with arthralgia and myalgia, soon after returning from a mission trip from Haiti. Day 8 she noticed macular rash on her face and chest. Next day she had a low grade fever of 101 F and noticed bilateral conjunctivitis, periorbital pressure and bilateral wrist pain. She was seen at a local urgent care where she remembers to be bitten by a mosquito on her thigh while in Haiti. She received oral prednisone and antibiotics. Later she was tested positive for Zika on PCR and negative for Dengue and Chikungunya.

• What advice would you give to a patient prior to travel to areas with active Zika virus infection?
• What diagnostic tools and approach would you use?
• What are some of the complications associated with Zika Virus infection?

Epidemiology

ZIKV discovered in 1947 in Ugandan Zika forest.
Epidemiology

Spread of Zika Virus from Africa

- First large outbreak of ZIKV was in Yap in 2007

Within 3 years, an estimate of 73% of Yap’s population got infected with ZIKV.
Epidemiology

ZIKV:

- Flavivirus
- RNA Virus
- Approximately 40 nm in diameter
- Contains membrane protein E and M
- Enveloped

Epidemiology

TRANSMISSION:
- Mosquito bites Aedes aegypti and A. albopictus
- Mother to child
- Sexual contact
- Blood transfusion
- FDA has recommended donor screening, donor deferral and product management.
- Lab exposure
Epidemiology

- Geographical mapping of *Aedes aegypti* and *A. albopictus*
Epidemiology

• Geographical areas with Active Zika Virus Transmission as of June 30, 2016
Poll Question #1

Which of the following is the most common clinical presentation in a patient infected with Zika virus?

A. Fever.
B. Maculopapular rash.
C. Arthralgia.
D. Conjunctivitis.
E. Asymptomatic

Clinical signs and symptoms

- Mostly asymptomatic ~80%
- Incubation period is likely 3-12 days
- Fever
- Maculopapular rash
- Conjunctivitis
- Arthralgia
- Less commonly myalgias and headaches
- Neurological symptoms including Guillain-Barre Syndrome
- Microcephaly
Clinical signs and symptoms

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maculopapular rash</td>
<td>90%</td>
</tr>
<tr>
<td>Fever</td>
<td>65 %</td>
</tr>
<tr>
<td>Arthralgia</td>
<td>65%</td>
</tr>
<tr>
<td>Conjunctivitis</td>
<td>55%</td>
</tr>
<tr>
<td>Myalgia</td>
<td>48%</td>
</tr>
<tr>
<td>Headache</td>
<td>45%</td>
</tr>
<tr>
<td>Retro-orbital ache</td>
<td>39%</td>
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<tr>
<td>Edema</td>
<td>19%</td>
</tr>
<tr>
<td>Vomiting</td>
<td>10%</td>
</tr>
</tbody>
</table>

Duffy M. N Engl J Med 2009 Total n=31

Differential Diagnosis

Dengue
Malaria
Leptospirosis
Group A Streptococcus
Measles
Rubella
Parvovirus
Enterovirus
Adenovirus
Chikungunya

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Zika</th>
<th>Dengue</th>
<th>Chikungunya</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rash</td>
<td>+++</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>Fever</td>
<td>++</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>Arthralgia</td>
<td>++</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>Conjunctivitis</td>
<td>++</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Myalgia</td>
<td>+</td>
<td>+++</td>
<td>+</td>
</tr>
<tr>
<td>Headache</td>
<td>+</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Hemorrhage</td>
<td>-</td>
<td>++</td>
<td>-</td>
</tr>
<tr>
<td>Shock</td>
<td>-</td>
<td>*</td>
<td>-</td>
</tr>
</tbody>
</table>
Poll Question #2

Zika virus testing is recommended for all except:

A. Anyone with possible exposure to Zika or Dengue virus with recent symptoms
B. Preconception screening.
C. Asymptomatic pregnant women with ongoing exposure to above viruses
D. Pregnant mother with positive prenatal ultrasound findings consistent with congenital Zika infection.

Who should you test?

• Anyone with possible exposure to Zika or Dengue virus with recent symptoms
• Symptomatic pregnant women with possible exposures
• Asymptomatic pregnant women with ongoing exposure to above viruses
• Pregnant mother with positive prenatal ultrasound findings consistent with congenital Zika infection.

Zika virus testing is not routinely recommended for
• Non-pregnant asymptomatic patients
• Preconception screening.
Zika Virus disease is a nationally notifiable condition.

Diagnostic tools and approach

- Complete CDC submission form (50.34)
- Include date of onset of symptoms
- Date of specimen collected
- Pertinent travel history
- Specimen origin field = select HUMAN
- Test order name field = select ARBOVIRUS
- Add email
- Add brief clinical history
Diagnostic tools and approach

- **Nucleic Acid Amplification test NAAT**
  - Highest sensitivity in serum during the first week of illness
  - Urine sample should be performed up to 14 days of illness
  - CSF specimen

- **ELISA**
  - Virus specific immunoglobulin M (IgM)
    - Cross-reactivity exist among other flavivirus eg. Dengue and Yellow fever.
  - Plaque reduction neutralization test (PRNT)

Diagnostic tools and approach in Non-Pregnant Symptomatic Patient
Diagnostic tools and approach in Pregnant Symptomatic Patient

Approach in Pregnant Asymptomatic Patient

Asymptomatic pregnant women with recent travel to zika endemic area

No routine testing needed

Asymptomatic pregnant women with current Zika exposure

Test with NAT three times during pregnancy. First test at the initial prenatal visit

Positive NAT results indicates active Zika infection.
Congenital Zika Syndrome

- Severe microcephaly
- Decrease brain tissue
- Impaired visual and auditory response to stimuli
- Joints deformities and contractures such as club foot
- Hypertonia
- Non febrile seizures

The Zika Outcomes and Development in Infants and Children (ZODIAC) investigation
Microcephaly


Centers for Disease Control and Prevention
CDC 24/7: Saving Lives, Protecting People™

<table>
<thead>
<tr>
<th>Gestational Age at Birth</th>
<th>Reference Chart</th>
</tr>
</thead>
<tbody>
<tr>
<td>33–43 Weeks</td>
<td>INTERGROWTH-21st Newborn Size at Birth Chart</td>
</tr>
<tr>
<td></td>
<td>A tool for calculating centiles for head circumference for infants 33–42 weeks is available.</td>
</tr>
<tr>
<td>24–32 Weeks</td>
<td>INTERGROWTH-21st Very Preterm Size at Birth References</td>
</tr>
<tr>
<td></td>
<td>A tool for calculating centiles for head circumference for infants 24–32 weeks is also available from this site.</td>
</tr>
<tr>
<td>&lt;24 Weeks</td>
<td>INTERGROWTH-21st Fetal Growth Standards</td>
</tr>
</tbody>
</table>

The International Very Preterm Size at Birth Reference Charts

Head circumference (cm) Girls

<table>
<thead>
<tr>
<th>Gestational age (weeks+days)</th>
<th>3rd</th>
<th>5th</th>
<th>10th</th>
<th>25th</th>
<th>50th</th>
<th>75th</th>
<th>90th</th>
<th>95th</th>
<th>97th</th>
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<tbody>
<tr>
<td>24+0</td>
<td>19.16</td>
<td>19.52</td>
<td>20.09</td>
<td>22.09</td>
<td>24.09</td>
<td>24.66</td>
<td>25.02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24+1</td>
<td>19.28</td>
<td>19.65</td>
<td>20.22</td>
<td>22.22</td>
<td>24.22</td>
<td>24.78</td>
<td>25.15</td>
<td></td>
<td></td>
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<td>24+2</td>
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<td>20.34</td>
<td>22.34</td>
<td>24.34</td>
<td>24.91</td>
<td>25.28</td>
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<tr>
<td>24+3</td>
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<td>19.90</td>
<td>20.47</td>
<td>22.47</td>
<td>24.47</td>
<td>25.04</td>
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<td>24+4</td>
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<td>20.03</td>
<td>20.60</td>
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<td>24+5</td>
<td>19.79</td>
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<td>20.72</td>
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<td>24.72</td>
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<td>24+6</td>
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<td>20.85</td>
<td>22.85</td>
<td>24.85</td>
<td>25.42</td>
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<td>25+0</td>
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<td>20.41</td>
<td>20.98</td>
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<td>24.98</td>
<td>25.54</td>
<td>25.91</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


Ultrasound screening for fetal microcephaly following Zika virus exposure

Society for Maternal-Fetal Medicine (SMFM) Statement

Prenatal Ultrasound (HC)

- <2SD
  - Repeat q 3-4 weeks
- >2SD
  - Detailed Neurosonographic Exam
- >3 SD
  - Isolated microcephaly
  - >5 SD
  - Pathologic microcephaly

Practice Advisory: Updated Interim Guidance for Care of Women of Reproductive Age During a Zika Virus Outbreak

- 1st ultrasound 3-4 weeks after symptom onset or exposure or 18-20 weeks in endemic area
- Serial ultrasounds q3-4 weeks with diagnosed infection (IgM, PCR)
- If negative for infection, consider 2nd ultrasound and if negative, return routine prenatal care

Updated June 23, 2016

http://www.acog.org/About-ACOG/News-Room/Practice-Advisories/Practice-Advisory-Interim-Guidance-for-Care-of-Obstetric-Patients-During-a-Zika-Virus-Outbreak

Head Circumference

http://www.fetal.com/Screening/s03%20Standard%20Examination.html
Technique

- Find cervical spine in long axis
  - Turn probe 90 degrees to find occipito-frontal axis
  - Identify landmarks

Microcalcifications  Ventriculomegaly

Large Subarachnoid Space

Simplified convolution pattern    Agenesis of Corpus Collosum

Visual Ultrasound for Ultrasound in Obstetrics and Gynecology

Sloping forehead

Visual Ultrasound for Ultrasound in Obstetrics and Gynecology
Treatment

• No specific antiviral are available against ZIKV

• Supportive care
  • Rest
  • Hydration
  • Acetaminophen for analgesic and antipyretic effects
  • Avoid Aspirin and NSAIDS

Prevention

• Vector control

• Prevention of sexual transmission
  • Condom use throughout pregnancy

• Screening of blood product

• Reducing travel exposure

• Pregnant women of all trimesters should avoid travel to destinations with active ZikV infection.
Vector Control

- Everyone can control mosquitos!!!
- Local government uses Integrated Mosquito Management [IMM]
  - Track mosquito population and viruses they carry
  - Determine the efficacy of EPA-approved insecticides.
  - Dispose of illegally dumped tires, clean up and maintenance of public places, storm drainage etc.
  - Use of larvicides and adulticides.

Poll Question #3

Which of the following is **NOT** true regarding vector control?

A. Oil of lemon eucalyptus is not an EPA approved insect repellent.

B. EPA approved insect repellents should not be used if infant younger than 2 months of age.

C. Do not use oil of lemon of eucalyptus (OLE) or para-methane-diol (PMD) products for children under 3 years of age.

D. Treat clothing and gears with permethrin and avoid direct skin contact.
Vector Control

• Public role:
  • Use EPA approved insect repellent
    • Follow product label
    • Reapply often as directed
    • Do not use if infant younger than 2 months of age
    • Do not use oil of lemon of eucalyptus (OLE) or para-methane-diol (PMD) products for children under 3 years of age.
    • Do not apply repellent directly on a child’s face or irritated skin.

Environment Protection Agency (EPA) registered insect repellents.

<table>
<thead>
<tr>
<th>Active ingredient</th>
<th>Some brand name examples*</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEET</td>
<td>Off!, Cutter, Sawyer, Ultrathon</td>
</tr>
<tr>
<td>Picaridin, also known as KBR 3023, Bayrepel, and icaridin</td>
<td>Cutter Advanced, Skin So Soft Bug Guard Plus, Autan (outside the United States)</td>
</tr>
<tr>
<td>Oil of lemon eucalyptus (OLE) or para-methane-diol (PMD)</td>
<td>Repel</td>
</tr>
<tr>
<td>IR3535</td>
<td>Skin So Soft Bug Guard Plus Expedition, SkinSmart</td>
</tr>
</tbody>
</table>

* Insect repellent brand names are provided for your information only. The Centers for Disease Control and Prevention and the U.S. Department of Health and Human Services cannot recommend or endorse any name brand products.
Vector Control

• Protect children:
  • Dress to cover arms and legs as well.
  • Use mosquito netting over cribs, stroller, and baby carriers

• Treat clothing and gears with permethrin. Do not apply directly on the skin.

Vector Control

Prevent home invasion

• Use mosquito screen,
• Air conditioning, if possible
• Avoid water pooling
Prevention via Sexual Transmission

• Infected men can transmit ZikV up to 41 days\textsuperscript{1} and infected women up to 11 days\textsuperscript{2} from the onset of symptoms
• Transmission can occur among both genders infected with Zika virus.
• All pregnant women should use barrier methods or abstain from sex during pregnancy if their partners live in or travel to areas with presence of Zika virus.
• Similar guidelines for non pregnant couples.
  • Barriers include both male and female condoms and dental dams

Prevention of Transmission

• Screening of blood transfusion products.
  • FDA has recommended donor screening, donor deferral and product management.

• Reducing travel exposure
  • Pregnant women of all trimesters should avoid travel to destinations with active ZikV infection.
Perinatal Counseling

<table>
<thead>
<tr>
<th>Uncertainty in Data regarding Zika Virus effect during pregnancy</th>
<th>Ultrasound examination has limitation and may not rule in or out congenital Zika syndrome</th>
</tr>
</thead>
<tbody>
<tr>
<td>All pregnant patient at risk should be offered detailed options and counseling</td>
<td>If Zika virus testing is indicated, physician should provide pretest counseling</td>
</tr>
<tr>
<td>Several testing may be required with complexity of interpretation</td>
<td>Provider should discuss each type of test in detail</td>
</tr>
</tbody>
</table>

Case study continues

A 44 year old school teacher, started feeling fatigued with arthralgia and myalgia, soon after returning from a mission trip from Haiti. Day 8 she noticed macular rash on her face and chest. Next day she had a low grade fever of 101 F and noticed bilateral conjunctivitis, periorbital pressure and bilateral wrist pain. She was seen at a local urgent care where she remembers to be bitten by a mosquito on her thigh while in Haiti. She received oral prednisone and antibiotics. Later she was tested positive for Zika on PCR and negative for Dengue and Chikungunya.

Positive serum, saliva and sputum RT-PCR.
Positive IgM and negative RT-PCR on spinal fluid analysis
Case study continues
In the meantime, she develops bilateral upper and lower extremities paranesthesia. She was hospitalized where:

- CT scans MRI were essentially normal.
- LP was performed and was positive for IgM for ZikV.
- Nerve conduction studies showed bilateral mild radial sensory neuropathy and right tibial motor nerve conduction abnormality.

A diagnosis of sensory-motor variant of GBS was made and she was treated with plasmapheresis and IVIG with partial symptoms improvement.

Practice Changing Recommendations

| Infection with Zika virus is a nationally notifiable condition. | SORT A |
| All pregnant women infected or presumptively infected with Zika virus should be offered comprehensive options counseling, including a thorough discussion of pregnancy continuation, terminations of pregnancy, and adoption. | SORT B |
| Counsel patients to use environment protection agency (EPA) registered insect repellents. | SORT A |
If you think you are too small to make a difference, you haven’t spend a night with a mosquito.

Thank you.

Contact Information

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Questions
Reference and Resources

- Turmel JM, Abgueguen P, Hubert B, et al. Late sexual transmission of Zika virus related to persistence in the semen. Lancet 2016;387:2501
- Duffy M. N Engl J Med 2009 Zika virus outbreak on Yap Island, federated states of Micronesia
- American College of Obstetricians and Gynecologists, [http://www.acog.org/About-ACOG/News-Room/Practice-Advisories/Practice-Advisor-Interim-Guidance-for-Care-of-Obstetric-Patients-During-a-Zika-Virus-Outbreak](http://www.acog.org/About-ACOG/News-Room/Practice-Advisories/Practice-Advisor-Interim-Guidance-for-Care-of-Obstetric-Patients-During-a-Zika-Virus-Outbreak)