

Vaccines and Pregnancy

Part 1: Influenza

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Grand Rounds Lecture

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Learning Objectives

- ◇ Clinical manifestations of influenza
- ◇ Maternal and fetal effects of infection
- ◇ Mechanism of action of vaccination in pregnancy
- ◇ Benefits of flu vaccination
- ◇ Safety considerations

Impacts of Influenza Infection

Symptoms of Influenza Infection

- ◇ Fever
- ◇ Headache
- ◇ Myalgias
- ◇ Rhinorrhea
- ◇ Non-productive cough
- ◇ Sore throat
- ◇ Mild shortness of breath
- ◇ Malaise

Remember: Flu is a **CLINICAL** diagnosis

Complications of Influenza Infection

- ◇ Bacterial pneumonia
 - ◇ Dehydration/PO intolerance
 - ◇ Respiratory compromise
 - ◇ Death
- ◇ OB patients with any of the following require urgent intervention
 - ◇ Chest pain/pressure
 - ◇ Respiratory distress
 - ◇ PO intolerance
 - ◇ Clinical signs of dehydration
 - ◇ Altered mental status
 - ◇ Obstetric complications

Impact of Flu on Pregnant Women

- ◇ Compared to the general population, pregnant women are:
 - ◇ Equally likely to contract flu
 - ◇ More likely to become severely ill or die from infection
 - ◇ Up to 4x more likely to be hospitalized
- ◇ These worse outcomes thought to be due to routine physiologic changes of pregnancy
 - ◇ Increased heart rate
 - ◇ Increased O₂ demand/consumption
 - ◇ Decreased lung capacity
 - ◇ Decreased cell-mediated immunity

Impact of Flu on Fetus/Newborn

- ◇ Generally not well-studied
- ◇ *In utero* period
 - ◇ Transplacental transmission observed, but rare
 - ◇ Increased risk of congenital anomalies (esp. hydrocephalus, neural tube defects, cleft lip/palate, heart defects)
 - ◇ IUFD
- ◇ Post-natal period
 - ◇ Low birth weight/SGA
 - ◇ Preterm birth
 - ◇ Increased risk of hospitalization for flu-related complications

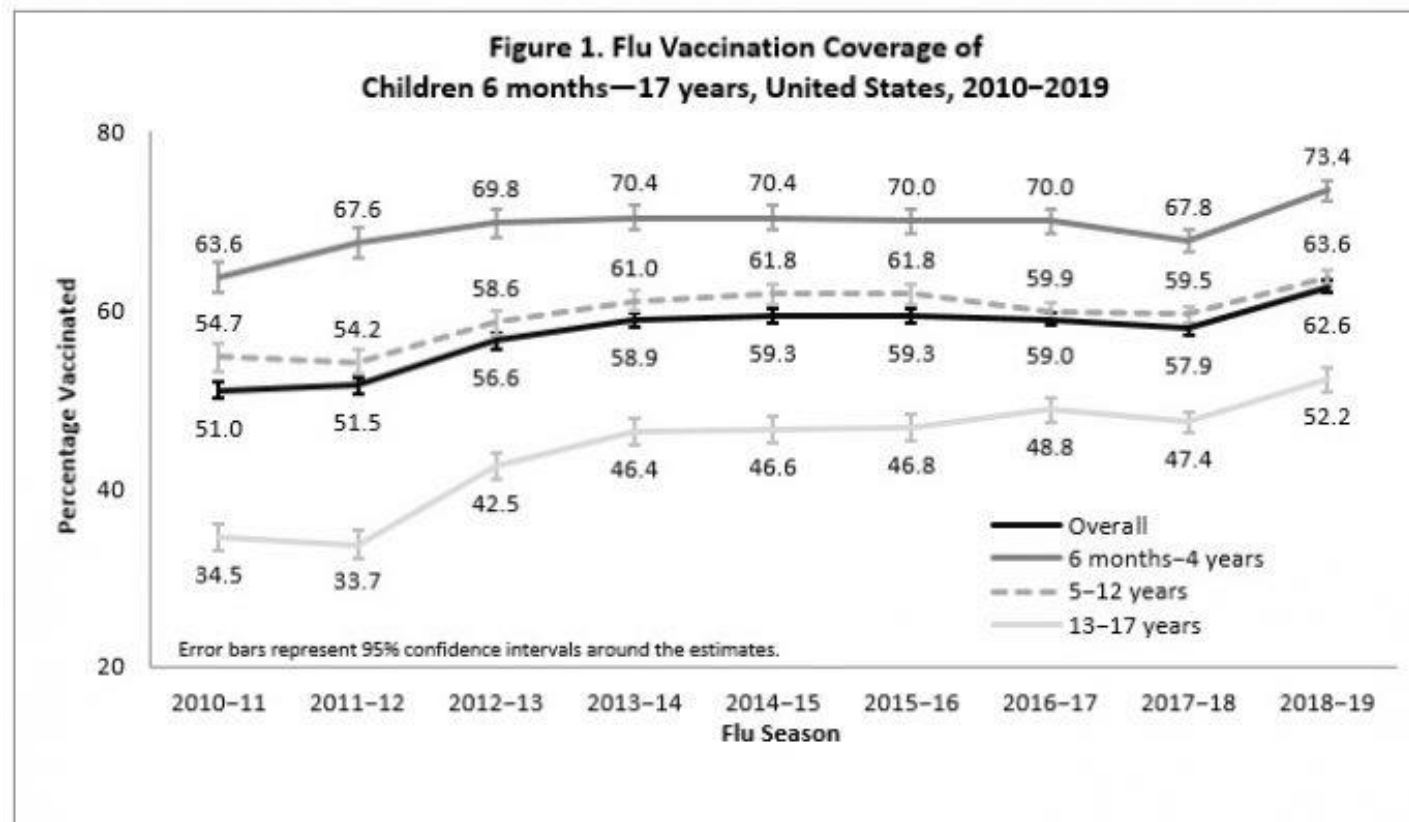


Influenza Vaccination: Rates, Trends

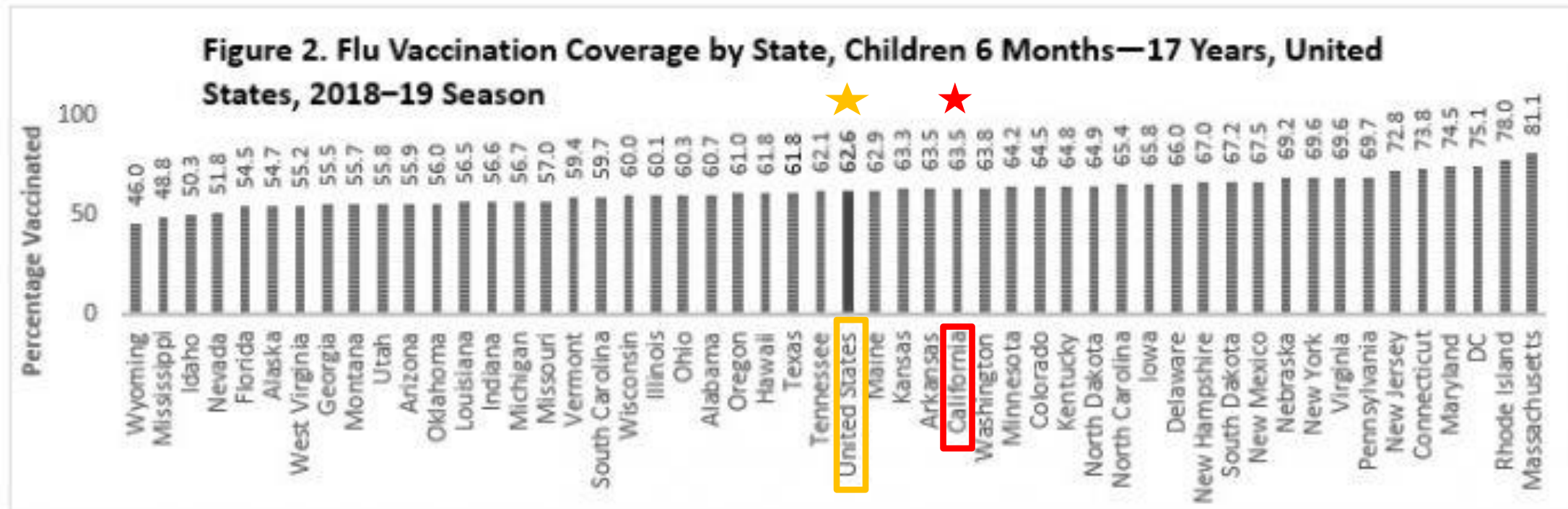
Flu Vaccination Trends Nationally

- ◆ Flu vaccine coverage rates are generally low in the United States, across all groups
 - ◆ Rates are highest among those 65+ years and infants
 - ◆ Lowest among adolescents and young adults
 - ◆ Rates among pregnant women are just above national average for adults, at around 50%

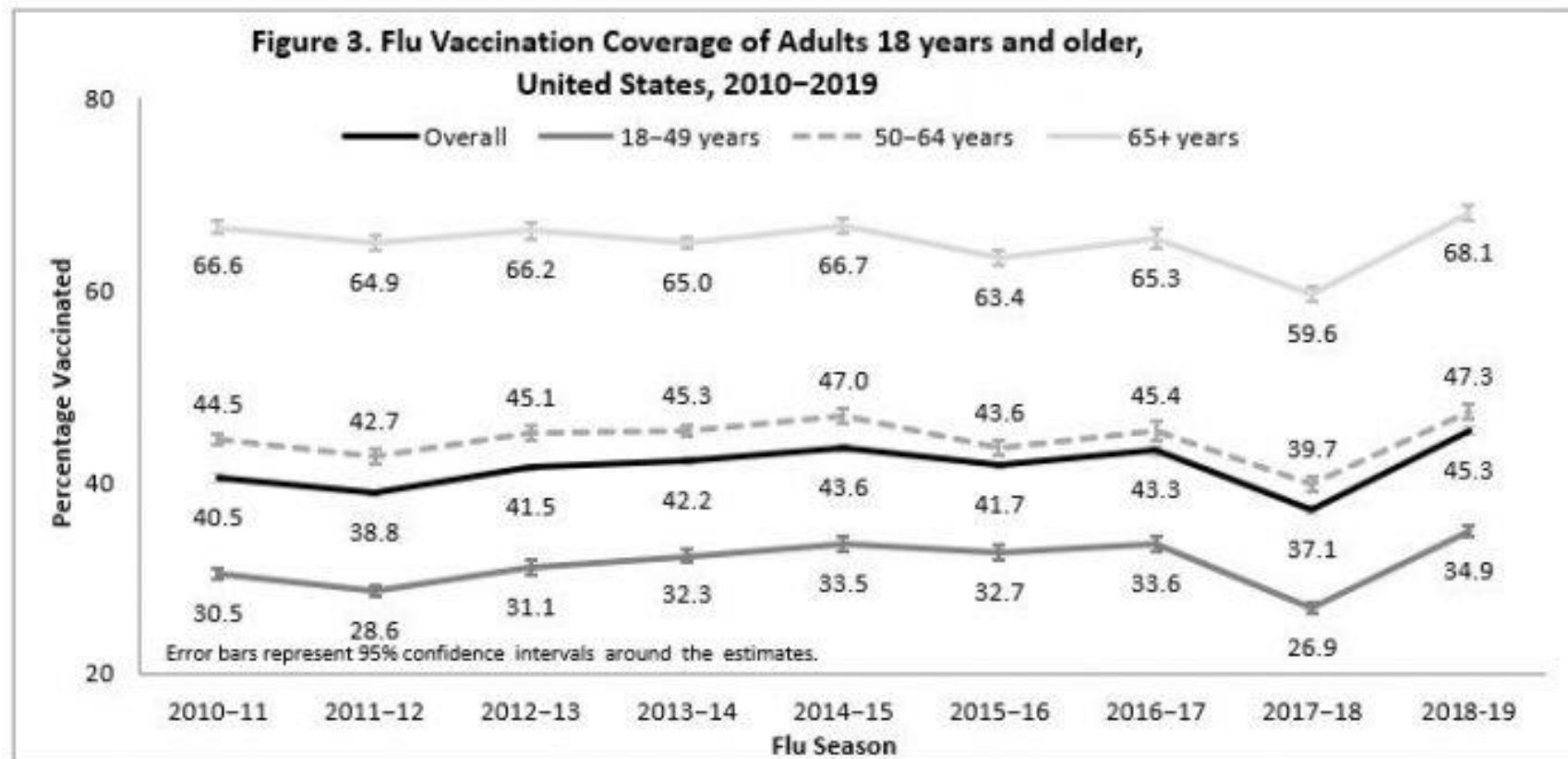
Pediatric Flu Vaccination Rates



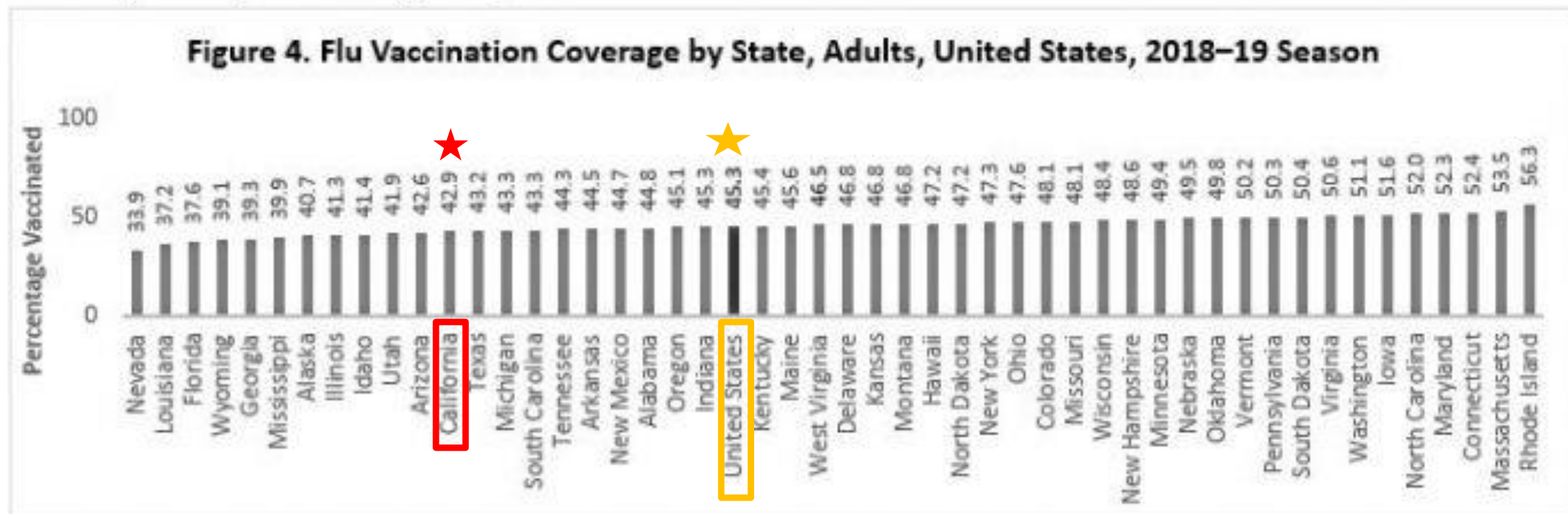
CA Flu Vaccination Rates—Peds



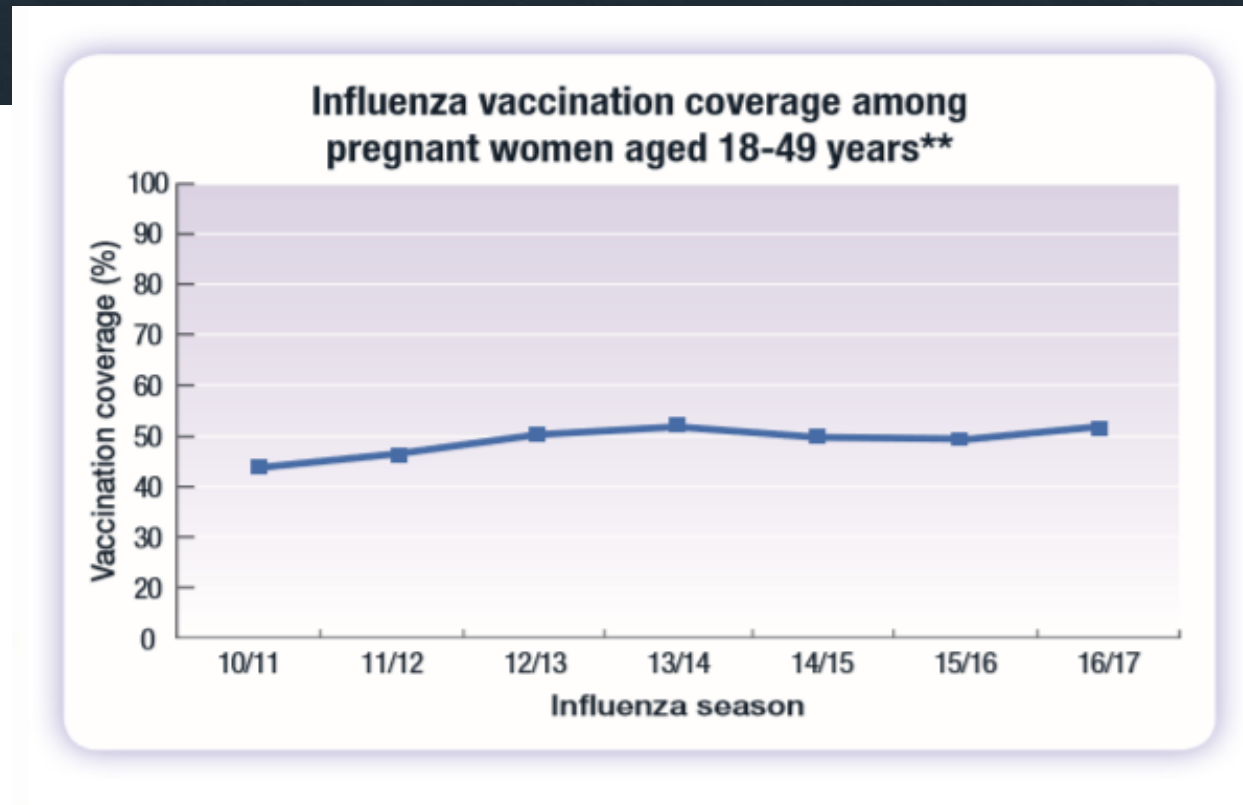
Adult Flu Vaccination Rates



CA Flu Vaccination Rates—Adults



Epidemiology of Flu Vaccines in Pregnancy



Nationally, only about 50% of pregnant women on average receive a flu shot



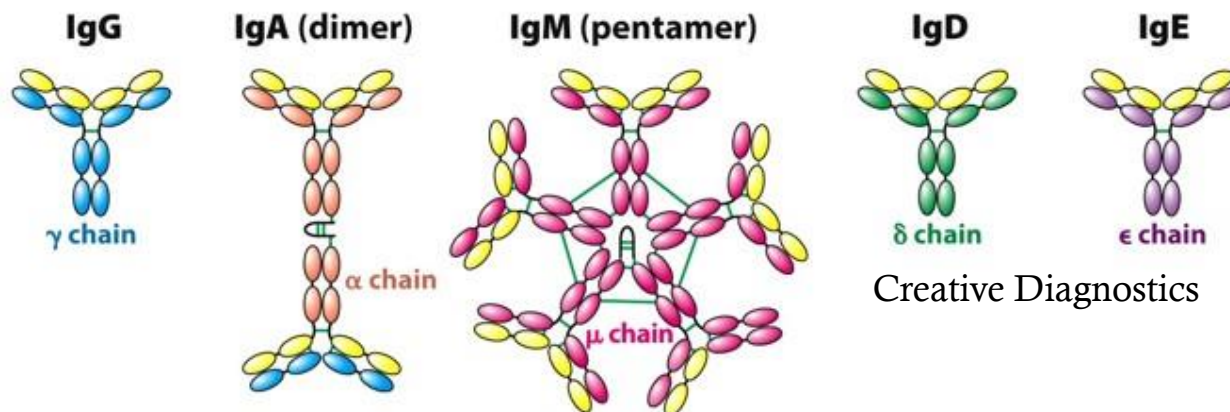
Influenza Vaccination: Mechanism of Action

Vaccination of Pregnant Woman



Humoral Immunity

- ◇ Mechanism of action of flu vaccination
 - ◇ Pregnant woman receives injection of inactivated influenza vaccine
 - ◇ Develops humoral immune response → protective, strain-specific IgG antibodies (to viral hemagglutinin proteins)



Maternal Antibody Transfer

- ◇ Strain-specific IgG antibodies are transferred across the placenta to fetus (neonatal Fc receptor)
- ◇ Transplacental antibody transfer usually starts around 17 wks and peaks at end of pregnancy
 - ◇ Premature babies tend to have lower antibody levels
- ◇ Usually takes about 2 wks for maternal and fetal antibody levels to be reach high levels
- ◇ Strain-specific IgA antibodies are transferred via breastmilk

Transplacental Antibody Transfer

- ◆ May be ideal to administer vaccine during 2nd or 3rd trimester, but in general, administer whenever possible!
- ◆ This protection lasts for weeks after birth and is infant's main source of protection against infection
 - ◆ Vaccines not approved for infants under 6 mo—typically cannot mount adequate immune response
 - ◆ Highest rates of morbidity/mortality from flu occur in those <12 mo old



Influenza Vaccination: Benefits, Safety Considerations

Benefits of Flu Vaccination

- ◆ For pregnant women
 - ◆ Reduction in rates of influenza-like illness and febrile respiratory illness of 24-36%
 - ◆ Reduction in rates of illness in their newborns of 41-63%
 - ◆ Reduction in risk of stillbirth and possible reduction in SGA, less preterm delivery, and higher BW
 - ◆ A 40% decrease in flu-associated hospitalization during pregnancy based on large hospital study from 2010-2016

Benefits of Flu Vaccination

- ◆ For newborns
 - ◆ Higher birth weights
 - ◆ Lower rates of congenital abnormalities
 - ◆ Decreased rates of hospitalization (in one study, decreased overall LRTI deaths among babies 3 mo and younger)
 - ◆ Decreased mortality from infection

Side Effects of Flu Vaccination

- ◇ Soreness, erythema, induration at injection site
- ◇ Mild systemic symptoms (fever, malaise, myalgias), lasting no more than 1-2 d
- ◇ More severe effects extremely rare (CDC has database)
- ◇ Risk of Guillain-Barré syndrome: no clear association w/ overall with influenza vaccination other than slight increase during swine-origin flu seasons
 - ◇ Avoid vaccination if hx of GBS within 6 wks of vaccination in the past

Safety Considerations

- ◇ Live, attenuated flu vaccine (i.e. nasal mist) is contraindicated in pregnant women
 - ◇ Theoretical risk of vertical transmission
 - ◇ However, it IS safe for breastfeeding women
- ◇ May be given any trimester
 - ◇ May be more beneficial to baby if given in later trimesters, but risk of waiting > benefit

Safety Considerations

- ◇ There is no increased risk of miscarriage with flu vaccination
 - ◇ A small study published in 2017 suggested the possibility of increased risk of spontaneous abortion in women who received H1N1 two years in a row (2010-2012) in the first trimester
 - ◇ Several studies since have not found this correlation, including a much larger trial by the CDC using the same Vaccine Safety Datalink project database
 - ◇ The CDC's Advisory Committee on Immunization Practices and ACOG (among other organizations), support the administration of flu vaccine in pregnancy women in any trimester

Myths

- ◇ Thimerosal does NOT cause autism in pregnant women, babies born to vaccinated women, or in anyone else
 - ◇ Thimerosal is a preservative used in some multidose vaccines including flu
- ◇ The inactivated influenza vaccine does NOT cause flu infection
 - ◇ Not even theoretically
 - ◇ LAIV theoretically can but little evidence for this

Reasons You May Get Sick After a Flu Shot



Not enough time for vaccine to develop immunity



Already exposed to flu or flu-like illness



Not responding fully to vaccine



Over age 65



Vaccine doesn't cover strain of flu



The Role of Providers

- ◆ Based on a CDC survey of women pregnant during the 2017-2018 flu season
 - ◆ 2/3rd reported receiving an offer for flu vaccine
 - ◆ 15% reported receiving a recommendation but no offer for vaccine
 - ◆ 19% reported receiving no recommendation or offer for vaccine
- ◆ Always recommend and offer the flu shot (and any appropriate vaccines) to your patients, pregnant or otherwise!
- ◆ If you can't offer a vaccine, give them a prescription



The End

Thank you for your attention!

Works Cited

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Image Credits

- ❖ Pregnancy antibodies graphic: <http://www.immunizeca.org/pregnant-women/>
- ❖ Antibodies graphic: <https://www.creative-diagnostics.com/blog/index.php/clinical-significance-of-five-immunoglobulin-tests/>
- ❖ Flu shot myths graphic: <https://www.verywellhealth.com/why-did-i-get-sick-after-a-flu-shot-770535>