Improving Tdap & Influenza Vaccination for Pregnant Women & Caregivers

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Disclosures

- InvoBioscience-medical device company for infertility
- Merck-trainer for Nexplanon contraceptive implant

Objectives

At the end of this presentation the learner will be able to:

1. Restate vaccination recommendations for Tdap & Influenza in during pregnancy
2. Identify Ethical Considerations of Vaccination during pregnancy
3. Discuss strategies to Integrate &increase Immunization rates in a clinical practice

Outline

- Maternal Immunization
- Updates for Pertussis vaccination
- Update for Influenza vaccination
- Ethical Considerations
- Practice Integration

MATERNAL IMMUNIZATION

Key Facts

- Vaccines have been a useful tool for reducing childhood mortality
- Immunization schedules start when infants are 2 months of age in the USA
- Primary immunization schedule is not complete until infants are 6 months of age
- Most childhood vaccines do not start providing adequate protection until the infant is several months old
- Progress in reducing deaths has been slower for infants too young to be vaccinated
- An Immunity Gap Exists
  - Gap between birth and vaccination protection
  - Can be addressed by maternal vaccination
- Maternal Vaccination Rate in the United States:
  - 50% for influenza nationally
  - 10% for Tdap in 16 states that have data

- N Engl J Med 2017;376:1256-67
- MMWR Morb Mortal Wkly Rep 2015; 64: 1000-5.
- MMWR Morb Mortal Wkly Rep
- 2015; 64: 522-6.

Pregnancy as an Immunologically Dynamic State

- Sex hormones modify immune responses

- Increased estradiol levels:
  - relatively higher type 2helper T-cell (Th2) responses
  - diminished type 1 helper T-cell (Th1) responses

- Increasing progesterone levels:
  - reduction in immune responses and an alteration of the Th1–Th2 balance.5,6
- Other components of the immune response are maintained:
  - phagocytic activity, alpha-defensin expression, and the numbers of neutrophils, monocytes, and dendritic cells, are maintained and may even increase during the second and third trimesters.

Kourtis AP, Read JS, Jamieson DJ.Pregnancy and infection. N Engl J Med2014; 370: 2211-8.

Straub RH. The complex role of estrogensin inflammation. Endocr Rev 2007;28: 521-74.

Immunogenicity of Vaccines in Pregnancy

- Evidence is mixed
- Decreased Immunogenicity did mean decrease in the clinical effectiveness

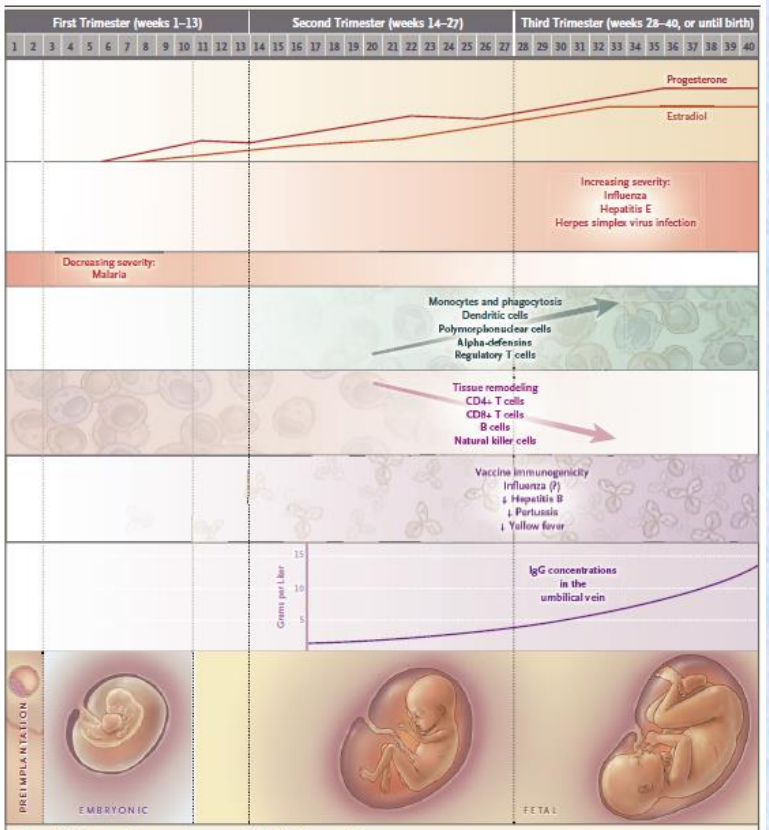


Figure 1. Vaccine and Immune Responses during the Course of Pregnancy.
Adapted from Kourtis et al.[2] and Malek et al.[3]

Current US Maternal Immunization Recommendations

Table 1. Summary of Maternal Immunization Recommendations

Vaccine*	Indicated During Every Pregnancy	May Be Given During Pregnancy in Certain Populations	Contraindicated During Pregnancy	Can Be Initiated Postpartum or When Breastfeeding or Both
Inactivated influenza	X[1,2]			X[1]
Tetanus toxoid, reduced diphtheria toxoid and acellular pertussis (Tdap)	X[1,3,4]			X[1]
Pneumococcal vaccines		X[4,5,6]		X[4,5,6]
Meningococcal conjugate (MenACWY) and Meningococcal serogroup B		X[6,7]		X[6,7]
Hepatitis A		X[6,8]		X[6,8]
Hepatitis B		X[6,9,10]		X[6,9,10]
Human papillomavirus (HPV)**				X**[11,12]
Measles–mumps–rubella			X[11,13,14]	X[11]
Varicella			X[11,13,15,16]	X[11]

*An "X" indicates that the vaccine can be given in this window. See the corresponding numbered footnote for details.

[1]Inactivated influenza vaccination can be given in any trimester and should be given with each influenza season as soon as the vaccine is available. The Tdap vaccine is given at 27–36 weeks of gestation in each pregnancy, preferably as early in the 27–36-week window as possible. The Tdap vaccine should be given during each pregnancy in order to boost the maternal immune response and maximize the passive antibody transfer to the newborn. Women who did not receive Tdap during pregnancy (and have never received the Tdap vaccine) should be immunized once in the immediate postpartum period.[1–3]

Vaccine Recommendations for Pregnant Women

Influenza virus			
Inactivated	Routine	Recommended	The inactivated vaccine is recommended for all women who are or will be pregnant during influenza season.
Live, attenuated	Routine	Contraindicated	Because of theoretical risks of fetal infection associated with live vaccines, the live, attenuated vaccine is contraindicated during pregnancy. However, no worrisome patterns regarding adverse birth outcomes have been reported in VAERS.
Tetanus toxoid, inactivated, reduced diphtheria toxoid, and acellular pertussis	Routine	Recommended	To ensure passive antibody transfer to the infant, the preferred time of vaccination is between 27 and 36 weeks of gestation, although vaccination during any stage of pregnancy is recommended. If a woman does not receive the vaccine during pregnancy, she should receive it immediately after giving birth. Tetanus toxoid has been shown to be safe and very effective in pregnant women. Moreover, neonates are protected against tetanus through antibodies transferred from vaccinated women.†

General Considerations

- Prenatal care includes an assessment of immunization status
- Inactivated virus/bacteria vaccine & toxoids are safe in pregnancy
- Concomitant administration of indicated vaccines are safe
  (eg. Influenza and Tdap)
- No proven increase risk of autism
- Document vaccinations and vaccine discussions (including refusal)

TETANUS, DIPHTHERIA, AND PERTUSSIS VACCINATION UPDATE

Pertussis

- *Bordetella pertussis*
- highly contagious acute respiratory illness
- pre-vaccine era: predominantly children <10 yrs. of age
- Post-vaccine era: USA 1990s, more than one-half of cases occurred in adolescents and adults
- Features:
  - inspiratory whoop
  - paroxysmal cough
  - posttussive emesis
- Estimated 24.1 million cases worldwide
- Estimated 160,700 deaths per year

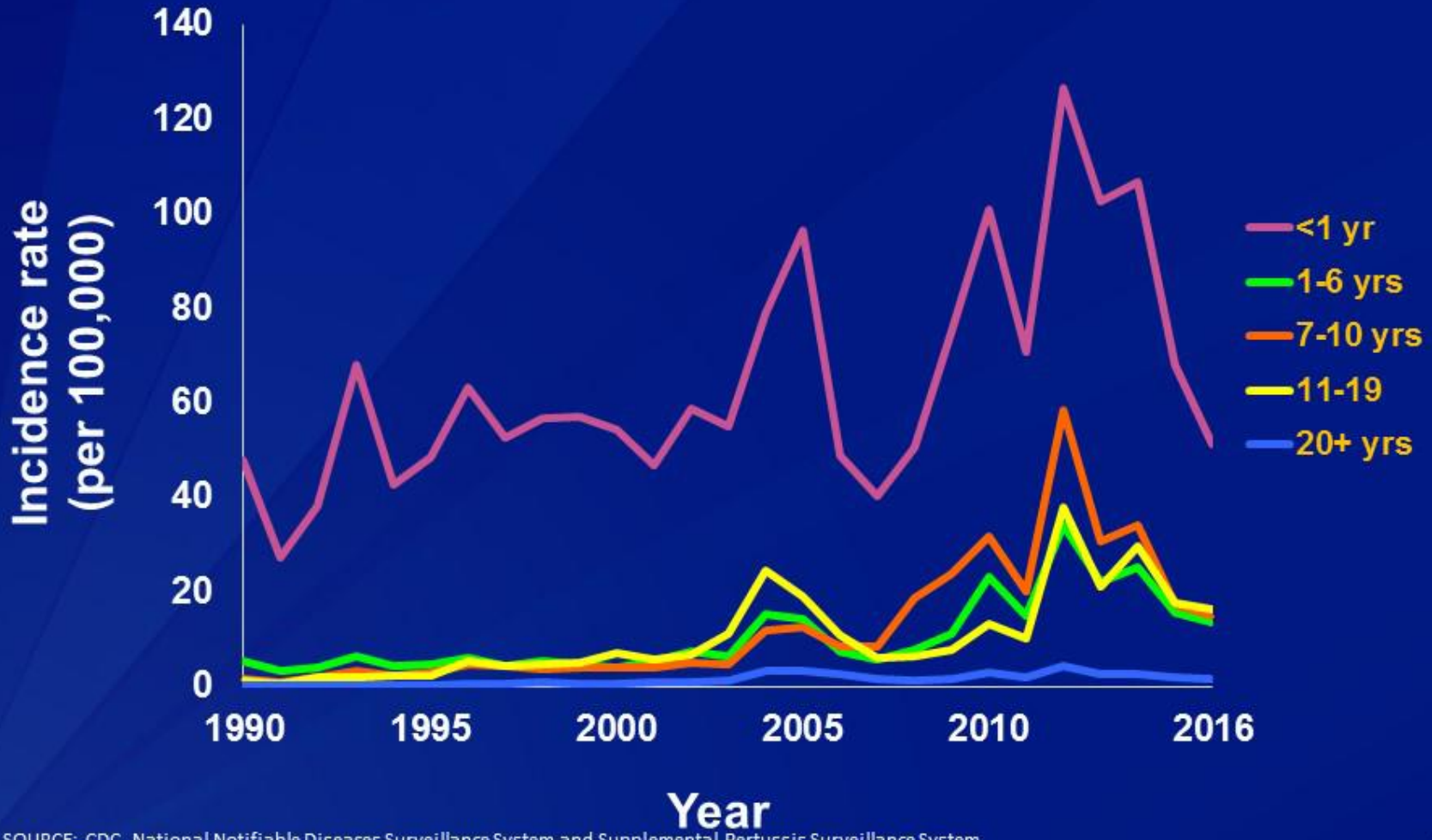
Pertussis

- Majority of Morbidity & Mortality occurs in infants $\leq$ 3 months of age
- Infants begin pertussis vaccine at age 2 months (DTaP)
- Window of vulnerability exposes infants
- Contract from Family members/caregivers

Reported NNDSS pertussis cases: 1922-2016

SOURCE: CDC, National Notifiable Diseases Surveillance System and Supplemental Pertussis Surveillance System and 1922-1949, passive reports to the Public Health Service

Reported pertussis incidence by age group: 1990-2016



SOURCE: CDC, National Notifiable Diseases Surveillance System and Supplemental Pertussis Surveillance System

Pertussis (Whooping Cough)

https://www.youtube.com/watch?v=S3oZrMGDMMw

https://www.youtube.com/watch?v=31tnXPlhA7w

Mayo Clinic
Published on Oct 7, 2013
SUBSCRIBE 89K

Mother holding infant girl in Intensive Care Unit. The baby has pertussis (whooping cough) and is coughing severely.

Whooping Cough in an Adult

603,149 views

NEJMvideo
Published on Jul 13, 2012

Goals of Outbreak Control

- Primary-decrease morbidity and mortality among babies

- Secondary-decrease morbidity among people of all ages

Evolution of ACIP Recommendations

- 2006 ACIP recommendations
  - "cocooning"
  - Tdap to previously unvaccinated family members/caregivers/mother in immediate pp period
- 2011
  - vaccinate pregnant women if not previously received

CDC: Year & Number Reported Cases

2002	9,771
2003	11,647
2004	25,827
2005	25,616
2006	15,632
2007	10,454
2008	13,278
2009	16,858
2010	27,550
2011	18,719
2012	48,277
2013	28,639
2014	32,971
2015	20,762
2016	17,972

Evolution of ACIP Recommendations

- 2013 ACIP updated recommendations
  - Tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis (Tdap)
  - Tdap should be given during each pregnancy
  - Vaccinated between 27wks-36wks

Summary

- Vaccination of pregnant women (27-36wk) with Tdap is to help protect children
- Vaccinated children and adults can become infected and spread pertussis
- Disease is typically much less serious in vaccinated people
- Clinicians generally treat pertussis with antibiotics,
  - control symptoms and to prevent spreading of the disease
- In 2012, the most recent peak year, CDC reported 48,277 cases
  - many more go undiagnosed and unreported

INFLUENZA VACCINATION DURING PREGNANCY

Introduction

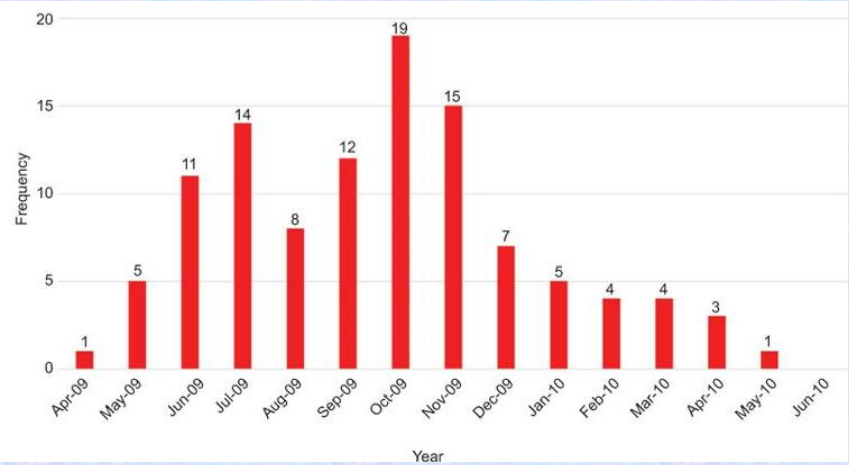
- 54% pregnant women vaccinated during 2016-2017 influenza season
- HHS Healthy people 2020 goal→ 80% vaccination
- Influenza Season is typically October-May
- Vaccination is core element of prepregancy, prenatal and postpartum care
- Morbidity and Mortality among pregnant women increase during influenza pandemics

Obstet Gynecol. 2015 Sep;126(3):486-90. doi: 10.1097/AOG.0000000000000996.

Pregnancy-Related Mortality Resulting From Influenza in the United States During the 2009-2010 Pandemic.

Callaghan WM[1], Creanga AA, Jamieson DJ.

- PMSS data
- Studied deaths attributed to influenza A (H1N1)pdm09 virus
- 915 pregnancy-related deaths and 4,911,297 live births
- 12% (109) of pregnancy-related deaths were attributed to confirmed or possible influenza A (H1N1)pdm09



Influenza Vaccine

- Recommended for pregnant women in the US since the 1960s

- Influenza vaccine is now recommended for all pregnant women (during each pregnancy)

- Vaccine can be administered in any trimester of pregnancy

  (also safe for breast-feeding women)

- Justification for pregnant women:
  - More severe outcomes among pregnant than among nonpregnant women
  - Infants < 6 months of age have highest burden of childhood complications and death associated with influenza
  - no efficacious vaccines are licensed & available for infants < 6 months of age

Vaccine Recommendations CDC-ACIP & ACOG

- Annual Influenza vaccination recommended for all adults
- Inactivated influenza vaccine for pregnant women
- Any licensed, recommended, age-appropriate inactivated vaccine is safe
- Obstetrician should stock and administer, or refer appropriately
- Encourage **office staff** to be vaccinated
- Egg allergy (hives vs severe)- vaccine can be given, clinic setting preferred
- Previous severe allergic reaction to influenza vaccine (NOT EGGS) is the only current contraindication to future receipt

Efficacy against maternal and infant infection

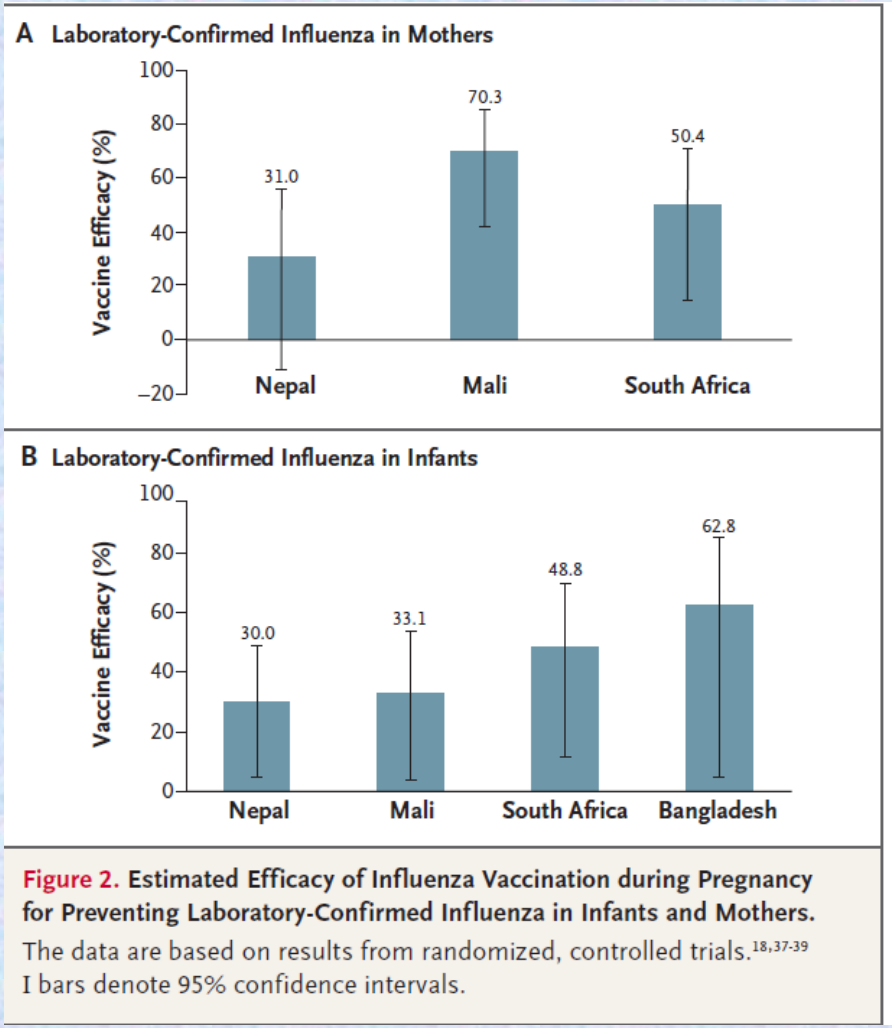


Figure 2. Estimated Efficacy of Influenza Vaccination during Pregnancy for Preventing Laboratory-Confirmed Influenza in Infants and Mothers.

The data are based on results from randomized, controlled trials.[18,37-39] I bars denote 95% confidence intervals.

Treatment Recommendations

- Flu like symptoms
  - Treat presumptively
  - Regardless of vaccine status

- Post-exposure chemoprophylaxis

-75mg oseltamivir once daily x 10ays

-Consider pregnant women & to 2 weeks postpartum

-If oseltamivir unavailable, then substitute zanamivir 2 inhalations once daily for 10 days

Strategies to Increase

Know your Role

- -Discuss effects & benefits of vaccine
- -Lack of knowledge is a barrier to acceptance
- -Use tools (chart prompts)
- -Provider's words have power
- -Stock and administer if possible
- - Counsel + Office Availability → up to 50 fold higher acceptance
- - Coordinate Care if unable to vaccinate in office

Give early in recommended window

Consider linking vaccination visit to other intervention

Increasing Rates of Influenza Vaccination During Pregnancy: A Multisite Interventional Study

David H. Wallis, MD, Jennifer L. Chin, MD, Denise K. C. Sur, MD, and Michael Y. Lee, MD

- Notes reading “Think Flu Vaccine” were placed on active obstetric charts
- Charts were reviewed at the end of influenza season for documentation of discussion or administration of influenza vaccination
- Charts for the same period during the previous 2 years were also reviewed for baseline.
- Baseline rates of vaccination or discussion averaged 1.5% over the 2000 – 2002 influenza seasons.
- After intervention, the 2002–2003 rate of vaccination or discussion demonstrated an almost 15-fold increase to 21.9%.

J Am Board Fam Med July-August 2006 vol. 19 no. 4 345-349

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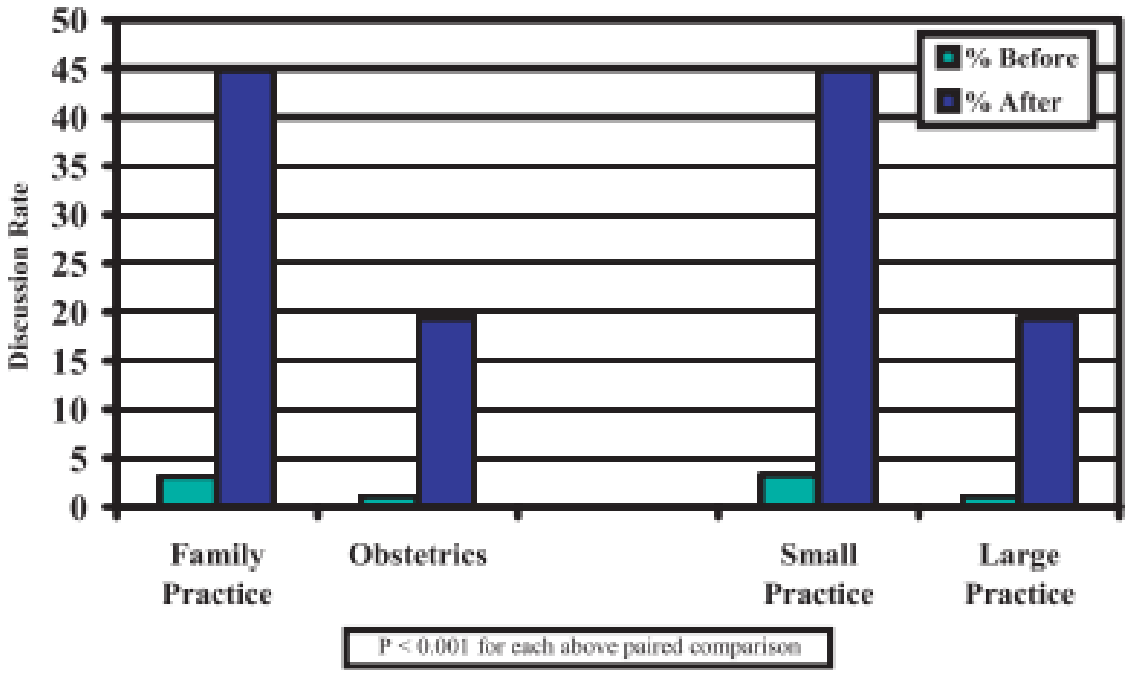

Figure 1. Effects of Intervention by Practice Type and Size.

ETHICAL CONSIDERATIONS

Ethical Principles of Vaccination

- Goal is to preserve health of patient and public
- Preventing disease in an individual protects the public
- Population immunity may prevent spread of communicable disease
- Ethical consideration is the obligation to patient and public
- Traditional clinical ethics –individual health being focus
- Public health ethics- health of the community is given priority
- Personal interests-rights-expectations

Distribution of Limited Resources

- If resources are limited, be prepared to discuss with patients
- Reallocation can generate conflict (elderly, pregnant, children)
- Design plans that don’t exacerbate pandemic risks
- Be prepared to provide counsel to public health jurisdictions

Successful Vaccination Strategies

- Understand and Comply with guidelines and recommendations regarding allocation and administration

  (some withheld influenza vaccines during 2009 pandemic)(violates autonomy)

- Financial & Business Concerns as a Barrier
  - Survey revealed ~ 50% found cost and infrastructure to be a challenge
  - Limited time & resources
  - BATNA-provide information about alternative resources and refer as needed

Informed Consent & Patients' Decision Making

- Indication/Risks/Benefits/Alternatives
- Acknowledge evolving body of knowledge
- Vaccination Information Statement must be given
  - (federal law)
- Consequences of no vaccination
- Respect Informed Refusal

Recommendations

- Recognize and accept responsibility to the patient and general population
- Maintain knowledge of current practice standards
- Counsel patients in an evidence based manner; informed decision making
- Serve patients' best interest by following authoritative guidance/evidence
- Discus and Review with patients evidence regarding efficacy & safety
- Respect patient autonomy & Promote patient safety
- Avoid personal contribution to spread of disease
  - Follow recommendations for vaccinations personally

INTEGRATING IMMUNIZATION INTO PRACTICE

- Rates of Vaccination lag behind national goals
- Increasing Awareness + Resources + Action→ Enhance Uptake
- Standing Orders if allowed
- http://www.immunizationforwomen.org/

Tips for Office Success

- Advocate
  –talk directly with patient
- Identify
  - Use prompts to remind providers/staff about vaccinations
  - (EMR or low tech)
- Educate & Vaccinate
  - Designate a Immunization Coordinator (backup)
    - Orders & Receives deliveries
    - Ensures proper storage
    - Know the local, regional, national contacts
  - Educate self & staff
- Integrate- standing orders if possible
- Practice management-
  - Become knowledgeable in proper coding requirement for reimbursement
  - Eliminate financial barriers

Summary

- Maternal vaccines have the potential to provide clinically significant protection for mothers & infants
- Realizing the full potential of maternal vaccines will require rigorous evaluation of these vaccines in preventing adverse birth outcomes
- Incorporating maternal vaccines into antenatal care is both a challenge and an opportunity improve health outcomes
- Evidence-based interventions are needed at the practice, provider, and patient levels to ensure high maternal vaccination.

References

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- https://www.cdc.gov/vaccines/pregnancy/downloads/pregnancy-vaccination.pdf
- https://www.cdc.gov/flu/pdf/professionals/pregnant-women-letter_september-2017-2018.pdf
- ACOG committee opinion 732 April 2018
- ACOG committee opinion 718 September 2017
- ACOG committee opinion 564 May2013
- ACOG committee opinion 661 April 2016 (reaffirmed 2018)
- N Engl J Med 2017;376:1256-67

Vaccinations in Development

- **Respiratory Syncytial Virus Vaccine**
  - leading cause of viral acute lower respiratory tract illness, with highest morbidity is among preterm infants
  - In 2005-associated with an estimated 66,000 to 199,000 deaths among children younger than 5 years of age globally.
  - U.S.-based surveillance study
    - 20% of hospitalizations, 18% of ED visits, 15% of office visits for acute respiratory infections in children younger than 5 years of age were associated with RSV

Vaccinations in Development

- **Group B Streptococcal Vaccine**
- associated with adverse fetal and infant outcomes
- invasive group B streptococcal disease is a consequence of transmission from colonized mothers during birth
- Early-onset group B streptococcal infection
  - neonates who are younger than 7 days of age
  - characterized by sepsis without a focus, pneumonia, meningitis, or a combination of these findings
- Late-onset group B streptococcal infection
  - infants who are 7 to 89 days of age
  - associated with higher rates of meningitis