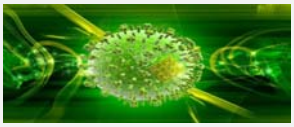

Vaccine Preventable Diseases Shouldn't Happen in Pregnancy: Immunizations for Mother and Baby

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I have no disclosures other than I am the author of "Parvovirus in pregnancy" "Herpes in Pregnancy", "Rubella in pregnancy" and "Varicella in Pregnancy" for Up To Date.

I may discuss some recommendations for vaccines that are off-label, but in accordance with the recommendations of the Advisory Committee on Immunization Practices.

After participating in the conference, you should have improved your knowledge of, and enhanced your competence to:

1. Counsel women about risks and benefits of influenza vaccination.
2. Identify which vaccines are contraindicated during pregnancy.
3. Describe the current recommendations for pertussis vaccine in pregnancy.

Historical Perspective

Influenza Pandemic 1918-19

1,350 pregnant women reported; 50% developed pneumonia (>50% died); case fatality 27%

Asian Flu 1957

Also noted higher than expected death rate
Second & third trimesters particularly affected

H1N1 Pandemic 2009

56 deaths reported (7.1% 1st trimester, 26.8% 2nd trimester, 64.3% third trimester)

Why are Pregnant women at risk?

- ⬇ Lung capacity
- ⬆ Nasal congestion
- ⬇ Colloid oncotic pressure
- "Relative compromised immune system"

H1N1 in pregnancy and postpartum women: CA

Characteristic	Pregnant (N=94)	Postpartum (N=8)	Nonpregnant (N=137)	P Value
Median age (range) — yr	26 (16-42)	28 (22-33)	28 (15-44)	0.02‡
Race or ethnic group — no./total no. (%)§				0.24‡
Hispanic	43/78 (55)	3/8 (38)	47/116 (41)	
Non-Hispanic white	15/78 (19)	2/8 (25)	32/116 (28)	
Asian or Pacific Islander	9/78 (12)	2/8 (25)	15/116 (13)	
Non-Hispanic black	6/78 (8)	1/8 (12)	18/116 (16)	
Other	5/78 (6)	0	4/116 (3)	
Chronic coexisting illness — no./total no. (%)¶	32/93 (34)	2/8 (25)	82/137 (60)	<0.001‡

Young, healthy women get sick!

Louie et al NEJM, 2010;362:27-35

H1N1 in pregnancy and postpartum women: CA

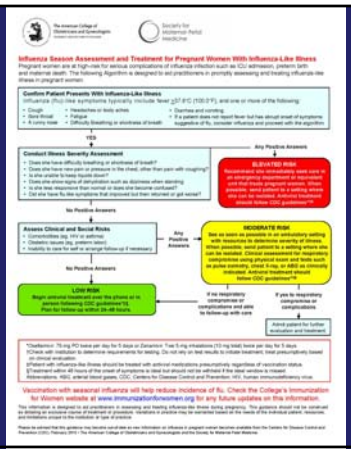
Characteristic	Pregnant (N=94)	Postpartum (N=8)	Nonpregnant (N=137)	P Value
Secondary bacterial or fungal infection — no. (%) †	1 (1)	1 (12)	9 (7)	0.05
Antiviral treatment — no./total no. (%) ‡				
At any time during course of illness	71/88 (81)	7/8 (88)	97/120 (81)	0.98
≤48 hr after symptom onset	30/60 (50)	3/7 (43)	28/82 (34)	0.06
Antibiotic treatment — no./total no. (%)	42/94 (45)	7/8 (88)	80/137 (58)	0.04
Median time from symptom onset to hospitalization (range) — days	2 (0–11)	6 (1–7)	3 (0–20)	0.12§
Median hospital stay (range) — days	3 (1–76)	6 (1–36)	4 (1–41)	0.03§
Death — no.	6	2	17	
Median time from symptom onset to death (range)	20 (14–49)	30 (26–33)	10 (3–22)	0.01§

Delay in antiviral treatment ⟶ greater death rate!

Louie et al NEJM, 2010;362:27-35

What did we learn from H1N1?

1. Young, previously healthy women died
2. Death and ICU admission was highest in pregnant and post-partum women who were treated >48 hours after symptoms.
3. Rapid flu screens performed poorly
   (antigen detection tests: 10-70% sensitivity)
   (direct fluorescent tests: 47-80% sensitivity)



Treatment of Disease

- **Oseltamivir 75 mg BID x 5 days**

Zanamivir 10 mg (2 inhalations) BID x 5 days

***Give within 48 hrs of illness to attack early phase of viral replication

Clinically, oseltamivir leads to milder illness with faster recovery

*Preferred for use in pregnancy
**Side effects: nausea, vomiting

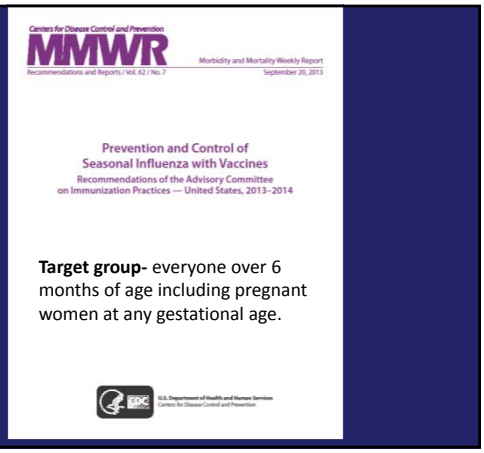
Safety of Oseltamivir

Japanese cohort n=619 pregnancies
- 159 1st trimester exposures
- 14 children with birth defects (PS, hemangioma)
- Incidence PTD, low birthweight NS

Saito S et al. AJOG 2013;209:130. e1-9.

Canadian healthcare database (1237 pregnancies)
- no difference PTB, Apgar scores, SGA<3rd percentile
- SGA<10 percentile less likely in oseltamivir exposed

Xie H-Y Y et al. AJOG 2013;208:293.e1-7.



The 2014-15 Flu Vaccines***

Trivalent Flu Vaccine

A/CA/7/2009 (H1N1)-like virus
A/Victoria/361/2011 (H3N2 Virus)
B/MA/2/2012 – like virus

Quadravalent Flu Vaccine

Above + B/Brisbane/60/2008 – like virus

***Messaging opportunity: how the components of vaccine are determined & antigenic drift

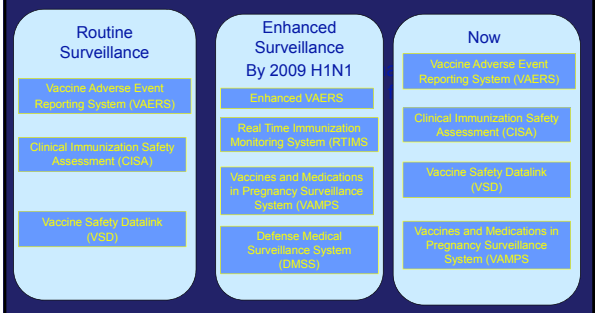
The 2014-15 Flu Vaccines

Contraindications: severe allergy to any component including egg allergy (angioedema; respiratory distress, lightheadedness, or recurrent vomiting.

Precautions: moderate to severe illness with or without fever; history of Guillian-Barré Syndrome within 6 weeks of receipt of influenza vaccine.

MMWR 8/15/2014. vol.63

Surveillance of Influenza Vaccination Safety in Pregnancy



Case Control Study (2009 – 2011)

- 4781 subjects (3539 cases and 1242 controls)
- No increase in birth defects
- Increase in PTD in 2009 but not 2010
- Decrease in gestational age – 2 days

Louik C, et al. Vaccine 2013;31:5033-5040

Prospective Cohort Study (2009 – 2012)

- 1032 exposed pregnant women
- No increase in birth defects, SAb, IUGR
- Vaccinated women delivered 3 days earlier
- H1N1 containing vaccines

Chambers C, et al. Vaccine 2013; 31(44):5026-5032

Case Control Study (2009 – 2011)

- 4781 subjects (3539 cases and 1242 controls)
- No increase in birth defects
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Efficacy of Influenza Vaccination

340 Bangladeshi women randomized to receive pneumococcal vaccine or trivalent influenza vaccine in third trimester
- serum samples from 292 babies at 20 and 26 weeks showed significant antibody levels to influenza types passively acquired from the mother

N Engl J Med 2010; 362:1644-1646

1160 Native American mother-infant pairs who delivered during 3 flu seasons 2002-2005
- risk of lab confirmed flu – RR 0.59 (CI 0.37-0.93)
- risk of ILI hospitalization – RR 0.61 (CI 0.45-0.84)
- HIA titers higher @birth & @2 mo in babies born to vaccinated moms for the 8 flu virus strains tested

Arch Pediatr Adolesc Med 2010; 165 E 1-8

Efficacy of Influenza Vaccination

Double-blind, randomized, placebo controlled trial of IIV3 in 2,116 non-HIV infected and 194 HIV infected pregnant women

	HIV- IIV3	HIV- Placebo	HIV+ IIV3	HIV+ Placebo
Attack Rate (%)	1.8	3.6	7	17
Efficacy (%)	50.4		57.7	

Madhi et al. NEJM 2014;371:918-931

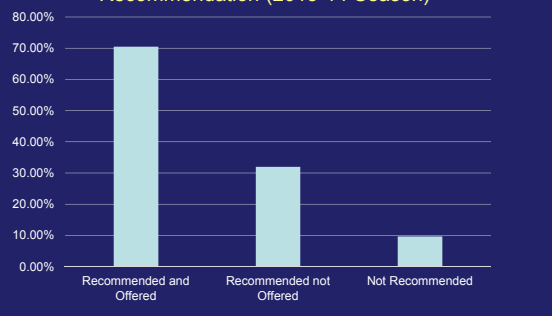
A 30 year old woman G_3P_0 @30 weeks calls with fever, malaise, & vomiting, you should suggest:

a. Tylenol and fluids
b. Ask if she recently traveled to Liberia, Sierra Leone or Guinea in the last 21 says
c. Invite her to L&D for a rapid flu test
d. Call in Tamiflu for 5 days

Estimates from CDC…

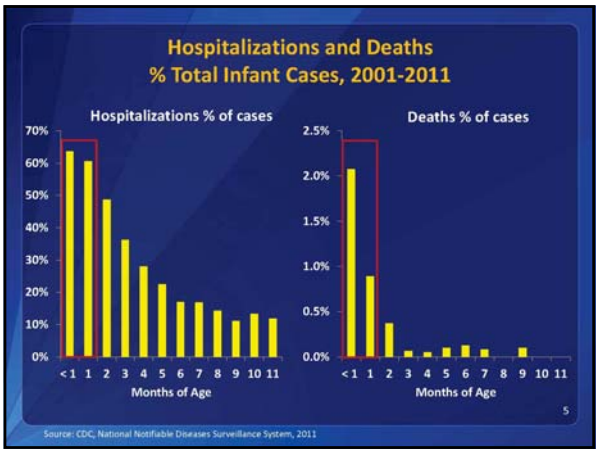
- Coverage among women who were pregnant during the 2013-14 influenza season was 52.2%, similar to the 47% coverage estimate for the 2011-12 influenza season.
- 65% of women reported provider recommendation & offer: 70.5% were vaccinated.
- 15.1% women received recommendation: 32% were vaccinated.
- 19.8% women received no recommendation or offer: 9.7% were vaccinated.

MMWR 9/19/2014



http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6337a3.htm?s_cid=mm6337a3_e#fig

What other vaccines should we be giving routinely during pregnancy?



Tetanus, Diptheria, Pertussis (Tdap)

- Tdap vaccine is recommended for pregnant women during each pregnancy (27-36 weeks gestation).
- Tdap vaccine is recommended for all persons who are close contacts of infants younger than 12 months of age (e.g., parents, grandparents, and child-care providers) and who have not received Tdap previously.
- Other adults who are close contacts of children younger than 12 months of age continue to be recommended to receive a one-time dose of Tdap vaccine.

Source: CDC, National Notifiable Diseases Surveillance System, 2011

Effectiveness of maternal pertussis vaccination in England: an observational study

- Maternal immunization program began 10/2012
- Maternal coverage peaked @ 78% ~ 60%
- <3mo. infants (328 cases in 2012 vs 72 in 2013
  (-78%, 95% C1 -72 to -83)
- <3mo. infants (440 admissions in 2012 vs 140 in 2013
  (-68%, 95% C1 -61 to -74)
- 91% vaccine efficacy

Amirthalingam et al. www.thelancet.com July 2014

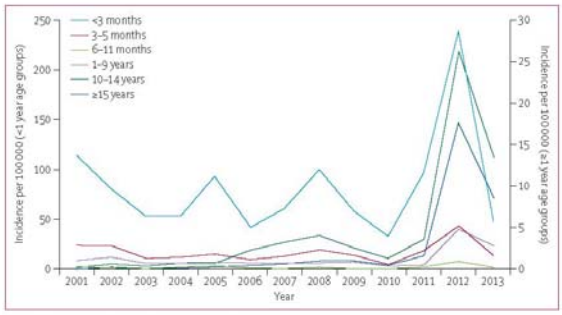


Figure 2: Annual incidence of laboratory-confirmed cases of pertussis by age group
Figure shows incidence from 2001 to 2013 in England only.

Safety of pertussis vaccination in pregnancy

- Short-term risks: 17,560 vaccinated ≥ 28 wks
  No signal in stillbirth, preterm ctx or PTD
- Overall, no increased risk stillbirth, maternal or neonatal death, preeclampsia, hemorrhage, fetal distress, low birth weight, neonatal renal failure

Donegan et al. BMS 2014;349

Pneumococcal Disease

- **Invasive disease from S. pneumoniae**
- Vaccination recommended for persons <65 if immunosuppressed or immunocompetent with:
  - asthma
  - smoking
  - diabetes
- Pneumococcal polysaccharide vaccine (PPSV23) given to immunocompetent.
- PPSV23 + PCV13 (pneumococcal conjugate vaccine) – both given if immunocompomised.

Postpartum vaccines

- Measles-Mumps-Rubella Vaccine
- Varicella Vaccine
- Human Papilloma Vaccine

Note: administer despite a newborn at home and/or breastfeeding

Other vaccines to consider

VACCINE	WHY
Anthrax	high risk exposure
Hepatitis A	high risk behavior
Hepatitis B	high risk behavior
Japanese encephalitis	travel
Meningococcal conjugate	exposure
Meningococcal polysaccharide	travel
Inactivated polio vaccine	travel
Rabies	travel / exposure
Smallpox	high risk exposure
Yellow Fever	travel

Provider Responsibility

- Get vaccinated
- Vaccinate all staff
- Give a strong recommendation to patients
- Give vaccine information statement (VIS)– "Federal Law"
- Report adverse event to VAERS

Provider Responsibility

- Assess immunization status
- Strongly recommend needed vaccines
- Administer needed vaccines or Refer to a vaccine provider
- Document vaccines given

Future of Vaccines in Pregnancy

- Increase overall vaccination rates in all adults
- Continue studies on the vaccine hesitant populations (which include providers)
- Improve pre-licensure studies in pregnant women
- Potential new vaccines:
- Group B strep, CMV, RSV

Immunization resources

- www.immunizationforwomen.org
- cdc.gov
- Flu.gov

ACOG Resources for Business Practice

- On-Demand webinar: ACOG Immunization & Clinical Strategies for OB-Gyn Practices. Free
- ACOG CO 558: Integrating Immunizations into Practice
- www.Immunizationforwomen.org
  - Reimbursement
  - Vaccine purchasing resources
  - Standing Orders
  - Utilizing Electronic Health Records
  - Routine forms: VIS forms, VAERS
  - State Registry Contacts

ACOG Resources for Incorporating Immunizations into Routine Practice

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