Helping Mothers Prevent Influenza Illness in Their Infants

Although pediatricians are well aware that influenza can be a problem for infants younger than 6 months, they may be less familiar with the high rates of influenza disease and complications among pregnant women. We provide here a summary of recent data on increased risk of influenza in pregnancy and in very young infants and on vaccine protection of these 2 groups at high-risk. Pediatricians should be aware of their central role in assisting in the vaccine prevention of influenza in pregnancy and in the young infant.

INFLUENZA PANDEMICS IN PREGNANT WOMEN AND NEWBORNS

Healthy pregnant women are at increased risk of morbidity and mortality from pandemic influenza infection. During the 1918–1919 influenza pandemic, the case-fatality rate of pregnant women with influenza was reported to be 30% to 50% in the United States.1–3 Similarly, the 2009 H1N1 influenza pandemic disproportionately affected pregnant women.4–6 By August 2009, 788 H1N1-infected pregnant women had been reported to the Centers for Disease Control and Prevention (CDC), and 30 of these women died (5% of all reported 2009 H1N1 influenza deaths in this period).7

The increased risk of influenza during pregnancy is related to the physiologic changes of decreased pulmonary tidal volume and increased cardiac output. In addition, suppressed type 1 T-helper cell-mediated immunity impairs maternal response to infection with several viruses including influenza and smallpox.8,9 Seasonal influenza-related hospitalization in healthy pregnant women occurs at a rate of 1 to 2 per 1000,10–12 a risk that is 18-fold greater than that for healthy nonpregnant women.10

Historically, young infants have had high rates of illness during pandemics. Between August 30, 2009, and May 22, 2010, the CDC reported 225 laboratory-confirmed influenza-associated pediatric deaths, of which 49 were in children younger than 2 years old.13

INFLUENZA RISK TO THE FETUS

Although recent and past pandemics have clearly demonstrated influenza risk for pregnant women, there are limited data on seasonal influenza-related risk to the fetus. Influenza virus can cross the placenta, but there is no direct evidence that the virus invades the bloodstream of the fetus.14 Many studies have reported adverse fetal outcomes associated with influenza, but these associations have been inconsistent.11,15–22

EPIDEMIC SEASONAL INFLUENZA RISK FOR INFANTS 0 TO 6 MONTHS OLD

Newborns and young infants experience increased rates of influenza infection, outpatient visits, and hospitalization.23,24 Data from the Ten-
nessee Medicaid database showed high hospitalization rates of ~1% for infants younger than 6 months: 104 in 10,000 compared with 4 in 10,000 in older children. A recent prospective 5-year surveillance study in 3 states revealed that the average annual rates of hospitalization associated with influenza were 45 per 1000 infants younger than 6 months compared with 3 to 9 per 1000 for older children; overall, 0- to 6-month-olds were 48% of all 0- to 5-year-old hospitalized children. In some winters as many as 9% of all infants younger than 6 months were hospitalized or seen in a clinic or emergency department (Fig 1).

**INFLUENZA IMMUNIZATION FOR YOUNG INFANTS**

Currently, influenza vaccine is not approved or licensed for infants younger than 6 months. Recent studies in <6-month-old infants revealed that 2 doses of trivalent inactivated influenza vaccine (TIV) are safe and moderately immunogenic against some influenza strains.

**SAFETY, IMMUNOGENICITY, AND EFICACY OF INFLUENZA VACCINE IN PREGNANCY**

Influenza vaccines are safe for pregnant women, as indicated by data from >10,000 immunized women described in a recent review and from policy documents. The CDC has recommended influenza immunization for pregnant women since 1997, and the recommendation was expanded in 2004 to include first-trimester vaccination. Even without accounting for the reduction of infant disease, influenza immunization in pregnancy is cost-saving.

**PROTECTING INFANTS WITH MATERNAL IMMUNIZATION**

Results of a novel randomized trial in Bangladesh demonstrated a significant 63% reduction of laboratory-confirmed influenza among infants of mothers who received influenza vaccine, and there was a 36% reduction of flu-like illnesses in the mothers. Results of a similar case-control study in the United States confirmed these findings by revealing 85% effectiveness of maternal immunization in preventing influenza-associated hospitalization in infants.

**VACCINE COVERAGE IN PREGNANT WOMEN IN THE UNITED STATES**

It is unfortunate that pregnant women continue to have the lowest vaccine-coverage rates of all adults recommended to receive seasonal influenza vaccination, only 13% of pregnant women were immunized in 2003. Immunization with monovalent pandemic 2009 H1N1 vaccine for pregnant women reached 38% in December 2009, which perhaps reflects pandemic concerns.

**WHAT IS THE ROLE OF PEDIATRICIANS?**

Results of a 2004 survey revealed that 30% of obstetric clinicians did not stock influenza vaccine in their offices. Although this statistic may have changed, pediatricians are well placed to provide prenatal, antenatal, and postnatal counseling about the benefits for mothers and their infants from maternal influenza vaccination. Prenatal visits to the pediatrician’s office provide an excellent opportunity to encourage pregnant mothers to receive influenza immunization to protect themselves and their infant. During postpartum neonatal visits to the delivery hospital or well-child checks within the first week, mothers should be offered influenza vaccination, especially if they are breastfeeding. Postpartum maternal vaccine will likely prevent influenza in the infant.

**CONCLUSIONS**

Pregnant women and their infants are at increased risk for complications of influenza infection. New data show that vaccination of pregnant women is safe and effective and also provides excellent protection for the infants. Pediatricians should use all contacts with pregnant and postpartum mothers to promote maternal immunization to protect them and their young infants.

![Figure 1](image-url)
Even if pediatricians are unable to provide influenza vaccines to pregnant women within their practice settings, they should use available medical contacts to ensure immunization of this high-risk population.

Immunizing pregnant women means that 1 influenza shot will protect the mother, the fetus, and the 0- to 6-month-old infant—a 2-for-1 bargain. Similarly, postpartum maternal immunization is a 2-for-1 bargain.

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Do Parents Worry About the Right Things?: Standing in a long checkout line, I casually remarked to the woman standing in front of me that her young daughter had lovely ringlets of hair. The mother immediately replied that both she and the girl hated the hair. So many strangers touched her daughter’s hair she was sure someone was bound to snatch her. Upon hearing that, a pert 8-year-old standing behind me, chimed in that her father had told her that she was the most likely person in the family to be stolen.

According to an article in The New York Times (Belkin L, September 18, 2010) the 5 things that parents are most worried about are kidnapping, school snipers, terrorists, dangerous strangers and drugs. The Centers for Disease Control, however, reports that the 5 most common causes of injury to children under the age of 19 are car accidents, homicide, child abuse, suicide and drowning. It would seem that parents are poor judges of childhood risk. Reasons for this include the national attention given to horrifying and rare events, immediate access to information from around the world, and complacency about the dangers of normal activities such as driving. We also have difficulty balancing short with long-term risks. To protect children from abduction, children are driven to play dates and supervised by parents. However, what is the risk of childhood obesity in a child routinely driven to all functions? So while the mothers in front and back of me discussed strategies to prevent childhood abduction, I simply whispered to myself, I hope the girls are wearing a seatbelt on the drive home.

Noted by WVR, MD
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