Pregnancy as a risk factor for severe outcomes from influenza virus infection: a systematic review and meta-analysis of observational studies

Dominik Mertz MD, MSc1, Johanna Geraci, MSc1, Judi Winkup, MSc1, Justin R. Ortiz, MD2, Mark Loeb, MD, MSc1

McMaster University, Hamilton, ON, Canada, 1World Health Organization, Initiative for Vaccine Research, Geneva, Switzerland

Abstract

Background: Pregnancy is widely considered to be an important risk factor for severe complications following influenza infection. As a consequence, WHO recommendations prioritize pregnant women over other risk groups for influenza vaccination. The risk associated with pregnancy has however not been systematically quantified.

Methods: Search of MEDLINE, EMBASE, CINAHL, and CENTRAL to identify comparative observational studies (cohort, case-control, cross-sectional and ecological studies) reporting on outcomes of interest in pregnant women with evidence of influenza virus infection compared to non-pregnant patients. Outcomes included pneumonia, hospital admission, admission to intensive care units (ICU), receipt of mechanical ventilatory support, death, and a composite of ICU admission and/or death. A random effects model was used to obtain risk estimates.

Results: A total of 148 non-ecological and 10 ecological studies of pregnant women with evidence of influenza virus infection were included. There was a higher risk for influenza-associated hospital admission in pregnant versus non-pregnant patients in meta-analysis (odds ratio (OR) 2.94, 95% confidence interval 1.58-5.54). Meta-analysis found no effect of pregnancy on other influenza-associated outcomes: mortality (OR 1.03, 0.81-1.3), pneumonia (OR 1.80, 0.72-4.49), receipt of mechanical ventilatory support (OR 1.21, 0.70-2.08), or the composite of ICU admission and need for ventilatory support. Evidence of influenza virus infection was defined as laboratory-confirmed (serology, culture, antigen, NAAT) or influenza-like illness within a period of laboratory confirmed circulation of influenza. A random effects model was included, including ecological studies defined as studies using aggregate data to estimate rates.

Study selection, data extraction, risk of bias assessment: Independent screening, data extraction and risk of bias assessment by two reviewers

Newcastle-Ottawa scale: 6/9 (interquartile range 6-7)

Quality of evidence (GRADE): Moderate

Conclusions: Meta-analysis of non-ecological studies demonstrated a higher risk of influenza-associated hospital admission for pregnant women, but no increase in other severe influenza events. In contrast, some ecological studies suggested a higher risk of death and ICU admission. Given the limitations of ecological study designs, influenza virus infection in pregnancy may not be associated with severe outcomes other than a higher likelihood of hospital admission.

Methods

Inclusion criteria: Search of MEDLINE, EMBASE, CINAHL, CENTRAL through April 25, 2014. Studies reporting on pregnancy as a risk factor for severe influenza as an outcome

Results

Discussion

Limitations

Conclusions