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Influenza and pertussis vaccination coverage in pregnant women

Jolien Laenen[a], Mathieu Roelants[b], Roland Devlieger[c], Corinne Vandermeulen[a,*]

[a] KU Leuven, University of Leuven, Department of Pharmaceutical and Pharmacological Sciences, Leuven University Vaccinology Center (LUVAC), B-3000 Leuven, Belgium
[b] KU Leuven, University of Leuven, Department of Public Health and Primary Care, Centre for Environment and Health, Youth Health Care, B-3000 Leuven, Belgium
[c] KU Leuven, University of Leuven, Department of Development and Regeneration, Department of Obstetrics and Gynaecology, University Hospitals Leuven, B-3000 Leuven, Belgium

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ABSTRACT

Background: Pregnant women have an increased risk for complications and hospitalizations when infected with the influenza virus in the second or third trimester. Additionally, infants under six months of age are most vulnerable when contracting pertussis. Immunization against influenza and pertussis during pregnancy provides protection for mother and neonate against influenza and for neonates against pertussis pending protection through infant immunization. In Belgium, a gradual increase in pertussis cases over the past decade was observed. This study was undertaken to document vaccination coverage for influenza and pertussis and factors related to vaccination status in pregnant women.
Methods: Two hundred and fifty pregnant women completed a questionnaire during their third trimester. Vaccination data were collected and reasons for non-vaccination were noted as well as socio-demographic data which are known to influence vaccination coverage.
Results: A documented vaccination coverage of 42.8% for influenza and 39.2% for pertussis was observed. Taking into account doses which were not documented, but administered according to the expectant mother, coverage for influenza would increase to 62% and for pertussis to 46%. The most important reasons for non-vaccination were the absence of a recommendation by medical staff (9.6%) and delay in vaccination (8.4%). The GP was the most important vaccinator. Pregnant women with a lower education and those with a foreign origin were more vulnerable for non-vaccination.
Conclusion: Incomplete documentation is the most important barrier in determining the vaccination status of pregnant women. Immunization during pregnancy needs further integration through vaccination campaigns aimed at both health care providers and pregnant women.

1. Introduction

Insights in the burden of disease of influenza in pregnant women and studies on the resurgence of pertussis with a particular burden of disease in neonates have increased knowledge and awareness regarding the necessity of immunization of pregnant women against influenza and pertussis [1–3].

Pregnant women are at increased risk of severe complications and hospitalization when infected with influenza. Physiologic changes in the respiratory, cardiovascular and immune system during pregnancy may contribute to this increased risk [4–6]. In addition, pregnant women who are infected with influenza have an increased risk of adverse pregnancy outcomes such as preterm delivery, small-for-gestational-age infants, lower birth weight babies, and stillbirths [7–9].

Since 2000, there is an increase in cases of pertussis in countries which have used the acellular pertussis vaccine for infant vaccination, including Belgium [10,11]. In particular newborns under 6 months of age are extremely vulnerable and the highest burden of disease occurs in this age group [11]. Infants need at least three doses of acellular pertussis vaccines to gain protection against pertussis by six months of age [12,13]. During the first months of life,

Abbreviations: GP, general practitioner; HCP, health care provider.

* Corresponding author. Tel.:+32 16 34 20 20; fax: +32 16 34 20 50.
E-mail addresses: Jolien.laenen@uzleuven.be (J. Laenen), Mathieu.roelants@med.kuleuven.be (M. Roelants), Roland.devlieger@uzleuven.be (R. Devlieger), corinne.vandermeulen@uzleuven.be (C. Vandermeulen).

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maternal antibodies provide primary protection against infectious agents, as the neonate immune system cannot yet elicit adult-like humoral immune responses [14]. Therefore, the main reason to recommend pertussis vaccination during pregnancy is to elicit maternal antibodies in order to protect newborns during the first 6 months after birth [13].

Inactivated influenza vaccines and combined diphtheria–tetanus–acellular pertussis vaccines are considered to be safe when given during pregnancy [2,4–6,15–17]. Studies on effectiveness on reducing influenza in pregnant women and neonates [1,18,19] and pertussis in neonates have shown the added value of immunizing pregnant women [11,20,21]. In 2012 the World Health Organization (WHO) recommended immunization against seasonal flu for pregnant women [22] and in 2014 the Strategic Advisory Group of Experts (SAGE) considered that maternal immunization against pertussis was the most cost-effective complementary strategy to prevent pertussis-associated infant mortality [23]. The Belgian Superior Health Council also recommends influenza vaccination in pregnant women from the second trimester of pregnancy onwards during the flu season [24]. In 2012, a new action plan regarding influenza vaccination was launched in Flanders, which considers pregnant women to be a specific target group, and aims at a coverage of at least 50% of all pregnant women by 2020 [25]. Additionally, all pregnant women are also advised to be immunized against pertussis between 24 and 32 weeks of each pregnancy, regardless of whether they received a booster vaccine in the past or not [12].

Data on the combined vaccination coverage rate of influenza and pertussis in pregnant women are limited. This article reports the documented vaccination coverage of influenza and pertussis in pregnant women and possible associated socio-demographic factors for (non-)vaccination.

2. Materials and methods

2.1. Population and sampling procedure

During the influenza season (December 2013–February 2014), 257 women in their third trimester of pregnancy (≥28 weeks) attending the University Hospitals KU Leuven, Belgium for a routine third trimester ultrasound examination, were approached to participate in the study. Seven (2.8%) woman refused, mainly because of language barrier or lack of time, leaving questionnaires of the remaining 250 pregnant women fit for analysis. All participants were Belgian residents.

2.2. Survey procedure

Potential participants were informed about the aim and course of the study by one of the authors. Upon agreement, they were asked to sign the informed consent, and a questionnaire was taken. The questionnaire was based on the questionnaire of the 2008–2012 Flemish coverage study in young children and adolescents, but adjusted for the current target group [26]. The questionnaire and informed consent were available in Dutch, French and English language to include as many patients as possible.

The main part of the survey regarded data on influenza and pertussis vaccination: by whom they were informed or advised on vaccination in pregnancy, vaccination status and, if applicable, date and vaccinator, prior vaccination against influenza and pertussis, willingness to vaccinate their child, and vaccination status of the partner. The questionnaire included several items on socio-demographic background of the participant and her partner (Table 1). Obstetric data consisted of gestational age, obstetric history, parity, complications during pregnancy (bleeding, preterm contractions, hyperemesis gravidarum, gestational diabetes, gestational hypertension, infectious diseases and preeclampsia) and medical conditions (diabetes mellitus, cardiopathy, nephropathy, pulmonary condition, immune deficiency).

Only documented vaccination data were taken into account. If not available, the hospital medical files or Vaccinnet, the Flemish vaccination registry, were checked. Finally, the GP of the

Table 1
Characteristics of participants and current pregnancy.

Characteristic	Pregnant women $n = 250$	
	n (%)	
Age (years)		
<25	19	(7.6)
25–34	177	(70.8)
≥35	54	(21.6)
Origin[a]		
Belgian	191	(76.4)
European	24	(9.6)
Non-European	35	(14.0)
Education[b]		
Lower education	29	(11.6)
Secondary school (completed)	59	(23.6)
Higher education (Bachelor, Master, PhD)	162	(64.8)
Work situation		
Job (full-time, independent)	146	(58.4)
Part-time job	52	(20.8)
No job (student, paid leave, housewife/man, disabled or job-seeking)	52	(20.8)
Marital status		
Cohabiting	111	(44.4)
Married	122	(48.8)
Single	10	(4.0)
Other	7	(2.8)
Family income (euros)[c]		
<1500	9	(3.6)
1500–3000	73	(29.2)
>3000	131	(52.4)
No data	37	(14.8)
Gestational age (weeks)		
28–32	195	(78.0)
>32	55	(22.0)
Parity		
First pregnancy	114	(45.6)
Second pregnancy or higher parity	136	(54.4)
Current pregnancy		
Singleton	245	(98.0)
Twin	5	(2.0)
Pregnancy complications		
No	218	(87.2)
Yes	32	(12.8)
Pre-existing medical condition		
No	230	(92.0)
Yes	20	(8.0)

[a] Origin: based on the country of origin of the women, their partners and their parents. If the woman or one or both parents was of non-Belgian origin then the subject was considered of non-Belgian origin. If the birth country was located within the 27 countries of the European Union, then the subject was assigned as European. All other countries were regarded as non-European. Similar classification was done for the partner.

[b] Education: Lower education = no secondary school diploma; Secondary school = completed secondary school with diploma; Higher education = continued education beyond secondary school.

[c] Family income was determined as the total amount of money available monthly that could be spent, including alimony, wages and social security allowance.