

Childhood vaccinations: a pilot study on knowledge, attitudes and vaccine hesitancy in pregnant women

Azzurra Massimi^{(1)*}, Annalisa Rosso^{(1)*}, Carolina Marzullo⁽¹⁾, Grazia Pia Prencipe⁽¹⁾, Pasquale De Soccio⁽¹⁾, Giovanna Adamo⁽¹⁾, Giulia Sturabotti⁽¹⁾, Maria Rosaria Vacchio⁽¹⁾, Corrado De Vito⁽¹⁾, Paolo Villari⁽¹⁾

(1) Department of Public Health and Infectious Diseases, Sapienza University of Rome, Rome, Italy

*"These authors contributed equally to this work"

CORRESPONDING AUTHOR: Prof. Corrado De Vito, Department of Public Health and Infectious Diseases, Sapienza University of Rome, Piazzale Aldo Moro 5, Rome, 00185, Italy, phone: +39 06 49970251, E-mail: corrado.devito@uniroma1.it

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ABSTRACT

Background: The objective of this pilot study was to test a questionnaire aimed at assessing knowledge of and attitudes towards vaccination, as well as intention to vaccinate, among pregnant women.

Methods: The questionnaire was self-administered by 49 pregnant women attending antenatal classes at three Family Centers in Rome. A descriptive analysis of data was performed.

Results: Poor knowledge of vaccinations, inadequate attention from healthcare professionals, recurrent consultation of unreliable sources of information, misconceptions about the side effects of vaccines, high level of vaccine hesitancy were found. Where appropriate, questionnaire sections were shown to be internally consistent.

Conclusion: The questionnaire proved reliable and is suitable for further studies.

Key words: vaccine hesitancy, pregnant women, childhood vaccination, survey

INTRODUCTION

In recent years, Italy has experienced a decline in coverage of childhood vaccinations: immunization coverage for polio, diphtheria, tetanus and hepatitis B was already below the recommended threshold of 95% in 2014 and this downward trend continued in 2015 and 2016. A 4% decline in immunization with the first dose of measles-mumps-rubella vaccine (MMR) was observed from 2012 to 2015, with vaccination rates falling from 89.2% to 85.2%, although this increased to 87.3% in 2016 [1-3].

This decreasing coverage reflects the international trend over the past few years and is known as "vaccine hesitancy", defined as "a delay in acceptance or refusal of vaccination despite availability of vaccination services" [4]. Vaccine hesitancy is a complex phenomenon, influenced by contextual, individual and group determinants, as well as by vaccine-specific issues [4]. Therefore, these context-specific factors need to be understood before tailored strategies for increasing vaccine coverage can be developed.

Clearly, pregnant women are a key population for analysing the determinants of vaccine hesitancy and the

development of communication and information strategies to increase trust in vaccines. The first pregnancy, in particular, is a strategic “teachable moment”, being a time when women are both motivated to maintain and improve their health and are in regular contact with health care professionals; they are thus open to instruction and to positive changes in health behaviour [5-8]. We are therefore conducting a survey of pregnant women attending antenatal classes (CANs) at Family Centers in Rome (Italy) to assess their knowledge of and attitudes towards childhood immunization. In this paper, we describe the pilot phase of the survey, which was conducted to ensure practicability and validity of the survey questionnaire.

METHODS

A review of the literature and an analysis of the evidence on childhood immunization and vaccine hesitancy [4,5,9,10] allowed us to design a questionnaire to identify the level of vaccine hesitancy, together with knowledge of and attitudes towards vaccination, in pregnant women. The tool was structured in six sections: personal and reported experiences of vaccine side effects (5 items); knowledge of vaccination schedule, and the efficacy and safety of vaccines (4 sets of items); attitudes towards and perception of the efficacy, convenience and value of vaccination (3 sets of items); knowledge of and attitude towards MMR vaccine (1 set of items); intention to vaccinate (2 sets of items) and personal information (11 items). Answers based on three- or five-points Likert scales were used to assess degree of agreement and to rate levels of knowledge and quality perceived, respectively.

In the first section respondents indicate their own vaccination history and that of any previous children and specify and explain previous experiences (direct or reported) of any side effects. Knowledge of vaccinations is explored in the second section of the questionnaire. The first set of items concerns the vaccination schedule: for each of the 12 vaccines listed, women are asked to identify mandatory/recommended vaccines in Italy at the time of the survey [11]; in the second set of questions, a three-point Likert scale is used to assess the degree of agreement with eight statements on the efficacy and safety of vaccines. The source and quality of information on vaccinations provided by healthcare professionals (five-point Likert scale) are also explored in this section. Opinions of and attitudes towards the most popular beliefs about vaccinations, including anti-vaccine theses, which were identified through web and social media sites, are investigated in the third section of the tool using a three-point Likert scale on 11 statements. The perception of the utility of vaccines to protect against the most common infectious diseases (three-point Likert scale) and the self-assessed level of knowledge of vaccination (five-point Likert scale) are also explored. In the fourth section, knowledge and opinions of the MMR trivalent vaccine are

investigated more closely using a three-point Likert scale on nine statements. In the fifth section, women are asked about the intention to vaccinate their children (three-point Likert scale) with eight of the vaccines available in Italy. In the last section, demographic and socio-cultural information (e.g. religious and political orientation, type of diet and treatment) are collected (see Appendix for further details of the tool).

The questionnaire was self-administered by a convenience sample of women attending the third educational meeting of CANs organized by three Family Center in Rome located in the same Local Health Unit (RM2) but in three different neighbourhoods to increase variability and representativeness in terms of socio-demographic factors. Since women were interviewed irrespective of their parity, the statistical analysis in the large-scale study following this pilot will take into account this factor as a potential confounder. Participants also received an accompanying letter for informed consent, which explained the details and purposes of the study and which guaranteed participants anonymity. Statistical analysis was performed with Stata version 12.0 software (Stata Corporation, College Station, TX) with descriptive analysis (frequencies, percentages, mean values, SD). The questionnaire's reliability was evaluated, where appropriate, by calculating Cronbach's alpha as a measure of internal consistency. The cut-off of 0.70 was used for the interpretation of sufficient reliability's degree of Cronbach coefficient [12].

RESULTS

A total of 49 pregnant women attending CANs in the three Family Centers in Rome (Local Health Unit - RM2) completed the survey during the pilot phase of the study. The mean age of respondents was 32.9 years (± 5.1) and 83.3% were giving birth for the first time. The most frequent source of information was word-of-mouth (61.2%) or mass-media (40.8%). Only 28.6% of respondents received information on neonatal vaccinations from at least one healthcare worker (Table 1). Knowledge of the vaccination schedule was insufficient since only 4.1% of the respondents knew exactly which vaccines were available in Italy: for example, only 14.6%, 22.9% and 43.8% of women were aware of the availability of vaccines for Haemophilus influenzae B, diphtheria and polio, respectively (Table 1).

Only 4.4% of the sample correctly assessed all eight statements on vaccination knowledge (Table 2A). Moreover, 25.5% of women were uncertain about the scientific evidence of the efficacy of vaccines. Only 21.3% of respondents were sure about the safety of the adjuvants contained in vaccines and 37.0% were uncertain or strongly convinced (13.0%) about the association between vaccines and autism, multiple sclerosis or cancers (Table 2A). Internal consistency analysis of the 16 items (eight items on vaccination knowledge; eight items on knowledge of the vaccination schedule) in the scale showed a sufficient level of

TABLE 1. Answers to questions on personal experience, knowledge and information relating to vaccination.

ITEMS	N (%)
Direct experience of vaccine side effects (46)*	
No	46 (100.0)
Yes	0 (0)
Reported experience of vaccine side effects (48)*	
No	44 (91.7)
Yes	4 (8.3)
Source of information (multiple answers allowed) (49)*	
Word of mouth	30 (61.2)
Pediatrician/GP	10 (20.4)
Family center	8 (16.3)
Midwife/Obstetrician	1 (2.0)
Physician	1 (2.0)
Institutional web	9 (18.4)
Blog/forum	12 (24.5)
Media	20 (40.8)
School/University	7 (14.3)
No-vax movements	1 (2.0)
Other source	2 (4.1)
Knowledge on vaccination schedule - identification of available** vaccines (multiple answers allowed) (48)*	
Influenza	5 (10.4)
Measles	34 (70.8)
HBV	28 (58.3)
Polio	21 (43.8)
Haemophilus influenzae B	7 (14.6)
Tetanus	17 (35.4)
Rotavirus	6 (12.5)
Meningococcus B	28 (53.3)
Mumps	17 (35.4)
Diphtheria	11 (22.9)
Pertussis	21 (43.8)
Tuberculosis	17 (35.4)
Quality of the information provided by HCWs (12)*	
Poor	0 (0)
Inadequate	2 (16.6)
Adequate	5 (41.7)
Good	5 (41.7)
Excellent	0 (0)
Self-assessed level of knowledge about vaccination (48)*	
Poor	21 (43.8)
Inadequate	18 (37.5)
Adequate	9 (18.7)
Good	0 (0)
Excellent	0 (0)

*Number of women responding to the question

** National Vaccine Prevention Plan 2012-2014

TABLE 2. Answers to questions concerning knowledge, attitudes and intention to vaccinate.

STATEMENTS	N (%)		
	Agree	Uncertain	Disagree
A. KNOWLEDGE			
The effectiveness of vaccines against infectious diseases has been scientifically proven (47)*	35 (74.5)	12 (25.5)	0 (0)
Smallpox has disappeared thanks to mass vaccination (46)*	27 (58.7)	15 (32.6)	4 (8.7)
In Italy, polio has disappeared thanks to improved hygiene and not through vaccination (48)*	10 (20.8)	23 (47.9)	15 (31.3)
Serious side effects of vaccines are very rare (47)*	34 (72.3)	11 (23.4)	2 (4.3)
Diseases such as autism, multiple sclerosis or cancer could be caused by vaccinations (46)*	6 (13.0)	17 (37.0)	23 (50.0)
Vaccinations increase the risk of allergies (47)*	4 (8.5)	28 (59.6)	15 (31.9)
Substances contained in vaccines are not dangerous for humans (47)*	10 (21.3)	22 (46.8)	15 (31.9)
Unvaccinated children are more resistant to infections (48)*	6 (12.5)	18 (37.5)	24 (50.0)
B. ATTITUDES			
Vaccines are important for the prevention of diseases that can have very serious effects (47)*	41 (87.2)	5 (10.6)	1 (2.2)
I think the administration of more than one vaccine at the same time can be unsafe for my child's health (46)*	11 (23.9)	27 (58.7)	8 (17.4)
I'm worried about the side effects of vaccines (46)*	25 (54.5)	14 (30.3)	7 (15.2)
Physicians often provide biased/incomplete information on vaccine side effects (45)*	21 (46.7)	17 (37.8)	7 (15.5)
Vaccines are above all an economic deal for pharmaceutical companies (46)*	11 (23.9)	20 (43.5)	15 (32.6)
Vaccinating my child is important to protect the health of our community (46)*	32 (69.6)	11 (23.9)	3 (6.5)
Compulsory vaccinations are against the right of citizens to the choice of care (44)*	7 (15.9)	12 (27.3)	25 (56.8)
I would vaccinate myself or vaccinate my child even if vaccinations were no longer compulsory (46)*	19 (41.3)	24 (52.2)	3 (6.5)
I am not sure about the safety of the new vaccines (e.g. MenB) (45)*	11 (24.4)	28 (62.3)	6 (13.3)
A check of the health status of my child just before vaccination would make me feel safer (46)*	39 (84.8)	2 (4.5)	5 (10.8)
Vaccinations should be recommended based on family lifestyle, health and child medical examinations and not be the same for everyone (46)*	12 (26.1)	13 (28.3)	21 (45.6)
C. INTENTION TO VACCINATE			
Hexavalent [HBV, Polio, Haemophilus influenzae B, Tetanus, Diphtheria, Pertussis] (46)*	37 (80.4)	9 (19.6)	0 (0)
MMR [Measles, Mumps, Rubella] (45)*	32 (71.1)	11 (24.4)	2 (4.4)
Pneumococcal (42)*	14 (33.3)	27 (64.3)	1 (2.4)
MenB (44)*	22 (50.0)	20 (45.5)	2 (4.5)
MenC (45)*	24 (53.3)	20 (44.4)	1 (2.3)
Rotavirus (44)*	11 (25.0)	31 (70.5)	2 (4.5)
Varicella (43)*	11 (25.6)	17 (39.5)	15 (34.9)
HPV (45)*	19 (42.2)	19 (42.2)	7 (15.6)

*Number of women responding to the question

reliability (Cronbach's alpha = 0.71).

Regarding attitudes towards vaccinations, most pregnant women (54.5%) were concerned about vaccine side effects and only 17.4% thought that vaccine co-administration was safe for children's health (Table 2B). A large percentage of the sample (46.7%) believed that physicians provide biased or incomplete information about vaccine side effects and another 37.8% were unsure about it. The pregnant women in the sample were positive towards vaccination, in particular their ability to prevent serious diseases (87.2%). They were also aware of their social value: 69.6% of respondents believed

that vaccinating their own child also protected the community (Table 2B). Internal consistency analysis of the 11 items on attitudes showed a good level of reliability (Cronbach's alpha = 0.85).

A high level of hesitancy to vaccinate was found when women were asked about their intention to vaccinate their infants: 19.6%, 24.4%, and 39.5% of respondents were uncertain about the use of hexavalent, MMR, and varicella vaccines, respectively (Table 2C), even though they are the new compulsory vaccines in Italy [13]. Internal consistency analysis of the eight items on intention to vaccinate showed satisfactory reliability (Cronbach's

alpha = 0.79). The questionnaire has satisfactory internal validity, as the three scores had $\alpha > 0.7$ [12].

DISCUSSION

This pilot study showed that pregnant women have generally positive attitudes towards vaccinations, but have poor knowledge of them and have received only a low level of information from health care professionals. Moreover, most women in the sample consult unreliable, potentially misleading sources of information. Thus, women have doubts or misconceptions about the side effects of vaccines and an unjustified fear that, ultimately, may contribute to vaccine hesitancy.

CANs appear to be the ideal setting for informing pregnant women about vaccinations. In an Italian study on 6189 women, 53.6% of respondents participated in CANs during the present or previous pregnancy, but vaccinations were one of the less-covered topics in contrast to topics related to labour and delivery, breastfeeding or neonatal care (61.2% vs 98.5%, 96.1% and 89.2%, respectively) and only 69% of respondents thought it was adequately treated [14]. Pregnancy is a strategic "teachable moment" when knowledge of childhood vaccinations can be influenced, because attitudes and beliefs about this topic are often not yet fully formed in expectant women [5]. Therefore, the level and the quality of information received during CANs may allow parents to make more informed decisions on vaccination.

This strategy falls within the scope of the new National Vaccine Prevention Plan, recently approved in Italy, which stresses the importance of promoting the development of a true "vaccine culture", which should increase and consolidate vaccination coverage by undertaking health education and empowerment of citizens [15]. The increase in vaccination coverage should not be based solely on the ability of prevention programs to reach the target population; most important is the training of health care professionals to enable them to establish relationships with pregnant women that are mindful of the needs and concerns of individuals, yet also allow them to tackle prejudices and incorrect information.

The questionnaire has proved reliable and valid for assessing the level of knowledge, attitudes and vaccine hesitancy among pregnant women. This fact finding survey, which also will be useful to identify the determinants of vaccine hesitancy, will be the basis for tailored training interventions directed at midwives and paediatricians working in CANs. This process should improve information flow to pregnant women and ultimately reduce the levels of vaccine hesitancy.

The main limitation of this study concerns the administration of the questionnaire only to women who attended CANs organized by Family Centers. Since there are other institutions that organize CANs (e.g. general hospitals), these latter will be included in the large-scale study following this pilot to ensure that the representativeness of the sample and the generalizability of the results.

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