



RESEARCH ARTICLE

Health education intervention to improve vaccination knowledge and attitudes in a cohort of obstetrics students

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Keywords

Vaccines • Midwives • Knowledge • Health education • Pregnant women

Summary

Introduction. To improve the vaccination coverage in pregnant women it is important to increase their knowledge of vaccines and related preventable diseases. Midwives can play an important role because they are often the first contact for woman during her pregnancy. This study aimed to explore the vaccination knowledge and attitudes in a cohort of Obstetrics students in Italy and improve their knowledge through an informative health education intervention.

Methods. The study consisted in the administration of a first questionnaire followed by a health education intervention concerning all aspects of vaccinations. Then, a second questionnaire to evaluate the efficacy of the educational program was administered.

Results. From the pre-intervention questionnaire resulted that almost the whole sample (97.1%) were favorable to vaccines in general. Moreover, 65.7% of the participants declared a sufficient

level of vaccination knowledge but 62.9% found herself unprepared to answer questions and provide information about vaccinations. Concerning the answers about vaccination in pregnancy, the correct answers went from 17.1 to 68.6% respectively before and after educational intervention. The training intervention obtained a total consensus (100%). The most part of the students (85.7%) declared that the received information changed some of their beliefs and the entire sample (100%) stated that it improved their preparation.

Conclusions. Our results revealed some critical issues in the preparation of midwives about vaccinations and confirm the necessity to carry out health intervention campaigns to these health professionals that, for the role they play, they must necessarily be well prepared.

Introduction

In the last decades, the scientific community has paid a great and increasing attention to maternal immunization and several studies have showed that vaccinations in pregnancy are a safe and highly effective strategy not only for woman but also for unborn and newborn thanks to the passive transplacental transfer of antibodies [1-4]. Previous studies have well demonstrated that infections contracted during pregnancy can result in an increased risk of serious complications in mothers, adverse outcomes in newborn, lengthening of the hospitalization period, and higher mortality rate [5, 6]. However, despite these large and proven scientific evidences, the coverage rates among pregnant women remain consistently very low [7, 8]. Thus, several countries recommended maternal immunization and established immunization programs. In Italy, according to the World Health Organization (WHO) Global Vaccine Action Plan [9], the Ministry of Health issued the Vaccine Prevention National Plan 2017-2019 stating that women should routinely receive tetanus, diphtheria, and acellular pertussis (Tdap) vaccine between the 27th and the 36th week of every pregnancy (regardless of prior Tdap history), and influenza vaccine at any stage of pregnancy [10, 11].

It is well known that the success of a vaccination program may also depend on the knowledge and

awareness of those who are at risk, because a lack of information and fear of vaccination may result in a lower vaccine acceptance and hesitancy [12, 13]. Therefore, it is important to increase knowledge of vaccines and related preventable diseases in pregnant women, and to evaluate their attitudes and concerns that may affect their decisions. Several studies have been carried out to assess vaccination knowledge and acceptability in this particular group [14-17]. However, little literature on this topic is currently available in Italy [18-20].

Health professionals can play the most important role to increase knowledge and awareness in pregnant women and recommending vaccination [21, 22]. The strong link between health professionals' vaccination beliefs and vaccine uptake has been documented by several studies [13, 23, 24].

Midwife is often the first and important contact for the woman during her pregnancy, during labor, childbirth and the early postnatal period. This health category is responsible for providing care and supporting women to make informed choices and decisions about their care. For these reasons, midwives can play a key role in the prevention of infectious diseases and in the increasing of vaccine knowledge and awareness by informing and educating their patients. However, although they have become new actors in the effort to increase immunization coverage, their vaccine awareness and perception and

their preparation in this field have only been little studied in Europe. Improving their knowledge could help to increase vaccine coverage among pregnant women.

This study aimed to explore the vaccination-related knowledge and attitudes in a cohort of Obstetrics students in Italy and improve their knowledge through an informative health education intervention.

Methods

STUDY DESIGN

The survey was carried out in December 2019 by physicians with a specific education in vaccinations and public health assisted by experts in infectious diseases on students attending the Obstetrics course of the University of Messina, Italy. We have joined the participants of all three years of the course and we asked students to participate to our investigation. The study consisted of three steps.

In the first one, a written informed consent form and a brief anonymous first (pre-intervention) questionnaire were administered. This questionnaire collected socio-demographical data (age, gender, educational level) and the knowledge of vaccinations. Particularly, we asked if they were in favor of vaccination in general and during pregnancy, whether or not they had received vaccine information during the course of studies and how they assessed this information, their level of knowledge through questions about mandatory and recommended vaccinations and vaccines recommended during pregnancy.

In the second step, after the administration of this first questionnaire, we conducted an educational intervention concerning all aspects of vaccinations (general characteristics, current legislation about mandatory and recommended vaccines, vaccination of particular groups of people including pregnant women) through the use of slides and the supply of informative material to the audience. After the intervention, a debate was conducted in order to clarify with the audience any possible doubt. The entire step lasted about four hours.

Finally, in the third step, at the end of the educational session, a second anonymous questionnaire (post intervention) to evaluate the efficacy of the educational program (containing the same questions of the first one plus some questions about the satisfaction degree of the intervention), was administered.

STATISTICAL ANALYSES

All the obtained data were collected and analyzed with Prism 4.0 software. Descriptive statistics were used to find the percentages and the 95% Confidence Interval (CI). Chi-square test was used for the comparison between the answers (pre- and post-education program). The role played by the independent variables in the effectiveness of the program was assessed using nonparametric Spearman test. Significance was assessed at the $p < 0.05$ level.

Results

The sample consisted of 35 students attending all the three years of course. Particularly, 9 (25.7%) attended the first year, 17 (48.6%) the second and 9 (25.7%) the third. The participants were all women with an average age of 21.0 ± 1.1 y/o and all of Italian nationality. From the pre-intervention questionnaire resulted that almost the whole sample (97.1%) were favorable to vaccines in general, which they defined with various adjectives among which useful, effective, safe and necessary were the most frequent. Almost the entire sample (82.7%) declared that received information about vaccines during the course of study and the 63.4% evaluated as sufficient the quality of the received information. However, 36.6% declared as insufficient the information received. Moreover, 65.7% of the participants declared a sufficient level of vaccination knowledge but 62.9% found herself unprepared to answer questions and provide information about vaccinations. Finally, 80% stated they learned information mainly from Internet (42.9%) and traditional mass media (37.1%).

To evaluate the level of vaccination knowledge we asked to indicate the current mandatory vaccinations in Italy. Figure 1 shows the differences between the pre- and the post-intervention questionnaires. In particular, the correct answers ranged from 8.6 to 65.7% ($P < 0.0001$) (concerning respectively the pre- and the post-intervention questionnaires).

Moreover, 94.3% of the sample stated that would advise a pregnant woman to carry out vaccinations. Figure 2 shows how significantly change the vaccinations they would recommend in pregnancy analyzing the answers given to the pre- and the post-intervention questionnaires. For this type of questions, the correct answers went from 17.1 to 68.6% respectively before and after educational intervention ($P < 0.0001$).

Furthermore, we asked to express the level of concern about vaccine-preventable diseases. The results are shown in Table I.

Table II shows the differences between the pre- and the post-intervention questionnaire about the answers given to the questions regarding general vaccination beliefs and attitude of the sample.

The training intervention obtained a total consensus (100%), reaching the desired goal. The most part of the students (85.7%) declared that the received information changed some of their beliefs and the entire sample (100%) stated that it improved their preparation.

To further analyze the obtained results, we calculated the score obtained by each of the sample components as the sum of the exact answers given in the two questionnaires, both on compulsory and strongly recommended vaccinations in pregnancy. Specifically, the score calculated as the total of the correct answers increased from 2 of the pre- to 19 ($P < 0.0001$, OR: 0.0510, 95% CI: 0.0105-0.2465) of the post-intervention questionnaire. Analyzing separately the data between the two questionnaires, the score increased from 3 to 23 ($P < 0.0001$, OR: 0.0489, 95% CI: 0.0123-0.1933) and from 6 to 24 for what concerning strongly

Fig. 1. Differences between the pre- and the post-intervention questionnaires about the knowledge of the current mandatory and strongly recommended vaccinations in Italy.

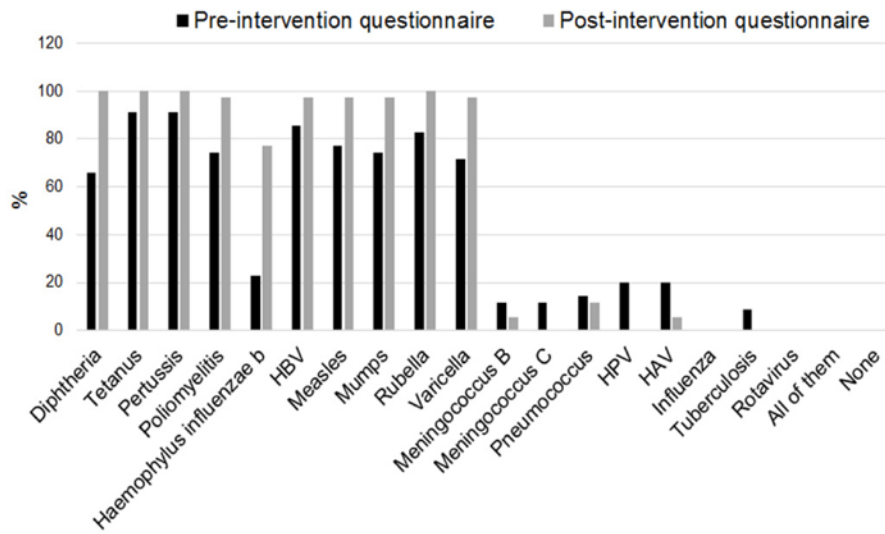
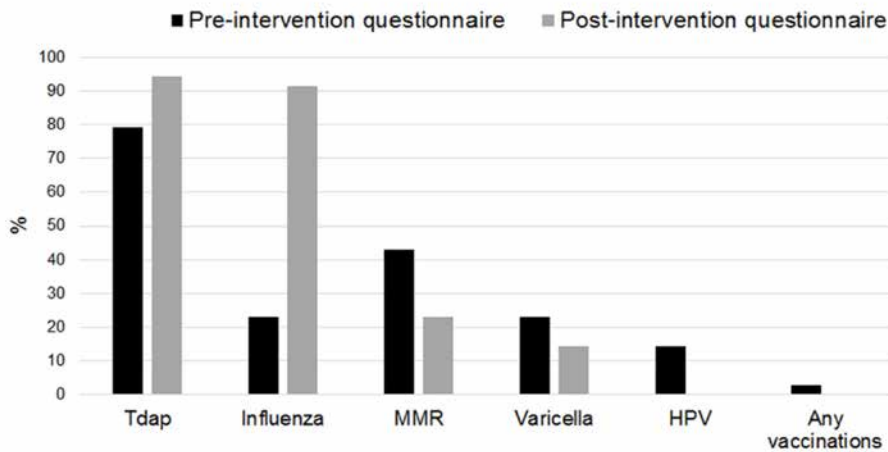


Fig. 2. Differences between the pre- and the post-intervention questionnaires on the strongly recommended vaccinations in pregnancy.



Tab. I. Percentages of expressed level of concern about vaccine-preventable diseases.

	Null	Low	Moderate	High	Very high	Empty
Diphtheria	0	17.2	31.4	20.0	11.4	20.0
Tetanus	0	5.7	22.9	31.4	25.7	14.3
Pertussis	0	8.6	20.0	37.2	11.4	22.9
Poliomyelitis	11.4	11.4	11.4	22.9	22.9	20.0
Hepatitis B	0	2.9	11.4	22.9	57.2	5.7
Measles	2.9	11.4	34.3	31.4	17.2	2.9
Mumps	2.9	11.4	42.9	22.9	5.7	14.3
Rubella	2.9	8.6	45.7	28.6	14.3	0.0
Varicella	8.6	20.0	48.6	11.4	8.6	2.9
Meningitis by Hib	11.4	5.7	5.7	25.7	48.6	2.9
Meningococcal meningitis	0	0.0	11.4	5.7	77.2	5.7
Pneumococcal disease	2.9	0.0	14.3	17.2	62.9	5.7
Rotavirus diarrhea	0	17.1	42.9	11.4	17.2	8.6

Tab. II. Differences between the pre- and the post-intervention questionnaires about the answers given to the questions about general vaccination beliefs and attitude of the sample.

	1 th questionnaire		2 nd questionnaire		P-value
	Agree	Disagree	Agree	Disagree	
Vaccines are important because they prevent diseases that can have serious effects	100	0	100	0	-
I think that administering multiple vaccines at the same time can be risky for children's health	28.6	71.4	2.9	97.1	P < 0.0001
Vaccines contain harmful substances	14.3	85.7	0	100	P < 0.0001
I am concerned about the side effects of vaccinations	40.0	60.0	20.0	80.0	0.0032
Getting vaccinated is important to protect the health of the community	100	0.0	100	0	-
Healthcare professionals often provide incomplete information on the side effects of vaccines	11.4	88.6	80.0	20.0	P < 0.0001
Vaccines are primarily an economic affair of the pharmaceutical industries	22.9	77.1	5.7	94.3	0,001
I don't care about the safety of the new vaccines available (meningococcus B, nonavalent HPV, Herpes Zoster)	31.4	68.6	0	100	P < 0.0001
Vaccinations must be individual and recommended based on health and medical tests; they cannot be the same for everyone	25.7	74.3	20.0	80.0	ns
The MMR (measles-mumps-rubella) vaccine can cause autism	17.1	82.9	0	100	P < 0.0001
I believe that children should contract measles, rubella, mumps and chickenpox naturally and not be vaccinated	11.4	88.6	0	100	0.0007
I don't believe the news about the alleged vaccine toxicity	68.6	31.4	88.6	11.4	P < 0.0001
The effectiveness of vaccinations has been scientifically proven	82.9	17.1	100	0	P < 0.0001
Smallpox has been eradicated from the planet thanks to vaccination	88.6	11.4	91.4	8.6	ns
In Italy, poliomyelitis and diphtheria have disappeared thanks to the improvement of hygiene conditions and not thanks to vaccinations	37.1	62.9	8.6	91.4	P < 0.0001
Serious side effects of vaccines are very rare	88.6	11.4	97.1	2.9	0.0489
There is a link between autoimmune diseases and vaccines	31.4	68.6	14.3	85.7	0.0063
Vaccinations increase the risk of developing allergies	17.1	82.9	2.9	97.1	0.0015
There is a link between vaccines and tumors	11.4	88.6	8.6	91.4	ns
Unvaccinated children are more resistant to infections	5.7	94.3	11.4	88.6	ns

recommended in pregnancy and strongly recommended and compulsory vaccinations in general respectively (P < 0.0001, OR: 0.0948, 95% CI: 0.0305-0.2943).

Both scores were positively related to the attended year of course (P < 0.05). Furthermore, the satisfaction degree expressed by the participants for educational intervention and the awareness of being able to give the right information to pregnant women were positively correlated to the score obtained from the post-intervention questionnaire (P < 0.01).

Discussion

In the perspective of increasing vaccination coverage for all population, it is important to know the opinions of health professionals involved in advising and/or offering vaccines to pregnant women, in order to bridge the gap between recommendation and implementation.

The acceptance rate of vaccinations during pregnancy is affected by several concerns especially regarding the maternal-fetal safety. Previous studies suggested that common barriers are fear of vaccine-transmitted infections with potential adverse pregnancy outcomes and lack of knowledge of national and provider recommendations [25, 26]. In order to counteract this

beliefs, it is crucial that midwives play an active role, as showed by previous studies in which pregnant women being 5 to 50 more likely to accept a vaccine if directly recommended by their provider [27-31].

Midwives are surely a reference figure for pregnant women as, during pregnancy, they can provide all the antenatal care for a pregnant woman playing a key role in promoting vaccinations. Therefore, it is crucial that this health category is well prepared and aware on vaccination topic. Recent studies showed that pregnant women and women with young children were willing to be vaccinated and they cited in particular midwives as their preferred source of information [22, 32]. Indeed, it has been showed that the uptake of Tdap and influenza vaccines by pregnant women, although the relative vaccination coverage are yet not optimal, has increased remarkably in last years, especially because of midwives recommending these two vaccines [33-35].

From our study resulted that there were no subjects among participants with anti-vaccination attitudes because the vast majority of the sample was favorable to vaccinations in general. However, from the pre-intervention questionnaire, we detected some critical issues concerning the general vaccination knowledge, corroborated by the detected poor knowledge of the current mandatory and strongly recommended

vaccinations in Italy and that a very high percentage of the sample declared to feel unprepared to provide information on this topic. Moreover, although almost the entire sample stated that it would advise a pregnant woman to carry out vaccinations, the answers about the strongly recommended vaccinations in pregnancy shows a rather poor knowledge. Particularly, a remarkable gap was detected between Tdap vaccination, which it would be advised by a large part of the sample, and influenza vaccination, of which only a small number of participants knew that it is strongly recommended in pregnancy. Even more serious, a rather high percentage of the sample declared that would advise vaccinations strongly discouraged in pregnancy such as MMR and Varicella vaccinations. Furthermore, from the request to express their level of concern about vaccine-preventable diseases, we found that the most part of the diseases arouse a moderate level of concern except for meningococcal meningitis and pneumococcal disease towards which the sample resulted more worried. The lack of concern regarded especially those diseases disappeared thanks to vaccinations (poliomyelitis and diphtheria) and poorly known diseases as *Haemophylus influenzae* b meningitis.

Moreover, from the pre-intervention questionnaire it is clear that a certain amount of the sample has many wrong preconceptions about vaccines such as the think that administering multiple vaccines at the same time can be risky for children's health, the fear that vaccines contain harmful substances, the belief that vaccines are primarily an economic affair of the pharmaceutical industries and that some vaccinations can cause diseases as autism, autoimmune diseases, allergies and tumors. Previous studies have shown that these concerns are the cornerstones of the anti-vaccine ideologies that unfortunately built their fortune on the luck of scientific knowledge [13]. For these reasons, we think that fighting these beliefs in healthcare workers could remarkably help in counteracting these dangerous movements and improve the vaccination rate of acceptance in general population. Our intervention was effective not only to decrease but, in some cases, even remove these concerns. The efficacy of our health intervention is also demonstrated by the remarkable differences between pre- and post-intervention questionnaires concerning the knowledge of the mandatory and strongly recommended vaccinations in general population, the strongly recommended vaccinations in pregnancy and the general vaccination beliefs and attitude. Particularly, the knowledge of all mandatory and strongly recommended vaccinations improved and, specifically concerning those strongly recommended in pregnancy, a remarkable result was reached for influenza vaccination. Moreover, the correlation between the score and the years of course shows that, although the vaccination knowledge has improved overtime, it appears necessary integrate the training provided by university with specific meetings and debates on vaccination topics.

Finally, from the declarations about the satisfaction rate, the most part of the sample stated that the intervention

changed some of their beliefs and the entire sample declared that it felt more prepared to answer questions and provide information about vaccinations.

Conclusions

Our study detected some critical issues in the preparation of the enrolled midwives and confirm the importance and necessity to carry out health education campaigns not only to general population [36] but also to health professionals that, for the role they play, they must necessarily be well prepared. Moreover, because previous studies have been shown that students have often a poor general health knowledge [37, 38], in order to increase awareness, we think that it is important to integrate the training provided during university courses with specific intervention, such as tutorial and meetings on vaccinations. Our results show that this methodology is advantageous to improve knowledge and preparation of the audience even with the evident limit presented by such a methodology. Indeed, it is well known that checking knowledge immediately after a training intervention could overestimate the results, assuming that not all information will remain for a long time.

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Conflicts of interest statement

The authors declare no conflict of interest.

Authors' contributions

AD and GV conceived, designed and coordinated the research; AF and GV administered questionnaires and carried out the educational intervention; GV, AF, FM and PL contributed to the acquisition, interpretation of data, identified the endpoints analysed and prepared the figures and tables; AF and GV wrote the paper. All the Authors revised the manuscript and gave their contribution to improve the paper. All the authors read and approved the final manuscript.

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