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The impact of an educational intervention on fertility awareness of healthcare professionals: A cross sectional study

Vpliv izobraževalne intervencije na zavedanje o pomenu ohranjanja plodnosti med zdravstvenimi strokovnjaki: presečna raziskava

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Ključne besede:

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POVZETEK

Uvod: Pari nosečnost odlagajo na vse poznejši čas, kar deloma tudi prispeva k višji stopnji neplodnosti. Zdravstveni strokovnjaki morajo zato proaktivno delovati in svetovati o dejavnih tveganja, ki vplivajo na reprodukcijo. Za to potrebujejo večšine svetovanja in na dokazih temelječe informacije. Namen raziskave je bil oceniti znanje zdravstvenih strokovnjakov pred in po izobraževalni intervenciji na temo ohranjanja reproduktivne sposobnosti.

Metode: Izvedena je bila presečna raziskava, v kateri smo uporabili enak vprašalnik za oceno stanja pred in po izobraževalni intervenciji. Raziskovalni instrument je bil razvit na podlagi pregleda literature o dejavnih tveganja za plodnost. Izobraževalna intervencija je potekala v obliki konference. Udeležencem (babe, medicinske sestre, študenti zdravstvenih ved) je bila zagotovljena zaupnost. Sodelovanje je bilo prostovoljno. V analizi smo izračunali osnovno deskriptivno statistiko, razlike v znanju pred in po izobraževalni intervenciji pa so bile ugotovljene z Wilcoxonovim testom.

Rezultati: Na splošno se je znanje udeležencev izobraževalne intervencije o dejavnih tveganja za plodnost po izvedenem dogodku izboljšalo. V kategoriji »Starost« in »Nevarnosti okolja« so bile razlike statistično značilne. V kategoriji »Obstoječa zdravstvena stanja« in »Dejavniki življenjskega stila« pa so udeleženci že pred samo izobraževalno intervencijo razpolagali z obsežnim znanjem.

Diskusija in zaključek: Zdravstveni strokovnjaki lahko izboljšajo svoje znanje o predkonceptijskem zdravju z izobraževalno intervencijo. Potrebno bi bilo raziskati, kako dolgo učinki trajajo in ali nadgrajeno znanje pomeni tudi uvajanje sprememb v klinični praksi.

ABSTRACT

Introduction: With couples' increasing postponement of pregnancy to later in life and the associated rising infertility rates, healthcare professionals need to be proactive in counselling on the risk factors affecting reproduction. To do so, they need specific counselling skills and evidence-based information. The aim of this study was to assess and compare participants' knowledge of fertility issues before and after an educational intervention on preconception health care.

Methods: A cross-sectional observational study was conducted, using the same questionnaire to assess the pre- and post-intervention status. The questionnaire was developed on the basis of a literature review on infertility risk factors. The survey was conducted in a conference setting. Participation in the survey was voluntary and confidentiality was assured to all participants (midwives, nurses and healthcare students). The differences in participants' pre- and post-intervention knowledge were calculated using the Wilcoxon signed rank test.

Results: The results of our study show an improvement in participants' overall knowledge on infertility risk factors. These improvements were statistically significant in the sections of 'Age and Fertility' and 'Environmental Hazards', while in the sections 'Pre-existing Medical Conditions' and 'Lifestyle Factors Affecting Fertility', participants already possessed comprehensive knowledge prior to the educational intervention.

Discussion and conclusion: Health professionals can improve their knowledge on preconception health through continuous education. Further studies need to test the long-term effects of different educational approaches.



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Introduction

In recent years, increasing attention has been paid to promoting a healthy lifestyle to preserve fertility in the preconception period (The Lancet, 2018). These efforts are based on fertility statistics which clearly show that birth rates in Europe are declining, while the average age of women at childbirth is steadily increasing (Eurostat, 2021) due to postponed pregnancy planning and postponed birth of the first child. However, the physiology of the human body itself can hardly follow this social trend (Pal & Santoro, 2003). It should also be noted that natural fertility is declining and that the reasons for this phenomenon are quite complex and include nutritional, genetic, environmental and other aspects (World Health Organization, 2013).

When it comes to fertility issues, the general population lacks up-to-date and evidence-based knowledge and may be further misled by the current confusing and sometimes controversial data in the media (PreconNet, 2021). Postponing pregnancy is associated with various pregnancy-related complications and can also affect a couple's ability to have children (Schmidt et al., 2012). Conversely, good preconception health benefits the health and wellbeing of both women and men even if they decide not to have children (World Health Organization, 2013).

According to the Lancet Series on Preconception Health (2018), the most effective way to improve preconception health is to target women and couples planning pregnancy, and to promote the health of all women of childbearing age, as well as that of their male partners. It is therefore crucial to take effective measures to sensitise young people to the importance of a healthy lifestyle and to educate them about fertility through educational interventions conducted by healthcare professionals.

Shawe et al. (2015) point out that guidelines and recommendations on preconception care are inconsistent across six European countries and therefore call for action to develop evidence-based guidelines on preconception health. In 2018, a group of European experts launched an international project entitled “*Preconception health of youth, bridging the gap in and through education* (PreconNet)”. The aim of this project was to create a learning platform for healthcare professionals who provide care to men and women in the preconception period. Health professionals need to educate this target group on the impact of their lifestyle, age, environmental factors and other aspects affecting their fertility. The fact that we live in a digital age where health information is easily accessible via the internet (Fahy et al., 2014; Cusack et al., 2018) should not be ignored. However, when it comes to preconception health and care, the knowledge of healthcare professionals who disseminate this information to the wider population is often called into question. Health professionals working with

women and men in the preconception period need evidence-based information to provide their clients with relevant advice which will allow them to make informed decisions.

Aims and objectives

Evidence shows that health-related educational interventions can have a positive effect on participants' knowledge (Hemsing et al., 2017; Cusack et al., 2018). The aim of this study was to assess participants' knowledge of fertility issues before and after the educational intervention in order to determine whether the educational intervention improved their knowledge in this field.

Methods

A quantitative approach was adopted for this study as it objectively and effectively measures explicit knowledge (Ye, 2016). A cross-sectional observational study was conducted. The data were collected using the same questionnaire before and after the educational intervention, which enabled a comparative analysis of the participants' knowledge so as to determine its improvement and possible changes in their opinions.

Description of the research instrument

The research instrument was a questionnaire derived from the questions asked by all lecturers at the conference. The lectures in the educational intervention covered various factors that can pose a risk to fertility and presented evidence-based information on how to preserve fertility. From the content of these lectures, the lecturers derived one or several questions to test participants' knowledge of the various aspects of fertility.

The questionnaire comprised 26 questions—three demographic questions and 23 questions on fertility, with one question asking participants' opinion on the preconception model of care (this question was excluded from the comparative analysis). Of the remaining 22 questions, two were open-ended questions, six asked participants to give their opinion using a five-point Likert-scale, and the rest were closed questions (two with multiple correct answers and 12 with one correct answer). The answers to these questions were marked as correct/incorrect and rewarded with one point if correct (for questions with multiple correct answers, all had to be correct).

The 22 questions were divided into six sections: 'Age and Fertility' (2 questions), 'Environment' (2 questions), 'Infection Risks' (2 questions), 'Lifestyle Factors' (11 questions), 'Pre-existing Medical Conditions' (3 questions), 'Understanding Reproduction' (2 questions). In line with the themes of the PreconNet web platform (PreconNet, 2018), three questions

addressed pre-existing medical conditions and their impact on fertility, two addressed risks of infection, two dealt with the impact of environmental hazards, two tested participants' knowledge of reproductive ability, and two tested their knowledge of the impact of age. Most of the questions (11 in total) dealt with various lifestyle choices and their effects on the ability to conceive.

All questions were reviewed by experts from the PreconNet team to improve content validity. Moreover, ten midwifery students involved in organising the conference tested the questions for clarity. No corrections to the research instrument were required.

Description of the sample

The invitation to the event was emailed to all Slovenian maternity hospitals, community health centres, health faculties and professional associations. No conference fee was charged as the conference was organised as a multiplier event of the PreconNet project and the funding for such events is part of the Erasmus+ programme. A total of 92 participants registered for the conference; however, not all of them attended the event. In total, 69 participants registered at the conference desk on the morning of the event (midwives, nurses and students of health sciences).

Description of research procedure and data analysis

The research was approved by the institutional review board. The research was conducted in accordance with the Helsinki-Tokyo Declaration (World Medical Association, 2013) and general ethical standards of research to maintain participants' integrity. Participation was voluntary and conference participants were not required to submit questionnaires if they did not wish to participate in the study. They were assured confidentiality: individuals could not be traced through the questionnaires.

The conference, which was considered as a single educational intervention, was held on 9 May 2019 at the Faculty of Health Sciences in Ljubljana, Slovenia, and was the first multiplier event for the PreconNet Erasmus+ project. At registration, participants received promotional material and a pre-intervention questionnaire. Before the lectures began, the purpose of the survey was explained to them and they were invited to take part in the research. A few minutes of the programme was devoted to completing the questionnaires. The organisers collected the questionnaires, but as participation in the research was voluntary, returning the questionnaire was not obligatory.

The educational event started at 9.00 am and ended at 5.00 pm. It comprised short presentations covering various risk factors affecting fertility. Before the final

session, participants received a post-intervention questionnaire and were asked to submit it to the organisers at the end of the programme.

First, the participants' responses to each of the 22 questions were coded as correct or incorrect. In addition to the total score, partial scores were computed for each of the six questionnaire sections. The Wilcoxon signed rank test was used to compare the pre- and post-intervention responses.

Results

A total of 69 participants were present at the conference, however only those who completed and submitted both questionnaires (pre- and post-intervention) were included in the analysis ($n = 38$). All respondents were female. Seven of them were midwives, four were nurses and 16 were students of different health professions; 11 did not provide information on their professional background. The groups were too small to analyse the differences in responses by professional field, and we therefore only report on the general responses.

The results of the respondents who took part in the study are summarised in Table 1; the questions are divided into individual sections, as mentioned in the Methods section. The improvements in their answers after the educational intervention are marked in bold. For the majority of items, there was a clear improvement in the number of correct answers.

Table 2 shows the median values, 1st and 3rd quartile (Q_1 and Q_3 respectively), of the questionnaire results in the pre-/post-intervention, as well as the Wilcoxon signed rank test results. The overall score improved significantly ($p < 0.001$), as the median values in the post-intervention phase increased by two points compared to the pre-intervention phase. Furthermore, both quartiles increased as well: Q_1 by four points and Q_3 by three points. The results show significant improvement in four sections: 'Age and Fertility', 'Environment', 'Lifestyle Factors' and 'Pre-existing Medical Conditions'. On the other hand, there were no significant differences between the pre- and post-intervention scores for the sections 'Infection Risks' and 'Understanding Reproduction'.

Discussion

The study explored the changes in participants' knowledge on fertility after taking part in an educational intervention on preconception health. There is sufficient evidence to conclude that the educational intervention on preconception health helped increase participants' knowledge of the factors influencing preconception health. As demonstrated by Goossens et al. (2018), the involvement of well-educated healthcare professionals is one of the most important factors for the provision of high-quality

preconception care, whereas the lack of knowledge and unfamiliarity with preconception care are the barriers to the provision of quality preconception care.

Given the duration and intensity at which the content was delivered (one full-day programme),

the results of the pre- and post-intervention test showed significant improvements in participants' knowledge in four out of six thematic sections. The educational intervention demonstrated its efficacy in the knowledge transfer in the following sections:

Table 1: Percentage of correct and incorrect responses before and after the educational intervention by section

Tabela 1: Delež pravih in nepravilnih odgovorov pred in po edukativni intervenciji – predstavljene po segmentih

Section/Sklop	Pre-intervention/Pred intervencijo		Post-intervention/Po intervenciji	
	Correct/ Pravilni (%)	Incorrect/ Nepravilni (%)	Correct/ Pravilni (%)	Incorrect/ Nepravilni (%)
Age and fertility				
Can infertility treatments be effective for age-related infertility?	18.4	81.6	81.5	18.5
At what age does female fertility begin to decline?	77.1	22.9	88.9	11.1
At what age does male fertility begin to decline?	45.7	54.3	81.5	18.5
Environment				
Are endocrine disruptors always caused by humans?	81.6	18.4	88.5	11.5
Do BPS and BPF have endocrine disrupting effects?	7.9	92.1	85.2	14.8
Infection risks				
Who can benefit from preconception vaccination?	80.0	20.0	37.0	63.0
Which sexually transmitted infections are the main cause of reduced fertility in women?	58.3	41.7	92.6	7.4
Lifestyle factors				
What are the international recommendations for physical activity?	89.5	10.5	92.6	7.4
Is sperm quality / sperm count in men associated with the intensity of physical activity?	94.7	5.3	100	0
Can sleep increase reproductive capacity?	92.1	7.9	100	0
What is the effect of smoking on fertility?	2.6	97.4	29.6	70.4
Does maternal and paternal obesity cause problems in their offspring?	91.7	8.3	96.3	3.7
Is malnutrition detrimental to male fertility?	5.3	94.7	100	0
Do overweight or obese men have poorer sperm quality?	77.6	22.2	96.2	3.8
Do obese women struggle with hormonal imbalance?	94.7	5.3	100	0
How many European women have a normal pre-pregnancy body mass index?	30.6	69.4	38.5	61.5
Does an increased body mass index affect a woman's ability to conceive?	84.4	5.6	96.2	3.8
Does long-term use of hormonal contraceptives cause infertility in women?	32.4	67.6	30.8	69.2
Pre-existing medical conditions				
Can over-the-counter painkillers affect fertility?	64.9	35.1	100	0
Can taking high doses of ibuprofen for months at a time cause infertility and other health problems in males?	75.7	24.3	96.3	3.7
Can anabolic steroid use cause structural and genetic sperm damage?	89.2	10.8	100	0
Understanding reproduction				
Is a regular menstrual cycle a sign of fertility?	78.4	21.6	96.2	3.8
Is our phenotype representative of the genome that we received from our parents at conception?	29.7	70.3	11.5	88.5

Legend/Legend: % – percentage/odstotek

Table 2: Results of the questionnaire in the pre-/post-intervention phase**Tabela 2:** Rezultati vprašalnika pred in po izobraževalni intervenciji

Section/Sklop	Max. score	Phase/Faza		Wilcoxon signed rank test	
		Pre-intervention/ Pred intervencijo	Post-intervention/ Po intervenciji	Z	p
		Me (Q ₁ -Q ₃)	Me (Q ₁ -Q ₃)		
Age and Fertility	3	1 (1-2)	3 (2-3)	-3.685	<0.001
Environment	2	1 (1-1)	2 (2-2)	-4.104	<0.001
Infection Risks	2	2 (1-2)	1 (1-2)	0	1
Lifestyle Factors	11	7 (7-8)	8 (7-9)	-1.969	0.049
Pre-existing Medical Conditions	3	3 (2-3)	3 (3-3)	-3.140	0.002
Understanding Reproduction	2	1 (1-1)	1 (1-1)	-0.632	0.527
Overall score	23	15 (13-16)	17 (17-19)	-3.751	< 0.001

Legend/Legenda: Me-Median value/mediana; Q1-1st quartile/prvi kvartil; Q3-3rd quartile/tretji kvartil

'Age and Fertility', 'Environment', 'Lifestyle Factors' and 'Pre-existing Medical Conditions'. No statistically significant differences were observed in the following sections: 'Infection Risks' and 'Understanding Reproduction'. While our study did not measure any long-term effects, previous studies have shown that education improves knowledge and raises fertility awareness both in the short term and as long as two years after the intervention (Maeda et al., 2020).

The content of our educational intervention went beyond the mere clinical knowledge and individual behaviour and also tested the social and environmental factors influencing preconception health (we tested these factors in the 'Environment' and 'Lifestyle Factors' sections). In this context, the integration of a life-course approach to preconception health (and consequently preconception care) has been called for, as such an approach recognises health as a life-long continuum from birth to delivery and shows that one's reproductive health is determined by an accumulation of physical risks and social health determinants over the course of one's lifetime (Hemsing et al., 2017). It is of particular importance that knowledge about health disparities and health inequalities related to social determinants of health is shared by a group of healthcare professionals, as they are in a position to understand and prevent health disparities where people work and live, and not just within the health system. For example, in a low-income population, unhealthy diets and abnormal BMI are more prevalent, which also has an impact on reproduction. When counselling on healthy nutrition and physical activity, healthcare professionals need to also consider reproductive risks.

The present study has certain limitations. First, as this was a one-day conference, the intensity of the educational intervention may have influenced the knowledge transfer and uptake. Second, participants were given a book of abstracts (conference proceedings) before the conference began, but were instructed not to read the material during the pre- and post-intervention survey. Third, the questions in the

survey were presented in English, which may have made comprehension more difficult for those whose English language skills were not very good. Moreover, all lectures were delivered in English and the lecturers were not native English speakers, so understanding the topics may have influenced participants' post-intervention responses. To mitigate the negative effects of the language barrier, participants were given the opportunity to ask for assistance, but they did not take up this offer. The survey assessed the change in participants' knowledge immediately after the end of the intervention, and no further longitudinal and long-term follow-up was conducted.

Educational interventions are widely recognised as interventions that influence people's knowledge and skills, at least in the short term (Cusak et al., 2018). At the provider level, educational interventions should be part of lifelong learning and professional development, and should be tailored to the needs of professionals. To achieve the desired results, educational interventions (face-to-face, online, etc.) need to be well structured, based on a systemic (rather than randomised) approach, and tailored to the needs of participants (in our case, healthcare professionals). In this regard, further research is needed to investigate the barriers and factors that motivate healthcare professionals to engage in educational interventions. A long-term follow-up study is needed to evaluate the impact of knowledge transfer as well as knowledge transfer in individual groups of healthcare professionals.

Conclusion

Preconception health needs to be addressed more rigorously, and in this endeavour, healthcare professionals are the key experts who can raise fertility awareness among their clients. However, it must first be ensured that they possess adequate evidence-based information, otherwise they need to be educated and trained. The results of our study provide clear evidence that such training can contribute significantly to improving knowledge in this field. However,

whether the effects of such interventions have a long-term impact on the participants and whether the information changes their professional practice remains to be investigated.

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Conflict of interest/Nasprotje interesov

The authors declare that no known conflict of interest exists associated with this publication./Avtorji izjavljajo, da ni nasprotja interesov.

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Ethical approval/Etika raziskovanja

Raziskava je pripravljena v skladu z načeli Helsinško-Tokijske deklaracije (World Medical Association, 2013) in v skladu s Kodeksom etike za babice Slovenije (2014)./The study was conducted in accordance with the Helsinki-Tokyo Declaration (World Medical Association, 2013) and Code of Ethics for Midwives of Slovenia (2014).

Author contributions/Prispevek avtorjev

Mirko Prosen was involved in the elaboration of the theoretical background and the interpretation of the results. Patrik Pucer and Boštjan Žvanut designed the study methodology, conducted the statistical analysis, and presented its results. Petra Petročnik and Ana Polona Mivšek collaborated on the drafting of the theoretical background, developed the research

instrument, conducted the study and interpreted the results./Mirko Prosen je sodeloval v pripravi »Teoretičnih izhodišč« in pri interpretaciji rezultatov. Avtorja Patrik Pucer in Boštjan Žvanut sta sodelovala pri oblikovanju metodologije ter statistični analizi ter predstavitvi rezultatov. Petra Petročnik in Ana Polona Mivšek sta sodelovali pri oblikovanju teoretičnih izhodišč, raziskovalnega instrumenta, izvedli raziskavo ter interpretaciji rezultatov. Vsi avtorji so prebrali in se strinjajo s končnim izdelkom.

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