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ORIGINAL ARTICLE

The effects of an educational program for non-physician health care providers regarding fertility preservation

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Abstract

Purpose The American Society of Clinical Oncology (ASCO) Clinical Practice guidelines recommend that physicians, nurses, social workers, and other health care providers should be prepared to discuss the risk of infertility with patients. We conducted an educational program for non-physician health care providers regarding fertility preservation and evaluated the effects of the educational program.

Methods The 4-h educational program consisted of lectures about infertility as a potential risk of cancer treatment, fertility preservation, and psychosocial support. Knowledge, confidence, institutional change, and self-practice were assessed pre-program, immediately post-program, and 6 months post-program.

Results Of 124 participants who joined the program, 74 completed and returned the follow-up survey 6 months after the program. Sixty-one percent of the participants were nurses, 27% were social workers, and 4% were psychologists. The scores for confidence and knowledge increased between pre- and immediate post-program periods ($p < 0.01$), and between pre- and 6-month post-program periods ($p < 0.01$). The knowledge score was 52, 76, and 71% at the 3 points respectively. The participants became more likely to disseminate fertility preservation counseling at their institutions ($p < 0.01$) and use informational resources ($p < 0.01$). Overall, self-practice and institutional support did not change.

Conclusions The study revealed that this educational program is applicable for non-physicians to learn about fertility preservation. The participants improved significantly in confidence and knowledge, but not in counseling skills.

Keywords Fertility preservation · Knowledge · Confidence · Counseling · Health care provider

Introduction

Due to the rise in survival rate and the development of reproductive medicine, fertility preservation has become an option for cancer patients in building their future plans after completing cancer treatment. As several cancer treatments, such as alkylating chemotherapy and total body irradiation, have a risk of fertility loss in young patients, sperm cryopreservation

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for males and oocyte or ovarian cryopreservation for females are fertility preservation technologies for patients who desire children. The American Society of Clinical Oncology (ASCO) has developed guidelines and stated that oncologists should explain the possible risk of infertility and refer patients to reproductive specialists, if needed, before starting cancer treatment [1]. Previous research found that only 42% of oncologists explained about fertility preservation, and just 30% referred patients to reproductive specialists [2]. That is, some patients started cancer treatment without knowing the risk of infertility. Lambertini et al. [3] noted the lack of adequate fertility preservation discussion to be a critical issue.

In order to serve patients' unmet needs regarding fertility, non-physician health care providers can play a critical role. ASCO has published the revised version of the guidelines, which highlights all health care providers—not only physicians but also nurses, social workers, and other health care providers—as having responsibility in supporting fertility preservation for patients [4]. All providers should be aware of patients' desire to have a biological child and refer patients to reproductive specialists and psychosocial providers, if needed. Indeed, oncologists working in multidisciplinary environments were more likely to actively discuss the risk [5]. Thus, non-physician health care providers can provide some basic fertility counseling, such as providing information and collaborating with other health care providers for further referral.

However, the lack of knowledge is one of the critical barriers for health care providers [6, 7]. Multidisciplinary team members are required to acquire basic knowledge about fertility preservation in order to identify patient needs and support patients with their own professional skills.

In this study, an educational program on fertility preservation was developed for non-physician health care providers, and we evaluated changes in knowledge, confidence, and self-practice in fertility counseling after the program. Educational programs regarding fertility preservation are rare. The program Educating Nurses about Reproductive Issues in Cancer Healthcare (ENRICH), which was conducted in the USA, may be the only program that has been evaluated for effectiveness [8, 9]. Our educational program is a new endeavor in Japan, and its content is more focused to provide information in a short time for non-physicians, as compared with the ENRICH program.

Methods

Procedure

We prospectively evaluated the effects of an educational program regarding cancer patient fertility preservation. Prior to the program, we created a draft of the educational materials. A multidisciplinary expert panel, composed of seven oncologists specializing in gynecology, urology, pediatrics, breast medical oncology, and radiation, along with one psychiatrist, one nurse/social worker, and one clinical psychologist, reviewed the material through repeated discussion and correction. We conducted 2-h focus group interviews with nurses and social workers, and asked them to evaluate the educational materials based on usability, comprehensibility, and quality/quantity of the content. The expert panel reviewed and finalized the program content and materials. The 4-h program included the following content: infertility as a potential risk of cancer treatment, fertility preservation for males and females, and (supplementary) psychosocial support. Each session took 15–30 min. We requested participants to answer the questionnaires before and after the program. Again, 6 months after the program, the questionnaires were sent to each participant for follow-up.

Participants

As we aimed to educate non-physician health care providers who provide psychosocial support to patients, we mainly targeted those who belong to Cancer Information and Support Centers (CISC). A CISC is placed in every designated cancer care hospital in Japan, and it consists of mainly nurses and social workers and provides consultation on various issues to all patients and their family for free. This center can be regarded as easy for patients to access for fertility counseling. Therefore, we sent brochures to CISCs in 425 designated cancer care hospitals and posted recruitment information online. One hundred seventy-seven applicants requested to participate. Due to the limitations on room capacity, only 124 participants were selected in order of arrival to attend the program. Those who answered the questions just before, and immediately after, the program, and again 6 months post-intervention, were included in the data analysis.

Measures

Based on the ENRICH program, four measures (confidence, knowledge, institutional change, self-practice) were designed for program evaluation. All measures corresponded with the content of the educational program. Confidence and knowledge were assessed pre-, immediately post-, and 6 months post-intervention. Institutional change and self-practice were assessed immediately post- and 6 months post-intervention.

Confidence

Participants answered five questions about how confident they were in fertility counseling. The questions assessed the level of confidence in the following situations: fertility counseling, accurately evaluating a patient's risk of infertility, explaining

reproductive medication such as oocyte/sperm cryopreservation, referring patients to reproductive specialists, and psychologically supporting patients who gave up on having children. This questionnaire was developed along with the behavior questionnaire. Cronbach's alpha was 0.92 at the pre-intervention.

Knowledge

Knowledge about fertility preservation was measured by a 10-item questionnaire. The questions were about possible risk of infertility due to cancer treatment, fertility preservation, and reproductive function, extracted from the educational tools for the training program. The multidisciplinary expert panel reviewed the questions. Participants answered the questions using "yes," "no," or "I don't know."

Institutional change

Participants were asked whether their institutions changed to supporting patients with fertility preservation concerns. We asked the participants whether their hospitals were holding seminars for patients or medical staff, coordinating with reproductive specialists, displaying brochures, or opening hotlines. Participants were required to answer "yes," "no," or "I don't know." We developed this questionnaire based on ENRICH.

Self-practice

The goals of the training program were to promote fertility preservation discussion between non-physician health care providers and patients, and to improve the quality of the discussion. Providers' attitudes and behaviors in fertility counseling are important factors when evaluating the quality of discussion. We developed the behavior questionnaire based on the focus group interview. The interviewees had free discussion about what health care providers do in fertility counseling.

The self-practice questionnaire consisted of two sections. The first section consisted of three questions and asked about self-practice for preparing for fertility counseling such as participating in educational programs and disseminating information within their institutions. The second section consisted of 11 questions and asked what is done during fertility preservation counseling, such as providing brochures or referring to reproductive specialists. The second section was applied only to participants who provide counseling at least once in 6 months. Cronbach's alpha was 0.87. The participants answered questions using a 0 (not at all) to 5 (always) scale.

Data analysis

Data analysis was conducted using IBM SPSS Statistics 24.0. Demographics were compared between participants who returned follow-up surveys and those who did not. This study aimed to assess changes in knowledge, confidence in counseling, institutional changes, and self-practice. The scores were compared by two-tailed dependent-sample t tests and the Wilcoxon signed rank test. Knowledge and confidence were compared between pre-, immediate post-, and 6-month post-intervention situations. Self-practice and fertility counseling experience were compared between pre- and 6 months post-intervention to assess if participants had changed 6 months after the training program. Institutional change was compared with McNemar's test. We extracted participants who provided fertility counseling to patients or their family at least once in 6 months, and compared the 11 questions between the pre- and 6-month post-intervention situations with the Wilcoxon signed rank test. All p values were two-sided, and the significance level was set at $p < 0.05$.

Table 1 Participants' demographic ($n = 74$)

	N	%
Certificate		
Nurse	45	60.8
Social worker	20	27.0
Psychologist	3	4.1
Other	6	8.1
Workplace		
General hospital	35	47.3
University hospital	25	33.8
Cancer center	9	12.2
Local clinic	1	1.4
Other	3	4.1
Unknown	1	1.4
Belonging to patient and family advisory council		
Yes	55	74.3
No	19	25.7
Clinical experience (year)		
None	2	2.7
1–9	12	16.2
10–19	30	40.5
20–	29	39.2
Unknown	1	1.4
Years since oncofertility consulting started		
None	21	28.4
– 1	10	13.5
1–4	26	35.1
5–	17	23.0

Results

Of 124 participants, 74 (59.7%) completed the follow-up survey (Table 1). Of these, 45 participants were nurses (60.8%), and 20 were social workers (27.0%); 55 participants belonged to patients and family advisory councils (74.3%), and 21 participants never gave fertility counseling to patients (28.4%). Certificates, clinical experience, and fertility preservation counseling experience were not significantly different between the participants who completed the follow-up survey and those who did not.

Confidence

The score of confidence significantly changed from 13.27 at the pre-intervention stage to 17.90 at the immediate post-intervention ($p < 0.01$), and to 16.38 at the 6-month post-intervention stage ($p < 0.01$) (Table 2). The effect size was large enough both between the pre- and immediate post-intervention stages ($d = 1.01$), and between the pre- and 6-month post-intervention stages ($d = 0.66$) [10].

Knowledge

The averages were 52, 76, and 71% at pre-, immediate post-, and 6-month post-intervention stages, respectively (Table 2). The average score significantly increased from the pre- to immediate post-intervention ($p < 0.01$) and to 6-month post-intervention stages ($p < 0.01$). There were marked effects (pre- vs. immediate post-intervention: $d = 1.29$; pre- vs. 6 months post-intervention: $d = 0.99$) [10].

Institutional changes

The number of participants who reported institutional changes did not significantly change between the pre- and 6-month post-intervention stages. The environmental status for fertility preservation support at 6 months post-intervention was as follows: those who held study groups with health care providers (15.8%), those who held fertility preservation seminars for patients (6.6%), those who had medical coordination networks with reproductive specialists (36.8%), those who displayed brochures (22.4%), and those who made announcements about fertility counseling (32.9%).

Self-practice

The scores for the following statements significantly increased from the pre-intervention to the 6-month post-intervention stage: "I actively educate coworkers in my institution" ($p < 0.01$); "I disseminate information about fertility counseling in my institution" ($p < 0.05$); and "I participate in educational programs for deepening my understanding" ($p < 0.01$).

The additional 11 questions were asked to 23 participants who conducted fertility counseling for patients or their family at least once in 6 months (Table 3). The score at 6 months post-intervention was significantly higher for the question "I provide resources, such as brochures and websites, about fertility preservation" ($p < 0.01$). However, the scores were overall lower than pre-intervention scores. In particular, the score was significantly lower for the question "I ask patients whether they could discuss about fertility with their physicians" ($p < 0.05$).

Discussion

This study aimed to evaluate an educational program for non-physician health care providers regarding fertility preservation. Although this program was short, participants' confidence and knowledge scores significantly increased immediately after, and 6 months after, the program. These results suggested that this program is effective for improving the knowledge and confidence of non-physician health care providers regarding fertility preservation. The ENRICH program also improved knowledge and confidence [8]. Our program is basic and short compared with the ENRICH program, which consists of 60- to 90-min lectures over 8 weeks targeting registered nurses who care for over five young patients annually. Both programs are effective among the targeted participants. This study also demonstrated that the participants educated themselves and their coworkers, and disseminated fertility

Table 2 Changes in the participants' confidence and knowledge regarding fertility preservation

	Pre-intervention		Immediate post-intervention		6 months post-intervention		Pre- vs. immediate post-intervention			Pre- vs. 6 months post-intervention		
	M	SD	*M*	SD	*M*	SD	Mean difference	*P*	*d*	mean difference	*p*	*d*
Confidence	13.27	5.40	17.90	3.57	16.38	3.80	4.63	< 0.001	1.01	3.11	< 0.001	0.66
Knowledge	0.52	0.23	0.76	0.14	0.71	0.16	0.25	< 0.001	1.26	0.20	< 0.001	0.96

The scores of confidence and knowledge range from 0 to 30 and from 0 to 1, respectively

Table 3 Changes in self-practice between pre-intervention and 6 months post-intervention ($n = 23$)

Items	Pre-intervention		6 months post-intervention		z	p
	M	SD	*M*	SD		
1. I ask patients about their disease and treatment status	5.96	0.21	5.83	0.45	0.58	
2. I ask patient's age, marital status, and parity	5.65	0.49	5.64	0.68	0.00	
3. I ask patients whether they can discuss about fertility with their physicians	5.39	0.72	4.83	1.25	2.23	*
4. I ask patients whether they can discuss about fertility with their family	5.26	0.92	5.08	1.11	0.76	
5. I discuss with patients or their family with a considerate attitude	5.78	0.42	5.67	0.54	0.82	
6. I provide informational resources, such as brochures and websites, about fertility preservation	4.09	1.51	4.57	1.29	2.68	**
7. I refer to, or give information about, reproductive specialists	4.52	1.56	4.37	1.48	0.37	
8. I collaborate with other multidisciplinary staff in order to meet patients' needs	5.09	0.95	4.89	1.04	0.75	
9. Even if patients request consultations for other topics, I ask them whether they have concerns about infertility	4.00	1.41	3.81	1.43	0.54	
10. I support patients in making their own decisions for fertility preservation	4.73	1.39	4.72	1.26	1.81	
11. I provide psychological support to patients who were unable to have children	4.14	1.78	3.47	1.54	0.95	

The above were offered as responses to the question what they had done during the fertility preservation counseling

*$p > 0.05$; **$p > 0.01$

preservation counseling within their institution. The study indicates that this educational program may encourage the participants to further fertility preservation counseling in their institutions.

Also, the participants in this study became more likely to use informational resources 6 months after the program. Brochures and online information are helpful resources for decision-making [11, 12], and patients reported that they prefer to be given information in brochure-format [13]. The Oncofertility website is one of the major resources utilized worldwide; while in Japan the informational resources were limited, the Japan Society for Fertility Preservation provided useful resources such as a list of institutions and basic information about fertility preservation. Informational resources are convenient for health care providers to provide information without advanced knowledge.

However, overall fertility preservation counseling skills did not improve significantly through the educational program. Self-practice scores did not increase 6 months after the program except for providing informational resources. Besides, the frequency of asking patients whether they could discuss with their physician significantly decreased 6 months after the program. We made a couple of assumptions about why the participants became less likely to ask patients whether they could discuss with their physician. One is that the participants recognized the difficulty of having counseling after the program. Another assumption is that because the use of brochures is easier and more convenient, the participants might become more likely to use brochures instead of having in-depth discussions. Additional studies are necessary to reach this conclusion, but no matter what brought about this result, communication between patients and their physicians is necessary. Support and understanding by physicians are necessary when patients desire fertility preservation [14]. When planning cancer treatment, patients and their physicians need to discuss the timing of fertility preservation, and medical collaboration between their physician and reproductive specialists is necessary. Fertility preservation without the physician's knowledge and support may be difficult, and some patients prefer to decide whether to undergo fertility preservation through discussion with their physicians [15]. Therefore, the importance of developing a good relationship between patient and physician is emphasized in the program.

Also, in order to improve the program in regard to self-practice, the program could have benefited from the addition of role-play-based activities. One study found that role-play-based learning improved medical students' knowledge, engagement, confidence, and empathy for clinical communication [16]. Role-play provides opportunities for observation, rehearsal, and discussion [17], and thus may help with practicing counseling and integrating knowledge.

This study did not find any changes in the participants' institutions. This may be because the follow-up period was too short and the institutions remained unchanged. According to Vadaparampil et al. [8], 37% of participants reported their workplace developed in-service education programs, 26% provided education materials, and 46% developed medical collaboration with reproductive specialists. Compared with this result, institutions in Japan may be lacking institutional support for patients with fertility preservation concerns. Fortunately, this study also revealed that participants became more likely to spread fertility preservation counseling. Improvement in institutional support is expected in the near future. Supporting those who provide educational

materials and holding periodic educational programs are necessary.

There are some limitations to this study. First, measurements were self-reported and not validated. Objective, validated measurement methods should be developed. Second, the participants may not represent general health care providers who work in situations where patients can easily access fertility counseling. Furthermore, the low response rate may risk response bias, but the demographics were not different between those who responded to the follow-up survey and those who did not.

Conclusions

Fertility preservation is a valuable topic in supportive care for cancer patients. In order to provide some support for patients who may want children in the future, health care providers are required to have knowledge about fertility preservation to some extent. This study suggested that the educational program can be the first step for non-physician health care providers to learn about fertility preservation. Handouts and websites are also helpful, but advanced study and institutional change are necessary for providing high-quality counseling. Fertility preservation issues have not yet become familiar nationwide, so dissemination of support is essential.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflicts of interest.

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