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ORIGINAL ARTICLE

Oncologists and hematologists' perceptions of fertility-related communication – a nationwide survey

C. Micaux Obol[a], G. M. Armuand[a,b], K. A. Rodriguez-Wallberg[b,c], J. Ahlgren[d], P. Ljungman[e,f], L. Wettergren[a]* and C. Lampic[a]*

[a]Department of Neurobiology, Care Sciences and Society, Division of Nursing, Karolinska Institutet, Huddinge, Sweden; [b]Department of Oncology-Pathology, Karolinska Institutet, Karolinska University Hospital, Stockholm, Sweden; [c]Reproductive Medicine Karolinska, Karolinska University Hospital, Stockholm, Sweden; [d]Department of Oncology, University of Örebro, Örebro, Sweden; [e]Departments of Allogeneic Stem Cell Transplantation and Hematology, Karolinska University Hospital, Stockholm, Sweden; [f]Department of Medicine Huddinge, Division of Hematology, Karolinska Institutet, Karolinska University Hospital, Stockholm, Sweden

ABSTRACT

Background: Despite the negative impacts of several cancer treatments on fertility, many patients do not recall having fertility-related discussions with their physicians. This study was conducted to identify those factors related to physicians' discussing the treatment impacts on fertility with cancer patients of reproductive age.

Material and methods: In this nationwide survey of cancer care physicians ($n = 329$, response rate 55%), oncologists and hematologists (mainly) completed a questionnaire on practice behavior, barriers, attitudes and confidence in knowledge regarding treatment-related fertility risks. Logistic regression analyses were conducted to identify factors associated with not routinely discussing fertility issues with patients.

Results: Most of the physicians agreed that they were responsible for discussing fertility issues with patients of reproductive age (91%), but approximately 30% did not do so regularly. Those factors decreasing the likelihood of discussion were: patient already had children (female/male OR 3.0/6.9), high workload (OR 3.3/4.8), seeing <5 female/male patients of reproductive age weekly (OR 3.2/3.4) and access to a reproduction clinic (OR 5.2/4.2).

Conclusions: Most Swedish oncologists and hematologists regularly discuss impact of treatment on fertility with their patients. Those factors having a negative impact on fertility discussions may guide targeted organizational and educational efforts to further improve fertility-related communication in cancer care.

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Introduction

Physicians meeting young adult patients in cancer care face many communication challenges. One is broaching the topic of the cancer treatment's impact on future fertility, since this treatment in many cases is known to be gonadotoxic [1]. Although it is rational for most cancer patients to prioritize survival over fertility, having children remains an important life goal after being treated for cancer [2,3]. Moreover, treatment-induced infertility is associated with emotional distress [2] and depression [4]. The American Society of Clinical Oncology recommends the early provision of information on the risks to fertility associated with cancer treatment and on fertility preservation (FP) to all patients of reproductive age [5]. Similarly, the European Society of Medical Oncology states that, for patients planning to receive treatment that may affect future fertility, sperm banking should be planned for men, and women should be counseled on available FP options. In Sweden and the Nordic countries, recommendations and guidelines are also available, and programs for FP have been established at large university hospitals [6]. Still, a review of the literature shows that many patients, especially women, do not recall discussing fertility issues in connection with their cancer treatment and unmet informational needs are commonly recognized among patients and survivors [5].

Research on physicians' communications about fertility in cancer care has largely focused on their pretreatment discussions of FP [7–14] and referral for FP [15,16]. However, discussions about the potential impact of treatment on a patient's future fertility are also important when FP is not an option, such as when the patient's fertility is already affected by the cancer, and should not be limited to the pretreatment situation.

Previous studies have indicated that physicians in general consider it important to discuss fertility-related issues with patients of reproductive age [7,17,18], but refrain from such discussions in cases of specific circumstances related to the

CONTACT C. Lampic claudia.lampic@ki.se Department of Neurobiology, Care Sciences and Society, Division of Nursing, Karolinska Institutet, Alfred Nobels allé 23, 23300, 141 83 Huddinge, Sweden
*Equal responsibility as principal investigators.

patient, organization or physician. Patient-related reasons for not discussing fertility issues (including fertility risk and FP) include a poor prognosis [8,10,18,19], a disease requiring immediate treatment [9,10], marital or parenthood status [10,11,18] and sexual orientation [9,10,18]. Organization-related barriers to communication include unclear referral paths for FP [12,15], a lack of inter-professional cooperation [7,12,15] and the cost of FP in insurance or patient-funded settings [9–11,13]. In addition, some studies have identified barriers related to the physician that could affect discussions about fertility issues (including fertility risk and FP), such as low confidence in their knowledge about the treatment impact on fertility [10,12,14,20], negative attitudes [19], personal discomfort regarding engaging in such discussions [9,10,14] and not perceiving a personal responsibility for discussing fertility [20]. Not initiating a discussion about fertility has been shown to be associated with lower referral rates for FP [15].

Research in this area has been descriptive, to a considerable extent, or examining the influence of single factors on physicians' practice behavior. In addition, Duffy et al. used multivariable analyses to study associations between several physician factors related to fertility communication [20]. In the study by Quinn et al. [16], several factors influencing physician referral for FP were identified using logistic regression models. However, no corresponding studies have been found investigating the influence of potentially explanatory factors on physicians' practice behavior with regard to discussing fertility risks with young cancer patients. Since previous research indicates that oncologists and hematologists in general are positively inclined towards communicating fertility issues [7,17,18], the identification of factors hindering such communication may contribute to the development of cancer care.

Based on the abovementioned information, the aims of this study were to (1) investigate the practice behaviors, attitudes, confidence in knowledge and perceived barriers to discussing fertility issues among physicians in cancer care and (2) identify factors related to physicians' practice behaviors regarding discussions about treatment-related fertility risks with female and male patients of reproductive age.

Material and methods

Study participants

This nationwide survey study had a cross-sectional design. Physicians currently working in cancer care in Sweden ($n = 821$), a country with a population of approximately 10 million, were identified through the national register of healthcare personnel. This register combines data on specialized physicians from the National Board of Health and Welfare with data on physicians working in oncological and hematological care (regardless of specialty training) obtained from annual contact with all clinics in Sweden. In 2015, those physicians identified were contacted via mail and invited to participate in an anonymous survey to be completed on paper or online. All of the physicians received two postal reminders, and no honorarium was offered for the completion of the survey. Those physicians stating no clinical activity during the past two years, or seeing no or very few patients of reproductive age, were given the opportunity to opt out from the survey and subsequently excluded (but included in the response rate) (Figure 1).

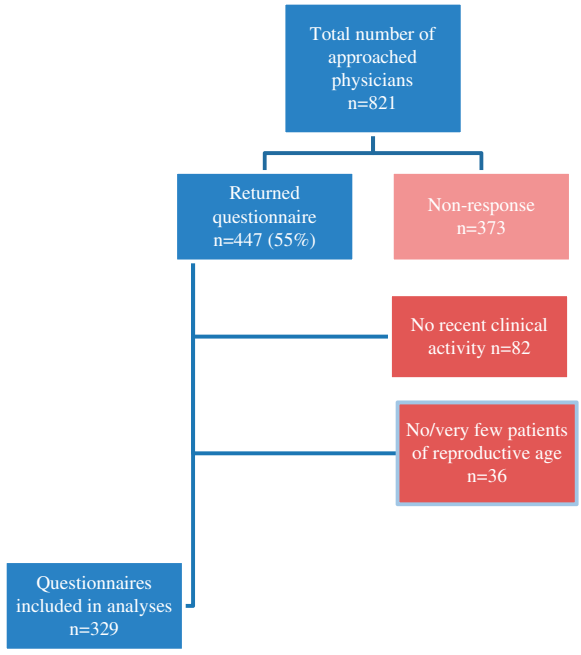

Figure 1. Flowchart of participants.

The present study follows the principles of the Declaration of Helsinki. According to the Regional Ethical Review Board in Stockholm, Sweden, the study did not require ethical approval.

Instrument

On the basis of two questionnaires previously used in the US [16,20], a study-specific 54-item questionnaire was developed to measure aspects related to the physicians' communication about fertility issues with adult cancer patients. After translation and adaptation to the Swedish health care system, three physicians clinically active in cancer care assessed the face validity and feasibility of the questionnaire, and their suggested changes were incorporated. The questionnaire included four domains: practice behavior, perceived barriers and attitudes concerning communication with cancer patients of reproductive age (women 18–45, men 18–55), and confidence in knowledge regarding treatment-related fertility risks and FP. The present definition of the reproductive age was based on the national guidelines on the upper age limits for publicly funded assisted reproduction (women 40, men 55), while also taking into account the fact that a considerable number of children in Sweden are born to women 41–45 years old ($n = 3615$, 3% of new-borns in 2015). The responses to a selection of relevant items were included in the present study, and are presented below.

Practice behavior (six items) was assessed by indicating the frequency of behaviors regarding fertility-related communication. The responses on the five-point Likert scale were dichotomized into practicing these behaviors often (always/often) or seldom (sometimes/seldom/never). The two items

on discussing the impact of cancer treatment on fertility with female and male patients, respectively, were selected as outcome variables in the multivariable analyses. For the practice domain, the response option 'not applicable' was available for those physicians who treated only male or female patients, and these responses were handled as missing values.

The attitudes (seven items) were assessed by the physicians stating their level of agreement with a number of statements (e.g., 'Discussing fertility-related aspects of treatment with patients is my responsibility') on a five-point Likert scale with only the extremes labeled (1 = disagree completely, 5 = agree completely). The responses were dichotomized into the physicians disagreeing with (responses 1–3) and agreeing with (responses 4–5) the specific statements.

The perceived barriers (13 items) were assessed by the physicians indicating the likelihood of them bringing up fertility-related issues in the face of different circumstances related to the patient (e.g., 'Need to start treatment immediately') or the organization (e.g., 'Heavy workload'). The responses were given on a five-point Likert scale with only the extremes labeled (1 = not at all likely, 5 = highly likely). They were dichotomized into those physicians who felt unlikely to bring up fertility issues under the specific circumstance (i.e., considered the item a barrier) (response alternatives 1–2) and those physicians not believing the item to be a barrier/reason for not bringing up fertility (responses 3–5).

The physicians' confidence in their knowledge concerning the treatment-related risk of infertility (two items) was assessed on a five-point Likert scale ranging from 'very uncertain' (1) to 'very certain' (5). The responses were dichotomized into low confidence in knowledge (responses 1–3) and high confidence in knowledge (responses 4–5) about the specific statements.

Finally, the assessment of the background variables included the physician's age, gender, specialization level and experience in cancer care, as well as the workplace (university hospital/other), access to a reproduction clinic at the hospital, and number of reproductive aged patients (women 18–45, men 18–55) seen each week.

Data analysis

The statistical inference was calculated using Chi-Square tests and univariable logistic regression after the dichotomization of all of the relevant variables. The multivariable logistic regression analyses were performed with the two dependent variables 'discussing treatment impact on fertility' for female patients (DV female) and male patients (DV male), respectively. The independent variables considered for inclusion in the multivariable logistic regression analyses were based on the literature and univariable analyses, and included background variables, perceived barriers, and confidence in knowledge regarding infertility risks. Four of the variables were excluded from the multivariable analyses for statistical reasons, such as a high level of missing values and multicollinearity. First, the multivariable logistic regression analyses for the two dependent variables (DV female and DV male) were performed using the stepwise backwards method. Subsequently, multivariable regression analyses using the enter method were performed with the independent variables retained from the last step of the backwards model for the two dependent variables, respectively. The models were evaluated with Nagelkerke's R^2 and the percentage of cases correctly classified. The significance level for all of the analyses was set at $p < .05$, and the analyses were performed with IBM SPSS version 22 (IBM Corp., Armonk, NY, USA).

Table 1. Sample characteristics of participating physicians ($n = 329$).

	N^a (%)
Sex	
Male	133 (40.8)
Female	188 (57.8)
Chose not to state	5 (1.5)
Specialty areas[b]	
Oncology	185 (56.7)
Hematology	93 (28.5)
Gynecologic oncology	21 (6.4)
Other[c]	28 (8.6)
No specialization/resident in training	23 (7.0)
Number of years in cancer care	
<5	31 (9.6)
5–10	76 (23.5)
11–15	52 (16.0)
>15	165 (50.9)
Working at university hospital	
Yes	227 (69.8)
Access to reproduction clinic	
Yes	238 (73.2)
Number of female patients of reproductive age seen weekly	
<5	185 (57.6)
≥5	136 (42.4)
Number of male patients of reproductive age seen weekly	
<5	197 (62.7)
≥5	117 (37.3)

[a]Missing values not reported for *n*. Only valid percentages reported.
[b]Total exceeds 100% due to reported double specialization.
[c]Gynecology/obstetrics, surgery, internal medicine, radiology and orthopedics.

Results

Following the reminders, 55% of the invited physicians had returned the questionnaire. The study sample ($n = 329$) included 59% women, and the majority of the physicians were either oncologists (57%) or hematologists (28%) (Table 1). Most of the participants were highly experienced, with half having worked in cancer care for more than 15 years. The mean age of the participants was 50 years old (range 28–75, sd 10.6).

Physicians' practice behavior regarding discussing the treatment impact on fertility

A majority of the physicians reported that they always or often discuss the treatment impacts on fertility with the patients of reproductive age (74% with females and 70% with males), and more than half also discussed the FP options with their patients (Table 2).

Fertility-related communication: attitudes, barriers and confidence in knowledge

The physicians' attitudes towards discussing fertility issues are presented in Table 3. Among the participating physicians,

Table 2. Self-reported practice behavior regarding discussing fertility issues with patients of reproductive age.

	Always/often n^a (%)[b]	Sometimes/Seldom/ Never n^a (%)[b]
I discuss the cancer treatment's impact on fertility with my *female* patients	234 (73.6)	84 (26.4)
I discuss the cancer treatment's impact on fertility with my *male* patients	198 (69.7)	86 (30.3)
I discuss fertility preservation measures with my *female* patients	183 (57.4)	135 (42.6)
I discuss fertility preservation measures with my *male* patients	181 (63.5)	104 (36.5)
I let a colleague at my workplace (e.g., a nurse or counsellor) follow-up on fertility-related issues with my patients	49 (14.9)	261 (84.2)
I leave it to an entirely different clinic (e.g., the clinic initiating the cancer treatment) to discuss fertility-related issues with my patients	22 (8.6)	233 (91.4)

[a]Does not sum to total due to the option 'not applicable' being coded as a missing value (between 11 and 74 for individual items).
[b]Valid percentage reported.

Table 3. Attitudes towards discussing fertility issues.

	Agree n^a (%)[b]	Disagree n^a (%)[b]
Discussing fertility-related aspects of treatment with patients is my responsibility	291 (90.9)	29 (9.1)
Patients think it is important to be able to have children after cancer	242 (75.2)	80 (24.8)
Women are more worried about their fertility than men	111 (35.2)	204 (64.8)
Bringing up the risk of infertility is worrying for patients	81 (25.2)	241 (74.8)
By talking about fertility after cancer one risks giving patients false hope about good chances of survival	34 (10.6)	286 (89.4)
Discussing fertility after cancer with my patients is awkward because it is a sensitive and intimate subject	11 (3.4)	310 (96.6)
Bringing up the risk of infertility may cause patients to choose to refrain from life-saving treatment	11 (3.4)	308 (96.6)

[a]Does not sum to total due to missing values (between 7 and 14 for individual items).
[b]Valid percentage reported.

75% agreed that patients regarded fertility after cancer to be important. Ninety-one percent of the physicians stated that it is their responsibility to discuss the fertility-related aspects of treatment with their patients, while few believed that such discussions would give the patients false hope (11%) or cause them to abstain from treatment (3%).

The participants were asked to assess which circumstances would influence the likelihood of them bringing up fertility issues with patients of reproductive age, including the patient and organizational factors. Many of the physicians stated that they would be less likely to initiate a discussion about fertility when a patient presents with a poor prognosis (78%) or a disease that requires immediate treatment (38%). Furthermore, many would be less likely to bring up fertility issues when the patient is a woman $\geq$40 years of age (63%), appears anxious or overwhelmed by having cancer (54%), already has children (43%), is homosexual (41%) or is single (29%). Additional circumstances were reported by many physicians to decrease the likelihood of them bringing up fertility issues: intellectual impairment (75%), HIV positive status (58%) or a known genetic mutation for cancer that his/her children may inherit (34%). Several of these traits, however, occur infrequently in young cancer patients.

Among the organizational barriers, significant groups of physicians reported that they would be less likely to initiate a discussion of fertility issues with patients in cases of unclear referral paths for FP (49%), a high workload (45%) and when the cost of FP conflicts with the need to keep the clinic's expenses low (35%).

More than half of the physicians had high confidence in their knowledge regarding the treatment-related risk of infertility for male patients (59%) and the treatment-related risks of infertility and early menopause in female patients (65%).

Factors associated with discussing the treatment impact on fertility

The univariable analyses showed a number of patient, physician and organizational factors associated with the physicians' frequency of discussing a cancer treatment's impact on fertility (Table 4). Ten independent variables were significantly associated with both dependent variables: discussing the impact on fertility with female patients (DV female) and male patients (DV male). The physician's professional experience was significant for the DV female only, but was included in both models. The variable 'female patient age >40 years' was included in the model for DV female only, resulting in a total of 11 independent variables for DV male and 12 for DV female.

The final regression models resulted in one patient factor and three organizational factors independently increasing the likelihood of seldom discussing fertility impacts with both female and male patients: patient already has children (female/male OR 2.97/6.93), a high workload (OR 3.30/4.81), access to a reproduction clinic (OR 5.18/4.19) and seeing less than five female/male patients of reproductive age weekly (OR 3.25/3.41) (Table 4). For the female patients, the need for immediate treatment (OR 2.08) and the physician having limited experience in cancer care (OR 3.30) also negatively affected the likelihood of fertility discussions. With regard to the male patients, those physicians with a low confidence in their knowledge of treatment-related infertility risks were five times less likely to discuss fertility issues when compared to more confident peers.

Discussion

Since it is crucial that physicians in cancer care address fertility issues with all patients of reproductive age, the present

Table 4. Factors associated with physicians seldom discussing treatment impacts on fertility with female and male patients.

	Seldom discussing fertility with FEMALE patients Univariable analyses			Seldom discussing fertility with FEMALE patients[a] Final regression model[d]		
Independent factors	OR[b]	95% CI[c]	*p*	OR[b]	95% CI[c]	*p*
Patient factors						
Need to start treatment immediately	4.13	2.44 to 7.00	<.001	2.08	1.05 to 4.10	.035
Patient already has children	6.54	3.71 to 11.54	<.001	2.97	1.48 to 5.97	.002
Patient single	4.31	2.50 to 7.35	<.001	–	–	–
Patient homosexual	4.06	2.39 to 6.89	<.001	–	–	–
Patient anxious/overwhelmed	5.13	2.84 to 9.29	<.001	–	–	–
Patient >40 years of age	5.03	2.59 to 9.78	<.001	–	–	–
Physician factors						
Limited experience in cancer care (<5 years)	2.60	1.22 to 5.56	.013	3.30	1.24 to 8.83	.017
Low confidence in knowledge of infertility risks for female patients	1.90	1.13 to 3.18	.015	–	–	–
Organizational factors						
High workload	6.73	3.79 to 11.96	<.001	3.30	1.66 to 6.56	<.001
Access to reproduction clinic at hospital	3.05	1.53 to 6.09	.002	5.18	2.23 to 12.04	<.001
Seeing <5 female patients of reproductive age per week	2.83	1.69 to 4.95	<.001	3.25	1.65 to 6.39	<.001
Concerns about cost of FP for clinic	2.95	1.75 to 4.97	<.001	–	–	–
	Seldom discussing fertility with MALE patients Univariable analyses			**Seldom discussing fertility with MALE patients[a]** Final regression model[e]		
Independent factors	OR[b]	95% CI[c]	*p*	OR[b]	95% CI[c]	*p*
Patient factors						
Need to start treatment immediately	4.12	2.42 to 7.01	<.001	–	–	–
Patient already has children	8.97	4.97 to 16.20	<.001	6.93	3.24 to 14.82	<.001
Patient single	6.39	3.62 to 11.28	<.001	–	–	–
Patient homosexual	3.90	2.29 to 6.65	<.001	–	–	–
Patient anxious/overwhelmed	7.45	3.98 to 11.95	<.001	–	–	–
Physician factors						
Limited experience in cancer care (<5 years)	1.27	0.58 to 2.79	.545	–	–	–
Low confidence in knowledge of infertility risks for female patients	4.26	2.48 to 7.30	<.001	5.33	2.51 to 11.36	<.001
Organizational factors						
High workload	8.00	4.47 to 14.31	<.001	4.81	2.30 to 10.03	<.001
Access to reproduction clinic at hospital	1.99	1.09 to 3.67	.026	4.19	1.99 to 11.67	<.001
Seeing <5 female patients of reproductive age per week	3.35	1.87 to 6.02	<.001	3.41	1.58 to 7.33	.002
Concerns about cost of FP for clinic	3.91	2.28 to 6.70	<.001	–	–	–

[a]Dependent variable dichotomized into Seldom and Often (reference value).
[b]Odds ratio.
[c]Confidence interval.
[d]Final model DV Female: 81.3% correct, $n = 284$ (13.7% missing), $x^2 = 94.4$ (df = 6), $p < .001$, −2LL = 241.6, Cox & Snell 0.282, Nagelkerke 0.407, H&L $p = .969$.
[e]Final model DV Male: 83.5% correct, $n = 255$ (22.5% missing), $x^2 = 119.699$ (df = 5), $p < .001$, −2LL = 192.69, Cox & Snell 0.375, Nagelkerke 0.530, H&L $p = .757$.

national study is unique in its use of multivariable analyses to identify factors associated with physicians not routinely discussing the treatment impacts on fertility with young cancer patients, regardless of whether FP is discussed as an option or not. Our results show that a large majority of the physicians in cancer care considered it their responsibility to discuss fertility issues with their patients, and often or always discussed the treatment impacts on fertility with male and female patients of reproductive age. However, for those 30% of the physicians who did not routinely discuss fertility issues with their patients, we identified a number of physician factors and circumstances at the clinic that had negative impacts on discussing fertility. Interventions targeting these modifiable factors may be used to further improve cancer care for patients of reproductive age.

Our finding that about 70% of the physicians in our sample stated that they always or often discuss the treatment impacts on fertility with their patients is consistent with some studies [7,21], and indicates a markedly higher frequency than those reported by others [11,12,17]. A poor prognosis was the most frequently stated reason for choosing not to initiate a discussion of fertility issues with cancer patients, in both this survey and previous studies [8,10,18,19]. This is not particularly surprising. When survival is unlikely, and posthumous reproduction is not an option (e.g., not permitted according to Swedish legislation), it seems rational to focus on issues other than future fertility. Similarly, the need to start treatment immediately was identified as a common reason for omitting fertility discussions, and has also been reported in previous studies, especially with regard to women [8,11,21]. In our study, perceiving the need for immediate treatment as a reason for not bringing up fertility was a factor that also significantly impacted the physicians' self-reported frequency of fertility discussions with female patients of reproductive age. The fact that no corresponding association was found for male patients suggests that fertility discussions with female patients are hindered by specific concerns about the time required for the cryopreservation of oocytes/embryos, or by the perception that FP for women is 'complicated' [11,12]. However, even in situations where pretreatment FP is not an option, the discussion of potentially impaired fertility is important for the patients' ability to make informed reproductive decisions after completing cancer treatment. For example, young women who know they are at risk for premature menopause may consider having children earlier in their life, or opt for post-treatment oocyte cryopreservation.

In the present study, half of physicians regarded the patient being anxious or overwhelmed by having cancer as a barrier to initiating fertility discussions. It is well known that many patients feel overwhelmed by, and have difficulties processing the large amount of information that is provided in connection with a diagnosis and primary treatment [3]. As a result, fertility-related treatment information may be misinterpreted or forgotten, and needs to be repeated later on in the cancer trajectory. Guidelines on fertility communication typically focus on discussing FP-options prior to treatment start [5,7]. However, as fertility and family building constitute important aspects of cancer survivorship for young adults, these issues may be even more appropriate to discuss after treatment, e.g., in connection with follow-up care.

Our results confirmed earlier findings indicating that many physicians are less likely to discuss fertility issues with patients who already have children [10,11,18,21], are single [10,11] or are homosexual [9,10,18]. Since none of these circumstances are obstacles for desiring or pursuing parenthood, they should not be accepted as reasons for not discussing fertility issues. Moreover, the present finding that one-third of the physicians would refrain from bringing up fertility issues with a patient carrying a known genetic mutation for cancer is disconcerting. BRCA mutations are not uncommon among young women with breast cancer, and these patients' options for having children should be open for discussion. Health care professionals have the responsibility to initiate fertility discussions with all patients, and should not presume that patients who want to have children in the future will bring up this issue, since they may not be aware of the possible treatment impact on fertility.

In the logistic regression models conducted in the present study, four factors related to the physician or the organization were found to be independently associated with not routinely discussing fertility issues: a high workload [10], not seeing many patients of reproductive age [11], a low confidence in knowledge [10–12,14,20] and limited experience in cancer care. While we did not inquire about the participants' fertility or communication training, a lack of training has been reported to be a hindering factor for fertility communication [12], and some of the participants in our study made comments in this regard. Also, our finding that physicians with a low confidence in their knowledge of treatment-related infertility risks for men were less likely to discuss fertility issues with their male patients suggests a need for targeted education. Therefore, providing communication training as well as access to informational and educational materials regarding treatment-related infertility risks could be measures to make sure the existing guidelines for fertility communication in cancer care [22] are being implemented. Furthermore, closer collaboration with fertility specialists, as has been previously suggested [19], may be a way of providing patients with adequate information about their options to become parents with their own or donated gametes. Finally, allocating more resources to cancer care could contribute to preventing suboptimal fertility communication due to a high workload.

We also found in the final regression models that physicians with access to a reproduction clinic at their hospital were less likely to discuss fertility issues with their patients. This is somewhat surprising since it contrasts with earlier findings [23], where access to reproductive specialists was positively associated with physician referrals for FP. One possible interpretation of the present result is that those physicians working at a cancer clinic that is geographically and organizationally close to a reproduction clinic are more likely to refer such discussions to fertility specialists, instead of having them directly with their patients. A multifaceted oncofertility program including both organizational and educational interventions has recently been shown to increase the frequency of documented fertility-related conversations

between oncologists and patients, as well as referral rates to reproductive endocrinology and/or FP [24]. This strengthens the conclusion that, despite relatively high levels of perceived knowledge about treatment-related infertility risks among Swedish oncologists and hematologists, identifying and eliminating organizational barriers could be helpful in order to further improve fertility-related communication in cancer care.

One of the reasons for conducting the present study was the previous results from our research group [2,3,25], showing that female patients receive less information about the treatment-related impact on fertility and FP than males. We therefore inquired separately about the fertility discussions with female and male patients, and conducted all analyses separately for the two groups. Interestingly, the surveyed physicians in the present study reported discussing treatment impacts on fertility and FP to a relatively high and similar extent with both female and male patients. These results are reassuring in terms of gender equality, and may be interpreted as indicating an increased awareness of the importance of fertility for young cancer patients, possibly related to growing attention to this subject both in the Swedish media and among professionals in cancer care. This may have had consequences for both the clinicians' and patients' likelihood of bringing up fertility. In the present study, the outcome variables did not specify who initiated the discussion, but it has been shown earlier [16] that those patients who raise the question themselves are more often referred for FP. Another possible explanation for the reportedly high frequency of fertility discussions is related to the relatively low response rate and the risk of selection bias, that is, an overrepresentation of physicians with an interest in fertility issues. Thus, the positive results may be an overestimation of the actual situation.

Methodological considerations

By providing flexibility in the response mode (paper and web survey) and anonymous participation, we aimed to enhance the response and minimize the risk of the answers being influenced by social desirability. Our 55% response rate is comparable [7,8,11,15] or higher than the previous survey studies in the field (response rates 15–30%) [9,10,12,16,20,21,23]. However, the fact that the physicians participated anonymously made it impossible to identify non-responders in order to assess the representativeness of the sample. An important strength of the present study is the fact that we were able to include a sufficiently large sample, which made it possible to perform multivariable analyses including a large number of factors of potential importance for the frequency of the physicians' discussion of fertility issues with cancer patients of both sexes.

In conclusion, and considering the above-mentioned limitations, Swedish oncologists and hematologists appear to be well aware of the importance of fertility for their patients, and frequently discuss the treatment impacts on fertility with their patients of reproductive age. However, a number of factors related to the physicians' work situation, knowledge and experience were found to independently increase the risk of not routinely discussing the treatment impacts on fertility. All patients are entitled to information about the consequences of cancer and cancer treatments on their fertility in order to make informed decisions about their reproductive lives. Therefore, targeted organizational and educational interventions are recommended to further improve fertility communication with young cancer patients.

Disclosure statement

The authors report no conflicts of interest.

Previous presentations: This research previously appeared in poster presentations at the 12th Nordic Conference on Advances in Health Care Sciences Research, November 11–12, 2015, at the Karolinska Institutet in Stockholm, Sweden, and at the 32nd Annual Meeting of the European Society of Human Reproduction and Embryology (ESHRE), Helsinki, Finland, July 3–6, 2016.

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