Portuguese oncologists’ practices regarding female fertility preservation:

Which barriers most relate with these practices?

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Abstract

This study aims to investigate the current practice patterns of Portuguese oncologists with different clinical specialties regarding female fertility preservation (FP) and to determine the relative endorsement of different barriers to these practices. A total of 111 doctors with different clinical specialties assisting female cancer patients of childbearing age at Portuguese clinical institutions completed a self-report questionnaire to assess their current practice patterns regarding female FP and their perceptions of the barriers to these practices.

Although the majority of the oncologists reported discussing the reproductive future with their patients, 2.8% and 7.2% of these clinicians reported never informing about the risk of infertility and about FP, respectively, and 75.8% of the participants have referred fewer than ten patients to a reproductive medicine doctor. Time with patients was the strongest endorsed barrier to these practices. A stronger endorsement of the barriers “oncologists’ communication skills” and “patient-related factors” was related to a lower frequency of informing about both the risk of cancer-related infertility and about FP. It is important to overcome the intrinsic barriers that emerged as being the most relevant to oncologists’ FP practices and that can be modified, namely, the lack of communication skills and the oncologists’ perceptions of their patients’ characteristics.

Keywords: fertility preservation / oncologists practices / decision-making / childbearing age / oncology / communication in health
Introduction

Cancer survival rates have been increasing steadily over the past years all over the world (World Health Organization, 2014). Portugal survival rates are high for several oncolgical diseases when compared with other European countries (de Angelis et al., 2013). For breast cancer, one of the most frequently diagnosed malignancy among young adult women (Assi et al., 2013), Portugal survival rates are greater than 80% (de Angelis et al., 2013). The late side effects of the more successful but aggressive cancer treatment protocols has been increasingly recognized, including the risk of future fertility impairment (Loren, Mangu, et al., 2013). Sustained infertility develops in 50-90% of cancer survivors (Bahadur, 2000). Given the increasing incidence of cancer at younger ages (Desandes & Stark, 2016) and the current social trend of delaying childbearing until older ages (Schmidt et al., 2012), there is a growing number of young and childless cancer patients whose reproductive future is at risk.

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Fertility preservation (FP) methods are now offered to the young cancer patients facing cancer-related infertility risk as an attempt to ensure their future biological parenthood. Female FP techniques have only recently acquired criteria to be routinely offered to cancer patients (Practice Committees of American Society for Reproductive Medicine & Society for Assisted Reproductive Technology, 2013). These techniques require more invasive and complex procedures than the male FP option (Chang & Suh, 2008), which is a simple and well-known technique all over the world (Loren, Mangu, et al., 2013). In Portugal, despite the availability of male FP since the 1990s in several clinical institutions, female FP techniques are only offered since 2010; both male and female FP options are funded by the Portuguese National Healthcare System.

Moreover, when compared to men, women have not only a higher rate of cancer diagnosis (Cancer Research United Kingdom, 2013), but also a higher cancer survival rate (Siegel, Miller, & Jemal, 2016), and female cancer survivors achieve lower reproductive rates than do male survivors (Stensheim, Cvancarova, Moller, & Fossa, 2011). Cancer-related infertility has been shown to have a negative impact on the individual adaptation of female cancer survivors (Carter et al., 2010; Loscalzo & Clark, 2007; Perz, Ussher, & Gilbert, 2014), so this topic deserves further attention.

Female cancer patients seem to be interested in FP, wishing to receive information and to play an active role in the decision-making process about FP as soon as possible after the diagnosis (Peate et al., 2011). Several oncology societies worldwide (e.g., the American Society of Clinical Oncology, the European Society for Medical Oncology) have recently published guidelines regarding the oncologists’ role in discussing the reproductive future with their patients of childbearing age. These guidelines recommend that, before the
infertility-inducing cancer treatment, all cancer patients of reproductive age should be fully informed about the
cancer-related infertility risk and of possible FP options, and that they should be referred to fertility specialists
to make a decision about FP (Loren, Mangu, et al., 2013; Peccatori et al., 2013). These are also the
recommendations of the Portuguese guidelines for oncologists about FP in adults with cancer (Almeida-Santos
et al., 2017). It is important to note that in Portugal, the fertility specialists that consult female cancer patients
regarding their fertility preservation are doctors with the clinical specialty in gynecology and a sub-
specialization in reproductive medicine.

Despite these strong recommendations, not all oncologists are discussing this topic with their patients.
Recent studies report that many cancer patients of childbearing age who received cancer treatment do not recall
infertility discussions with their oncologists and that those who were informed report a lack of or a delayed
referral to a fertility specialist consultation to make a decision about FP (Kim & Mersereau, 2015; Ruddy et al.,
2014). Female cancer patients seem to be at greater risk of not being informed about their fertility and FP than
male patients, as one study found that 50% of female cancer survivors reported having received information
about infertility risk (versus 80% of male participants), 14% reported having received information about FP
options (versus 68% of male participants), and only 2% underwent FP (versus 54% of male participants)
(Armuand et al., 2012).

Furthermore, prior European and North American surveys have examined the practice patterns and
perceptions of oncologists regarding FP and have shown that, although oncologists recognize the importance of
discussing FP with young cancer patients, the rates of discussion about infertility risk and FP options and the
rates of referral to a fertility specialist are low (Adams, Hill, & Watson, 2013; Schover, Brey, Lichtin, Lipshultz,
& Jeha, 2002). In fact, 18-48% of these physicians report never referring patients to make a decision about FP
(Adams et al., 2013; Forman, Anders, & Behera, 2009). One study showed lower referral rates for female cancer
patients than for male patients, with 70% of doctors rarely ever referring a female patient to make a decision
about FP (Yee, Fuller-Thomson, Lau, & Greenblatt, 2012).

Therefore, it is of major importance to better understand the factors that may contribute to the oncologists’
practices regarding FP. The physicians’ age, gender and clinical specialty have already been reported as factors
that may influence these practices. Younger female oncologists with a clinical specialty who treat patients with
reproductive cancer (e.g., gynecology) are more likely to include FP information as part of their patient
treatment protocol and to refer patients to a fertility specialist than older male oncologists with other clinical
specialties (Forman, Anders, & Behera, 2010; Loren, Brazauskas, et al., 2013; Quinn, Vadaparampil, Bell-
Moreover, several barriers for the discussion of FP have also been identified in studies comprising oncologists who work with pediatric and adult (both male and female) cancer patients. Despite the existence of some heterogeneity in the literature regarding these barriers, some authors have proposed their organization into five main themes: oncologists’ knowledge of FP; oncologists’ communication skills; patient-related issues; time; and financially related barriers (e.g., Adams et al., 2013; Gilbert, Adams, Mehanna, Harrison, & Hartshorne, 2011; Quinn et al., 2008). Many oncologists lack knowledge about potential cancer-related infertility, FP options and their efficacy and about where to refer patients to perform these techniques (Overbeek et al., 2014; Yee, Fuller-Thomson, et al., 2012), which can preclude them to initiate a discussion about FP with a patient (Adams et al., 2013; Forman et al., 2010; King, Davies, Roche, Abraham, & Jones, 2012). Many clinicians also reveal their lack of communication skills, referring feeling uncomfortable when discussing fertility with their patients (Goossens et al., 2014), and frequently, the patient him/herself needs to raise the topic (Yee, Abrol, McDonald, Tonelli, & Liu, 2012). Patient-related issues have also been documented as an obstacle to oncologists’ engagement in FP discussions. Clinicians’ practices depend on patients’ clinical variables because they are less likely to discuss FP with patients with a poor prognosis, in emergent need to start cancer therapy or with low cancer-related infertility risk (Adams et al., 2013; Loren, Brazauskas, et al., 2013; Overbeek et al., 2014; Peddie et al., 2012). Oncologists also highlight that cancer patients who face a severe illness are not interested in fertility and that this is a reason to not initiate a discussion about this topic (Shimizu et al., 2013; Yee, Fuller-Thomson, et al., 2012). The same has been reported concerning certain socio-demographic variables, with clinicians being less likely to discuss FP with female patients, those under the age of majority, those who are single, homosexual or who already have children (Adams et al., 2013; Peddie et al., 2012; Yee, Abrol, et al., 2012). In addition, many oncologists express being extremely pressured to consult a great number of patients in a shorter amount of time, with topics beyond the cancer diagnosis and treatment becoming a lower priority (Adams et al., 2013; Loren, Brazauskas, et al., 2013; Overbeek et al., 2014; Shimizu et al., 2013). In fact, some prior studies found that time was the most commonly barrier to FP practices cited by oncologists, after their lack of knowledge about the topic (Quinn et al., 2007). Finally, financial barriers have also been presented as important by most prior surveys (Forman et al., 2010; Gilbert et al., 2011; Loren, Brazauskas, et al., 2013). However, it is important to note that financial barriers were reported in studies conducted in countries where the National Health System does not fund FP procedures.
Despite the significant findings to date, there are some gaps in the literature that must be addressed. First, most of the existing studies rely on descriptive data about the oncologists’ perceptions regarding the relevant barriers to their FP practices but do not examine which of the different oncologists’ perceived barriers to FP discussion have a greater impact on the real FP practices documented by the physicians; thus, what are the most influencing barriers of oncologists’ FP practices remains unknown. Moreover, most of the existing studies are performed in countries with a different context regarding female FP (e.g., Australia, Cancer Council Australia, 2010; United States of America, Lee et al., 2006; United Kingdom, Royal College of Physicians, The Royal College of Radiologists, & Royal College of Obstetricians and Gynecologists, 2007), when compared with the Portuguese context. First, in these countries, female FP is offered to patients for more than twenty years ago; in Portugal, the female FP start being offered in 2010 in just one clinical institution (Melo, Canavarro, & Almeida-Santos, 2017). Second, and in contrast with these countries, the first Portuguese clinical guidelines regarding the FP practices were just developed and published in 2017 (Almeida-Santos et al., 2017). Third, in these countries, FP costs are mostly covered by the patients or by insurance or there are restrictions on access to public assistance coverage; in Portugal, the National Health System covers all the FP procedures for all cancer patients with no exceptions (Assembleia da República Portuguesa, 2015). Thus, given these specificities it is important to better understand the oncologists’ FP practices in the Portuguese context, which may be similar to other countries where FP techniques and guidelines for physicians are recently implemented and where the financial costs for patients are not a possible barrier.

Therefore, the main purposes of this study are the following: (1) to assess the current practice patterns of a sample of oncologists with different clinical specialties regarding the reproductive future of female cancer patients of childbearing age (i.e., the frequency of informing about the risk of cancer-related infertility, the frequency of informing about FP, the number of patients referred to a reproductive medicine doctor); (2) to describe the strength of the endorsement of different barriers to oncologists’ FP practices (i.e., the oncologists’ knowledge of FP, the oncologists’ communication skills, patient-related factors and time with patients); (3) to examine the role of the oncologists’ individual characteristics (i.e., gender, age and clinical specialty) in their female FP practices and in the strength of endorsement of the barriers to these practices; and (4) to determine the relationship between the strength of endorsement of different barriers and FP practices.

**Methods**

**Procedures**
The present cross-sectional study was part of a larger research project that was approved by the Ethics Committee of [Blind for Review], a large Portuguese university-based hospital, and followed the ethical standards and procedures for research with human beings (e.g., Helsinki Declaration; American Psychological Association, 2010; World Medical Organization, 2000).

The inclusion criteria were being a doctor who assists female cancer patients of childbearing age in a Portuguese clinical institution and having knowledge and understanding of Portuguese to complete the survey. A total of 111 male and female doctors who assist female cancer patients at clinical institutions in Portugal were recruited face-to-face (n = 37; 78% response rate, based on the total number of surveys delivered) and online (n = 74) between May 2013 and December 2015. Face-to-face recruitment was performed at clinical institutions and scientific medical meetings. At clinical institutions, we have identified all the oncologists who assisted female cancer patients in each of the clinical institutions participating in the study ([Blind for Review]), and all of them were individually approached by a researcher to be invited to participate in the study; at scientific meetings, the recruitment was conducted on the basis of random interception. In both cases, the participants were given the survey in an envelope and instructed to complete it at that moment or later and to return it to the researchers in a pre-addressed sealed envelope. Online recruitment was performed through a secure internet-based survey (hosted by http://www.limesurvey.com/) whose web link was advertised on Facebook groups of physicians and through pamphlets that were provided to the oncologists at clinical institutions and scientific medical meetings. The web link to the online survey was also promoted by e-mail by the Portuguese Society of Oncology to all of its members. Participation was voluntary, and no remuneration was provided.

All participants were given information concerning the research goals, the anonymity of the answers provided, the participants’ role and the researchers’ obligations, and they expressed their consent in participating in the study before completing the survey.

**Measures**

The questionnaire was specifically developed for the present study by the research team, including two psychologists and a reproductive medicine doctor with clinical experience in FP, based on prior studies. The questionnaire was previously piloted with 10 oncologists with different clinical specialties (e.g., gynecology, general oncology and hematology), so that the items could be examined and revised for clarity and comprehensibility before the beginning of the study. The final self-report questionnaire took approximately 5 minutes to complete and included the following measures.
Socio-demographic and clinical practice-related information

Socio-demographic (gender, age) and clinical practice-related (clinical specialty, the number of female cancer patients of childbearing age assisted per year) data were collected.

Practices regarding female FP

Practices regarding female FP were assessed by two questions that were answered using a 5-point Likert scale ranging from 0 (Never) to 4 (Always) and one open-ended question. These questions were developed based on those previously used by other authors (Forman et al., 2010; Zapzalka, Redmon, & Pryor, 1999) and were the following: 1) frequency of informing about the risk of cancer-related infertility – “How often do you inform your female cancer patients of childbearing age about the potential impact of cancer treatment on their fertility?”; 2) frequency of informing about FP – “How often do you inform your female cancer patients of childbearing age who are at risk of cancer-related infertility about the possibility to preserve their fertility?”; and 3) number of patients referred to a reproductive medicine doctor (i.e., in Portugal, this is the fertility specialist to whom patients need to be referred to discuss FP, make a decision about it, and implement their decision) – “How many female cancer patients of childbearing age do you remember referring to a reproductive medicine doctor to preserve their fertility in all your years of clinical practice?”.

Barriers to practices regarding female FP

Barriers to practices regarding female FP were assessed by the question “How much do you identify with the following sentences?”, and clinicians were asked to evaluate their agreement with the items using a 5-point Likert scale ranging from 0 (Entirely disagree) to 4 (Entirely agree). This measure consisted of 17 items that were developed based on those used in prior studies (Adams et al., 2013; Gilbert et al., 2011; King et al., 2012; Schover et al., 2002), and they were organized along four dimensions, with each referring to a different type of barrier to oncologists’ practices regarding FP that has already been described in the existing literature: 1) oncologists’ knowledge of FP (five items; e.g., “I do not know reproductive medicine doctors to whom to refer patients for FP.”); 2) oncologists’ communication skills (two items; e.g., “I only inform the patient about the risk of cancer-related infertility when she initiates the topic.”); 3) patient-related factors (nine items; e.g., “I do not inform the patient about the risk of cancer-related infertility when she already has children.”); and 4) time with patients (1 item; “I have little available time with the patients to discuss the risk of cancer-related infertility.”).
The total score of each dimension was the mean score of its items, with higher total scores indicating a stronger endorsement of that barrier theme by the oncologists.

**Statistical analyses**

Analyses were conducted using IBM Statistical Package for the Social Sciences, version 23.0 (SPSS Inc., Chicago, IL, USA).

Descriptive statistics were calculated to explore the sample characteristics (gender, age, clinical specialty) and also to describe the oncologists’ practices regarding FP and the barriers to these practices. Taking into account the heterogeneity of clinical specialties, the less frequent specialties (i.e., urology, general surgery, medicine, dermatology, pneumology, nephrology, endocrinology) were recoded together in the category of “Other”. Spearman bivariate correlation coefficients were computed to explore the associations among the different oncologists’ practices regarding FP and to explore the associations among the oncologists’ strength of endorsement of the different barriers to these practices. The strength levels of these associations were classified as “small” for correlations lower than .30, as “moderate” for those higher than .30 and lower than .50, and as “strong” for those at .50 or higher (Cohen, 1988).

A repeated-measures ANOVA (i.e., analysis of variance) was used to compare the oncologists’ relative strength of endorsement of the different barriers to FP practices (barrier themes as the within-subjects factor). Contrast analyses (Deviation method; the effect of each category, except the first, is compared to the overall experimental effect; Field, 2013) were conducted to specify the nature of the differences.

To examine the role of the oncologists’ individual characteristics (gender, age and clinical specialty) in their female FP practices and in the strength of their endorsement of these barriers to these practices, comparison tests (t and Kruskal-Wallis tests) were used. Age was converted into a categorical variable (0 = 40 years old or less and 1 = more than 40 years old). Effect size measures were presented for the comparison analyses (small: $\eta^2 \geq .01$, $d \geq .20$, $V = .01$; medium: $\eta^2 \geq .06$, $d \geq .50$, $V = .03$; large: $\eta^2 \geq .14$, $d \geq .80$, $V = .05$; Cohen, 1988).

Finally, two multiple linear regressions (Enter method) were performed to evaluate the relationships between the oncologists’ strength of endorsement of each barrier theme and their practices regarding FP. These were performed separately for each dependent variable (frequency of informing about the risk of cancer-related infertility, frequency of informing about FP), but all of the predictors (oncologists’ knowledge of FP, oncologists’ communication skills, patient-related factors, time with the patients) were included together in the
regression model. The effect sizes of the main effects were based on $R^2$ values, considering $R^2 \geq .02$ to be small, $R^2 \geq .13$ to be medium and $R^2 \geq .26$ to be large effects (Cohen, 1992).

For all of the previously described analyses, the significance level was set at $p < .05$, and these results are reported and discussed.

Results

Preliminary analyses

The findings showed no significant differences between the participants recruited face-to-face and those recruited online in terms of their socio-demographic characteristics [gender: $\chi^2(1) = 0.18, p = .673, V = .04$; age: $t(109) = -0.10, p = .916, d = .02$], practices regarding female FP [frequency of informing about the risk of infertility: $t(106) = -1.02, p = .309, d = .021$; frequency of informing about FP $t(69.19) = 1.68, p = .098, d = .34$; number of patients referred to a reproductive medicine doctor: $t(101) = -1.09, p = .277, d = .26$], and barriers to these practices [oncologists’ knowledge of FP: $t(109) = 0.17, p = .868, d = .04$; oncologists’ communication skills: $t(109) = 0.64, p = .522, d = .13$; patient-related factors: $t(109) = 1.31, p = .194, d = .26$; time with patients: $t(109) = 1.14, p = .259, d = .23$]. Taking into account the lack of significant differences between these two samples, they can be analyzed together as a whole.

Participants

The sample consisted of 111 doctors who assist female cancer patients at clinical institutions in Portugal. Two thirds of the oncologists were women ($n = 72, 64.90\%$) and had a mean age of 42.97 years old ($SD = 11.43$). The most frequent clinical specialty was general oncology [$n = 47, 42.30\%$; with a mean number of female cancer patients assisted per year of 55.74 ($SD = 56.93$, ranging from 3 to 250)], followed by gynecology [$n = 30, 27.00\%$; with a mean number of female cancer patients assisted per year of 98.46 ($SD = 174.10$, ranging from 3 to 880)] and hematology [$n = 15, 13.50\%$; with a mean number of female cancer patients assisted per year of 24.67 ($SD = 14.33$, ranging from 4 to 50)]. The less frequent clinical specialists were grouped together in the “Other” category [$n = 19, 17.10\%$; with a mean number of female cancer patients assisted per year of 75.89 ($SD = 120.21$, ranging from 0 to 400)].

Practices of oncologists regarding FP
Two thirds of the oncologists revealed taking FP discussions into consideration in their clinical practice; 65.7% (n = 71) of these clinicians very often or always inform their female cancer patients about the risk of cancer-related infertility, and 59.3% (n = 64) very often or always inform them about FP. However, 2.8% (n = 3) and 7.2% (n = 8) of the oncologists reported never informing their female cancer patients of childbearing age about their risk of cancer-related infertility and about FP options, respectively.

Moreover, the oncologists reported that, in all their years of clinical practice, they have referred, on average, 7.38 (SD = 13.22, ranging from 0 to 100) female cancer patients to a reproductive medicine doctor to make a decision about FP. A great proportion of clinicians (75.80%, n = 78) reported that they had referred fewer than ten female cancer patients, and 18 (17.50%) oncologists indicated that they had never referred any female cancer patient to a reproductive medicine doctor.

Significant and positive correlations between oncologists’ practices about FP were found. Specifically, a higher frequency of informing about the risk of cancer-related infertility was strongly associated with a higher frequency of informing about FP ($r = .77, p < .001$) and moderately associated with a higher number of patients referred to a reproductive medicine doctor ($r = .42, p < .001$). A higher frequency of informing about FP was also moderately associated with a higher number of patients referred to a reproductive medicine doctor ($r = .34, p < .05$).

### Barriers to oncologists’ practices regarding FP

Table 1 presents information about the explored barriers to the oncologists’ practices regarding FP.

A significant multivariate effect was found for these barriers [Pillai’s Trace = 0.54, $F(3, 108) = 41.87, p < .001$, $\eta^2 = .54$], suggesting that there were differences concerning the oncologists’ relative strength of endorsement of such barriers. Specifically, compared to the other barriers, time with patients was significantly strongly endorsed ($p < .050$, $\eta^2 = .43$), and oncologists’ knowledge about FP was significantly poorly endorsed ($p < .001$, $\eta^2 = .43$) by the oncologists.

Additionally, the strength of endorsement of the barrier themes proved to be weakly to strongly positively associated with each other.

### The role of the oncologists’ individual characteristics in their practices regarding FP and in the strength of endorsement of the barriers to these practices
Table 2 presents information about the role of the oncologists’ individual characteristics (i.e., gender, age, clinical specialty) in their practices regarding FP (i.e., frequency of informing about the risk of cancer-related infertility, frequency of informing about FP) and in the strength of endorsement of the barriers to these practices.

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Significant age differences concerning the frequency of informing female cancer patients about FP were found. Older oncologists reported informing about FP more frequently than younger oncologists. Moreover, age differences concerning the barrier theme of “oncologists’ communication skills” were also found, with younger clinicians strongly endorsing this barrier to their practices regarding FP compared to older clinicians. No significant differences were found concerning the remaining individual characteristics.

Moreover, significant and positive correlations between oncologists’ practices regarding FP were found for all the clinical specialties. The association between the frequency of informing about the risk of cancer-related infertility and the frequency of informing about FP ranged from .66 (“Oncology”, $p < .001$) and .85 (“Other”, $p < .001$). The association between the frequency of informing about the risk of cancer-related infertility and the number of patients referred to a reproductive medicine doctor ranged between .47 (“Oncology”, $p < .01$) and .65 (“Other”, $p < .01$). Finally, the association between the frequency of informing about FP and the number of patients referred to a reproductive medicine doctor ranged between .34 (“Oncology”, $p < .05$) and .55 (“Other”, $p < .05$).

The association between the mean number of female cancer patients in childbearing age assisted per year and the oncologists’ practices regarding FP was only significant for the “other” specialty category of oncologists. For this category, a higher number of patients assisted per year was strongly associated with a higher frequency of informing about the risk of cancer-related infertility ($r = .56$, $p < .05$).

**The relationship between the strength of endorsement of different barrier themes and oncologists’ practices regarding the frequency of informing about the risk of cancer-related infertility and FP**

Table 3 presents the regression models predicting the oncologists’ practices regarding the frequency of informing about the risk of cancer-related infertility and FP. The overall models were significant and explained between 8% and 31% of the variance.

A stronger endorsement of oncologists’ communication skills as a barrier to the practices regarding FP predicted a lower frequency of both informing female cancer patients about the risk of cancer-related infertility
and informing about FP. A stronger endorsement of the “patient-related factors” barrier theme also predicted a lower frequency of informing about cancer-related infertility risk.

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Discussion

The main findings of this study are: (1) although the majority of the Portuguese oncologists reported very often or always informing their female cancer patients of childbearing age about their risk of cancer-related infertility and FP, there were still some practitioners who do not take a discussion of FP into consideration in their clinical practice; (2) in all their years of clinical practice, most of these clinicians have referred fewer than ten female cancer patients to a reproductive medicine doctor to make a decision about FP; (3) although lack of time with patients was the strongest endorsed barrier to oncologists’ FP practices of discussion, the lack of oncologists’ communication skills and patient-related factors seem to be the barriers that were more associated with their practices regarding FP; and (4) older oncologists reported informing about FP more frequently, and they weakly endorsed “oncologists’ communication skills” as a barrier to practices regarding FP compared to younger clinicians.

Practices of oncologists regarding FP

Our results showed a discrepancy between the oncologists’ perceptions of discussing FP with their patients and the practice of referring the patient to a fertility specialist. These results are in line with existing research (e.g., Adams et al., 2013) conducted in countries in which the FP is a well-established practice, suggesting that such discrepancy seems to be independent of the contextual specificities. One possible explanation for this discrepancy may be the oncologists social desirability bias, that is, the overestimation of the self-reported oncologists’ practices regarding the frequency of discussing FP with the patients. However, the referral of female cancer patients by the oncologists to make a decision regarding FP with a reproductive medicine doctor may still not be a well-established practice in Portugal, considering that female FP practices are recent in the country and the clinical guidelines for practitioners have been just recently developed and published.

Taking into account the existence of female FP options that can be offered to these patients and the existing research that emphasizes the importance of this discussion with them (e.g., Peate et al., 2011; Perz et al., 2014), these results highlight the need to implement strategies that help to generalize the FP discussion and referral practices. Considering the positive associations between the different practices found in the present study, it is
expected that increasing the frequency of informing patients about cancer-related infertility will also contribute
to increase the frequency of informing about FP and will increase the number of patients referred to a
reproductive medicine doctor. Therefore, there is a need to attempt to improve these practices in general.

**Barriers to oncologists’ practices regarding FP**

This is the first study comparing the oncologists’ relative strength of endorsement of the different barriers to
the FP practices, taking into account that the existing studies only rely on the descriptive oncologists’
perceptions regarding the barriers to their FP practices and do not examine which barriers have a greater impact
on the FP practices. Our results showed that time with patients was the strongest endorsed barrier and
oncologists’ knowledge was the weakest endorsed one. In prior qualitative studies with oncologists, the lack of
time with patients has also been referred by these practitioners as one of the most important barrier to their FP
discussion practices (e.g., Quinn et al., 2007). It is important to note that the Portuguese public health
institutions are overwhelmed with a large number of patients and poor human resources to meet their needs, in
the context of the National Health System. These oncologists are forced to make a high number of consultations
in a short period of time and thus need to decrease the time they spend with each patient. Considering that this
can clearly compromise the implementation of the clinical guidelines regarding the treatment of cancer patients
and specifically concerning FP, health policies decision makers should reflect about these institutional factors
that need to be optimized. The oncologists’ lower endorsement of the knowledge regarding FP as a barrier to
their practices is an unexpected result, taking into account the previous studies (e.g., King et al., 2012). We can
hypothesize that this is already a result of the efforts of Portuguese clinical societies (e.g., the Portuguese
Society for Reproductive Medicine, the Portuguese League Against Cancer) in developing several information
tools for oncologists in recent years regarding the reproductive future of cancer patients (e.g., pamphlets,
websites) (Portuguese Centre for Fertility Preservation, 2015; Silva, Almeida-Santos, Melo, & Rama, 2017), but
this can also be a result of the oncologists’ inaccurate perception of their own FP knowledge. Future studies are
needed to objectively assess the Portuguese oncologists’ knowledge about this topic.

Moreover, considering that the strength of the endorsement of oncologists’ intrinsic barriers (i.e., their
knowledge, communication skills, and their subjective perception of discussing fertility with patients with
different clinical and socio-demographic characteristics) (Panagiotopoulou, Ghuman, Sandher, Herbert, &
Stewart, 2015) proved to be more strongly associated with each other than with extrinsic barriers (lack of time
with patients) and that these intrinsic barriers are more related with the oncologists’ personal characteristics and
can be more easily changed, it becomes clear the importance of developing and implementing effective strategies to overcome these intrinsic barriers together, considering a holistic approach to this matter.

The role of the oncologists’ individual characteristics in their practices regarding FP and in the strength of endorsement of the barriers to these practices

Unexpectedly, the present study only found age differences regarding the oncologists’ practices, with older oncologists informing their female cancer patients about FP more frequently than younger oncologists. This result is not consistent with previous studies, which have found that younger oncologists inform more frequently about FP than older oncologists (e.g., Yee, Fuller-Thomson, et al., 2012). Two reasons may explain our results. First, older oncologists have more clinical experience, which may be translated in more communication skills in health settings than younger clinicians. In fact, these results are congruent with another novel result of the present study, that younger oncologists more strongly endorse “oncologists’ communication skills” as a barrier to the practices regarding FP than older oncologists. Second, in Portuguese health institutions, the first consultations with patients (in which the diagnosis is disclosed, and information concerning treatment side effects and FP is discussed) are commonly performed by more experienced and older oncologists; thus, younger oncologists may not face the opportunity to discuss fertility with their patients as frequently.

Considering the positive associations found between the different FP discussion practices for all clinical specialties, it is important to develop strategies for the optimization of these practices for all the doctors that assist female cancer patients. Moreover, only in the less representative clinical specialties (grouped in the “other” category), an association between the mean number of female cancer patients assisted per year and the practices of the oncologists was found. One possible explanation for this result is that, given the wide variation in clinical specialties and in the number of female patients assisted per year, it is possible that the oncologists that assist more female patients were more frequently confronted with the need to inform and discuss about FP topics.

The relationship between the strength of endorsement of different barrier themes and oncologists’ practices regarding the frequency of informing about the risk of cancer-related infertility and FP

To the best of our knowledge, this study is the first to examine the relationship between the strength of endorsement of the different barriers by oncologists and their real FP discussion practices. Oncologists’ lack of
communication skills and patient-related factors proved to predict poorer oncologists’ practices of discussion with patients about infertility risk and FP.

The moment when a cancer diagnosis is received may be so emotionally overwhelming that the patient’s ability to receive and process information is typically impaired. Thus, it is predicted that communication at these moments will be more successful if it is presented by a communicator who is perceived by the patient as appealing (Cacioppo, Cacioppo, & Petty, 2017; Petty & Cacioppo, 1986). Taking into account that the discussion about the reproductive future of the patient occurs near the cancer diagnosis and together with the explanation of the treatment plan and its side effects, it can be assumed that the communication skills of the communicator of this information are essential features. Oncologists need to be direct and appealing, drawing the patient’s attention to her own infertility risk and guiding her about FP.

Moreover, the discussion of the reproductive future with patients with certain characteristics can be a challenging task for oncologists, taking into account that some of the characteristics raise ethical, moral and legal issues (e.g., the discussion of future infertility with patients with a poor prognosis can be challenging because it raises questions about hope for survival and other emotionally overwhelming issues). Communication skills are even more important in such cases, which is consistent with our previously described finding regarding the strong association between the “patient-related factors” and “oncologists’ communication skills” barriers. For these two reasons (i.e., the ethical, moral and legal issues that these discussions can raise and the lack of communication skills), oncologists’ practices regarding fertility can be negatively affected. However, oncologists’ decisions to discuss fertility with some patients and not to do so with others are subjective, which can lead to a marginalization of some patients’ worries about their reproductive future.

In addition, it is important to note that lack of time with patients was not found to be a predictor of oncologists’ practices regarding FP, despite being the strongest endorsed barrier by these clinicians. This is a particularly innovative and important finding of our study that draws our attention to the fact that oncologists may be less conscious about the intrinsic factors that can undermine their clinical practices. They may be more aware of the impact of institutional factors on their professional performance because, feeling pressured by the health institution, they address it in their everyday professional lives. Despite previous studies found lack of time with patients to be one of the most important barrier for the oncologists (e.g., Quinn et al., 2007), we have to bear in mind that these studies only described these barriers according to the perceptions of the physicians, not examining their association with the real oncologists’ practices regarding FP.
Limitations

Despite the important and innovative findings of the present study, which may be generalizable to other countries with a similar context to Portugal regarding the novelty of female FP and procedures costs-free for patients, there are some limitations that must be considered. First, it is important to note certain factors that may undermine the representativeness of the sample, such as the sample size (e.g., some clinical specialties are under-represented), the diversity of recruitment methods and the fact that it was a self-selected sample (i.e., oncologists with an interest in the topic may be more likely to participate in the study). Second, considering that it was a self-administered questionnaire and that it may occur a social desirability bias leading to an overestimation of the real practices regarding FP, our results must be regarded as an indication of oncologists’ perceptions about their practices and their endorsed barriers. Finally, this was a cross-sectional study, and its results do not demonstrate causality and must be interpreted with caution.

Future research that uses a larger sample of oncologists with different clinical specialties is a next logical step. To replicate this study in other countries with oncologists from the National Health System and with those from the private practice would also be helpful to examine the differences in terms of the most important barriers to the FP practices, in order to better optimize them in the distinctive institutional contexts. It would also be important to cross these results with data from female cancer patients regarding their experience regarding the information about their reproductive future and FP that they received. Finally, it would be relevant to assess the practices of other health professionals (e.g., nurses, psychologists) that also contact with cancer patients and that can help to promote a better decision-making process regarding FP.

Implications for practice

This study highlighted and extended existing findings regarding the extreme importance of promoting better FP discussion and referral practices among oncologists, in order to promote a shared decision-making process regarding FP and, consequently, a better quality of life of the patients in survivorship (Letourneau et al., 2012). Moreover, this study adds novel results to the literature which can give us more clues about how to promote better physicians’ practices in Portugal, and in other countries with National Health System and where female FP techniques are just recently being offered to patients. Oncologists’ communication skills and patients-related factors proved to be the barriers mostly associated with FP practices, but lack of time is perceived by these clinicians as the most important one. Despite strengthening the importance of implementing changes in health policies in order to overcome institutional gaps...
that are limiting the implementation of the clinical guidelines regarding FP, this data mostly draw our attention to the importance of supporting oncologists in their adaptation to this new field of intervention, namely of helping them to be more conscientious about the role of their own intrinsic barriers on their FP discussion and referral practices. Furthermore, the development of active education networks for oncologists is crucial, namely, to increase their knowledge about FP (e.g., development/adaptation of easy to use software for the calculation of patient infertility risk and of methods of contact with a fertility specialist to clinical cases discussion), to improve their communication skills and to adjust their perceptions of the patient-related factors that do not allow them to discuss this topic (e.g., development/implementation of training sessions for oncologists in health institutions). Specifically, younger oncologists need to be more involved in the FP discussion, considering their strongest endorsement of the lack communication skills as a barrier to their practices. Within this context, the cooperation of other disciplines, such as Psychology, may be important in contributing to the education of the oncologists regarding the impact that their intrinsic barriers can have in their clinical practice, in promoting oncologists’ self-knowledge, and in the training of oncologists’ communication skills, that should start in their early years of medical training.
References


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Table 1. Barriers to oncologists’ practices regarding FP (n = 111).

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Oncologists’ knowledge of FP</th>
<th>Oncologists’ communication skills</th>
<th>Patient-related factors</th>
<th>Time with patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>M (SD) Min-N</td>
<td>Entirely disagree</td>
<td>Slightly agree</td>
<td>Somewhat agree</td>
<td>Mostly agree</td>
</tr>
<tr>
<td><strong>Oncologists’ knowledge of FP</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. The success rates of the FP techniques are so low, that it is not important to refer patients to a reproductive medicine doctor.</td>
<td>77 (69.40)</td>
<td>27 (24.30)</td>
<td>5 (4.50)</td>
<td>0</td>
</tr>
<tr>
<td>2. I do not discuss fertility with my cancer patients, taking into account the risk of a cancer recurrence and/or of offspring malformations.</td>
<td>74 (67.30)</td>
<td>27 (23.70)</td>
<td>7 (6.10)</td>
<td>1 (0.90)</td>
</tr>
<tr>
<td>3. Most of the FP techniques are still experimental, so I should not refer cancer patients to a reproductive medicine doctor.</td>
<td>78 (70.30)</td>
<td>28 (25.20)</td>
<td>5 (4.50)</td>
<td>0</td>
</tr>
<tr>
<td>4. I do not discuss the risk of cancer-related infertility with my patients, because I do not know where to refer them.</td>
<td>80 (73.40)</td>
<td>19 (17.40)</td>
<td>8 (7.30)</td>
<td>2 (1.80)</td>
</tr>
<tr>
<td>5. I do not know reproductive medicine doctors where to refer cancer patients to FP.</td>
<td>86 (77.50)</td>
<td>15 (13.50)</td>
<td>8 (7.20)</td>
<td>0</td>
</tr>
<tr>
<td><strong>Oncologists’ communication skills</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. I only inform the patient about the risk of cancer-related infertility when she initiates the topic.</td>
<td>68 (61.80)</td>
<td>29 (26.40)</td>
<td>10 (9.10)</td>
<td>3 (2.70)</td>
</tr>
<tr>
<td>7. I feel comfortable discussing the risk of cancer-related infertility with my cancer patients.</td>
<td>39 (35.10)</td>
<td>41 (36.90)</td>
<td>20 (18.00)</td>
<td>8 (7.20)</td>
</tr>
<tr>
<td><strong>Patient-related factors</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Cancer patients are not interested in the fertility topic, because they are facing a severe illness. So I do not talk about it.</td>
<td>75 (67.60)</td>
<td>22 (19.80)</td>
<td>8 (7.20)</td>
<td>5 (4.50)</td>
</tr>
<tr>
<td>9. I only inform patients about the risk of cancer-related infertility when they are married.</td>
<td>86 (78.90)</td>
<td>21 (19.30)</td>
<td>2 (1.80)</td>
<td>0</td>
</tr>
<tr>
<td>10. I discuss the risk of cancer-related infertility with all my cancer patients.</td>
<td>27 (24.80)</td>
<td>37 (33.90)</td>
<td>30 (27.50)</td>
<td>10 (9.20)</td>
</tr>
<tr>
<td>11. I do not discuss the risk of cancer-related infertility with patients with a bad prognosis.</td>
<td>21 (19.10)</td>
<td>28 (25.50)</td>
<td>31 (28.20)</td>
<td>22 (20.00)</td>
</tr>
<tr>
<td>12. I do not discuss the risk of cancer-related infertility with patients under the age of majority.</td>
<td>80 (75.50)</td>
<td>15 (14.20)</td>
<td>6 (5.70)</td>
<td>1 (0.90)</td>
</tr>
<tr>
<td>13. I do not discuss the risk of cancer-related infertility with patients in emergent need to start cancer therapy.</td>
<td>55 (50.00)</td>
<td>24 (21.80)</td>
<td>22 (20.00)</td>
<td>5 (4.50)</td>
</tr>
<tr>
<td>14. I do not inform the patient about the risk of cancer-related infertility when she already has children.</td>
<td>71 (64.50)</td>
<td>23 (20.90)</td>
<td>11 (10.00)</td>
<td>5 (4.50)</td>
</tr>
<tr>
<td>15. I do not inform the patient about the risk of cancer-related infertility when she is homosexual.</td>
<td>72 (66.10)</td>
<td>26 (23.90)</td>
<td>7 (6.40)</td>
<td>1 (0.90)</td>
</tr>
<tr>
<td>16. I always discuss the risk of cancer-related infertility, even when the patient has a high probability of being fertile after cancer treatment.</td>
<td>27 (24.50)</td>
<td>30 (27.30)</td>
<td>26 (23.60)</td>
<td>17 (15.50)</td>
</tr>
<tr>
<td><strong>Time with patients</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. I have little time available with the patients to discuss the risk of cancer-related infertility.</td>
<td>58 (52.30)</td>
<td>20 (18.00)</td>
<td>20 (18.00)</td>
<td>11 (9.60)</td>
</tr>
</tbody>
</table>

1. Oncologists’ knowledge of FP
<table>
<thead>
<tr>
<th>2. Oncologists’ communication skills</th>
<th>0.52*</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Patient-related factors</td>
<td>0.55*</td>
</tr>
<tr>
<td>4. Time with patients</td>
<td>0.25*</td>
</tr>
</tbody>
</table>

*Reversed items.  
*p < .010
Table 2. The role of oncologists’ individual characteristics in their practices regarding FP and in the strength of endorsement of the barriers to these practices.

<table>
<thead>
<tr>
<th>Individual characteristics</th>
<th>Practices regarding FP</th>
<th>Barriers to the practices regarding FP</th>
<th>Time with patients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency of informing about risk of cancer-related infertility</td>
<td>Frequency of informing about FP</td>
<td>Oncologists’ knowledge of FP</td>
</tr>
<tr>
<td>Gender, M (SD)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>2.74 (1.19)</td>
<td>2.59 (1.41)</td>
<td>0.39 (0.48)</td>
</tr>
<tr>
<td>Female</td>
<td>2.84 (1.07)</td>
<td>2.54 (1.16)</td>
<td>0.38 (0.44)</td>
</tr>
<tr>
<td>t</td>
<td>-0.44</td>
<td>0.21</td>
<td>0.11</td>
</tr>
<tr>
<td>p</td>
<td>.664</td>
<td>.832</td>
<td>.916</td>
</tr>
<tr>
<td>d</td>
<td>.09</td>
<td>.04</td>
<td>.02</td>
</tr>
<tr>
<td>Age, M (SD)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤40</td>
<td>2.73 (1.13)</td>
<td>2.33 (1.18)</td>
<td>0.45 (0.46)</td>
</tr>
<tr>
<td>&gt;41</td>
<td>2.88 (1.09)</td>
<td>2.75 (1.29)</td>
<td>0.32 (0.44)</td>
</tr>
<tr>
<td>t</td>
<td>-0.71</td>
<td>-1.77</td>
<td>1.62</td>
</tr>
<tr>
<td>p</td>
<td>.479</td>
<td>.080</td>
<td>.107</td>
</tr>
<tr>
<td>d</td>
<td>.14</td>
<td>.34</td>
<td>.29</td>
</tr>
<tr>
<td>Clinical specialty, M (SD)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Oncology</td>
<td>0.62 (0.49)</td>
<td>0.49 (0.50)</td>
<td>0.36 (0.42)</td>
</tr>
<tr>
<td>Gynaecology</td>
<td>0.73 (0.45)</td>
<td>0.67 (0.48)</td>
<td>0.30 (0.37)</td>
</tr>
<tr>
<td>Haematology</td>
<td>0.67 (0.49)</td>
<td>0.75 (0.45)</td>
<td>0.54 (0.49)</td>
</tr>
<tr>
<td>Other</td>
<td>0.63 (0.50)</td>
<td>0.63 (0.50)</td>
<td>0.45 (0.61)</td>
</tr>
<tr>
<td>$\chi^2$</td>
<td>1.16</td>
<td>4.07</td>
<td>2.84</td>
</tr>
<tr>
<td>p</td>
<td>.763</td>
<td>.254</td>
<td>.417</td>
</tr>
<tr>
<td>Predictors of oncologists' practices regarding FP.</td>
<td>Frequency of informing about the risk of cancer-related infertility</td>
<td>Frequency of informing about FP</td>
<td></td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>---------------------------------------------------------------</td>
<td>--------------------------------</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$R^2 = .31$</td>
<td>$R^2 = .26$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$F(4, 103) = 13.08^*$</td>
<td>$F(4, 103) = 10.41^*$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$\beta / B (SE)$</td>
<td>$\beta / B (SE)$</td>
<td></td>
</tr>
<tr>
<td>Oncologists' knowledge of FP</td>
<td>-0.03 / -0.08 (0.25)</td>
<td>-0.08 / -0.23 (0.29)</td>
<td></td>
</tr>
<tr>
<td>Oncologists' communication skills</td>
<td>-0.32 / -0.47 (0.15)**</td>
<td>-0.40 / -0.66 (0.18)*</td>
<td></td>
</tr>
<tr>
<td>Patient-related factors</td>
<td>-0.33 / -0.73 (0.24)**</td>
<td>-0.15 / -0.38 (0.28)</td>
<td></td>
</tr>
<tr>
<td>Time with the patients</td>
<td>0.07 / 0.07 (0.08)</td>
<td>0.12 / 0.14 (0.10)</td>
<td></td>
</tr>
</tbody>
</table>

*p < .001, **p < .005, ***p < .05