Enfermería Global
ISSN 1695-6141
Revista electrónica cuatrimestral de Enfermería
Nº 77
Septiembre-Diciembre 2025
www.um.es/eglobal/

ORIGINALS

Fertility preservation in cancer patients of childbearing age: a care approach

Preservación de la fertilidad en pacientes afectos de cáncer en edad fértil: abordaje asistencial

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https://doi.org/10.6018/eglobal.651531

elocation-id: e651531

Received: 28/02/2025
Accepted: 23/09/2025

ABSTRACT:

Objective: To identify the fertility preservation care approach offered by professionals in the Catalan public health system (Spain) to cancer patients of childbearing age undergoing cancer treatment.
Methods: Multicentre cross-sectional descriptive study, Catalonia (Spain) in 2023. Participants were health professionals caring for cancer patients of childbearing age after diagnosis: physicians, residents and nurses. Estimated sample of 287 professionals (CI: 95% and p=q=0.5), accidental sampling. Ad hoc online questionnaire with 42 questions.
Results: One hundred nine professionals participated, 74% (81) nurses, 24.8% (27) physicians and one resident. Fertility preservation was considered by 97.2% (106) of the professionals as an important issue to be addressed from the beginning of the diagnosis. Seventy-eight percent (85) of the professionals reported that they had not received specific training in fertility preservation. 19.4% (21) of the participants indicated that their centre had a fertility preservation counselling unit, but only 9.2% (10) of them indicated that their centre had an assisted reproduction unit. Referral was made by the physician in 49.1% (53) of the cases.
Conclusions*:* There is an approach to fertility preservation that is not based on institutional guidelines or protocols. Professionals perceive a need for training in fertility preservation.

Keywords: Fertility Preservation; Cancer; Nursing.

RESUMEN:
Objetivo*:* Identificar el abordaje asistencial de la preservación de la fertilidad ofrecido por los profesionales del sistema de sanidad público Catalán (España) a pacientes con cáncer en edad fértil y recibirán tratamiento oncológico.
Metodología*:* Estudio descriptivo transversal multicéntrico, Cataluña (España) en 2023. Los participantes fueron profesionales de la sanidad que atendían a pacientes con cáncer en edad fértil tras el diagnóstico: médicos, residentes médicos y enfermeras. Muestra estimada de 287 profesionales (IC:95% y p=q=0,5), muestreo accidental. Envío de cuestionario *adhoc* online con 42 preguntas.
Resultados*:* Participaron 109 profesionales, 74% (81) enfermeras, 24,8% (27) médicos y un médico residente. La preservación de la fertilidad fue considerada para el 97,2% (106) de los profesionales un tema importante a ser abordado des del inicio del diagnóstico. El 78% (85) de los profesionales indicaron no haber recibido formación específica en preservación de la fertilidad. El 19,4% (21) de los participantes indicaron que en su centro existía unidad de asesoramiento de la preservación de la fertilidad, pero sólo el 9,2% (10) de ellos indicó que en su centro existía una Unidad de Reproducción Asistida. La derivación corrió a cargo en el 49,1% (53) por el médico.
Conclusiones*:* Existe un abordaje de la preservación de la fertilidad no basado en la guías o protocolos institucionales. Los profesionales perciben necesidades de formación en preservación de la fertilidad. El rol de la enfermera en la atención de la preservación de la fertilidad es bajo, siendo mayoritariamente el equipo de oncohematología médica quién la indica y la gestiona.

Palabras Claves: Preservación de la Fertilidad; Cáncer; Enfermería.

INTRODUCTION

Globally, the absolute number of cancer cases continues to rise, a phenomenon closely linked to population growth and ageing. By 2050, cancer incidence rates are estimated to reach approximately 19% in men and 16.3% in women, according to GLOBOCAN data. This increase also reflects improvements in patient survival thanks to preventive initiatives, early detection campaigns, and advances in treatment. [1,2] Increased survival poses new challenges for cancer survivors in terms of their future needs and the quality of life offered. Fertility impairment, temporary or permanent, secondary to the disease and antineoplastic treatments will impact both physically and emotionally, and will remain present even after the cancer process is over. This is why the care process must be approached with a broad vision of the vital process, beyond diagnosis and treatment [3,4]. The approach to the process of care for genetic desire requires a multidisciplinary and holistic approach from the moment of cancer diagnosis and during survival, as recommended by the American Society of Clinical Oncology (ASCO) in its recent update [5].

Oncofertility emerged with the purpose of preserving reproductive capacity in cancer patients, offering them the possibility of fulfilling their future reproductive wishes and improving their quality of life in patients who will receive gonadotoxic treatments [6]. Reproductive consultations provide patients with specialised information about reproductive capacity, offering available therapeutic alternatives to preserve their fertility. Currently approved fertility preservation methods include procedures to protect or store sperm, oocytes or gonadal tissues from gonadotoxic effects, with the aim of preserving an individual's ability to conceive [7]. Providing access to fertility preservation requires optimal coordination between oncohematology services and fertility units, ensuring that the process is carried out effectively within the period between diagnosis and initiation of treatment [8,9]. The expert fertility team evaluates the patient's life situation and future desires, determining the fulfilment of criteria for access to fertility preservation treatments. Among the factors considered are age, sex, family history, gynaecological history, stage of the disease, type of treatment to be followed, as well as ovarian reserve and sperm quality, among others [10].

Difficulties in dealing with fertility preservation are diverse and influenced by many factors. According to the meta-analysis by Panagiotopoulou N et al., there are intrinsic elements related to the patient, such as attitudes, health beliefs and health literacy. Aspects linked to the competencies of doctors during the care process and the dynamics of the doctor-patient relationship are also identified. On the other hand, extrinsic factors also stand out, such as the availability of resources for fertility preservation care and the characteristics of the institutions themselves [11]. In line with this, Covelli et al. highlight the relegation of the approach to infertility at the time of diagnosis by professionals, the lack of time for an adequate approach to the complexity of the situation and the strategies required, as well as the lack of knowledge and in accordance with the guidelines of the Clinical Guides, are among the most reported barriers [12].

The low involvement of nurses in the fertility preservation process, despite the recognition of its importance, is framed by possible role conflicts in the responsibility for the process, as well as the lack of knowledge and specific training on oncofertility [13]. Keim-Malpass et al, [14] Vadaparampil et al. propose models of care that include structured programmes to educate oncology nurses, with the aim of preparing them adequately and consolidating their participation in the fertility preservation team [15].

Given the importance of fertility preservation in people undergoing cancer treatment, the main objective of this study was to identify the care approach to fertility preservation provided by professionals in the Catalan public health system to cancer patients of childbearing age. We also sought to evaluate the relevance attributed by professionals to this aspect, the level of training received in this area and the roles played by them in the related care process.

MATERIAL AND METHOD

DESIGN AND PARTICIPANTS

A descriptive, multicentre cross-sectional study was conducted in three public hospitals with specialised oncohaematology units located in the provinces of Barcelona and Girona, Catalonia, Spain. These centres provide oncology care to 50% of patients diagnosed with cancer in this autonomous community. The target population consisted of 1,123 healthcare professionals who provided care to patients of childbearing age after receiving a cancer diagnosis, including doctors (specialists in oncology, haematology, and radiation oncology), medical residents, and nurses. A sample of 287 professionals (CI: 95% and p=q=0.5) was estimated using accidental sampling, through the sending of an online questionnaire between February and May 2023. The exclusion criteria were healthcare experience of less than one year at the study centre, and forms that were not completed in full were rejected.

DATA COLLECTION AND TOOLS

The variables analysed in this study included professionals' perception of knowledge about fertility preservation in oncohaematological patients, as well as the care models and circuits implemented to ensure such care in their respective work environments. To collect information, a questionnaire designed specifically for this purpose (ad hoc) was used, pre-tested with 10 expert professionals in the field of study, who were not part of the study. The instrument consisted of 42 closed-ended multiple-choice questions and one open-ended opinion question. Participants were contacted via corporate emails and

provided with invitations to participate voluntarily, which included informed consent in digital format. Data collection took place between February and May 2023, with two rounds of reminders after the start of the study during that period. Access to the questionnaire was provided via an external link that was not directly linked to the institution, ensuring participants' complete anonymity in their responses.

ETHICAL CONSIDERATIONS

The project was approved by the Management and the Ethics and Research Committee, in accordance with current legislation (CEIM code: 2023/026). All professionals gave their consent to participate.

DATA ANALYSIS

The data were processed using SPSS software (IBM Statistical Package for the Social Sciences, version 20). A descriptive analysis was performed in which quantitative variables were presented as means accompanied by their corresponding standard deviation, while categorical variables were described using frequencies and percentages. For the bivariate analysis, contingency tables were used, applying the Chi-square test or Fisher's exact test, depending on the sample size of the categories. A statistical significance level of $p<0.05$ was considered.

RESULTS

A total of 109 professionals participated in this study, representing 37.9% of the previously estimated sample. Among them, 74% (81) were nurses, while 24.8% (27) were doctors, in addition to one resident doctor. Female participation predominated, with 82.6% (90) of the total number of subjects. The average age of the participants was 39.9 ± 11.8 years, and they had an average of 14.9 ± 10.2 years of professional experience in the management of oncohaematological patients. On the other hand, the monthly number of patients of childbearing age treated by the participants varied widely, with an estimated range of 10 to 50 cases.

APPROACH TO FERTILITY PRESERVATION

Up to 97.2% (106) of professionals considered fertility preservation to be a fundamental issue that should be addressed from the outset of diagnosis. In contrast, only 2.8% (3) perceived it as secondary. Despite this initial assessment, only 42.2% (46) indicated that they actively consulted on the issue at the start of the oncological process, while 30.3% (33) acknowledged that they never addressed it.

There was a diversity of opinions regarding the appropriate time to discuss fertility preservation; 69.4% (75) indicated that it should be addressed early on, but not necessarily at the time of diagnosis. The analysis presented in Table 1 shows how the level of exploration of the desire for fertility preservation varies according to professional category. In this regard, the medical team specialising in oncology and haematology was found to be more involved than other professionals [$\chi2(12, N=190) = 28.13$, $p=0.005$]. It should be noted that no significant differences were identified in relation to the gender of professionals in terms of the frequency of exploration [$\chi2(4, N=190) = 4.23$, $p=0.376$].

Table 1. Exploration of the desire to preserve fertility by professionals

Frequency of scanning N (%)	Total	Nursing	Oncology medical	Haematology clinical	Oncoradio-terapy
Yes, always	9 (8.3%)	5 (6.7%)	2 (14.3%)	2 (12.5%)	0 (0.0%)
Yes, frequently	13 (11.9%)	9 (12.0%)	0 (0.0%)	4 (25.0%)	0 (0.0%)
Yes, occasionally	46 (42.2%)	23 (30.7%)	11 (78.6%)	8 (50.0%)	4 (100.0%)
No, never	33 (30.3%)	31 (41.3%)	0 (0.0%)	2 (12.5%)	0 (0.0%)
I don't know	8 (7.3%)	7 (9.3%)	1 (7.1%)	0 (0.0%)	0 (0.0%)
Total	**109 (100.0%)**	**75 (68%)**	**14 (12.8%)**	**16 (14.7%)**	**4 (3.7%)**

Seventy-eight per cent (85) of the professionals surveyed reported not having received specific training in fertility preservation focused on cancer patients of childbearing age. In addition, 83.3 per cent (90) stated that they were unaware of the existence of clinical guidelines on fertility for cancer and haematology patients of childbearing age within their respective healthcare centres. This lack of knowledge varied according to professional category: doctors specialising in oncology and haematology had a higher level of knowledge compared to nursing professionals, while those working in the field of radiation oncology showed no knowledge whatsoever [$\chi^2(6, N=108) = 0.30.15$; $p < 0.001$]. No significant differences were found according to the gender of the professional [$\chi^2(2, N=108) = 0.68$; $p = 0.712$].

A high percentage of respondents, 88.1% (96), reported not using any specific guidelines to address fertility preservation in their professional practice. However, all participants (100%; n = 109) considered it important to have some protocol or guideline on fertility preservation applicable in clinical practice. Although only 2.8% (3) of respondents stated that they were unaware of the adverse effects of oncohaematological treatments on fertility, 58.3% (63) expressed an interest in updating their knowledge in this area.

Regarding fertility preservation methods approved in Spain, 26.6% (29) stated that they were familiar with them, while 40.4% (44) indicated that they were unsure and 33% (36) acknowledged that they had no knowledge of them. Only 15.6% (17) of professionals stated that they were aware of the criteria that should be considered when offering fertility preservation options to patients. Regarding the most appropriate professional profile for providing fertility counselling to oncohaematological patients, 67.6% (73) were willing to accept that any healthcare professional specifically trained in this field could perform this task (Table 2).

Table 2. Professional responsible for fertility preservation information

Professional in charge of information	n	%
Oncologist, haematologist, radiation oncologist	14	13.0
Gynaecologist specialising in reproduction	17	15.7
Trained healthcare professionals (oncologist, radiation oncologist, nurse, gynaecologist, psychologist)	73	67.6
Referring doctor and specialist gynaecologist	2	1.9
Others	2	1.9
Total	**108**	**100.0**

FERTILITY COUNSELLING AND PRESERVATION OR ASSISTED REPRODUCTION UNITS

Only 19.4% (21) of respondents indicated that their centre has a unit dedicated to fertility preservation counselling. However, only 9.2% (10) reported that their centre has an Assisted Reproduction Unit capable of directly treating patients without the need for referral. The criteria for referral to these units, as reported by the professionals, are detailed in Table 3. The most frequent reason for referral is the administration of treatments with high gonadal toxicity aimed at nurses, while referrals due to reproductive age or patient interest are usually attributed to medical decision-making. Furthermore, no significant differences were observed in referral patterns according to the type of professional [$\chi2(6, N=106)= 0.44$, $p=0.150$], nor based on their gender [$\chi2(2, N=106)= 0.61$, $p=0.766$].

Table 3. Profile of patients referred to fertility preservation counselling units

Referred patient N (%)	Total	Nursing	Oncology medical	Haematology clinical	Oncoradio-therapy
All patients of reproductive age	34 (32.1%)	25 (34.7%)	2 (14.3%)	7 (43.8%)	0 (0.0%)
Patients who show interest in the subject	33 (31.1%)	18 (25.0%)	7 (50.0%)	5 (31.2%)	3 (75.0%)
Patients who will receive highly gonadotoxic treatment	39 (36.8%)	29 (40.3%)	5 (35.7%)	4 (25.0%)	1 (25.0%)
Total	**106 (100.0%)**	**72 (67.9%)**	**14 (13.2%)**	**16 (15.1%)**	**4 (3.8%)**

The care model implemented during the referral of patients to Fertility Counselling Units showed considerable variability in terms of the professionals involved in the process. In most cases, the recommendation to proceed with the referral came from the doctor specialising in oncohaematology (49.1%). This same professional also assumed, to a large extent, the responsibility of managing the referral procedures independently (46.3%), as detailed in Table 4.

Table 4. Care model for referring patients to fertility counselling units

Who indicates the referral?	**n**	**%**
Onco-haematology doctor	53	49.1
Nurse	3	2.8
Gynaecologist	1	.9
Doctor and/or Gynaecologist	15	13.9
Doctor and/or Gynaecologist and/or Nurse	30	27.8
nk/na	6	5.6
Total	**108**	**100,0**
Who handles the referral procedures?	**n**	**%**
Doctor	50	46.3
Nurse	10	9.3
Administrative	7	6.5
Administrative, Nurse	3	2.8
Administrative and/or Medical	16	14.8
Administrative and/or Medical and/or Nursing	12	11.1
nk/na	10	9.3

Total	**108**	**100.0**

nk/na: Does not know, does not answer

From the analysis of the referrals made, only 26.9% (29) of professionals reported following up on the case during the process. On the other hand, the time required for referral for preservation purposes showed differences between genders, with men taking less time than women. For men, this period was up to one week before the start of treatment for 30.6% (33), while for women it was 8.3% (9), as shown in Table 5.

Table 5. Estimated referral time by gender

	Men		**Women**	
Derivation time	**n**	**%**	**n**	**%**
One week before treatment	33	30.6	9	8.3
Two weeks before treatment	6	5.6	16	14.8
One month before treatment	8	7.4	26	24.1
I am not sure	61	56.5	57	52.8
Total	**108**	**100.0**	**108**	**100.0**

The fertility preservation methods reported by specialists include, in the case of male patients, semen cryopreservation, implemented in 100% of cases. On the other hand, for female patients, oocyte cryopreservation is the most widely used technique (see Table 6).

Table 6. Recommended preservation treatment in women according to treatment

Chemotherapy	**n**	**%**
Oocyte cryopreservation	68	63.0
Ovarian tissue cryopreservation	4	3.7
All	19	17.6
Others	1	.9
nk/na	16	14.8
Total	**108**	**100.0**
Radiotherapy	**n**	**%**
Oocyte cryopreservation	66	61.1
Ovarian tissue cryopreservation	1	.9
Embryo cryopreservation	3	2.8
Ovarian transposition	6	5.5
Others	1	.9
nk/na	31	28.7
Total	**108**	**100.0**

nk/na: Does not know, does not answer

DISCUSSION

The aim of this study was to identify the approach to fertility preservation care provided by professionals in the Catalan public health system to cancer patients of childbearing age. It also sought to assess the importance attributed to this aspect by professionals, the level of training received on this subject, and the roles performed by professionals in the related care process.

The results show that professionals consider fertility preservation as a significant issue that should be addressed from the initial stages of diagnosis. However, this approach is insufficient, as less than half of the professionals actively explore the patient in the early stages of the cancer process. These results are in line with the findings of previous studies such as Panagiotopoulou N et al. [11], De Simone et al. [16] and Linnane S et al. [17].

Infertility, although a late effect of cancer treatment, has a negative impact on the quality of life of young cancer survivors. It therefore requires a comprehensive assessment of intrinsic and extrinsic factors, such as patient attitudes and beliefs, the structure of the care model, availability of services and professional competencies. This process demands a robust relationship between the care team and the patient based on trust, which is unlikely to develop during the first consultation [11,16].

There is a consensus that an early approach should be prioritised without necessarily taking place at the time of diagnosis. These results are consistent with previous studies of patients diagnosed with breast cancer, who reported a care process focused on ensuring survival and stressed the importance of avoiding decisions made under pressure. Despite this, they expressed a desire to have access to accurate information in advance in order to make relevant decisions related to aspects such as fertility or breastfeeding [17,18].

In relation to specific training in fertility preservation, only a low percentage of the professionals had received training in this area, and many were unaware of the existing clinical guidelines for oncohaematological patients. Although these guidelines are available in the participating institutions, the results underline not only the importance of their development, but also the need for adequate dissemination through continuous training programmes aimed at both active professionals and new recruits [16]. Despite this, most reported some knowledge of the effects of oncohaematological treatments on fertility, but expressed an interest in further training. The study shows that professionals base their approach to the process on their individual experience, highlighting the lack of protocols or specific consultation tools to guide their clinical practices [19]. This finding is in line with the systematic review conducted by Chitoran et al. where it was concluded that medical teams frequently do not take into consideration the recommendations set out in clinical guidelines for patients over 35 years of age with gynaecological cancer [20].

On the other hand, the results reflect a preference for multidisciplinary counselling that integrates professionals trained in fertility preservation for oncohematological patients [21]. This approach is in line with the approach of Kim J et al. who advocate a model based on multidisciplinary teams in order to ensure smooth access to the care process and provide comprehensive care that addresses the patient's needs from a holistic perspective [9].

Regarding the services available in the participating centres, knowledge about dedicated fertility counselling units was extremely low. Only a few professionals in one of the centres indicated the existence of an Assisted Reproduction Unit while in the rest of the institutions external referrals to specialised hospitals are used. The results expose the structural barriers faced by both patients and professionals when seeking comprehensive and efficient care. Previous studies have proposed remote linkage models with specialised fertility preservation centres as an alternative to fragmented

care. Such initiatives may be promising solutions to improve access and ensure more coordinated and multidimensional care [6,22,23].

The referral of patients to fertility counselling units is usually done mostly by the oncohaematology medical team, although the follow-up after the referral process is often insufficient. The role of nurses in this area is limited or practically minimal compared to other professionals, which is in line with the trend observed internationally. Although several models have shown positive results after integrating nurse-led family planning programmes, the involvement of nurses in both needs identification and fertility education for oncohaematology patients currently remains low [24-27].

Half of the participants expressed uncertainty about their knowledge of fertility preservation systems [25]. For men, sperm cryopreservation was mentioned as the only reported alternative, leaving aside other emerging techniques such as testicular tissue preservation or spermatogonial stem cells [27]. These findings support that sperm cryopreservation is perceived as one of the simplest and most effective strategies to preserve male fertility in adulthood. However, this perspective may reflect a lack of knowledge about options applicable to younger populations [28,29]. On the other hand, women have a variety of modalities available to preserve their fertility, including less invasive options such as uterine transposition during surgical procedures indicated for patients receiving pelvic radiotherapy [30]. The increased technical and procedural complexity associated with forms of female fertility preservation consequently demands a significant increase in referral time and specialised care.

Half of the participants expressed uncertainty about their knowledge of fertility preservation systems.[23] In the case of men, semen cryopreservation was mentioned as the only reported alternative, leaving aside other emerging techniques such as testicular tissue preservation or spermatogonial stem cells.[26] These findings support the view that sperm cryopreservation is perceived as one of the simplest and most effective strategies for preserving male fertility in adulthood. However, this perspective may reflect a lack of knowledge about options applicable to younger populations.[26-27] On the other hand, women have a variety of options for preserving their fertility, including less invasive options such as uterine transposition during surgical procedures indicated for patients receiving pelvic radiotherapy.[28] The greater technical and procedural complexity associated with female fertility preservation methods therefore requires a significant increase in the time allocated for referral and specialised care.

Among the main limitations of this study, the low response rate among participating professionals stands out, which prevented the required sample size from being achieved to ensure adequate inference of the results to the study population. Likewise, the absence of stratification by professional category or specialty led to insufficient participation in certain areas, such as radiation oncology, limiting the representativeness of this specialty in the findings obtained.

The absence of stratification of the sample according to professional categories or workplaces also limited the possibility of carrying out specific inferential analyses for these variables. Furthermore, the use of a questionnaire designed specifically to explore the care model—although it underwent a preliminary validation process—reduces the external validity of the results, making it difficult to transfer them and compare them with previous or future studies in similar contexts.

The results provide an opportunity to establish protocols and training programmes for professionals to improve the fertility preservation counselling process.

The incorporation of fertility preservation competencies in postgraduate oncology training may encourage greater integration of the nurse within the multidisciplinary team to care for patients of childbearing age receiving oncology treatment, as previous experiences have shown.

Technological advances in telemedicine offer the opportunity to implement new models of remote counselling between the oncology team and the fertility preservation unit, ensuring continuity of care.

CONCLUSIONS

In conclusion, it should be noted that the professionals stated that they were unaware of the existence of clinical guidelines on fertility for oncohematological patients of childbearing age in their respective care centres.

A high percentage of patients of childbearing age require external referrals to specialised centres to meet the demands associated with fertility preservation, given the absence of a specialised fertility preservation unit in the study centres. Also, longer times were reported for the management and referral of women candidates for fertility preservation procedures.

The professionals identified the need for specific training on fertility preservation, as well as the implementation of protocols based on updated clinical guidelines.

There is little nurse involvement in the fertility preservation care process, with the medical team specialising in oncohaematology being mainly responsible for indicating and managing these interventions. The current situation presents an opportunity to expand the role of nurses in the future, particularly in the context of education and counselling for young patients with oncohaematological diagnoses requiring fertility preservation strategies.

ACKNOWLEDGEMENTS

The authors would like to thank all the professionals who participated in the study for their collaboration, and the CERCA Programme /Generalitat de Catalunya for institutional support.

FINANCING

This study has not received external support.

CONFLICT OF INTEREST

The authors declared that they had no conflicts of interest.

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