



Challenging cases in oncofertility: insights from a national specialized e-meeting for fertility preservation specialists

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Abstract

Purpose To determine the use of a new specialized E-Meeting for Complex Cases in Oncofertility by fertility preservation specialists (FPSs)

Material and methods We present 3 years of activity of the E-Meeting for Complex Cases in Oncofertility, a new tool created in September 2016 which allows national oncofertility experts to share viewpoints about challenging cases for which they do not have experience or sufficient data in order to provide them an emergency advice within 48 h. Second, a survey was conducted to evaluate the use of this e-meeting for participating FPSs.

Results One hundred and four experts have joined the e-meeting since its set-up, and 109 challenging cases have been submitted. The mean age of the patients was 22.4 ± 8.9 years, and 87.0% were female. Each submitted case received on average of 1.8 ± 1.1 different strategies for FP and the opinions of 7.1 ± 3.4 experts. Among the FPSs who submitted cases, seeking opinions from other FPSs allowed them to confirm their care plan ($N = 49$, 84.4%), to offer different options to their patients ($N = 34$, 58.6%), and to compare their practices with those of other specialists ($N = 23$, 39.6%). All respondents reported a self-perceived improvement in their practice of oncologic FP ($n = 80$, 100.0%).

Conclusion Specific attention should be paid to challenging cases for which the experiences of only a few individuals exist. Enhancing communication between FPSs through oncofertility networks, pooling experiences, and collecting the most complex cases is required to improve the management of these patients.

Keywords Fertility preservation · Oncofertility · Model of care · Network · Complex cases

Introduction

The ability to achieve parenthood is an important issue among cancer survivors concerned with potential infertility induced

by treatments. This risk of infertility also has negative impact on survivors' well-being and intimate relationships [1]. Health care professionals should now inform newly diagnosed young cancer patients about fertility preservation (FP) possibilities [2–4]. Furthermore, even when no action is taken to preserve fertility, consultation with a fertility preservation specialist (FPS) itself helps patients cope with the burden of treatments and is associated with less regret and improved quality of life among cancer survivors [5, 6].

Oncofertility is an innovative medical discipline and aims to both further preserve the fertility of patients with a malignant disease and manage endocrine complications arising from treatments (e.g., pubertal delay, hormonal deficiency, sexual dysfunction) [7, 8]. Providing oncofertility care is a complex task, requiring referral pathways, collaboration between oncologic teams and FPS, medical and communication skills, and specific facilities [9]. By bringing together all these elements, FP networks aim to improve oncofertility care.

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These structures include a supply for counselling in FP, centralization of facilities, and continuing education for healthcare professionals [10].

In France, there is no specific network for oncofertility care, and regional oncology networks promote the quality and safety of treatments for cancer patients, particularly in new fields such as oncofertility care [11]. Although we have an increased amount of data regarding the effectiveness of FP techniques to preserve fertility in the most common cancers, the management of a rare or complex oncofertility case remains challenging for FPSs due to a lack of large cohort studies and self-experience with rare cancers. We previously reported the case of a 26-year-old woman diagnosed with rectal cancer who was referred to our FP centre in 2015. This patient was scheduled to receive combined chemoradiotherapy with a total dose of 50.4 Gy followed by a total colectomy with abdominoperineal amputation and definitive ileostomy. As a result of differences in opinion within our team concerning the management to be proposed, the patient requested that we obtain a collegial opinion from experts across the country. She finally underwent bilateral ovarian transposition before she started cancer treatments, which allowed us to preserve her fertility and her to achieve spontaneous pregnancies [12]. As a result of the management of this challenging case, the increased need for shared knowledge led FP teams to set up this national e-meeting, in September 2016.

This article aims to present the first activity results of this e-meeting, 3 years since its set-up, and to assess the interest and use of this new tool by FPSs when they face a challenging oncofertility case.

Material and methods

We present 3 years of activity of a national e-meeting that was set up for the management of challenging oncofertility cases. We first conducted a retrospective analysis of all submitted cases between September 2016 and December 2019 to describe the activity of the e-meeting. Second, a 16-question survey to evaluate the use of this e-meeting at participating FPS was conducted.

The E-Meeting for Complex Cases in Oncofertility

The E-Meeting for Complex Cases in Oncofertility, created in September 2016, is a new tool that allows oncofertility experts to share viewpoints about challenging cases for which they do not have experience and/or for which insufficient data are available in the published literature. Participants in this e-meeting are experienced FPSs; most of them are gynaecologists, reproduction biologists, and endocrinologists who work in an authorized centre for FP in France. They are informed of the set-up of the e-meeting at specialized congresses through their regional

oncology network and by discussion between colleagues. They must first register for the e-meeting either by means of their regional oncology network or by directly contacting the e-meeting coordination team. When faced with a challenging case, each registered FPS can obtain nationwide advice by completing an anonymized dedicated form that is sent to the e-meeting coordination and sent to participants by e-mail. The form includes a short description of the case, the received or intended treatments and doses, data about the ovarian reserve assessment if available, and specific requests of the specialist submitting the case, if any. Each patient provides his/her consent for his/her case to be discussed anonymously and analysed by the members of the e-meeting. Experts who wish to provide an opinion about the case must reply to the e-mail within 48 h after the case submission, and a synthesis of the replies is returned to the specialist by the e-meeting coordination to provide “emergency counselling”. The proposals and advice of the e-meeting are only consultative opinions. Each patient provides his/her consent for his/her case to be discussed and analysed by the experts of the e-meeting. The registration and submission process to the e-meeting is described in Fig. 1.

Activity and use analysis of the e-meeting

A retrospective analysis of all cases submitted since the establishment of the e-meeting in September 2016 until December 2019 was conducted. First, we evaluated the number of cases submitted each month, demographic data, types of cancers involved, and number of proposals and replies for each case to evaluate the activity of the meeting. Second, an anonymized questionnaire was sent to the members of the e-meeting to evaluate the use of this new tool in their oncofertility practice. The survey included 16 questions and was sent by e-mail using online dedicated software (LimeSurvey GmbH, Hamburg, Germany). The complete questionnaire is available in [Appendix](#). Questions of our survey were pilot-tested as they were specially created for the study. The first four questions aim to describe the population of FPSs participating in the e-meeting (e.g., medical speciality, number of years of experience) and their available resources to manage a complex oncofertility case before the set-up of the meeting. Six questions pertained to the FPS who had previously submitted a case and assessed the reasons why the case was submitted. Specific questions explored the expected assistance from the meeting, especially when the author of the case had a first care plan draft to propose. Questions evaluated the self-perceived improvement of the FPS participating in the e-meeting to manage similar cases and their global improvement in oncofertility practice. Participants replied between February and June of 2020. Due to the COVID-19 pandemic, one reminder by e-mail was necessary to obtain a sufficient participation rate. In order to protect participant’s privacy, we only collected data about participant’s speciality and years of

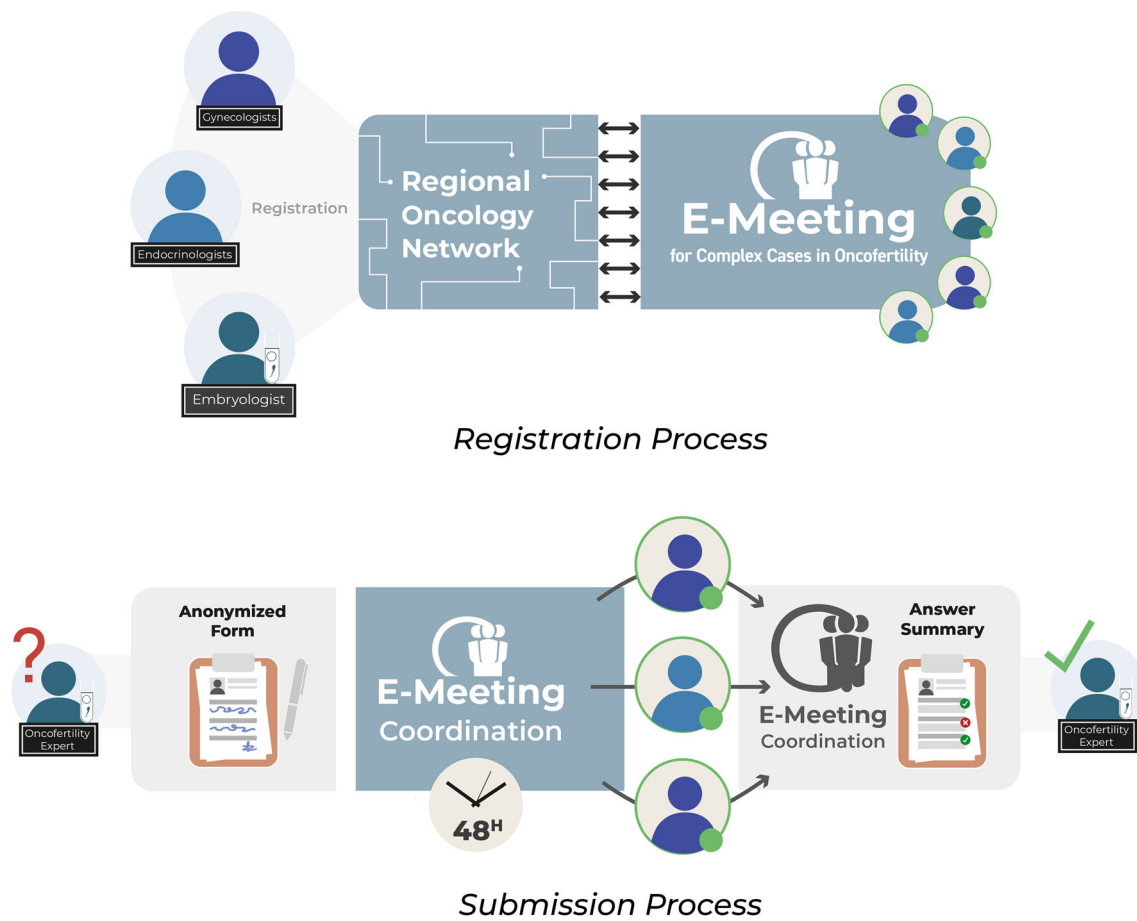


Fig. 1 Registration and submission process of the French E-Meeting for Complex Cases in Oncofertility

experience in the field of reproductive medicine. Categorical variables are expressed as percentages and absolute values. Continuous variables following a normal distribution are expressed as a mean \pm standard deviation. This study was approved by the local ethics committee of Aix Marseille University (N° 2019-17-10-003).

Results

Activity of the e-meeting

In December 2019, the e-meeting had 104 members, including reproductive biologists ($n = 62$, 59.6%), gynaecologists ($n = 36$, 34.6%), and endocrinologists ($n = 4$, 3.8%), a midwife and a pharmacologist. Among them, 80/104 replied to the survey (participation rate: 76.0%). Among them, 44/80 had joined the e-meeting through their regional oncology network (55.0%). Participants reported having on average of 17.6 (± 10.0) years of experience in the field of reproductive medicine. During the study period, 109 challenging cases of FP for cancer patients were submitted for a national consultation via the e-meeting. Ninety-five of 109 submitted cases involved

females (87.1%), and the mean age of the patients was 22.4 (± 8.9) years. Children under 15 accounted for 17/109 cases (15.5%). Types of cancers, the age distribution, and examples of submitted challenging cases are presented in Fig. 2 and Table 1. Most cases were haematological cancers ($n = 32/109$, 29.0%), gynaecologic cancers ($n = 30/109$, 27.0%), and neurological cancers ($n = 12/109$, 10.9%). Other types of cancer involved were sarcomas and breast cancers (respectively $n = 7/110$, 6.3%), urologic cancers ($n = 6/110$, 5.4%), hepatic cancer ($n = 5/110$, 4.5%), dermatological cancer ($n = 5/110$, 4.5%), cancer of soft tissues, and pneumologic and endocrinologic tumours (respectively $n = 2/110$, 1.8% each). On average, each submitted case received the opinion of 7.1 ± 3.4 experts and 1.8 ± 1.1 different FP care plans.

Use of the e-meeting by fertility preservation specialists

Experts responding to our survey were reproductive biologists ($n = 43$), gynaecologists ($n = 31$), endocrinologists ($n = 4$, 3.8%), a midwife, and a pharmacologist. Among experts responding to our survey, 58/80 had already submitted a case to the e-meeting (72.5%), and 51/80 had already given their

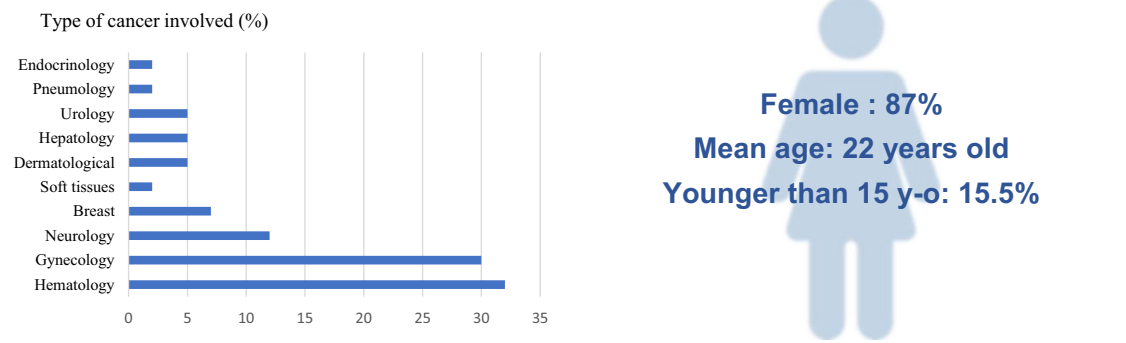


Fig. 2 Characteristics of challenging cases submitted to the Oncofertility e-meeting

opinion about a submitted case (63.7%). The submission of the case with a systematized fill-in form sent by e-mail appears to be effective since 72 of 80 participants felt that the submitted cases were well understood by their colleagues (91.0%). Thirty-two of 80 FPSs joined the e-meeting only to benefit from the expertise of other participants (40.0%), and 46 of 80 joined to both benefit from advice and share their expertise with other members (57.5%). Before the establishment of the e-meeting, when they faced a complex oncologic FP case, the participants were referring to scientific literature ($n = 61/80$, 76.2%), looking for direct advice from colleagues ($n = 61/80$, 76.2%), and looking for guidance from local consultation meetings ($n = 54/80$, 67.5%). The reasons for submitting a case were to seek advice from national experts ($n = 40/58$, 68.9%), a lack of consensus or data in the published literature ($n = 23/58$, 39.6%), and a lack of experience with the situation encountered ($n = 38/58$, 65.5%). Medico-legal considerations were grounds for submission of cases for 34 participants (58.6%). Thirty-one participants also used the e-meeting as a second recourse if no consensus was reached after a first local consultation ($n = 31/58$, 53.4%). Most of the participants who had previously submitted a case had already devised a first FP strategy to propose to the patient before submission (“Always”: $n = 10/58$, 17.2%; “Often”: $n = 34/58$, 58.6%; “Sometimes”: $n = 13/58$, 22.4%). In this case, they reported submitting a case to confirm their decision ($n = 49/58$, 84.4%), to propose alternative options to their patients ($n = 34/58$, 58.6%), and to compare their practice with those of other FP experts across the country ($n = 23/58$, 39.6%). Ethical issues regarding the possibilities and limitations of FP were also one of the reasons why experts submitted a case ($n = 22/58$, 37.9%). After receiving the experts’ response, participants claimed to follow their advice in the majority of cases (“Always” = 57%; “Often” = 41%). Only 7 participants reported that they needed additional advice after submitting a case; one said he had an incomplete response to his questions, three needed information about the teratogenic risk of cancer treatment for a future pregnancy, and two declared that they also sought complementary information in the literature. Overall, participants reported that their attendance at the e-meeting helped them in similar cases ($n = 78$, 97.5%), and there was a

Table 1 Examples of challenging cases of fertility preservation

Examples of challenging cases of fertility preservation

Case: Cerebellar vermis medulloblastoma in a 7-year-old girl treated with chemotherapy (Vepesid-carboplatin) and surgery followed by high dose of thiotepa, stem cell transplantation, cranial radiation and maintenance chemotherapy (temozolomide)

Question asked: is there any point in offering OTC?

Advices (9 answers): High-risk treatment of POF. OTC can be offered by informing parents of the risk of ovarian metastases and the impossibility of reusing cryopreserved tissue. Hope for reuse based on advances in *in vitro* folliculogenesis research.

Case: A FIGO IIA epidermoid carcinoma of the cervix in a 21-year-old woman. A para-aortic lymphadenectomy was planned followed by a concomitant radio-chemotherapy (total dose of radiation: 50 Gy)

Question asked: No possibility of ovarian transposition as they have to be included in the radiation field. Should OTC be proposed? Oocyte vitrification? What about the export of gametes (not authorized in France) and surrogacy which may be authorized in the years to come?

Advices (3 proposals, 10 answers):

- Proposal 1: OTC can be offered by informing parents of the risk of ovarian metastases and the impossibility of reusing cryopreserved tissue. Hope for reuse based on advances in *in vitro* folliculogenesis research and legalization of surrogate motherhood
- Proposal 2: COS and OC before radiation. Hope for advances in uterine transplantation
- Proposal 3: Informed decision of abstention. Very little real chance of pregnancy after a 50 Gy radiation on the uterus. Irradiated uterus is a contraindication to uterine transplantation. Very little real chance of legalization of surrogate motherhood

Case: A stage III Hodgkin’s lymphoma in a virgin 28-year-old woman with premature ovarian failure prior to cancer treatment (AFC = 5, AMH = 3.4 pmol/L). 2 courses of BEACOPP regimen followed by ABVD regimen or 6 courses of BEACOPP

Question asked: is there any point in offering oocyte cryopreservation?

Advices: (3 proposals, 12 answers):

- Proposal 1: Attempt of COS and OC before any treatment despite a high risk of low response due to Hodgkin’s lymphoma
- Proposal 2: In case of low response to COS and OC, an OTC could be proposed after 3 courses of BEACOPP
- Proposal 3: No OC after chemotherapy because of the mutagenic hazard.

OTC, ovarian tissue cryopreservation; *POF*, premature ovarian failure; *FIGO*, International Federation of Obstetrics and Gynecology; *Gy*, grays; *COS*, controlled ovarian stimulation; *OC*, oocyte cryopreservation; *BEACOPP*, bleomycin-etoposide-doxorubicin-cyclophosphamide-vincristine-procarbazine-prednisone; *ABVD*, adriamycin-bleomycin-vinblastine-dacarbazine

global self-perceived improvement in their oncofertility practice ($n = 80$, 100%). The details of the responses to the questionnaire by speciality are presented in Table 2.

Discussion

Here, we have described a new tool to help FPSs faced with complex oncofertility cases that provides “emergency” advice on the best FP strategy to propose to patients. To our knowledge, this is the first highly specialized meeting dedicated to such difficult cases of FP. Management of such cases requires experienced physicians and a collegial opinion, given the lack of data in such situations. The e-meeting offers a new approach through a national and virtual network, providing everyday decision support to FPSs and continuing education to these specialists. When faced with young men or women with a rare type of tumour, FPSs can feel overwhelmed, as there are no data to preserve fertility in such cases [13]. The e-meeting was set up to enable FPSs to discuss cases that they deem “complex” from a medical, technical, or ethical point of view and to benefit from the expertise of other FPSs across the country. As previously stated, this meeting was the result of an initial informal consultation between colleagues that developed into a structured organization to improve oncofertility care in difficult cases. We choose to use a very simple mailing system with a standardized fill-in form to simplify the submission of a case. The non-binding nature of the meeting also encourages FPSs to participate and provide advice.

Regarding the meeting operation, approximately 2 cases were submitted per month, justifying its national scale. Given the emergence of some situations, the preference was for an “on-demand” consultation rather than regular meetings to quickly provide advice and not to delay the start of FP procedures and oncologic treatments. The use of an e-mail distribution system to send requests and replies of participants is also valuable, as it frees FPSs from the time constraints of a videoconference, allowing the members of the meeting to reply whenever they wish. This freedom of operation also meets the needs of FPSs faced with these emergency situations and allows us to guarantee advice within 48 h after submission of the case. This functioning procedure seems to be the most suitable for oncofertility practice and can increase the number of responses. The meeting includes highly experienced participants (years of experience = 18 ± 10 (mean \pm SD)) providing a high level of expertise, and each case receives the advice of a sufficient number of experts (mean \pm SD = 7 ± 2). Most FPSs joined the e-meeting through their regional oncology network, which has also helped to strengthen the links between FP centres and oncology teams. These links between the oncology and fertility teams are crucial for increasing the referral rates of patients and awareness of the late side effects of cancer treatment among oncologists [14]. The response rate to our

survey was high and reflects the interest of FPSs in this tool. Before the establishment of the e-meeting, when they encountered a complex oncofertility case, the experts often obtained informal advice from a colleague and referred to the medical literature. Half of them had already obtained advice from local staff before submitting a case. These results show that FPSs mainly lack data and experience in dealing with difficult cases. In these situations, a collegial opinion is mandatory and allows them to confirm their care plan, to compare their practices with those of other specialists, or to be able to offer patients different care options.

The ethics of FP, especially in children, also seems to be an issue that is raised in oncofertility practice. The lack of proven efficacy of FP techniques and their burden (e.g., delay for cancer treatment, additional surgery, false hope of survival, distress) make FP counselling among these children and their parents are even more delicate, and the e-meeting aims to provide support to FPSs faced with these difficult issues [15]. Although advice from the e-meeting is only consultative, FPSs also referred to expert opinion as proof of their commitment to offer the best options to their patient in the event of a medico-legal problem. In France, the patient’s referring physician is solely responsible for the treatment decisions after receiving advice from an oncologic multidisciplinary team (MDT) meeting, unlike in several countries where each physician in the meeting can be held accountable [16, 17]. Similarly, the e-meeting does not place responsibility onto its participants, as the final decision on treatment belongs to the FPS and his patient. The results of our survey show that the e-meeting is perceived as a real help for all members even if they have not yet submitted or answered a case. Three years since its establishment, all FPSs attending this meeting reported a self-perceived improvement in their FP practice.

MDT meetings bring together specialists from different disciplines to discuss diagnoses and offer the best care plan for patients [18]. They were first set up among oncology teams and are now part of health policies in many countries [19]. MDT meetings have now become an important component for the management of numerous conditions (e.g., diabetes, cardiovascular diseases, bariatric surgery, rare tumours, endometriosis), which requires stakeholders from different fields of expertise [20–22]. Studies report that MDT meetings improve the decision-making process, coordination between physicians, and patient outcomes [23–25]. In rare diseases or tumours, MDT meetings also provide high-level expertise, pooling experiences, and knowledge of highly specialized physicians in a specific field [26, 27]. This illustrates the fact that communication and debate between healthcare professionals are essential to make the best decision for the patient in difficult cases. The e-meeting puts this principle into practice and offers the ability for FPSs to share their viewpoints and knowledge in rare or complex situations to improve the quality of care for these patients. However, this meeting is

Table 2 Use of the e-meeting by fertility preservation specialist

	<i>All participants (N = 80) n (%)</i>	<i>Reproductive biologists (N = 43) n (%)</i>	<i>Gynaecologists (N = 31) n (%)</i>	<i>Other** (N = 6) n (%)</i>
Have you ever submitted a case to the E-Meeting for Complex Cases in Oncofertility?				
Yes	58/80 (72.5%)	34/43 (79%)	21/31 (67.7%)	3/6 (50%)
No	22/80 (27.5%)	9/43 (20.9%)	10/31 (32.2%)	3/6 (50%)
Before the e-meeting was set up, where did you seek an opinion when facing a complex case of fertility preservation?				
Research the published literature	61/80 (76.2%)	36/43 (83.7%)	21/31 (67.7%)	4/6 (66.6%)
Sought advice from colleagues	61/80 (76.2%)	34/43 (79.0%)	23/31 (74.1%)	4/6 (66.6%)
From a local meeting of my care facility	54/80 (67.5%)	29/43 (67.4%)	21/31 (67.7%)	4/6 (66.6%)
None	2/80 (2.5%)	1/43 (2.32%)	0/31 (0%)	1/6 (16.6%)
Other	1/80 (1.25%)	0/43 (0%)	0/31 (0%)	0/6 (0%)
Reason(s) for submitting a case among participants who submitted at least one case*				
I would like to obtain the opinion of national experts	41/58 (70.6%)	22/34 (64.7%)	17/21 (80.9%)	1/3 (33.3%)
There are no recommendations and/or strong data in my case	36/58 (62%)	19/34 (55.8%)	14/21 (66.6%)	2/3 (66.6%)
I did not obtain a consensus decision among the different physicians in my centre	27/58 (46.5%)	17/34 (50%)	7/21 (33.3%)	3/3 (100%)
I have no experience with the situation I am facing	37/58 (63.5%)	23/34 (67.6%)	14/21 (66.6%)	1/3 (33.3%)
I think that obtaining a collegial opinion is necessary in a medico-legal risk situation	34/58 (58.6%)	22/34 (64.7%)	10/21 (47.6%)	2/3 (66.6%)
Before submitting a case, do you already have an initial therapeutic plan for the case submitted?*				
Always	10/58 (17.2%)	6/34 (17.6%)	3/21 (14.2%)	1/3 (33.3%)
Often	34/58 (58.6%)	18/34 (52.9%)	15/21 (71.4%)	1/3 (33.3%)
Sometimes	13/58 (22.4%)	9/34 (26.4%)	3/21 (14.2%)	1/3 (33.3%)
Other	1/58 (1.7%)	1/34 (2.9%)	0/21 (0%)	0/3 (0%)
If yes, why are you submitting the case?*				
To compare my opinion to those of others	23/58 (39%)	19/34 (55.8%)	4/21 (19.0%)	0/3 (0%)
To obtain support that confirms my therapeutic healthcare plan	49/58 (84%)	28/34 (82.3%)	19/21 (90.4%)	2/3 (66.6%)
To be able to offer several therapeutic proposals to my patient	34/58 (58%)	22/34 (64.7%)	11/21 (52.3%)	1/3 (33.3%)
For medico-legal purposes in a case of a lack of clear consensus	32/58 (55%)	19/34 (55.8%)	12/21 (57.1%)	1/3 (33.3%)
To initiate an ethical debate about the submitted case	22/58 (37%)	16/34 (47.0%)	5/21 (23.8%)	1/3 (33.3%)
Have you ever provided your opinion for a case submitted to the e-meeting?				
Yes	51/80 (63.7%)	24/43 (70.5%)	22/31 (70.9%)	5/6 (83.3%)
No	29/80 (17.3%)	19/43 (55.8%)	9/31 (29.0%)	1/6 (16.6%)
When you submit a case, how do you judge the respondent members' understanding of the issue?*				
Satisfying	53/58 (91%)	34/34 (100%)	16/21 (76.1%)	3/3 (100%)
After seeing the answers given, how often did you find the opinions of the responding experts to be useful? (even if it is not one of your cases)				
Always	45/80 (56.2%)	24/43 (70.5%)	18/31 (58.0%)	3/6 (50%)
Often	34/80 (42.5%)	19/43 (55.8%)	12/31 (38.7%)	3/6 (50%)
Sometimes	1/80 (1.2%)	0/43 (0%)	1/31 (3.2%)	0/6 (0%)
Never	0 (0%)	0/43 (0%)	0/31 (0%)	0/6 (0%)
When you submit a case, how often do you follow the advice of the e-meeting?*				
Always	33/58 (56.8%)	9/34 (26.4%)	14/21 (50.0%)	1/3 (33.3%)
Often	24/58 (41.3%)	24/34 (70.5%)	7/21 (33.3%)	2/3 (66.6%)

Table 2 (continued)

	<i>All participants (N = 80) n (%)</i>	<i>Reproductive biologists (N = 43) n (%)</i>	<i>Gynaecologists (N = 31) n (%)</i>	<i>Other** (N = 6) n (%)</i>
Sometimes	1/58 (1.7%)	1/34 (2.9%)	0/21 (0%)	0/3 (0%)
Never	0 (0%)	0/34 (0%)	0/21 (0%)	0/3 (0%)
Other (please specify)	0 (0%)	0/34 (0%)	0/21 (0%)	0/3 (0%)
Did you need another resource to take care of your patient after receiving advice from the e-meeting?				
Yes	7/58 (12%)	3/34 (6.97%)	4/21 (19.0%)	0/3 (0%)
No	51/58 (88%)	31/34 (91.1%)	17/21 (80.9%)	3/3 (100%)
Did the opinions issued have been helpful to you afterwards for similar cases? (even if this is not one of your cases)				
Yes	78/80 (97.5%)	41/43 (95.3%)	31/31 (100%)	6/6 (100%)
No	2/80 (1.5%)	2/43 (4.65%)	0/31 (0%)	0/6 (0%)
Do you feel that your participation in the e-meeting (even without having responded or submitted a case) improves your oncofertility practice?				
Yes	80/80 (100%)	43/43(100%)	31/31 (100%)	6/6 (100%)
No	0 (0%)	0/43 (0%)	0/31 (0%)	0/6 (0%)
How would you define your involvement in the e-meeting?				
I am registered to benefit from the expertise of the participants	32/80 (40%)	21/43 (48.8%)	12/31 (38.7%)	0/6 (0%)
I am registered to contribute my expertise to the participants	1/80 (1.2%)	0/43 (0%)	1/31 (3.2%)	0/6 (0%)
I am registered both to contribute my expertise to the participants and benefit from their own experience.	46/80 (57.5%)	22/43 (51.1%)	18/31 (58.0%)	6/6 (100%)
Other (please specify)	1/80 (1.2%)	0/43 (0%)	0/31 (0%)	0/6 (0%)

*This question was only for participants who have answered yes to the question: “Have you ever submitted a case to the E-Meeting for Complex Cases in Oncofertility?”

**Endocrinologists (4), a midwife, a pharmacologist.

multidisciplinary; it did not include other physicians that are not specialists in the field of fertility preservation and we prefer to reserve the discussion of fertility preservation strategy for specialists only and not including oncologists who are involved but in the “wider process” of oncologic care in order to increase the expertise level.

Thus, the implementation of healthcare networks is a major step forward in oncofertility practice [10]. The recent Guideline of The European Society of Human Reproduction and Embryology highlighted the need for such dedicated networks to improve oncofertility practice [14]. Anazodo et al. recently proposed a competency framework to define key components of an oncofertility model of care that include referral pathways, specific communication skills, decision-aid tools, documentation of oncofertility procedures, continuing education of FPS, and communication between FPS and oncologists [9, 28]. These features require organizing oncofertility practices in structures that pool these elements and allow optimization of oncofertility care at different scales [10]. Communication between health care providers is one of the essentials of an efficient oncofertility network. The e-meeting for complex cases fits in this context and allows communication as well as sharing

knowledge and skills. Another goal of networking is to gather these complex cases to increase knowledge about rare diseases to improve oncofertility care.

Despite these encouraging results, we did not study satisfaction and quality of life from the patient’s viewpoint in these particular situations where the treatment burden and poor prognosis make counselling more difficult. Further investigations are required to assess patients’ perceived satisfaction with collegial advice, particularly when experiencing a decision that has far-reaching consequences for their further fertility. Another limitation of our study is the lack of information regarding the final decision made by FPS as well as subsequent fertility outcomes according to the advice obtained from the e-meeting. Although in our study, the FPS stated that they followed the advice of the e-meeting in most cases (“Always” = 57%; “Often” = 41%), a further detailed analysis of these outcomes is required. This tool meets the real need of FPSs, offering them a highly specialized opinion from national experts within 48 h of case submission. This study highlights the usefulness of a dedicated e-meeting for referral of challenging cases in oncofertility and can have a place within oncofertility networks.

Conclusion

The French E-Meeting for Complex Cases in Oncofertility is a new tool that allows French FPSs to discuss challenging cases of oncologic FP for which they have insufficient data, guidelines, and experience. This “on-demand” meeting can provide an “emergency” national consultative opinion to FPSs faced with a complex FP case and responds to the real needs of healthcare professionals. Oncofertility specialists often lack data and experience, and a collegial opinion allows them to confirm their care plan, compare their practices with other specialists, and offer different therapeutic proposals to their patients. Virtual meetings for highly specialized cases can be used as part of a wider network, providing continuing education and decision aids for FPSs.

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References

1. Nilsson J, Jervaeus A, Lampic C, Eriksson LE, Widmark C, Armuand GM, et al. ‘Will I be able to have a baby?’ Results from online focus group discussions with childhood cancer survivors in Sweden. *Hum Reprod. Oxford Academic.* 2014;29:2704–11.
2. De Vos M, Smitz J, Woodruff TK. Fertility preservation in women with cancer. *Lancet Lond Engl.* 2014;384:1302–10.
3. Oktay K, Harvey BE, Partridge AH, Quinn GP, Reinecke J, Taylor HS, et al. Fertility Preservation in Patients With Cancer: ASCO Clinical Practice Guideline Update. *J Clin Oncol.* 2018;36:1994–2001.
4. Practice Committee of the American Society for Reproductive Medicine. Fertility preservation in patients undergoing gonadotoxic therapy or gonadectomy: a committee opinion. *Fertil Steril. Elsevier.* 2019;112:1022–33.
5. Letourneau JM, Ebbel EE, Katz PP, Katz A, Ai WZ, Chien AJ, et al. Pretreatment fertility counseling and fertility preservation improve quality of life in reproductive age women with cancer. *Cancer.* 2012;118:1710–7.
6. Deshpande NA, Braun IM, Meyer FL. Impact of fertility preservation counseling and treatment on psychological outcomes among women with cancer: A systematic review. *Cancer.* 2015;121:3938–47.
7. Woodruff TK. From the bench to bedside to babies: translational medicine made possible by funding multidisciplinary team science. *J Assist Reprod Genet.* 2013;30:1249–53.
8. Massarotti C, Scaruffi P, Lambertini M, Sozzi F, Remorgida V, Anserini P. Beyond fertility preservation: role of the oncofertility unit in the reproductive and gynecological follow-up of young cancer patients. *Hum Reprod.* 2019;34:1462–34.
9. Anazodo A, Laws P, Logan S, Saunders C, Travaglia J, Gerstl B, et al. How can we improve oncofertility care for patients? A systematic scoping review of current international practice and models of care. *Hum Reprod Update.* 2019;25:159–25.
10. von Wolff M, Andersen CY, Woodruff TK, Nawroth F. FertiPROTEKT, Oncofertility Consortium and the Danish Fertility-Preservation Networks - What can we learn from their experiences? *Clin Med Insights Reprod Health.* 2019;13:1179558119845865.
11. Preaubert L, Pibarot M, Courbiere B. Can we improve referrals for fertility preservation? Evolution of practices after the creation of a fertility network. *Future Oncol.* 2016;12:2175–7.
12. Khat S, Bottin P, Saïas-Magnan J, Gasmi M, Orsoni P, Courbiere B, et al. Fertility preservation strategies for rectal cancer in reproductive-age women. *Future Oncol Lond Engl.* 2019;15:2635–43.
13. Rosenbaum L. Cursed by Knowledge — Building a Culture of Psychological Safety. *N Engl J Med. Massachusetts Medical Society.* 2019;380:786–90.
14. ESHRE Guideline Group on Female Fertility Preservation, Anderson RA, Amant F, Braat D, D’Angelo A, Chuva de Sousa Lopes SM, et al. ESHRE guideline: female fertility preservation. *Hum Reprod Open.* 2020;2020:hoaa052.
15. McDougall RJ, Gillam L, Delany C, Jayasinghe Y. Ethics of fertility preservation for prepubertal children: should clinicians offer procedures where efficacy is largely unproven? *J Med Ethics. Institute of Medical Ethics.* 2018;44:27–31.
16. Sidhom MA, Poulsen MG. Multidisciplinary care in oncology: medicolegal implications of group decisions. *Lancet Oncol.* 2006;7:951–4.
17. Rouëssé J. L’expérience nationale des réunions de concertation pluridisciplinaire (RCP) pour les lésions malignes. *Bull Acad Natl Med.* 2016;200:757–61.
18. Fleissig A, Jenkins V, Catt S, Fallowfield L. Multidisciplinary teams in cancer care: are they effective in the UK? *Lancet Oncol.* 2006;7:935–43.
19. Independent cancer taskforce. Independent cancer taskforce report, “Achieving world-class cancer outcomes, a strategy for England 2015–2020”, July 2015. [Internet]. 2015. Available from: https://www.cancerresearchuk.org/sites/default/files/achieving_worldclass_cancer_outcomes_-_a_strategy_for_england_2015-2020.pdf
20. Ugwumadu L, Chakrabarti R, Williams-Brown E, Rendle J, Swift I, John B, et al. The role of the multidisciplinary team in the management of deep infiltrating endometriosis. *Gynecol Surg.* 2017;14:15.
21. Bullen NL, Parmar J, Gilbert J, Clarke M, Cota A, Finlay IG. How Effective Is the Multidisciplinary Team Approach in Bariatric Surgery? *Obes Surg.* 2019;29:3232–8.
22. Laurent E, Lemaignan A, Gras G, Druon J, Fèvre K, Abgueguen P, et al. Multidisciplinary team meeting for complex bone and joint infections diagnosis: The PHICTOS study. *Rev Epidemiol Sante Publique.* 2019;67:149–54.
23. Rogers MJ, Matheson L, Garrard B, Maher B, Cowdery S, Luo W, et al. Comparison of outcomes for cancer patients discussed and not

- discussed at a multidisciplinary meeting. *Public Health*. 2017;149:74–80.
24. Crawford SM. Multidisciplinary team working contributes to lung cancer survival. *BMJ*. 2018;361:k1904.
 25. Tsai C-H, Hsieh H-F, Lai T-W, Kung P-T, Kuo W-Y, Tsai W-C. Effect of multidisciplinary team care on the risk of recurrence in breast cancer patients: A national matched cohort study. *Breast Edinb Scotl*. 2020;53:68–76.
 26. Boyd N, Dancey JE, Gilks CB, Huntsman DG. Rare cancers: a sea of opportunity. *Lancet Oncol*. Elsevier. 2016;17:e52–61.
 27. Rosell L, Wihl J, Hagberg O, Ohlsson B, Nilbert M. Function, information, and contributions: An evaluation of national multidisciplinary team meetings for rare cancers. *Rare Tumors*. 2019;11:2036361319841696.
 28. Anazodo A, Laws P, Logan S, Saunders C, Travaglia J, Gerstl B, et al. The Development of an International Oncofertility Competency Framework: A Model to Increase Oncofertility Implementation. *Oncologist*. 2019;24:e1450–9.

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