

Physicians' Undecided Attitudes Toward Posthumous Reproduction: Fertility Preservation in Cancer Patients With a Poor Prognosis

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Improvements in treating cancer have resulted in an increased population of cancer survivors. Unfortunately, these treatments have detrimental effects on reproductive functioning. In women cancer treatments can interfere with the functioning of the ovaries, fallopian tubes, uterus, or cervix; affect hormone balance; or decrease the number of primordial follicles.^{1,2} Infertility in men as a result of cancer treatment is caused by damaged or depleted germinal stem cells, which results in compromised sperm number, motility, morphology, and DNA integrity.¹ Rates of infertility and compromised fertility after cancer treatment depend on a number of factors, including age, sex, cancer site, treatment type, treatment dose, and pretreatment fertility of the patient.^{1,3} Estimated risks of infertility are 40%-80% in female cancer patients of childbearing age⁴ and 30%-75% in male cancer patients.⁵

CANCER AND FERTILITY PRESERVATION

Fortunately, fertility preservation (FP) options are available that allow for storage of reproductive material in hopes of future parent-

ABSTRACT

Background: The American Society for Clinical Oncology (ASCO) established guidelines for fertility preservation for cancer patients. In a national study of US oncologists, we examined attitudes toward the use of fertility preservation among patients with a poor prognosis, focusing on attitudes toward posthumous reproduction.

Method: A cross-sectional survey was administered via mail and Internet to a stratified random sample of US oncologists. The survey measured demographics, knowledge, attitude, and practice behaviors regarding posthumous reproduction and fertility preservation with cancer patients of childbearing age.

Results: Only 16.2% supported posthumous parenting, whereas the majority (51.5%) did not have an opinion. Analysis of variance indicated that attitudes toward posthumous reproduction were significantly related to physician practice behaviors and were dependent on oncologists' knowledge of ASCO guidelines.

Conclusions: Physician attitudes may conflict with the recommended guidelines and may reduce the likelihood that some patients will receive information about fertility preservation. Further education may raise physicians' awareness of poor-prognostic patients' interest in pursuing this technology.

hood. The established methods of FP are sperm cryopreservation and embryo cryopreservation.^{1,2} Oocyte freezing is considered an experimental option but can be considered for women who do not have a partner and do not wish to use donor sperm.^{1,2} Both embryo- and oocyte-freezing procedures may delay cancer treatment for approximately 2-6 weeks. This delay in treatment may not be a viable option for some patients, particularly those with advanced stages of disease.⁶

PATIENTS' CONCERN WITH FERTILITY LOSS

Although some health care providers have questioned the importance of fertility loss in the con-

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text of a cancer diagnosis, research shows that cancer survivors desire a return to normal life post treatment; they are very much concerned with fertility loss and are interested in FP options. Infertility caused by cancer treatments is one of the most distressing side effects of cancer treatment, adversely affecting quality of life⁶⁻⁸ and causing increased emotional distress.^{1-5,7-9} Additionally, cancer patients are interested in parenthood, and specifically in having biological children.^{3,4,6,10} Research has shown that the banking of sperm or embryos is a positive action that can help patients cope with cancer even if the samples are never used.^{11,12} Knowledge of available FP often provides patients with a sense of reassurance about their future.¹¹ Should no preservation options be available, discussions with an infertility specialist provide the opportunity for mourning the loss of fertility and considering other options.^{5,10}

ONCOLOGIST'S ROLE

Considering the oncologist's role in treatment decisions and communication of treatment side effects, both the American Society of Clinical Oncology (ASCO) and the American Society for Reproductive Medicine (ASRM) issued guidelines that highlight the importance of patient education and recognize the oncologist as the main communicator of fertility-related information.^{1,13} The ASCO guidelines state, "As part of the informed consent process before cancer therapy, oncologists should address the possibility of infertility with patients treated during their reproductive years and be prepared to discuss possible fertility preservation options or refer appropriate and interested patients to reproductive specialists."¹

The ASRM similarly states that physicians should inform cancer patients about future fertility and FP options prior to treatment. In sum, these guidelines stress that addressing this issue with patients is an important aspect of quality cancer care and that physicians must provide timely information.¹ Despite these guidelines, recent research suggests that oncologists are not always providing their patients with fertility information, nor are they referring them to fertility specialists.¹⁴ Many factors may contribute to the lack of discussion of fertility issues between patients and physicians, including the physician's specialty; age; knowledge and attitudes toward FP; and comfort with the topic.^{10,15-18} The physician's perception of a patient's insurance status, availability of resources, and cost of procedures may also serve as barriers.^{15,17,19} Physicians may also be reluctant to have this discussion with patients who have a poor prognosis for survival.^{6,16,20}

POSTHUMOUS ASSISTED REPRODUCTION

Patients with a poor prognosis may complicate physician discussion and referral for FP. Several recent physician studies have identified this issue as either a barrier to discussion or a reason not to discuss.^{16,17,19,21}

The topic of posthumous reproduction or posthumous parenting is inadequately addressed in the FP literature. Posthumous reproduction is a controversial topic that is complicated further by the lack of national legislation in the United States.^{22,23}

While a few studies have suggested that physicians may have personal or ethical concerns with FP when it is used to conceive a child subsequent to the death of the patient, ie, posthumous assisted reproduction (PAR),^{10,16,17,21} none has evaluated these attitudes in a large national sample of oncology care physicians. As part of a larger national study focused on knowledge, attitudinal, and practice factors associated with discussion and referrals for FP among cancer patients of childbearing age,¹⁴ we explored attitudes, particularly toward posthumous reproduction, as they related to discussion of FP with patients with a poor prognosis.

METHODS

Sample

A stratified random sample of US oncologists from the American Medical Association Masterfile was recruited by US mail. The sample included physicians in specialties of hematology/medical oncology, gynecologic oncology, surgical oncology, radiation oncology, and musculoskeletal oncology. In addition to specialty, other eligibility criteria included (1) having graduated from medical school after 1945, (2) practicing medicine in the United States including Puerto Rico, and (3) listing patient care as the primary job and locum tenens. The purpose of the main study was to assess oncologists' patterns for discussion and referrals for FP in cancer patients of childbearing age. Those results are reported in another article, and a copy of the survey is available from the author.¹⁴

Recruitment

A 3-phased recruitment approach patterned after the Dillman method was utilized.²⁴ A \$100 honorarium was offered to those completing the survey. Requests for the honorarium could be made by returning the preaddressed postcard provided in the study packet or sending an e-mail to the study team with contact information.

Measure

A 53-item survey was developed to measure physicians' attitudes, knowledge, barriers, and practice behaviors related to FP in cancer patients of childbearing age (16-44 years). See Quinn et al¹⁴ for a description of survey development and survey items. This study represents a subset of results focused on an attitude item measuring physicians' attitudes toward posthumous reproduction and FP in patients with a poor prognosis in relation to practice behaviors that may enable FP.

FP Attitudes Toward Poor Prognosis. Attitudes toward FP in patients with a poor prognosis were assessed with the statement "Patients with a poor prognosis should not pursue fertility preservation." Physicians indicated agreement with the statement using the 5-point Likert scale ("strongly agree" to "strongly disagree," with a "neither agree/disagree" as the midpoint). Participants were considered to have a favorable attitude toward FP in patients with a poor prognosis if they disagreed or strongly disagreed with the statement.

FP Attitudes Toward Posthumous Reproduction. Attitudes toward posthumous reproduction were measured by the statement “I support posthumous parenting (child born from assisted reproduction subsequent to the patient’s death).” Physicians indicated agreement with the statement using the 5-point Likert scale (“strongly agree” to “strongly disagree,” with a “neither agree/disagree” as the midpoint). Participants were considered to have an overall favorable attitude toward FP in patients with posthumous reproduction if they agreed or strongly agreed with the statement.

Practice Behavior. Practice behaviors were assessed by the statement “I discuss fertility issues with patients whose prognosis is poor.” Physicians indicated agreement with the statements on a 5-point Likert scale (“always,” “often,” “sometimes,” “rarely,” “never”).

Data Analyses

Frequencies were obtained to determine physician attitudes toward posthumous reproduction and FP in patients with a poor prognosis. A correlation analysis was performed to determine if physicians who disagreed with a poor prognosis also disagreed with posthumous reproduction. Simple logistic regressions were used to determine if demographic or clinical characteristics were related to a negative attitude toward posthumous parenting. Using a backward elimination process, multiple logistic regression was conducted to determine which variables were most related to a negative attitude toward posthumous reproduction. Finally, analysis of variance (ANOVA) was conducted to determine if attitude toward posthumous reproduction influenced practice behaviors. We also examined knowledge of ASCO guidelines and looked at the interaction of knowledge of ASCO guidelines and posthumous attitude to detect a possible interaction with attitudes and practice behaviors. Analyses were conducted (by C.K., T.M., and J.M.) using SPSS V 17.0 (SPSS, Inc., Chicago, Illinois), and all tests were 2-sided with significance at the 5% level.

RESULTS

Sample Information

Of the 1,979 physicians recruited, 613 completed the survey, yielding a response rate of 32%, after accounting for mail that was ineligible ($n = 6$) and undeliverable ($n = 43$), which is slightly higher than the average response rate in previous physician surveys.^{25,26} Of the 613 physicians who completed the survey, 516 reported a specialty in oncology. The majority of the sample was male (70.8%), white (76.7%), Catholic (29.8%), and not Hispanic or Latino (94.5%), and had children (85.1%). Most physicians graduated from medical school in 1991 or earlier (68.2%) and specialized in medical oncology or hematology (31.9%). The primary practice location for most participants was a teaching hospital, a university-affiliated cancer center, a designated National Cancer Institute cancer center, or a location other than a private oncology practice (68.1%).

Table 1

Association Between Demographic and Practice Characteristics in Relation to Negative Attitude Toward Posthumous Reproduction

DEMOGRAPHIC AND PRACTICE CHARACTERISTICS	OR	CI
Sex		
Male	1.00	
Female	0.76	0.50–1.16
Race		
White	0.72	0.46–1.14
Other	1.00	
Religious background		
Catholic	1.00	
Protestant	0.77	0.48–1.24
Jewish	0.40	0.22–0.75
Atheist	0.49	0.27–0.87
Other		
Year graduated from medical school		
1991 or earlier	1.00	
1992 or later	0.55	0.36–0.85
Specialty		
Medical oncology/hematology	1.00	
Gynecologic oncology	1.712	1.03–2.84
Radiation oncology	1.24	0.73–2.11
Surgical oncology	1.41	0.83–2.40
Musculoskeletal/orthopedic oncology	0.73	0.19–2.72
Primary practice location		
Private oncology practice	1.00	
Teaching university and affiliated NIH	1.01	0.68–1.52
Practice arrangement		
Full/part owner	1.00	
Employee	0.81	0.56–1.19
Size of practice setting		
Small (1–5 physicians)	1.00	
Medium (6–15 physicians)	1.00	0.62–1.60
Large (>16 physicians)	1.36	0.88–2.10
Number of oncology patients seen per week		
<10	1.00	
>11	0.44	0.17–1.19
Have children		
Yes	1.00	
No	0.51	0.35–1.10
Aware of ASCO guidelines		
Yes	1.00	
No	1.02	0.69–1.50

Attitude Toward FP in Patients with a Poor Prognosis

Among 516 participants, 232 (45.0%) neither agreed nor disagreed with FP in a poor-prognosis patient, 117 (22.7%) agreed that patients with a poor prognosis should not pursue

Table 2

Attitude Toward Posthumous Parenting and in Relation to Discussion of Fertility in Patient Whose Prognosis Is Poor

ATTITUDE TOWARD POSTHUMOUS PARENTING	MEAN	SE	95% CI
Positive	3.152	0.177	2.805-3.499
Neutral	3.375	0.104	3.170-3.580
Negative	3.209	0.123	2.966-3.452

$P > .05$.

Table 3

Knowledge of ASCO Guidelines Predicts Discussion of Fertility in Patient Whose Prognosis Is Poor

KNOWLEDGE OF ASCO GUIDELINES	MEAN	SE	95% CI
Unaware	2.790	0.126	2.543-3.038
Aware	3.701	0.098	3.508-3.893

$P < .001$.

FP, and 164 (31.8%) disagreed with the statement that patients with a poor prognosis should not pursue FP. Data were missing for three participants (0.6%). Therefore, the majority of physicians had a neutral stance on the issue of patients with a poor prognosis pursuing FP.

Attitude Toward Posthumous Parenting

Only 83 (16.1%) reported that they supported posthumous parenting, whereas the majority, 263 (51.0%), did not have an opinion and 165 (32.0%) disagreed with posthumous reproduction. Data were missing for 5 respondents (1.0%).

The statement "Patients with a poor prognosis should not pursue fertility preservation" was significantly correlated with "I support posthumous parenting," suggesting that those who disagree with FP in a poor-prognosis patient also disagree with posthumous reproduction ($r = -0.282$; $P < .001$).

Demographic and Clinical Characteristics Related to Attitude Toward PAR

Simple Bivariate Analyses. In logistic regressions, significant factors of having a negative attitude toward posthumous reproduction were Jewish religion, Atheist religion, year graduated from medical school, and specialty in gynecologic oncology (Table 1).

Multivariate Analyses. Physicians with a negative attitude toward posthumous parenting were compared against those who reported a favorable or neutral opinion toward posthumous parenting. According to the backward elimination model, factors that significantly predicted having a negative attitude toward posthumous parenting were years since graduation ($P < .001$) and Jewish religion ($P < .001$). Physicians who graduated prior to 1992 compared to physicians who graduated after 1992 were more likely to have a negative attitude toward posthumous parenting (odds ratio [OR] = 0.54; 95% confidence interval [CI], 0.35–0.83). Physicians

Table 4

Attitude Toward Posthumous Parenting and Knowledge of ASCO Guidelines Predict Discussion of Fertility in Patient Whose Prognosis Is Poor

ATTITUDE TOWARD POSTHUMOUS PARENTING	KNOWLEDGE OF ASCO GUIDELINES	MEAN	SE	95% CI
Positive	Unaware	2.381	0.285	1.821-2.941
	Aware	3.923	0.209	3.512-4.334
Neutral	Unaware	3.224	0.159	2.910-3.537
	Aware	3.526	0.134	3.263-3.790
Negative	Unaware	2.766	0.190	2.392-3.140
	Aware	3.652	0.157	3.343-3.961

$P < .01$.

with a Jewish religion were significantly less likely to have a negative attitude toward posthumous parenting compared with physicians who were Catholic religion (OR = 5.01; 95% CI, 0.285–0.880).

Attitude Toward PAR Related to Discussing FP in Patients with a Poor Prognosis

For secondary and exploratory purposes, we performed an ANOVA to determine if a negative attitude toward PAR influenced practice behavior. To explore the nature of this relationship more closely, we used the attitude toward posthumous reproduction at three levels (negative: strongly agree, agree; neutral: neither agree nor disagree; positive: disagree, strongly disagree) as the predictor variable. The practice behavior question was "I discuss fertility issues with patients whose prognosis is poor" (range, 1 [rarely] to 5 [always]). Attitude toward posthumous reproduction did not significantly predict discussion of fertility with patients with a poor prognosis ($P > .05$; Table 2). Knowledge of ASCO guidelines (aware, unaware) was entered as a predictor variable. There was a significant main effect in that physicians who were aware of guidelines were more likely to discuss fertility issues with patients whose prognosis was poor ($P < .001$; Table 3). Furthermore, there was an interaction with attitude toward posthumous parenting and knowledge of ASCO guidelines in predicting discussion of fertility issues with patients whose prognosis was poor ($P < .01$; Table 4). Physicians who had a negative attitude were more likely to discuss if they had knowledge of ASCO guidelines, compared with physicians who had negative attitudes and no knowledge of ASCO guidelines (Table 5, Figure 1).

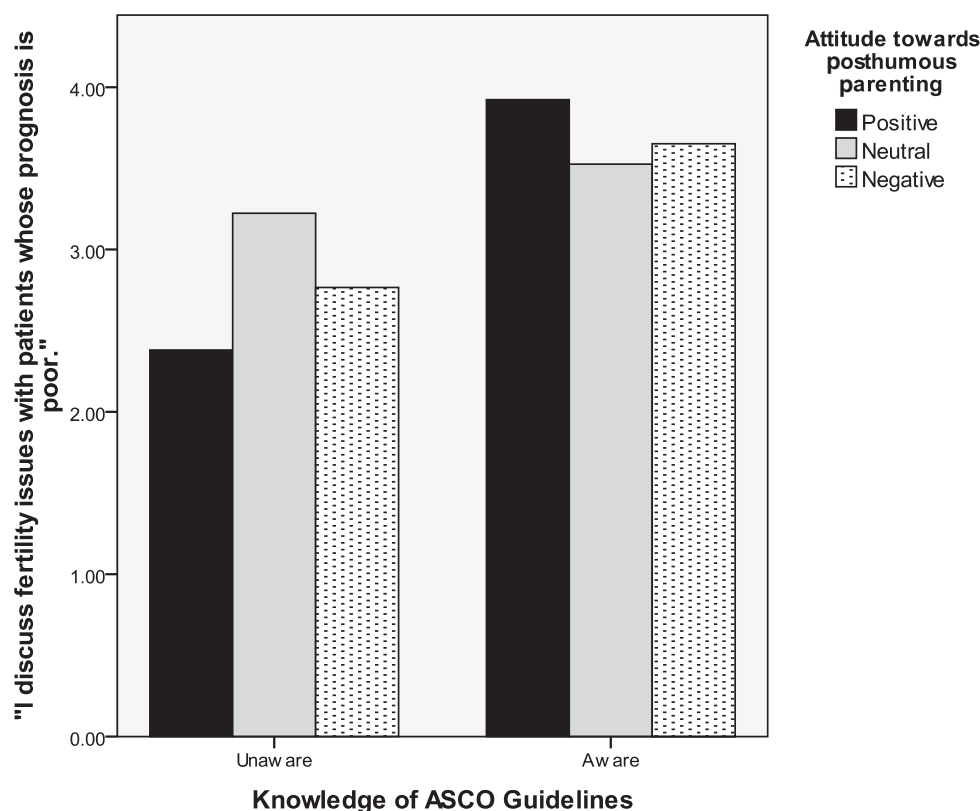
DISCUSSION

These results indicate that most oncologists are uncertain about the issue of FP in patients with a poor prognosis and the idea of posthumous reproduction. This is understandable given that little has been published in the academic literature about these concepts. Although they have not been explored in the context of cancer patients, they have been examined somewhat in patients with human

Table 5

ANOVA Model: Attitude Towards Posthumous Parenting and Knowledge of ASCO Guidelines Predict Discussion of Fertility in Patient Whose Prognosis Is Poor

SOURCE	TYPE III SUM OF SQUARES	DF	MEAN SQUARE	F	P
Corrected model	58.839 ^a	5	11.768	6.913	.000
Intercept	2,819.524	1	2,819.524	1,656.415	.000
Attitude toward posthumous parenting	2.878	2	1.439	0.845	.430
Awareness of ASCO guidelines	55.451	1	55.451	32.576	.000
Interaction: attitude toward posthumous parenting, aware guidelines	16.845	2	8.423	4.948	.008
Error	565.125	332	1.702		
Total	4,442.000	338			
Corrected total	623.964	337			

^a $R^2 = 0.094$ (adjusted $R^2 = 0.081$).**Figure 1** Attitude towards posthumous parenting and knowledge of ASCO guidelines in relation to discussion of fertility issues in patients with a poor prognosis.

immunodeficiency virus (HIV). HIV patients also report a strong desire for a biological child, even in the event of their death, and perceive medical professionals as likely to be unsupportive of this choice.²⁷ Additionally, US military personnel often bank sperm prior to deployment in the event that they do not return from overseas service. There have been multiple cases of wives using banked sperm from a deceased husband, and often these services were provided at no charge by the US military.^{28,29}

Oncologists' personal attitudes regarding posthumous reproduction were related to referral of patients with a poor

prognosis. Attitudes regarding poor prognosis and posthumous reproduction only in patients with a poor prognosis when ASCO guidelines were not known. Physicians' knowledge of the guidelines, not whether they followed them, influenced whether physicians discussed fertility issues with patients who had a poor prognosis. Guidelines can improve quality of care but do not always correlate with a change in clinical practice.^{30,31} Religion was specifically related to beliefs about posthumous reproduction and FP in patients with a poor prognosis, with physicians of Jewish religion having more negative attitudes. This is surprising given that several

ethical perspectives on Judaism and assisted reproductive technology (ART) cite the Jewish religion as being favorable toward both.^{32,33} There is a wide range of religious views regarding posthumous reproduction and the associated ART. Islamic law supports the use of ART only if both parents are still living.³⁴ Catholics have not historically condoned ART and may disapprove of posthumous reproduction because it implies insemination of an unmarried woman.^{14,23,24,25,26,35}

Limitations

There are limitations to the interpretation of our study data. It is likely that physicians who were more interested in the topic responded to the survey, and thus there may be response bias. In addition, the use of a few single-item indicators precludes our ability to evaluate situational considerations that oncologists face on a daily basis.

CONCLUSIONS

Oncologists should be cognizant of FP options as well as the adverse effects of cancer treatments on fertility and should offer referral to patients.^{22,36} Clearly, enabling a cancer patient with a poor prognosis to reproduce, and possibly to reproduce posthumously, presents ethical challenges. However, physicians' perceptions of these challenges should not interfere with referral for FP. It is possible that the storage of gametes represents hope for the family or partner left behind in the event of death. One researcher reported this as a way to "make a bad death good."³⁷

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