

# Trends in Clinical Practice and Nurses' Attitudes About Fertility Preservation for Pediatric Patients With Cancer

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**Purpose/Objectives:** To examine trends in fertility preservation attitudes and behaviors of pediatric oncology nurses and evaluate their awareness of fertility preservation guidelines published in June 2006 by the American Society of Clinical Oncology (ASCO).

**Design:** Cross-sectional surveys conducted in 2005 and 2006.

**Setting:** Annual meetings of the Florida Association of Pediatric Tumor Programs.

**Sample:** 115 pediatric oncology nurses in 2005 and 95 nurses in 2006.

**Methods:** A 45-item survey was distributed to conference attendees.

**Main Research Variables:** Knowledge, current fertility preservation practices, and awareness of fertility preservation guidelines.

**Findings:** Nurses' attitudes about fertility preservation discussions with patients did not change during the survey period; however, the number of nurses believing that one of their duties was to discuss fertility preservation with patients decreased from 91% in 2005 to 81% in 2006. Nurses' likelihood to discuss fertility preservation with patients with specific characteristics significantly changed over time. Fertility preservation discussions were just as likely for single patients as they were for those married or recently engaged, although nurses were more likely to discuss fertility preservation with patients who had at least one child or who had a poor prognosis. Nurses' awareness of ASCO guidelines was less than 5%.

**Conclusions:** A majority of nurses perceive that fertility preservation options should be offered to patients. However, practice and patient family barriers exist that may impede discussion. Attitudes and behaviors will be monitored with the 2006 ASCO guidelines.

**Implications for Nursing:** Nurses play a key role in survivorship discussions for pediatric patients with cancer and their families. Increased knowledge of fertility preservation guidelines may help promote the fertility preservation concept and lead to improved dissemination and implementation of training programs that focus on current ASCO fertility preservation guidelines and address the psychosocial needs of children aged 12–16 years.

According to the National Cancer Institute (NCI, 2008), 10,400 children were diagnosed with cancer in 2007. Childhood cancer is relatively rare and the survival rate for pediatric patients has improved dramatically in recent decades, with more than 79% of patients surviving (NCI). Pediatric cancer researchers have begun to focus on issues such as long-term morbidity and quality of life in survivors (Oeffinger et al, 2006; Wallace, Anderson, & Irvine, 2005). Infertility is one of the possible side effects of cancer treatments, such as chemotherapy and radiation, that has the potential to affect quality of life (Meirow, 2000; Wallace et al., 2005).

## Key Points . . .

- ▶ The survival rate for pediatric patients with cancer has improved in recent decades and the focus of patient care has shifted to quality of life for survivors.
- ▶ A potential side effect of cancer treatment is infertility, a factor that affects quality of life in survivors.
- ▶ A few fertility preservation options exist for pediatric patients, but available methods must be initiated prior to cancer treatment (chemotherapy or radiation).
- ▶ Fertility preservation guidelines do not fully address the psychosocial needs of patients younger than age 18.

Precise data about which patients may experience infertility or sterility are not available because factors, such as the type of cancer treatment and age of the patient, have differing effects on fertility (Brougham & Wallace, 2005; Rueffer et al., 2001; Simon, Lee, Partridge, & Runowicz, 2005). For example, young girls undergoing cancer treatment may experience damage to the ovaries or uterus (Brougham & Wallace; Thomson, Critchley, Kelnar, & Wallace, 2002), whereas irradiation can impair spermatogenesis in young boys (Brougham & Wallace). Several chemotherapy agents are known to cause gonadal damage,

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although the level of damage depends on factors such as the type of agent, dosage, gender, and age of the patient at the time of treatment (Brougham & Wallace; Thomson et al.).

Cancer survivors have gone on to conceive through natural methods or with assisted reproduction methods, such as intrauterine insemination or in vitro fertilization (Green et al., 2003; Magelssen et al., 2005; Meseguer et al., 2006; Schover, Rybicki, Martin, & Bringelsen, 1999; Zanagnolo, Sartori, Trusardi, Pasinetti, & Maggino, 2005). Given the risk of infertility following treatment of pediatric cancer and long-term survival rates, research into quality of life should include fertility preservation (Brougham, Kelnar, Sharpe, & Wallace, 2003).

Current fertility preservation options vary depending on the gender and age of pediatric patients with cancer. For male patients, the only established method of fertility preservation is semen cryopreservation (sperm bank), although this method is not effective for prepubertal boys (Brougham et al.; Hovatta, 2001; Thomson et al., 2002; Tournaye et al., 2004). Options for female patients are not as established. Two methods are available: shielding or removing ovaries from the field of radiation and removing mature oocytes for in vitro fertilization and cryopreservation of resulting embryos (Brougham & Wallace, 2005; Kim, 2006; Thomson et al.; Wallace et al., 2005). Embryo cryopreservation is not an optimal fertility preservation method for female pediatric patients because it requires sexual maturity and a male partner (or donor sperm) (Brougham & Wallace; Thomson et al.; Wallace et al.). Preservation of oocytes alone may be possible, depending on sexual maturity, but the procedure is considered experimental (Lobo, 2005; Porcu et al., 2000).

Research indicates that, although fertility preservation discussions with pediatric patients are advocated in the previous literature, many healthcare providers are not consulting with patients (Goodwin, Oosterhuis, Kiernan, Hudson, & Dahl, 2006; Schover, Brey, Lichtin, Lipshultz, & Jeha, 2002a, 2002b). Schover et al. (2002b) studied oncologists' attitudes and behaviors regarding fertility preservation and found that 91% of respondent agreed that sperm banking should be offered to men at risk of infertility, but 50% note that they do not address the subject with their patients.

Research on whether oncology nurses are discussing fertility preservation with pediatric patients and their families is limited. Nurses may have more time and opportunity in the clinical setting to discuss fertility preservation than oncologists or other physicians (Cope, 2002). Reebals, Brown, and Buckner (2006) surveyed nurses and nurse practitioners about fertility preservation in adolescent male patients with cancer and reported that 100% of the study population felt oncologists and nurse practitioners should discuss the topic. Vadaparampil et al. (2007) found that 93% of pediatric oncology nurses surveyed believed that patients at risk for infertility should be informed about fertility preservation; however, 73% reported discussing fertility preservation options less than 10% of the time.

Several barriers may limit fertility preservation discussions. Healthcare providers may not be up to date on current methods or may have difficulty finding specialists for patients interested in preserving fertility (Goodwin et al., 2006; Wallace, 2007). Patient factors (e.g., HIV status, homosexuality, aggressiveness of cancer, low likelihood of survival) also may influence a provider's likelihood of discussing fertility preservation (Schover et al., 2002b). Cost also may be a barrier (Achille et al., 2006).

The American Society of Clinical Oncology (ASCO) released recommendations in June 2006 for fertility preservation among patients with cancer in response to research demonstrating that many oncologists do not discuss treatment-related infertility or do not do it well (Lee et al., 2006). The guidelines focus on patients of childbearing age and are somewhat limited in regard to pediatric patients. Nurses may be in a more ideal position to discuss fertility preservation with patients, given their multiple interactions prior to cancer treatment. The primary research goal of this study was to examine trends in the fertility preservation attitudes and behaviors of pediatric oncology nurses. A secondary aim examining whether nurses were aware of ASCO guidelines was included.

## Methods

### Sample

Attendees of the 2005 and 2006 Florida Association of Pediatric Tumor Programs (FAPTP) Annual Advances in Pediatric Hematology/Oncology conferences were surveyed about their attitudes and behaviors regarding fertility preservation discussions with pediatric patients with cancer and their families. More than 90% of the attendees were pediatric oncology nurses. A waiver of informed consent was obtained through the institutional review board of the University of South Florida. A cover letter and survey were placed in each attendant's registration packet. The incentive for participation included a raffle ticket for one of two \$50 cash prizes.

### Instruments

The survey instrument measured three key content domains: practice characteristics, provider attitudes toward the discussion of fertility preservation, and patient factors. The domains were identified through previous research literature as having a potential impact on fertility preservation discussions (Jaen, Stange, & Nutting, 1994). Existing instruments were used to construct the survey items. For example, the items used to measure practice characteristics were adapted from Glaser, Phelan, Crawshaw, Jagdev, and Hale (2004). Provider attitudes were measured with eight questions from Schover et al.'s (2002b) scale of physician attitudes toward fertility preservation, with three additional questions created by the study team. Responses for provider attitude questions ranged from strongly agree to strongly disagree on a five-point Likert-type scale. Another instrument from Schover et al. (2002b) was adapted to measure the likelihood that several patient characteristics (e.g., HIV positive, aggressive disease) would influence providers' fertility preservation discussions with pediatric patients with cancer. These items were measured with three possible responses: more likely to discuss, less likely to discuss, or would not affect the discussion. If previous survey questions or items from other instruments did not address any of the three domains, questions such as "What state do you presently work in?" and "Do you work in the field of oncology?" were added by the research team. The resulting survey instrument was pretested with a group of healthcare professionals (two RNs, one social worker, and two doctorally prepared public health students. The structure and content of this survey have been described in more detail elsewhere (Vadaparampil et al., 2007).

After content review, final surveys were comprised of 45 items that took about 10 minutes to complete. Small but important differences in survey content from 2005 to 2006 resulted from the need to assess exposure to the ASCO guidelines published during the overall study. In total, 210 pediatric oncology nurses participated in the surveys, 115 in 2005 and 95 in 2006.

## Data Analysis

Descriptive analyses of proportions, frequencies, and graphic illustrations were used to examine data and assumptions. Group comparisons for continuous variables were conducted with Wilcoxon sign rank tests; group comparisons among categorical variables were conducted with Fisher's exact tests. All p values were two sided, and a p value less than 0.05 was regarded as significant. No adjustment was conducted for multiple comparisons because of the exploratory nature of this study. All analyses were performed using SAS® software version 9.1 (SAS Institute).

## Results

The response rate for the 2005 FAPTP conference was 65% (n = 126), of which analyses were restricted to 115 nurse respondents. The response rate for the 2006 conference was 67% (n = 103) and, again, only nurses were included in the analyses (n = 95). This resulted in a final study population of 210 pediatric oncology nurses.

### Practice Characteristics

Fifty percent of participants were employed in Florida, the remainder were distributed among 27 other states. Fifty percent indicated their primary employment position was in a pediatric hospital, 30% worked in a medical hospital, outpatient clinic, cancer center, university, or other, and 20% worked in a clinic (nonspecific). Fifty percent had been working in oncology for 5 or fewer years, 18% for 6–10 years, 14% for 11–15 years, and 18% for more than 15 years. Fourteen percent indicated their institutions had a religious affiliation, and 87% reported

**Table 1. Attitudes Toward Fertility Preservation**

Statement	Agree				Neither Agree Nor Disagree				Disagree				p <sup>a</sup>
	2005 Sample (N = 115)		2006 Sample (N = 95)		2005 Sample (N = 115)		2006 Sample (N = 95)		2005 Sample (N = 115)		2006 Sample (N = 95)		
	n	%	n	%	n	%	n	%	n	%	n	%	
Physicians are responsible for fertility preservation discussions.	27	24	25	32	7	6	11	14	81	71	43	55	0.05
Nurses and social workers should discuss fertility preservation with patients.	104	91	75	81	7	6	5	5	4	4	13	14	0.03
All patients at risk for loss of fertility because of cancer treatment should be offered fertility preservation.	107	93	88	94	4	4	5	5	4	4	1	1	0.52
Nurses do not have time in a busy clinic to adequately discuss fertility preservation.	34	31	39	42	30	27	21	23	47	42	32	35	0.23
Discussing fertility preservation with patients is difficult because it is an uncomfortable topic.	41	36	27	30	18	16	17	19	56	49	47	52	0.65
Success rates of infertility treatments are too low to justify recommending them to patients.	6	5	5	6	38	33	29	32	70	61	57	63	0.97
Fertility preservation options are affordable for most patients.	14	12	8	9	37	33	27	30	62	55	54	61	0.65
Finding convenient fertility preservation facilities for patients is difficult.	42	37	28	31	41	36	34	38	31	27	28	31	0.70
Patients younger than 18 should not be told about fertility preservation unless parents give consent.	21	18	15	16	11	10	15	16	82	72	64	68	0.39
Boys younger than 18 years should not be given erotic magazines or videos during semen collection unless parents agree.	53	47	40	44	24	21	12	13	37	33	40	44	0.17
Discussion of fertility preservation options may upset the patient or the family.	67	58	52	56	24	21	21	23	24	21	20	22	0.95

<sup>a</sup>Values were calculated using Fisher's exact test.

**Table 2. Patient Factors Affecting Fertility Preservation Discussion**

Statement	More Likely to Discuss				Would Not Affect Discussion				Less Likely to Discuss				p <sup>a</sup>
	2005 Sample (N = 115)		2006 Sample (N = 95)		2005 Sample (N = 115)		2006 Sample (N = 95)		2005 Sample (N = 115)		2006 Sample (N = 95)		
	n	%	n	%	n	%	n	%	n	%	n	%	
Patient is not married.	14	13	18	22	96	86	57	69	2	2	8	10	0.007
Patient is engaged or recently married.	67	60	41	44	44	40	51	55	–	–	1	1	0.03
Patient already has at least one child.	25	23	36	39	79	71	54	58	7	6	3	3	0.03
Patient is open about being homosexual.	8	7	14	15	77	69	63	68	26	23	16	17	0.15
Patient is younger than 18 years.	16	14	16	18	82	73	64	70	14	13	11	12	0.81
Patient does not have health insurance.	5	5	9	10	102	92	76	84	4	4	6	7	0.18
Patient brings up the topic of fertility and states that he or she wants children in the future.	93	83	68	74	19	17	24	26	–	–	–	–	0.12
Patient has poor prognosis of survival.	5	5	20	22	76	68	47	51	31	28	25	27	< 0.001
Patient is HIV positive.	4	4	10	11	64	58	48	52	42	38	35	38	0.13
Patient has a very aggressive disease and needs rapid initiation of cancer treatment.	16	14	15	16	55	49	43	46	41	37	35	38	0.89
Detailed educational materials about fertility preservation are available for patients and families.	35	32	35	38	65	59	47	51	11	10	10	11	0.59

<sup>a</sup> Values were calculated using Fisher's exact test.

working in oncology. When asked “What percent of the time do you see patients prior to the initiation of chemotherapy or radiation?”, nurses reported 55% in 2005 and 53% in 2006. However, the proportion of nurses who reported seeing patients “less than 10% of the time” increased from 31% in 2005 to 41% in 2006.

### Responses to Fertility Preservation Surveys

To determine whether fertility preservation discussions with patients had changed significantly during the study period, the responses to four items were compared by the year of the survey. The four items included the percent of time discussing the risks of infertility with patients, the percent of time discussing fertility preservation options with patients, the percent of patient families interested in finding out about fertility preservation, and the percent of time patients are seen prior to the initiation of chemotherapy or radiation. None of the four items changed significantly over the study.

### Trends in Nurses' Attitudes Toward Fertility Preservation Discussions

A significant change ( $p = 0.03$ ) was seen in an item asking participants whether they agreed that nurses and social workers should discuss fertility preservation options with patients, decreasing from 91% in 2005 to 81% in 2006. The proportion disagreeing with the statement increased from 4% in 2005 to 14% in 2006 (see Table 1). Regardless of survey year, the majority of nurses reported that they felt patients with cancer at risk of infertility should be offered fertility preservation (93% in 2005, 94% in 2006). A majority of respondents indicated that patients younger than 18 years should be told about fertility preservation, regardless of parental consent (72% in 2005, 68% in 2006).

### Trends in the Impact of Patient Factors on Fertility Preservation Discussions

A few changes were noted in the impact of patient factors on fertility preservation discussions (see Table 2). Nurses reported in 2006 that a patient's status as single (as opposed to engaged or married) would not affect the likelihood of fertility preservation discussions, although nurses would be more likely to discuss the issue with patients who already had at least one child. The proportion of nurses reporting that fertility preservation discussions were more likely for patients with a poor prognosis for survival increased from 5% in 2005 to 22% in 2006 ( $p < 0.001$ ). Regardless of survey year, the majority of nurses indicated that patient factors, such as being single, homosexual, younger than 18 years, or HIV positive; lacking health insurance; or having a poor prognosis for survival, would not affect the likelihood of fertility preservation discussions. Some respondents indicated that they would be more likely to discuss fertility preservation if educational materials were available for patients and families (32% in 2005, 38% in 2006).

### Potential Institutional Barriers for Fertility Preservation

Several institutional factors are potential barriers to nurses' fertility preservation discussions with patients (e.g., availability of guidelines, established links with fertility preservation providers). None of the institutional factors differed significantly during the study period. The reported institutional availability of guidelines for fertility preservation and links to service providers were exceptionally low (see Table 3). Regardless of survey year, less than 15% of nurses reported that their facilities had fertility preservation guidelines. The general availability of guidelines and services were higher for male patients than female patients.

## American Society of Clinical Oncology Guidelines and Their Impact

Ninety-six percent of nurses surveyed in 2006 reported that they were unaware of the ASCO guidelines (see Table 4). Therefore, the effect of the guidelines (i.e., formal fertility preservation discussion, changes to institutional guidelines, additional educational materials, fertility preservation consultations) was negligible (i.e., ranging from 1%–10%).

### Discussion

The overall results demonstrated minimal change in pediatric oncology nurses' behaviors, attitudes, and barriers toward fertility preservation discussions. A few factors did significantly change from 2005 to 2006. Nurses were less likely to believe that fertility preservation discussions were their responsibility; however, 81% still believed it was. This has important implications for fertility preservation discussions because nurses may be in a more ideal position to address the topic than physicians.

The majority of respondents believed that patients younger than 18 years should be told about fertility preservation, regardless of parental consent. Glaser et al. (2004) suggested that the best interests of the child or adolescent with cancer should be served, adding that preserving fertility protects patients' choices as adults. Because infertility may result in reduced quality of life from psychological stress, fertility preservation procedures may be justified. Fertility preservation methods that do not harm patients can protect their future fertility choices (Glaser et al., 2004). However, because technology and trends for fertility preservation discussions are relatively new, ethical issues on whether a provider or institution should provide fertility

preservation information to patients if the parents object have not been studied. Grundy et al. (2001) argued that legal consent depends on the individual understanding the information given, believing it applies to them, retaining the information, and using it to make an informed choice. Parents face anxiety when making decisions regarding their child's illness and prognosis, which may reduce their competence in decision making. Parents are forced to consider whether their child would wish to have children in the future. Children may lack the capacity to understand the implications of fertility preservation, but they should be involved in decisions whenever possible. Under the Family Law Reform Act (1969) approved in the United Kingdom, Australia, Canada, and New Zealand, children older than 16 years can consent to medical treatment if they are competent. Children younger than 16 may consent if they have sufficient understanding. A child who can show this ability is referred to as Gillick competent (Grundy et al.). Healthcare professionals and parents of children who are not Gillick competent are required to act in the child's best interest (Grundy et al.). A review of the literature showed no similar regulations for children in the United States.

Patients' family factors, such as marital status and whether they already have a child, also have differed significantly over time. Nurses were split in terms of whether they would be more or less likely to discuss fertility preservation with single patients. The percentage of nurses reporting they would be more likely to discuss increased from 13% to 22% from 2005 to 2006; nurses who reported they would be less likely to discuss increased from 2% to 10%. An increase from 40% to 50% was seen in the amount of nurses who said fertility preservation discussions were just as likely for single patients as they were for those married or recently engaged. For patients with at least one child, the proportion of nurses reporting that they would be more likely to discuss preservation increased over time. Whether these findings are from a change in the patient population (e.g., an increase in cancer diagnoses among older pediatric patients with cancer) or some other factor or event is unknown. Interestingly, the proportion of nurses who reported that they would be more likely to discuss fertility preservation with patients with a poor prognosis for survival increased from 5% in 2005 to 28% in 2006. The reason for that increase is unclear. Media attention regarding fertility preservation, such as stories publicized through Fertile Hope ([www.fertilehope.org](http://www.fertilehope.org)), may have increased awareness. Perhaps nurses feel the discussion serves as a message of hope for patients and their families. Further study is needed.

Institutional barriers such as having established guidelines for fertility preservation and links to professional services did not significantly change over time, which is an important observation as to whether guidelines or access to services increased the likelihood of discussions. With little or no change in these factors, other attitudes and behaviors understandably have not changed as well. Ninety-six percent of the study population reported that they were not aware of the ASCO guidelines; therefore, the guidelines had minimal effect on fertility preservation discussions, changes to institutional guidelines, availability of educational materials, and expert consultations.

Guideline awareness could be a major source of change in clinical practice and the subsequent delivery of care. Several theoretical models have been used in research literature to explain guideline awareness is not widespread. Rogers' (1995) Theory of Diffusions of Innovation explains the process by which an innovation is communicated through certain

**Table 3. Institutional Barriers to Fertility Preservation**

Statement or Question	Yes				p <sup>a</sup>
	2005 Sample (N = 115)		2006 Sample (N = 95)		
	n	%	n	%	
Facility has guidelines regarding which patients should be offered sperm conservation.	14	12	13	14	0.84
Facility has guidelines regarding which patients should be offered ova conservation.	9	8	6	7	0.79
Does your facility offer counseling for fertility issues?	42	37	27	30	0.30
Do you have an established link with a service for sperm collection or preservation?	35	30	18	23	0.32
Do you have an established link with a service for ova collection or preservation?	8	7	7	8	1.00
Has your facility reviewed or discussed policy guidelines for sperm or ova conservation in the past three years?	8	7	6	7	1.00
Do you have guidelines for sperm or ova conservation by therapeutic agents or disease?	6	6	9	10	0.42

<sup>a</sup>Values were calculated using Fisher's exact test.

**Table 4. Fertility Preservation Educational Practices and Awareness of American Society of Clinical Oncology (ASCO) Guidelines**

Question	Yes		No	
	n	%	n	%
Do you distribute educational materials from the following organizations?				
• American Cancer Society	16	17	77	83
• Lance Armstrong Foundation	5	5	90	95
• Fertile Hope	7	7	88	93
• ASCO	5	5	90	95
• Other	2	2	93	98
Does your organization offer financial assistance for fertility preservation? <sup>a</sup>	4	5	35	44
Are you aware of the ASCO fertility preservation guidelines? <sup>b</sup>	4	4	74	81
What is the impact of the ASCO fertility preservation guidelines?				
• Formal preservation discussions	9	10	85	90
• Changes to institutional guidelines	2	2	93	98
• Additional educational materials	5	5	90	95
• Consultations offered with fertility preservation experts	1	1	94	99
• None of the above	15	16	80	84
• Other	4	4	91	96

<sup>a</sup> 40 respondents (51%) answered “do not know.”

<sup>b</sup> 13 respondents (14%) answered “do not know.”

Note. 2006 survey only (N = 95).

channels over time among the members of a social system. The theory shows how research becomes integrated into nursing practice (Lia-Hoagberg, Schaffer, & Strohschein, 1999; McCleary & Brown, 2003; Oldenburg & Parcel, 2002; Parahoo & McCaughan, 2001; Rogers, 1983, 1995). According to the theory, as applied to nursing practice, “The process of diffusion of a research finding in nursing is theoretically influenced by (a) characteristics of the nurse, such as education and critical appraisal skills; (b) organizational characteristics, such as decision-making processes and research climate; (c) characteristics of the research and research findings; and (d) the way the findings are communicated” (McCleary & Brown, p. 365).

McCleary and Brown’s (2003) study of pediatric nurses showed that lack of time to read research findings was a frequent barrier to research use, followed by relevant literature not being compiled in one place, statistical analyses being difficult to understand, and having insufficient authority to make changes. Obstacles also were discussed in Hutchinson and Johnston’s (2006) review of the BARRIERS Scale. The review outlined several commonly reported barriers for nurses, including lack of time, confidence in critical appraisal skills, authority, organizational infrastructure, support, access, and evidence.

Nurses who participated in the current study were, for the most part, unaware of the ASCO guidelines. Several of the barriers to adoption of research in nursing practice may have been factors, but they were not assessed. The nurses may not have had adequate time to review research findings that did not relate to cancer treatment and guidelines were only a few months old at the time of the 2006 FAPTP conference. The majority of partici-

pants said their institutions did not have guidelines for fertility preservation, nor had they met to formally discuss the newly published ASCO guidelines. This indicates a need for institutional support in incorporating the guidelines into practice.

## Limitations

The current study is one of the first to explore trends related to attitudes and behaviors associated with fertility preservation discussions among nurses and the awareness and effect of the ASCO guidelines; however, its findings should be interpreted with caution. The ASCO guidelines focus on patients of child-bearing age and do not specifically discuss pediatric patients. Although both surveys in this study were anonymous, participants may have responded in a manner that they believed would be normal among their peers. As this study was undertaken among a population of pediatric oncology nurses who attended the 2005 or 2006 FAPTP conference, results should not be considered representative of pediatric oncology nurses or oncology nurses in general.

Fourteen percent of 210 participants did not work in oncology. Inclusion of hematology as a single option may have caused individuals who work primarily in hematologic malignancies to view themselves as exclusively working in the field of oncology. However, they were included in the analysis because attendance at a conference specific to pediatric tumors demonstrates their interest in the issue. The question, “What is the age of the patient population with whom you work?” was asked in 2005 but, because of a formatting error, not in 2006, leaving the primary population served unknown. Professionals may attend the same conference each year, which raises concerns that participants from 2005 were represented in 2006 as well. An item added to the 2006 survey revealed that about 19% of the 2006 survey respondents also attended the 2005 conference. To determine whether this had an effect on the results, a separate analysis was conducted. Responses were compared among the 2005 survey participants, participants who reported attending the 2005 conference and completed the 2006 survey, and the 2006 survey participants who did not attend the 2005 conference. No differences were found in the responses among the groups; therefore, the potential effect on the study likely was minimal.

## Conclusions

Fertility preservation is an important topic in pediatric oncology. Most of the pediatric oncology nurses believed that patients with cancer at risk for infertility should be offered options and that patients younger than 18 years should be told about fertility preservation regardless of parental consent. The current study, however, demonstrates that barriers to fertility preservation discussions with patients and their families exist, some at an institutional level. Future research should examine how institutional administration and culture should change to better facilitate fertility preservation guidelines. Trends in the behaviors and attitudes of pediatric oncology nurses toward fertility preservation discussions should be revisited in subsequent years to determine whether the additional time helped to facilitate fertility preservation guidelines.

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