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Original article

Provider Influences on Sperm Banking Outcomes Among Adolescent Males Newly Diagnosed With Cancer

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ABSTRACT

Purpose: The purpose of this study was to examine provider communication and sociodemographic factors which associate with sperm banking outcomes in at-risk adolescents newly diagnosed with cancer.
Methods: A prospective single-group quasi-experimental study design was used to test the contributions of provider factors on sperm banking outcomes. Medical providers ($N = 52$, 86.5% oncologists) and 99 of their at-risk adolescent patients from eight leading pediatric oncology centers in North America completed questionnaires querying provider factors and patient sperm banking outcomes. Logistic regression with single covariates was used to test each provider factor as a potential correlate of the two binary sperm banking study outcomes (collection attempt/no attempt and successful sperm bank/no bank). Multicovariate logistic regression was used to calculate odds ratios (OR) and 95% confidence intervals (CIs) for specified banking outcomes.
Results: Fertility referral (OR, 9.01; 95% CI, 2.54–31.90; $p < .001$) and provider comfort/skills in negotiating barriers to sperm banking with families (OR, 1.94; 95% CI, 1.03–3.63; $p < .04$) were associated with collection attempts. Adolescents who were referred for a specialized fertility consultation were also almost five times more likely to successfully bank (OR, 4.96; 95% CI, 1.54–16.00; $p < .01$) compared to those who were not.
Conclusions: Provider training in communicating/managing adolescents and their families about sperm banking, and increasing utilization of fertility preservation referrals, should increase the proportion of at-risk males preserving fertility before treatment initiation.

IMPLICATIONS AND CONTRIBUTION

Adolescent males newly diagnosed with cancer have increased odds of banking sperm if their providers refer them to a fertility specialist and/or are comfortable/skilled in negotiating perceived barriers to fertility preservation. Provider training to promote these features of care is important to maximize fertility preservation potential.

Eighteen in 100,000 children and adolescents are diagnosed with cancer each year in the United States. Most of these children survive into adulthood, with 5-year survival rates exceeding 80% [1]. Given the increased life expectancy of childhood cancer

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patients, special attention is being placed on controlling the adverse late effects of cancer treatment on quality of life outcomes.

Cancer therapy affects fertility in survivors [2,3], and infertility has a negative impact on survivors' psychological well-being [4,5]. Because of the seriousness of this issue, the American Society of Clinical Oncology recommends that health care providers discuss risk of infertility and options to preserve fertility with all patients of reproductive age before cancer therapy [6]. The gold standard in fertility preservation for males is sperm cryopreservation, a method that has been successfully used for the past 50 years [7,8]. Most adolescent cancer patients who attempt to bank sperm can produce a high-quality sample that can later be used in assisted reproductive technologies [9,10]. Adolescents who engage in fertility preservation report high decisional satisfaction regarding the banking process and outcome [11].

Despite the benefits of cryopreservation, only a minority of adolescents bank sperm before the initiation of cancer therapy [12]. Several qualitative, retrospective studies have explored barriers to fertility preservation and have suggested that the quality of discussions with health care providers regarding risk of infertility affects patient decision-making specific to sperm banking [13–15]. However, to date, no studies have used quantitative designs to explore the extent that providers influence adolescent decision-making regarding fertility preservation.

Previous research has found that health care providers' recommendations have a significant influence on adolescent decision-making. Studies considering adolescent receipt of the human papillomavirus vaccination, for example, suggest that a provider's recommendation in favor of the vaccination increases the likelihood of adolescent initiation [16,17]. As sperm banking is another sensitive health care decision that adolescents and their families face, it is possible that providers have a similar effect on an adolescent's decision to cryopreserve sperm. Furthermore, research focusing on adult cancer patients has found that men whose providers discuss cryopreservation more frequently bank sperm [18]. It has been hypothesized that provider communication has a similar effect among adolescent patients [19]. Quantifying provider influence on adolescent sperm banking outcomes is important in developing interventions designed to maximize the proportion of adolescent cancer patients who bank sperm. Therefore, the purpose of this study was to examine the influence of provider communication factors as they relate to sperm banking outcomes among adolescent males newly diagnosed with cancer. Provider sociodemographic variables were also explored as well.

Methods

Participants

To be eligible for the study, medical providers were required to be currently providing care to a patient who was male, newly diagnosed with a first cancer, 13–21 years of age (inclusive), Tanner stage ≥III, proficient in speaking and reading English or Spanish, and possessing the cognitive capacity to complete study questionnaires. Furthermore, the adolescent patient must have been identified by the attending oncologist (or designee) as being at increased risk for treatment-related infertility secondary to impending cancer treatment. From 2011 to 2014, a total of 52 providers across eight leading pediatric oncology institutions in the United States and Canada, caring for 99 patients meeting the above eligibility criteria, agreed to participate in the present study (Table 1). These providers consisted of 45 oncologists, 5 nurse practitioners, and 2 social workers.

Table 1
Demographic and personal characteristics of provider and adolescent participants[a]

Sociodemographic characteristics	n	%
Providers (N = 52)		
Profession		
Attending oncologist	44	84.6
Nurse practitioner	5	9.6
Social worker	2	3.8
Fellow	1	1.9
Experience caring for adolescents (years)		
1–5	13	25.0
6–10	13	25.0
11–20	15	28.8
>21	10	19.2
Age (years)		
20–29	2	3.8
30–49	33	63.5
50–69	16	30.8
Gender		
Male	25	48.1
Female	26	50.0
Race/ethnicity		
White	35	67.3
Non-white	16	30.8
Have children		
No	14	26.8
Yes	37	70.0
Adolescents (N = 99)		
Diagnosis		
Leukemia/lymphoma	58	58.6
Brain tumors	7	7.1
Solid tumors	34	34.3
Age (years)		
13–15	37	37.4
16–17	30	30.3
18–21	32	32.3
Tanner stage		
Stage 3	7	7.1
Stage 4	33	33.3
Stage 5	57	57.6
Race/ethnicity		
White	67	67.7
Non-white	32	32.3

[a] Values may not equal 52 (providers) or 99 (adolescents) because of missing data.

Design and method

A single-group quasi-experimental study design was used to test the role of provider communication and sociodemographic factors as they relate to the specified sperm banking study outcomes. Before study enrollment, study team members systematically completed daily eligibility checklists for all potentially eligible adolescent patients at their respective institutions. Once the medical record review was completed and initial study criteria was met for a new patient, the adolescent's oncologist was e-mailed and queried regarding the fertility risk status of the adolescent patient in question (fertility risk score ranging 0, no risk, to 3, high risk). Only after the oncologist rated the participant as being at increased risk for infertility (e.g., risk score ≥1) was the patient considered eligible for the study. Once a patient enrolled, the provider was sent a link to complete a very brief