



# Improving Fertility Preservation Discussions for Adolescent and Young Adult Male Oncology Patients

**R**ecently diagnosed adolescent males rank fertility as a top priority for life after cancer treatment.<sup>1</sup> Though several national oncology organizations provide recommendations for the discussion of fertility preservation with males of reproductive age with planned gonadotoxic treatment,<sup>2-4</sup> only 25 percent of adolescent and young adult (AYA) male oncology patients at risk of treatment-induced infertility complete sperm cryopreservation in the United States.<sup>5</sup> Reasons for low rates of fertility preservation include patient-, physician-, and institution-associated barriers.<sup>6</sup> Patient-related factors which influence electing sperm cryopreservation include:

- Parental status (i.e., men with children were less likely to bank sperm)<sup>7,8</sup>
- Desire for future children<sup>7,9,10</sup>
- Knowledge of fertility risk and preventive options<sup>7,11</sup>
- Availability of timely information from healthcare providers.<sup>7,9</sup>

About half of AYA cancer survivors do not recall discussing sperm cryopreservation before commencing treatment.<sup>7,12,13</sup> Despite the existence of fertility preservation guidelines by national oncology organizations,<sup>2,3,14</sup> a national survey by Quinn et al. found that less than half of oncologists routinely discuss sperm cryopreservation with all eligible males.<sup>15</sup> Factors deterring physicians from discussing fertility preservation guidelines include:

## In Brief

Fertility preservation is an increasing concern for adolescent and young adult (AYA) patients with cancer. However, not all newly diagnosed males discuss fertility preservation with a healthcare provider before treatment. This study used a four-step strategy to assess current oncofertility practices in an AYA oncology program and develop tools to improve fertility preservation discussion rates with newly diagnosed AYA males. We identified patient education, physician documentation, nursing education, and access to fertility specialists as areas for improvement. Key stakeholders then developed and implemented resources to address program weaknesses.

- Preconceptions based on patient characteristics (e.g., socioeconomic status)<sup>10,11,16,17</sup>
- Lack of knowledge about local facilities and treatment options<sup>9,17-22</sup>
- Perceived high costs of sperm cryopreservation.<sup>23-26</sup>

Studies suggest that institutional barriers must be addressed to overcome variation in physician practice.<sup>6,26-28</sup> Institutional barriers include lack of methods for recording fertility discussions,<sup>29</sup> lack of educational resources or materials,<sup>26,30,31</sup> and lack of financial support.<sup>6</sup> Studies have found that implementing a standardized system for addressing and documenting fertility preservation discussions and referrals can improve discussion and sperm cryopreservation rates.<sup>16,20,22,32</sup>

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As the trend toward developing new AYA oncology programs continues, establishing consistent practices in fertility preservation discussions will be an important component for institutions.<sup>33-35</sup> In the United States, models of delivering care for AYA oncology patients and the resources available to each institution vary widely; therefore, the method of providing oncofertility services must be tailored to each individual program.<sup>36</sup>

This quality improvement project describes the oncofertility program development that was part of a larger goal to develop an AYA oncology program at our institution, the University of California Los Angeles (UCLA) Mattel Children's Hospital, which includes a quaternary hospital and a community hospital. We used a four-step strategy to first assess current oncofertility practices at our institution and then develop tools to facilitate fertility preservation discussions with newly diagnosed AYA males:

1. Collect quantitative data through a retrospective chart review.
2. Collect qualitative data through interviews with key stakeholders.
3. Conduct a SWOT analysis to identify strengths, weaknesses, opportunities for improvement, and threats to success of a program.
4. Develop and implement resources to address identified program weaknesses.

### **Cross-sectional Retrospective Medical Chart Review**

First, we reviewed a convenience sample of medical records of males diagnosed within the past five years (2009–2013) between ages 13 and 21 with planned gonadotoxic chemotherapy and/or radiation in the pediatric hematology/oncology division. (The UK model for teen and young adult programs, Teen Cancer Trust,

defines an AYA as 13-24 years.<sup>37</sup> Accordingly, we selected this age range as we began development of our AYA program in partnership with Teen Cancer Trust. In addition, the physical space for our AYA program was housed within the pediatric department and, at that time, admission to the AYA program was capped at 21 years of age. There are future plans to extend the AYA program to include up to 39 years of age, and this onco-fertility program will be extended to that age group.) We defined gonadotoxic treatment as those with a moderate to high risk of infertility based on ASCO recommendations.<sup>2</sup> Exclusion criteria included males younger than 13, because these patients were less likely to be able to provide a sperm sample and the future fertility of males receiving only surgery would not be affected. Patients who did not receive all of their care within our institution were also excluded, because access to their complete outside medical records was not available. Patients who met inclusion criteria were identified using our institution's electronic database.

We evaluated documentation of fertility preservation discussion and sperm cryopreservation completion by reviewing initial inpatient and outpatient consult notes, chemotherapy consent notes, social work notes, and physician progress notes within 10 days from time of diagnosis. We used a data extraction tool to collect information during chart review. The primary outcome variable for the analysis was having a documented fertility preservation discussion vs. no documentation, and the secondary outcome variable was documentation of sperm cryopreservation completion if the fertility preservation discussion was held. Data were abstracted for the following potential predictive variables:

- Age at diagnosis
- Race/ethnicity
- Oncologic diagnosis
- Insurance coverage
- Patient primary language
- Need for language interpreter
- Enrollment on a clinical trial
- Gender of primary oncologist
- Inpatient or outpatient setting for fertility preservation discussion.

A priori power analysis determined an estimated sample size of 46 subjects needed for an  $\alpha = 0.05$  and an effect size of 35 percent between those who had fertility preservation discussions vs. those who did not. Univariate analyses were used to determine associations between the predictive variables and whether fertility preservation was discussed or not. Analyses were conducted using SAS software (version 9.3; SAS Institute, Cary, NC) and R (version 3.1.2; R-Project.org). The UCLA Institutional Review Board approved the study.

Table 1, right, shows the sample demographic and disease treatment characteristics and rates of fertility preservation discussion and sperm cryopreservation. The two main diagnoses represented in the sample included 29 solid tumors and 17 hematologic malignancies. All patients received chemotherapy as part

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Table 1. Demographic and Disease Treatment Characteristics

Variable	FP Discussed (n = 29)					
	Completed Preservation (n = 13)	Did Not Complete Preservation (n = 9)	No Medical Record of Whether FP was Completed or Not (n = 7)	Total # of Patients Who Had FP Discussion	FP Not Discussed (n = 17)	All Patients (n = 46)
Mean Age (Years)	16.2	16.2	16.3	16.2	15.6	16.2
<b>N(%)</b>						
<b>Race/Ethnicity</b>						
Caucasian	2 (50.0)	1 (25.0)	1 (25.0)	4 (66.7)	2 (33.3)	6 (13.0)
Hispanic/Latino	4 (36.4)	5 (45.5)	2 (18.2)	11 (61.1)	7 (15.2)	18 (39.1)
Other	7 (50.0)	3 (21.4)	4 (28.6)	14 (30.4)	8 (36.4)	22 (47.8)
<b>Oncology Diagnosis</b>						
Hematologic Malignancy	4 (44.4)	3 (33.3)	2 (22.2)	9 (52.9)	8 (47.1)	17 (37.0)
Solid tumor	9 (45.0)	6 (30.0)	5 (25.0)	20 (69.0)	9 (31.0)	29 (63.0)
<b>Planned Gonadotoxic Therapy</b>						
Chemotherapy	12 (50.0)	8 (33.3)	4 (16.7)	24 (61.5)	15 (38.5)	39 (84.8)
Chemo + Radiation	1 (20.0)	1 (20.0)	3 (60.0)	5 (71.4)	2 (28.6)	7 (15.2)
<b>Insurance Type</b>						
Public	7 (46.7)	6 (40.0)	2 (13.3)	15 (65.2)	8 (34.8)	23 (50.0)
Private	6 (42.9)	3 (21.4)	5 (35.7)	14 (60.9)	9 (39.1)	23 (50.0)
<b>Patient Language</b>						
English	12 (44.4)	9 (33.3)	6 (22.2)	27 (65.9)	14 (34.1)	41 (89.1)
Non-English	1 (50.0)	0 (0.0)	1 (50.0)	2 (40.0)	3 (60.0)	5 (10.9)
<b>Interpreter Services</b>						
Yes	2 (33.3)	3 (50.0)	1 (16.7)	6 (46.2)	7 (53.8)	13 (28.3)
No	11 (47.8)	6 (26.1)	6 (26.1)	23 (69.7)	10 (30.3)	33 (71.7)
<b>Enrolled in Study</b>						
Yes	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	3 (100)	3 (6.5)
No	13 (44.8)	9 (31.0)	7 (24.1)	29 (67.4)	14 (32.6)	43 (93.5)
<b>MD Gender</b>						
Male	7 (50.0)	3 (21.4)	4 (28.6)	14 (60.9)	9 (39.1)	23 (50.0)
Female	6 (40.0)	6 (40.0)	3 (20.0)	15 (65.2)	8 (34.8)	23 (50.0)
<b>Consent Setting</b>						
Outpatient	2 (22.2)*	2 (22.2)	5 (55.6)	9 (90.0)	1 (10.0)	10 (21.7)
Inpatient	11 (55.0)*	7 (35.0)	2 (10.0)	20 (60.0)	16 (44.4)	36 (78.3)

\*Significant difference at  $p = 0.05$ .

FP = fertility preservation.

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of their cancer treatment, and 7 patients (15 percent) received both chemotherapy and radiation. Fertility preservation discussion was documented with 29 patients (63 percent); of that group, 13 completed sperm cryopreservation. Significant findings in the multivariate model included:

- Descriptively, it was interesting to see that none of those who received fertility preservation discussion were enrolled in the clinical trial compared to those who did not receive fertility preservation discussion.
- There was a certain trend toward a significantly higher rate of documented fertility preservation discussion in the outpatient setting compared to the inpatient setting (90 percent vs. 56 percent,  $p = 0.07$ ).
- However, inpatients who received fertility preservation education from providers were more likely to complete sperm cryopreservation than informed outpatients (55 percent vs. 22 percent,  $p = 0.05$ ).
- Patient age, cancer, sexual maturity stage, race/ethnicity, patient language, use of interpreter services, insurance coverage, and physician gender were not significantly associated with fertility preservation discussion or sperm cryopreservation rates.

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The community fertility preservation expert invited stakeholders from the academic setting to attend site visits to further improve their knowledge of fertility preservation services at the California Cryobank ([cryobank.com](http://cryobank.com)).

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### Interviews with Key Stakeholders

We conducted interviews with key stakeholders across both quaternary and community hospital sites to further inform improvements to the oncofertility program. Stakeholders were asked to provide feedback on their operational experiences related to UCLA oncofertility practices prior to the development of the AYA program and identify its strengths and weaknesses as part of the SWOT analysis. Key stakeholders for the AYA oncology program included:

- One pediatric oncologist
- One adult oncologist
- Eight AYA cancer survivors who were active in the program's AYA advisory board
- One fertility preservation expert from the community-based cryobank
- Four registered nurses
- Two social workers
- Six hematology/oncology fellows
- One child life specialist.

The key stakeholder group (as defined above) was established to form an oncofertility working group for the UCLA AYA program. This group of stakeholders included members of the original AYA task force from UCLA who trained in the UK with the Teen Cancer Trust program. Additional members were added to the original UCLA AYA task force, including local cryobank leadership. Oncology trainees (fellows) were also included because they were often the front-line medical team to discuss the risks for infertility at the time of original diagnosis. This academic–community partnership was an integral part of the oncofertility program development because it led to better understanding of community resources in the community. The community fertility preservation expert invited stakeholders from the academic setting to attend site visits to further improve their knowledge of fertility preservation services at the California Cryobank ([cryobank.com](http://cryobank.com)).

### SWOT Analysis of Current Oncofertility Practices

SWOT analyses have been used in business, government, and healthcare settings as a method of rapid program evaluation.<sup>38-41</sup> Key stakeholders (as described above) identified strengths, weaknesses, opportunities for improvement, and threats to the success of existing oncofertility practices for males in the AYA oncology program. Strengths were defined as program characteristics or processes that facilitated sperm cryopreservation in AYA males. Weaknesses were defined as program characteristics that inhibited or delayed sperm cryopreservation in AYA males. Opportunities for success were defined as available resources or external conditions that could be used to facilitate sperm cryopreservation in AYA males. Threats to success were defined as a lack of necessary resources or external conditions that may inhibit/delay sperm cryopreservation in AYA males. Below are major themes identified from these key stakeholder interviews.

#### Strengths

- Both hospital sites, Ronald Reagan UCLA Medical Center and UCLA Medical Center in Santa Monica, have a dedicated, multidisciplinary staff from both pediatric and medical oncology advocating for AYA fertility preservation services.
- The partnership with the community-based cryobank increases awareness for AYA oncofertility services available locally.
- The partnership with the community-based cryobank facilitates fertility preservation by providing discounted rates for cancer patients, scheduling immediate appointments, and allowing inpatient semen collection.

#### Weaknesses

Key stakeholders identified four major themes for improvement within the program:

- Patient education could be improved with AYA-oriented written materials to supplement provider-led fertility preservation discussions.
- Physician documentation could be improved by creating a specific place to document fertility preservation discussions in the electronic health record (EHR) to improve healthcare provider documentation and facilitate practice evaluation.

- Nursing education could be improved by making training opportunities for AYA-specific oncofertility issues more widely available in the hematology-oncology nursing lecture series.
- There are no standard operating procedures (SOPs) for descriptions of available sperm cryopreservation facilities and referral steps to the cryobank partner.

### Opportunities for Improvement

- The involvement of eight AYA survivors previously treated at our institution provides important perspectives and feedback on oncofertility practices and the AYA-friendly education materials.
- The EHR provides a flexible tool to store accessible referral information and document fertility preservation discussions.
- Access to free oncofertility courses—for example, through our cryobank partner California Cryobank and Moffitt Cancer Center—provides training for interested nurses to become champions and advocates for fertility preservation in AYA males.<sup>42</sup>
- The partnership with the community cryobank provides improved channels to streamline and speed up the referral process for sperm cryopreservation.

### Threats to Success

- The large health system and geographically separate locations of our two hospital sites that treat AYA patients in both inpatient and outpatient settings pose a barrier to disseminating information about new guidelines and resources due to the large number of staff across two sites.
- Physicians are more likely to discuss fertility preservation with their patients if they are aware of specific SOPs to follow, but no SOPs were available.<sup>26,43</sup>
- The local fertility preservation services are separate from the institution (approximately four miles), complicating data sharing and the referral process. Cancer-related services or treatment that require patients to travel far distances negatively affects their ability to follow up with referral and seek out sperm cryopreservation services.<sup>26</sup>
- Insurance does not regularly cover fertility services, making cost a potential barrier to sperm cryopreservation for AYA males. Cost has been reported to be a factor preventing fertility preservation discussions.<sup>26,44</sup>

### Institutional Analysis

Starting with a review of current documentation practices, the retrospective chart review revealed suboptimal rates of fertility preservation discussion and the need for practice improvement. Our fertility preservation discussion rate (63 percent) was slightly higher than previously reported rates (26 to 57 percent)<sup>7,12,45</sup> likely due to increased awareness of AYA issues as we developed our AYA oncology program.

One important finding for our institution was the low rate of fertility preservation discussion for patients on clinical trials. An

exploration of reasons from key stakeholders revealed that lengthy consents for clinical trials may leave providers feeling that they have less time to discuss fertility options.

As noted previously, we also identified a trend toward lower rates of fertility preservation discussion with inpatients compared to outpatients. One contributing factor may include provider belief that a patient may be too ill to collect semen.<sup>46,47</sup> Though other studies have found low rates of fertility preservation discussion with Hispanic/Latino patients and males with hematologic malignancies,<sup>8,45</sup> these were not observed in our population. Future research will include exploration of these predictor variables in a multisite study.

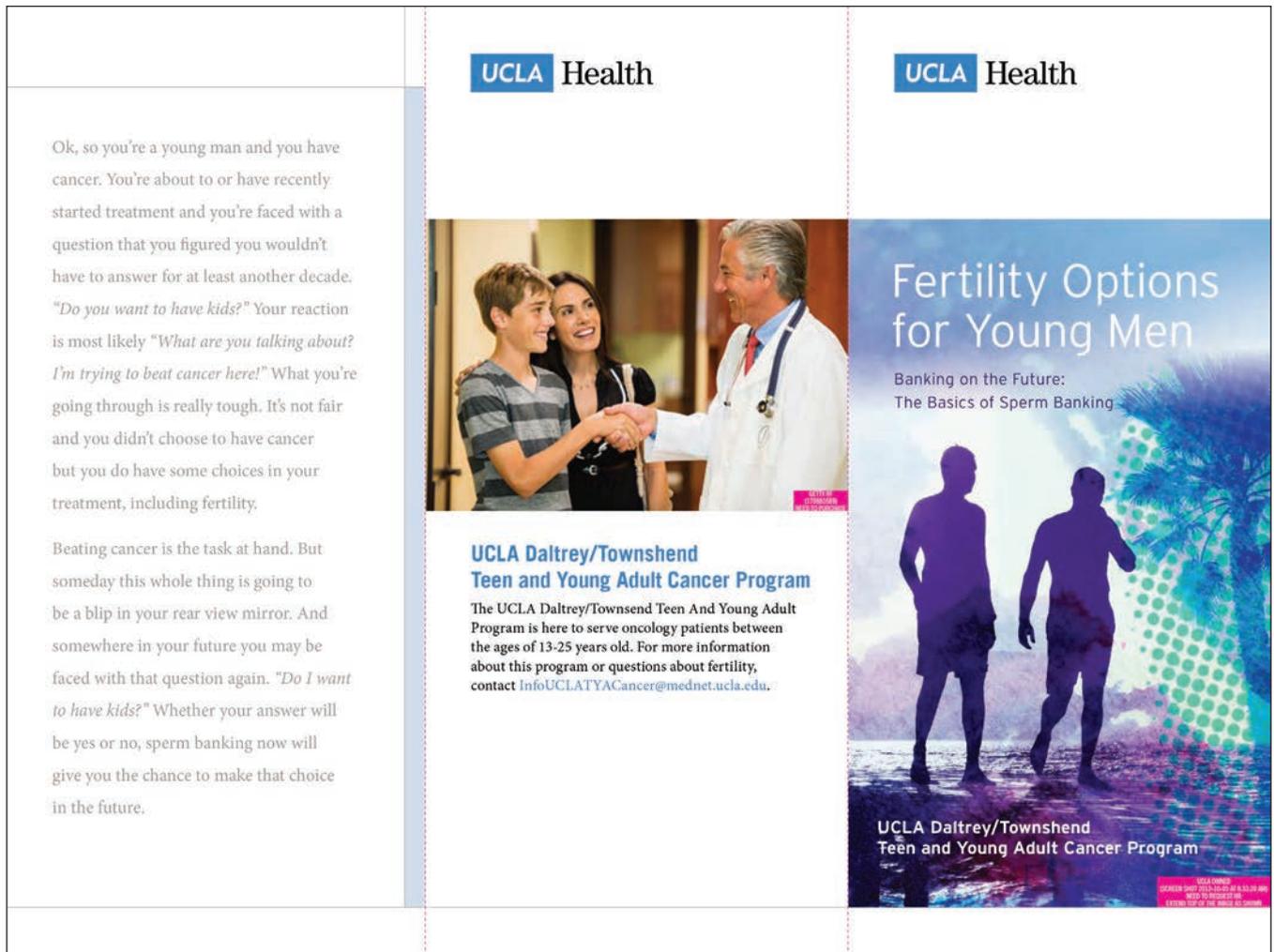
Given the high risk for infertility; the noninvasive, effective nature of sperm cryopreservation; and the importance patients place on future fertility, these findings suggest that there is a need for innovative tools to supplement provider-led discussions that can be implemented at AYA programs across the nation to improve rates of sperm cryopreservation.

We found suboptimal rates of documented sperm cryopreservation (28 percent) comparable to previously reported rates (18 to 26 percent).<sup>8,21,48</sup> Inpatients were more likely to complete sperm cryopreservation than outpatients. This may be the result of the additional responsibilities that patients receiving care in the outpatient setting have, including navigating multiple appointments and traveling to the community cryobank for sperm cryopreservation. Inpatients can complete the collection procedure in the hospital following a fertility preservation discussion.

For patients who had discussed fertility preservation with a provider, sperm cryopreservation rates were still only 45 percent (13/29). Though this small sample size limits our findings, previous studies have also found that less than half of informed patients elect for sperm cryopreservation.<sup>7,8</sup> Given the high risk for infertility; the noninvasive, effective nature of sperm cryopreservation; and the importance patients place on future fertility, these findings suggest that there is a need for innovative tools to supplement provider-led discussions that can be implemented at AYA programs across the nation to improve rates of sperm cryopreservation.

Current quality improvement efforts are ongoing to assess fertility preservation discussion as our AYA program has expanded to a third hospital site. Additional work will include follow-up

Figure 1a. AYA Brochure



with patients who initially said “no” to sperm cryopreservation two months into therapy to reassess their knowledge and intent to seek sperm cryopreservation.

### Developing and Implementing Practical Tools

Based on the results of the retrospective chart review and key stakeholder interviews, practical tools were developed to improve our oncofertility program and increase fertility preservation discussions and the use of sperm cryopreservation.

#### Patient Education Tool

Despite evidence that written materials improve patient comprehension, there is a lack of AYA-appropriate educational material on fertility preservation.<sup>9,21,23,26,30,31</sup> As a supplement to provider-led discussions and to guide patients in fertility preservation discus-

sions, key stakeholders produced an AYA-oriented brochure, “Banking on the Future: The Basics of Sperm Banking” (see Figures 1a, above, and 1b, right). AYA survivors then revised the language of the text and images to ensure AYA cultural appropriateness. Though it does not replace an in-depth conversation with a provider, the brochure covers topics that patients may feel uncomfortable discussing and allows patients and family members to return with questions.

The printed brochure, available in English and Spanish, addresses causes of infertility, sperm cryopreservation procedures, and basic information about costs. The brochures were distributed to pediatric, AYA, and adult inpatient units and outpatient clinics. A printable version was uploaded to the hospital intranet for easy accessibility from any location (inpatient and outpatient) across the sites.

Figure 1b. AYA Brochure

### The Basics

Sometimes cancer treatment can cause your body to stop making sperm, or the sperm stops working normally, which is a condition called infertility.

Sperm banking is a way to save your healthy sperm now. In this process (it's called cryopreserving), the sperm is frozen at a very low temperature (much lower than your home freezer). This allows the sperm to be kept in storage for many years. At a later time in life, when you are thinking about having children, the sperm will be available for you to use.

### Before Treatment

The best time to sperm bank is before you receive any treatment for your cancer. This is because the cancer treatment (both chemotherapy and radiation) may affect how your sperm will function. If you wish to sperm bank, you should talk to your UCLA medical team (doctor, nurse or social worker) and arrange a time to do so before treatment.



### How

The collection of sperm can be done privately at home, in your hospital room or at the sperm banking center. In each setting, a sample of your sperm is collected by masturbating into a cup. Masturbation is self-stimulation of your penis until you completely ejaculate. This may sound awkward as you're reading it in a pamphlet, but we want to make sure you get all the practical information to understand the process of sperm banking.

The sample must be given to the storage staff and should be delivered within one hour of providing the sample. A second sample may be required if more sperm is needed for an adequate volume. This is normal and can also be done before treatment starts.

### Where

The sperm will be frozen and stored after the collection. Additional paperwork must be completed at that time and signed by you (if you are over 18 years old) or by your parent (if you are not 18 yet). You can meet with a counselor at the sperm bank to get additional questions answered.

### Costs

Typically, sperm banking is not covered by medical insurance. Financial assistance is available for the cost of sperm banking if you qualify. Costs are based on processing fees, blood work and the amount of time you want to store your sample. You or your family can talk to your medical team about costs and financial assistance.



### Contact

Your UCLA medical team of doctors, nurses or social workers are here to help you. We understand this can be a confusing time, so please do not hesitate to ask us questions or let us know if you need to talk. E-mail The Daltrey/Townshend Teen and Young Adult Program at [InfoUCLATYACancer@mednet.ucla.edu](mailto:InfoUCLATYACancer@mednet.ucla.edu). Your e-mail will be answered within 48 hours.

Physician \_\_\_\_\_ Phone \_\_\_\_\_

Nurse \_\_\_\_\_ Phone \_\_\_\_\_

Social Worker \_\_\_\_\_ Phone \_\_\_\_\_

### Physician Documentation

At our institution, oncology providers document all chemotherapy consents in the EHR (Epic) using a standardized chemotherapy consent documentation template (“SmartPhrase”). To prompt physician-led discussions and provide one systematic location for maintaining fertility preservation discussion records, this template was modified to include a fertility preservation section as a clinical decision support tool (see Figure 2, page 24). The template allows for automated data capture from the EHR through structured data elements to facilitate practice evaluation and provide feedback to providers more efficiently over time as part of a learning health system.<sup>49</sup>

### Nursing Education

By providing opportunities for nursing education in AYA oncofertility topics, we sought to empower nurses to effectively discuss

fertility preservation with patients and advocate for sperm cryopreservation at the bedside. Nurses have been identified as a crucial asset in fertility preservation discussions,<sup>9</sup> because regular contact with patients at the bedside supports a continuing conversation.<sup>1,3</sup> This approach is instrumental in advocating for fertility preservation in a large health system across multiple sites. Focusing on the nursing team provides a large base of providers with oncofertility knowledge and avoids the cost of and dependence on a single fertility navigator.

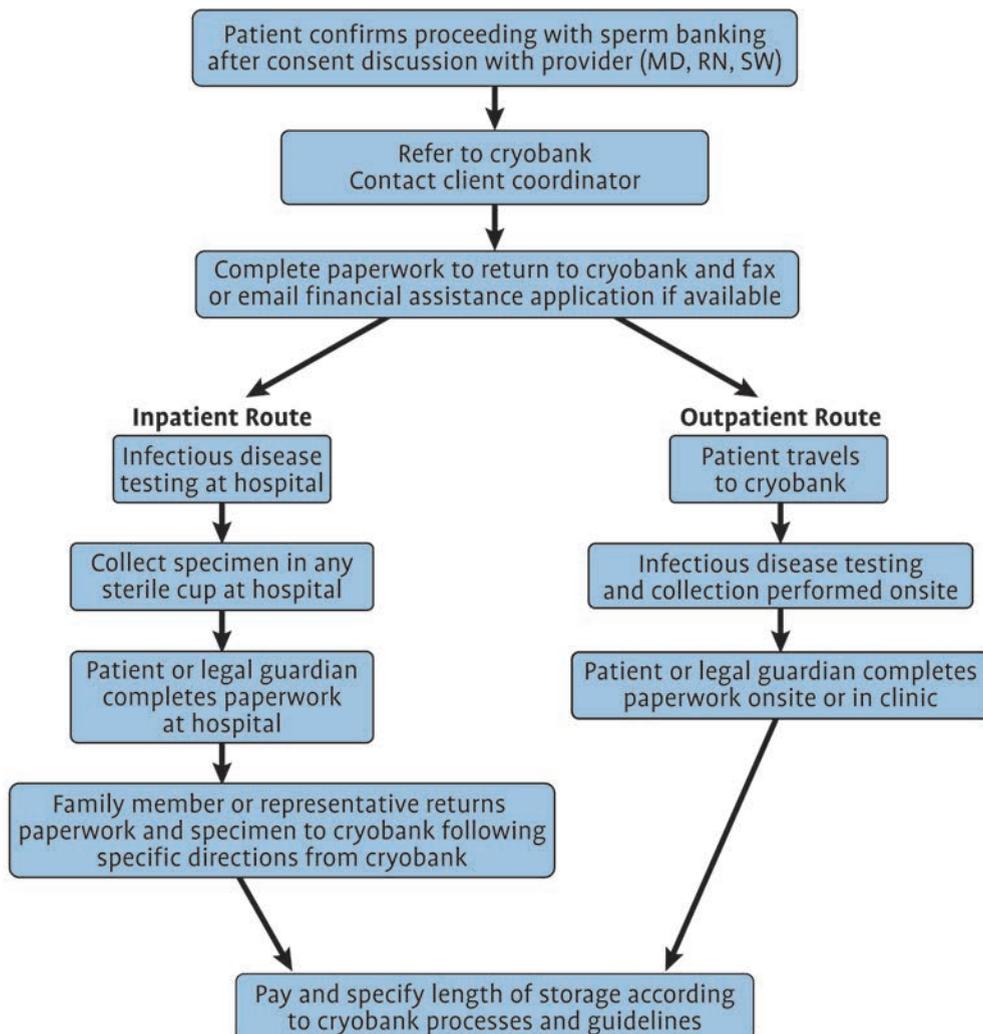
Oncology nurses who were identified as “champions” of fertility preservation for AYA males took the free online class, “The California Cryobank Male Oncofertility Online Course,”<sup>50</sup> covering causes of infertility, the importance of sperm cryopreservation, the collection procedure, and the cryopreservation process. Nurse champions additionally took an online eight-week course, “ENRICH: An Online Training Program for Oncology

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Figure 2. Electronic Health Record Documentation Template

To determine whether the patient was a candidate for fertility preservation, the patient was examined and determined to be at Tanner stage _____ of development.
The patient was deemed to be (unable/able) to receive standard fertility preservation.
The following option of fertility preservation was discussed with (caretaker):
<input type="checkbox"/> Sperm banking
<input type="checkbox"/> Testicular sperm extraction
<input type="checkbox"/> Oocyte preservation
<input type="checkbox"/> Leuprolide therapy
<input type="checkbox"/> Other _____
The family and patient (were/were not) interested in fertility preservation. A referral was made to _____.

Figure 3. Sperm Banking Standardized Operating Procedure After Fertility Preservation Discussion with Patient Has Been Completed



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Nurses,”<sup>51</sup> through the Moffitt Cancer Center to improve skills in communicating with AYA patients about reproductive issues, extending to sexual health and family building. Nursing leaders now teach an oncofertility lecture as part of the AYA oncology course, for which social work, child life specialists, and nurses can receive continuing education units.

### Access to Fertility Specialists

Studies have found that providers often lack knowledge of how and where to refer patients for fertility preservation.<sup>6,17,22,23,26,52</sup> Including bedside nurses in the task force to facilitate fertility preservation and sperm cryopreservation can alleviate the possible barrier of time constraints to these services for AYA males.<sup>17,22,23</sup> A previous study demonstrated a 2.4-fold increase in fertility preservation discussions with standard referral guidelines and a documentation template.<sup>16</sup>

To improve access to the community cryobank, key stakeholders collaborated on the development of SOPs to clearly outline the steps for semen collection and storage at the cryobank, helping to reduce logistical barriers. The oncofertility team also collaborated with our community’s cryobank team on specific contact information for cryobank patient coordinators. The SOP was uploaded to the intranet along with cryobank information and example documents, including directions, financial assistance applications, and a general description of cost (see Figure 3, left).

### Conclusion

Though our study was conducted at a single institution and consisted of a small sample size, the combined quantitative and qualitative SWOT approach can be used as a model for rapid cycle improvement for other institutions developing oncofertility programs. Additionally, patients may seek out fertility preservation without discussions with their provider, resulting in unreported data. We emphasize the importance of ongoing community-partnered work between hospitals and local cryobanks for future program development, because this will allow for more efficient dissemination of fertility preservation and sperm cryopreservation information and records between patients and their providers.

Fertility preservation is an important concern for AYA males diagnosed with cancer. Fertility preservation discussions must be assessed and addressed for any institution developing an AYA program. We describe our oncofertility program development, which was part of a larger goal to develop an AYA oncology program at our institution. We found suboptimal rates of documented fertility preservation discussion and sperm cryopreservation, which aligns with findings in other studies.<sup>51,53</sup> With the rapid growth of AYA programs nationally, future research can assess modification of these tools in newly develop AYA oncology programs and provide a method for assessing a program’s success at increasing fertility preservation discussion and sperm cryopreservation rates. 

*Jacqueline N. Casillas, MD, MSHS is a professor, a pediatric hematologist/oncologist, and a health services researcher; Roy L. Kao, MD is assistant professor and a pediatric*

*hematologist/oncologist; Gavin D. Roach, MD, MS, is an assistant professor and a pediatric hematologist/oncologist; Joanna J. Gell, MD, is a clinical instructor and a physician-scientist researcher; Elizabeth A. Van Dyne, MD, was a pediatric hematology/oncology fellow and Theodore B. Moore, MD, is the chief of pediatric hematology/oncology, director of the Pediatric Blood and Marrow Transplant Program, and a professor of pediatrics in the Department of Pediatrics, Division of Hematology–Oncology, UCLA David Geffen School of Medicine, Los Angeles, Calif. Joshua Macadangdang is a graduate student pursuing his master’s in nursing degree at UCLA, Los Angeles, Calif. Emma Lidington is an applied health researcher focusing on care and quality of life in adolescent and young adult oncology patients at The Royal Marsden Hospital, Chelsea, London, UK. Melody S. Hsu, MD, is pediatric hematologist and oncologist at Children’s Hospital of Los Angeles, Los Angeles, Calif. Hilary Gan is the Director of Hospital Programs at Teen Cancer America, Los Angeles, Calif. Shivani Upadhyay, MD, is a pediatric hematologist and oncologist and a faculty at Cedars–Sinai Medical Center, Los Angeles, Calif. Neha G. Vaghasia, MD, is pediatric hematologist/oncologist in the Department of Pediatrics, Division of Hematology–Oncology, Kaiser Permanente Southern California, Fontana, Calif. Ning Li PhD, is an associate professor in the Department of Biomathematics, UCLA David Geffen School of Medicine, Los Angeles, Calif. Grace Sund, RN, is pediatric clinical nurse specialist in the Department of Nursing, UCLA Health System, Los Angeles, Calif.*

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