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Impact of a Web-Based Reproductive Health Training Program: ENRICH (Educating Nurses about Reproductive Issues in Cancer Healthcare)

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Abstract

Purpose: Educating Nurses about Reproductive Issues in Cancer Healthcare (ENRICH) is a web-based training program to assist oncology nurses with timely communication and relevant information regarding reproductive health issues (e.g., risk of infertility, fertility preservation, sexual health) to adolescent and young adult (AYA) patients and survivors. This manuscript describes impact on knowledge, perceived communication skills, and practice behaviors.

Methods: The 8-module course incorporated didactic content and an interactive applied learning component on the following reproductive health topics: overview, men, women, family building options, pediatrics, sexual health, communication, and practical applications. A 14-question pre and post-test was administered to assess changes in knowledge. Additionally, participants received a follow-up survey addressing communication skills and practice behaviors.

Results: Over a 3 year period, 233 nurses completed the training. The mean pre- to post-test total score increased significantly ($p < .001$). Nurses rated their communication skills regarding risk of infertility with males as 7.5 and females as 7.4, based on a 10 point scale. Half of participants noted that they often or always discuss risk of infertility and fertility preservation options. Two-thirds indicated they refer patients to reproductive specialists and majority (72%) indicated they document those referrals

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Ethical Approval

This study was deemed Exempt by University of South Florida Institutional Review Board.

Conflict of Interest

The authors have declared no conflicts of interest.

Conclusions: ENRICH is a successful intervention for oncology nurses caring for AYA patients and survivors by increasing knowledge, communication skills, and frequency of discussion of reproductive health

Keywords

cancer; reproductive health; oncofertility; education intervention; AYA

Background

Impaired reproductive health can have a significant impact on future quality of life among adolescent and young adult (AYA) patients with cancer and survivors. Lack of communication among AYA patients and cancer survivors about a potential loss of fertility, appropriate contraception and sexual function have been identified as some of the least talked about aspects of cancer care.^[1] Multiple organizations such as American Society of Clinical Oncology (ASCO), National Comprehensive Cancer Network (NCCN), American Academy of Pediatrics (AAP), and American Society of Reproductive Medicine (ASRM) have developed guidelines suggesting providers discuss reproductive health issues with patients as early as possible in the cancer continuum.^[2-6] Yet, even after a decade of such guidelines, many AYA patients and survivors report not receiving this information.^[7, 8] Several years ago our working group identified oncology nurses as being in an ideal position to have these discussions with patients.^[9, 10] Communication skills training programs have been effective in other health contexts, particularly with a focus on nurse trainees.^[11, 12] After significant formative research, we developed a communication skills training program for nurses regarding cancer and reproductive health, Educating Nurses about Reproductive Issues in Cancer Healthcare (ENRICH).^[13]

The purpose of this study was to assess the overall impact of the training program over a three-year period on nurses' knowledge of program content and confidence with communication skills, and practice behaviors regarding reproductive health issues for AYA patients and survivors.

Methods

Training Program

ENRICH, is web-based curriculum designed to provide oncology nurses with communication skills about reproductive health issues such as risk of infertility and fertility preservation options, contraception, and sexual health with AYA patients with cancer. The entire training was grounded in the Adult Learning Theory.^[14] Participants completed 8 modules focusing on: (1) an overview of the topics and training website; (2) risk of infertility due to cancer treatment and fertility preservation options for males; (3) risk of infertility due to cancer treatment and fertility preservation options for females; (4) pediatric specific considerations; (5) alternative family building options; (6) sexual health, (7) communication strategies, and (8) practical applications. Ethical, legal, and psychosocial considerations were infused throughout all modules. Each module included a web-based lecture, course textbook readings,^[15] case studies, and interview-based learning

assignments.^[16, 17] The Communication module provided specific strategies: allow the patient to ask questions; preview the main points to be covered; communicate uncertainty; and use of a two sided message as well as the 3 key time points to discuss fertility preservation with patients and healthcare team members. A full description of the ENRICH curriculum development process is detailed elsewhere.^[13] The time commitment was ~60-90 minutes per week over the 8 week training program. Nurses completing requirements received 11 Continuing Education Units/Credits.

Recruitment

After completion of a pilot cohort, the program was offered annually from 2014-2016 (cohort 1, 2014; cohort 2, 2015; cohort 3, 2016). Eligibility criteria included being a Registered Nurse, providing care for 5 AYA patients and survivors annually, and working in an oncology care setting. Nurses were recruited through conference promotions, list-serve emails through: nursing professional organizations (e.g., Oncology Nursing Society, Academy of Nurse Navigators), nursing program alumni associations, outreach to National Cancer Institute (NCI) cancer centers, professional organization serving minority nurses (e.g., National Black Nurses Association), social media outreach, recommendation by previous ENRICH participants, nominations by ENRICH co-investigators and consultants, and a Children's Oncology Group newsletter.

Measures

Over the course of the study, participants are evaluated at several time points (Figure 1.): program application, pre-posttest, program evaluation, and follow-up survey. A detailed explanation of each measure is provided below.

Program Application

As part of the ENRICH application process, participants completed a program application (baseline), which included information about demographics, education, and workplace setting.

Knowledge

All participants completed a 14-item multiple choice knowledge assessment, developed by content experts. Items related to the six clinical content modules focusing on risk of infertility due to cancer treatment and fertility preservation options for males and females, pediatric specific considerations, alternative family building options, and sexual health. The assessment was administered prior to beginning the course and after viewing the sixth module, because the final two modules focused on application of communication strategies and institutional practical applications.

Program Evaluation

Each learner was required to complete a program evaluation to receive CEUs. This evaluation was created by the CEU providers and contained yes/no, Likert scale, and open-ended questions. We are reporting on items relevant to utility of a web-based training, self-reported confidence in knowledge and patient care, and participant satisfaction.

Communication Skills and Practice Behaviors

One goal of ENRICH is to empower participants to apply knowledge and skills within their personal practice. All program participants received a 6-month follow-up survey as well as a follow-up survey every year thereafter. Participants rated their communication skills on a variety of training topics, including knowledge of and confidence in discussing risk of infertility, using a 0 (no change) to 10 (most change) point scale. Participants also identified the frequency (never=0, rarely=1, sometimes=2, often=3, always=4) of their discussion of risk of infertility and fertility preservation options, referrals to a reproductive specialist, and documentation of referrals. Cohort 3 (class of 2016) was unique in that they were asked these questions at baseline (application) as well as at follow-up for comparison. The incentive for participation in the survey was a department store gift card, which varied in value (\$5-\$25) from 2014-2016.

Data Analysis

To assess changes in knowledge, the total score (% correct) was compared between pre- and post-test using a $p < .05$ level of significance. Descriptive statistics summarized learner demographics, communication skills, and practice behaviors. A sub-analysis comparing specific communication skills and practice behavior application data to follow-up survey was analyzed using Wilcoxon signed-rank test. Data were analyzed using SPSS v. 21.

Results

Recruitment and Retention

Between 2014 and 2016 there were three cohorts of trainees. Two-hundred and fifty one nurses applied for and were accepted for the training program; 233 (93%) completed the course. The majority of participants were non-Hispanic (92%), White (88%) females (98%), which reflects national statistics on the demographics of nurses in the United States.^[18] Table 1 summarizes participant demographic and practice characteristics.

Knowledge

The mean pre- to post-test total score increased from 57% to 79% correct ($p < 0.0001$). The effect size for this change was large (Cohen's $d=1.3$). The majority (88%) scored higher on the post-test than on the pre-test (Table 2.).

Program Evaluation

Ninety-six percent (n=226) of participants completed the program evaluation. Of those 94% (n=212) indicated they gained knowledge and 95% (n=215) felt the course increased their confidence in patient care. Between 79-92% of learners' perceived the following competencies were met: patient care (91%), medical knowledge (92%), practice-based learning and improvement (90%), and interpersonal and communication skills (86%). In regards to the utility of the course, 100% reported the method of instruction was conducive to learning and 98% noted the web-based environment was conducive to learning. Ninety-six percent of participants across all cohorts rated quality of conference, planning, staff, and services as very good or excellent (1= Poor, 3= Fair, 3=Good, 4=Very Good, 5=Excellent)

and 98% of participants across all cohorts indicated they would recommend the course to others (yes/no).

Communication Skills and Practice Behaviors

Overall Follow-Up Survey Results—Of 233 nurses, cohorts 1-3, 54% (n=125) (cohort 1 n=31, cohort 2 n=31, cohort 3 n=63) completed the final follow-up survey in 2016. Participation rates by cohort were as follows: cohort 1=41%, cohort 2 =44%, cohort 3= 61%. A comparison between responders and non-responders indicated no significant differences in the categories of: race, ethnicity, gender, or education. Because follow up surveys were administered at the same time point in their training trajectory for all three cohorts, time between completion of training program and final follow up survey used for the current analysis varied: 2.5 years for cohort 1, 1.5 years for cohort 2, and 6 months for cohort 3. Based on a 10 point scale, on average, nurses rated their communication skills regarding risk of infertility with males as 7.5 ($sd=1.5$) and females as 7.4 ($sd=1.4$). Regarding practice behaviors, half of participants noted they often or always discuss risk of infertility with patients (males 46%; females 56%) and discuss fertility preservation options (47% males; 54% females). Two-thirds indicated they refer patients to reproductive specialists (60% males; 61% females) and majority (72%) indicated they document those referrals.

Cohort 3 Application and Follow-Up Survey Comparison—We restricted analyses focused on changes in 2016 to Cohort 3 (n=63), because only this group of participants received the same follow up survey questions at baseline and program completion. This comparison indicated there was a significant ($p < .001$) increase in self-reported communication skills in the domains of risk of infertility for male and female patients. Additionally, based on a 5 point scale (never =0, rarely =1, sometimes =2, often= 3, and always= 4) participants increased frequency of discussion of risk of infertility and fertility preservation options, referral to reproductive specialists, and documentation of referrals (Table 3).

Discussion

ENRICH is a successful intervention for nurses working in oncology care with AYA patients; increasing knowledge, perceived communication skills, and frequency of discussion across a variety of reproductive health related domains, and leading to the adoption of practice behaviors aligning with ASCO and ASRM guidelines.

The ENRICH curriculum improved overall rates of knowledge among nurses regarding reproductive issues across a variety of the domains (risk of infertility, fertility preservation options, current technologies, and sexual health). Oncology nurses often report lacking the knowledge, skills, or confidence to talk about fertility and preservation [10, 19], thus leading to a lack of communication about these topics. In addition to an increase in knowledge as indicated by pre-posttest scores, participants perceived an increase in communication skills, specifically related to risk of infertility. Our training program demonstrated both objective and self-assessed gains in the area of knowledge; offering a successful intervention for nursing education, practice, and research as evidenced by the significant increase in post-test scores. The web-based training was well received and reported as an environment conducive

to learning among oncology nurses. Regarding behavioral aspects, results show oncology nurses had high rates of confidence in discussing this topics as well as increased frequency.

The 2018 ASCO guidelines for cancer and infertility suggest oncology healthcare professionals discuss treatment related risks or infertility, refer interested patients to reproductive specialists, and document the discussion and referral in the patient's medical record.^[3] Few studies have reported on interventions, such as ENRICH, seeking to implement these guidelines. To our knowledge, this is the first provider-focused intervention to demonstrate improvements in knowledge and self-reported behaviors and activities aligned with ASCO guidelines to address fertility needs of AYA oncology patients. A recent study by Salsman et al reported 83% of patients were informed about potential treatment-related infertility^[7]; however, the sample was drawn from an institution leading the field of Oncofertility and little is known about rates of fertility related discussion, referrals, and documentation at community cancer centers, university hospitals, community hospitals, and private practices, which typically have less resources.^[8] Our study, with participants from a variety of clinical settings, indicates that an educational intervention among healthcare professionals increases rates of discussion, referral, and documentation, but there is room continued improvement in these areas.

Clinical Implications

Health care providers are often responsible for implementing clinical practice guidelines related to the discussion of FP options with AYA oncology patients. Our training program provides a new opportunity to operationalize these guidelines by identifying a key member of the health care team who can serve as a champion for this topic (i.e., nurses). ENRICH offers an opportunity to, provide training that can be completed at the pace of the learners (i.e., web-based, asynchronous training), and ultimately improves both knowledge and practice behaviors the satisfy best clinical practice and quality measures that include discussion of infertility and FP options with AYA patients. While this training program was funded by the NIH/NCI funded project, we have now included categories that those who may be interested in implementing such a system would need to consider including: web-based learning platform, textbooks to deliver the curriculum, costs for awarding CEUs, an a program coordinator. Depending on the systems in which training programs will be implemented costs may drastically vary, for example, some institutions may have institutional licenses for web based learning platforms or staff who are responsible for continuing education. Thus, rather than including exact numbers, we chose to include a listing of these categories in our discussion section.

Limitations

While results point to an effective educational intervention for oncology nurses, findings should be considered in light of certain limitations. First, aside from the knowledge items from the pre-posttest, results are based on self-report by participants and communication skills and behavior changes were not objectively evaluated through clinical observation or chart review. Almost half (46%) of the participants, did not complete the follow-up survey and it is possible that nurses who were most likely to improve communication skills or adopt

new practice behaviors were responders. The majority of non-responders were non-Hispanic (91%), White (87%), and female (97%) thus there was limited diversity in the sample. Cohort 3 had the largest participation rate, possibly because they completed the course most recently. The other two cohorts were receiving the survey at 1.5 years and 2.5 years after the training. Additionally, a proportion of knowledge questions were not correct on post-test. We took this as feedback to address areas of the curricula related to these concepts as well as to reformat the poor performing items.

Conclusion

ASCO Fertility Preservation Clinical Practice Guidelines and ASRM guidelines are an important component impacting the delivery of timely and appropriate reproductive health services, including discussion of FP options with AYA oncology patients.^[3, 6] Implementing them into daily clinical practice and integration into workflow often falls to health care providers.^[20] Our training program provides an opportunity to operationalize these guidelines by identifying a key member of the health care team who can serve as a champion for this topic (i.e., nurses), providing training that can be completed at the pace and time of the participants (i.e., web-based, asynchronous training), and ultimately improving both knowledge and behaviors that directly relate to the clinical practice guidelines and quality measures (i.e., discussion of fertility and FP with AYA patients).

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Figure 1:
ENRICH Evaluation Measures Sequence

Table 1.

Participant Demographics and Practice Characteristics

	Total (N=233) %*
Ethnicity: Not Hispanic/Latino	214 (92%)
Race: White	207 (88%)
Sex: Female	229 (98%)
Region	
Northeast	51 (21%)
South	65 (28%)
Midwest	53 (23%)
West	64 (27%)
Highest Degree	
Associate's	17 (7%)
Bachelor's	107 (46%)
Graduate	109 (47%)
Years in Nursing	
1-10	109 (46%)
11-20	60 (26%)
21+	66 (28%)
Workplace Setting	
Academic Cancer Center	139 (60%)
Community Cancer Center	33 (14%)
University Hospital	14 (6%)
Community Hospital	22 (9%)
Private Practice	8 (3%)
Other	17 (7%)

Table 2.

Pre-Posttest Results

Item Content	Correct (pre-test)	Correct (post-test)	P value
<i>Overall Knowledge (% of total items correct)</i>	57%	79%	< 0.0001
<i>Fertility Risks</i>			
Fertility risk in young male oncology patient previously treated with prednisone for rheumatoid arthritis.	47%	69%	0.0001
Impact of cancer site on sperm count and sperm motility.	80%	95%	<0.0001
Impact of age, gender, and radiation site on future fertility outcomes.	35%	46%	0.0086
Impact of chemotherapeutic agents on gonadal damage and fertility.	63%	92%	<0.0001
Impact of age, gender, and cancer site on fertility.	75%	90%	<0.0001
<i>FP Options</i>			
Standard methods to obtain sperm from men prior to treatment.	65%	84%	<0.0001
Success rates for female FP methods.	35%	67%	<0.0001
Pregnancy success rates with embryos cryopreserved prior to receiving chemotherapy with alkylating agents.	65%	88%	<0.0001
Benefits and limitations of oophorectomy.	45%	78%	<0.0001
Success rates for male FP options.	41%	69%	<0.0001
Use of Tanner Stage to determine FP options.	48%	83%	<0.0001
<i>Sexual Function</i>			
Impact of nerve-sparing radical prostatectomy on sexual function.	72%	79%	0.0629
Impact of biologic response modifiers on sexual function.	62%	83%	<0.0001
Physical effects of targeted therapies on sexual function.	57%	82%	<0.0001

Table 3.

Cohort 3 Comparison Between Application and Follow-Up Survey (n=63)

	Application		Follow up		<i>p</i> Value	Cohen's <i>d</i> Effect Size
	Mean	SD	Mean	SD		
How would you rate your communication skills on each of the following topics withAYA oncology patients...? (0 = None, 10 = Very Skilled)						
Risk of infertility for male patients	3.76	2.28	7.62	1.56	<0.001	1.84
Risk of infertility for female patients	3.68	2.49	7.78	1.44	<0.001	1.91
Please rate the following statements related to your practice with AYA oncology patients (never =0, rarely =1, sometimes =2, often=3, and always= 4)						
I discuss the risk of infertility with my male patients	1.55	0.99	2.43	1.03	<0.001	0.80
I discuss fertility preservation options with my male patients	1.40	0.96	2.35	1.02	<0.001	0.88
I discuss the risk of infertility with my female patients	1.71	0.89	2.59	1.01	<0.001	0.85
I discuss fertility preservation options with my female patients	1.58	0.92	2.52	1.03	<0.001	0.88
I refer my interested male patients to reproductive specialists	1.44	1.20	2.52	1.42	<0.001	0.75
I refer my interested female patients to reproductive specialists	1.63	1.18	2.63	1.36	<0.001	0.72
I document any referrals I make for patients to reproductive specialist in the medical record	1.90	1.49	2.87	1.44	<0.001	0.60