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Oncofertility Barriers in Nurses Caring for Women with Breast Cancer

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Despite the importance of oncofertility care in supporting women coping with fertility challenges after breast cancer, the practice of oncofertility care among nurses remains suboptimal. There is an urgent need to investigate oncofertility barriers faced by nurses caring for women with breast cancer. A cross-sectional online study was conducted among registered nurses caring for women with breast cancer. A self-developed questionnaire and the Oncofertility Barriers Scale (OBS) were used to assess participants' characteristics and self-perceived barriers. A score ≥ 3 indicates a high level of oncofertility barriers requiring further attention. 372 nurses completed the survey, with 45.54% reporting a score of ≥ 3 on the OBS. Notably, 85% of participants reported high levels of barriers in at least one domain and 27.42% reported barriers in all six domains of the scale. The most commonly reported barrier was "Stereotype of cancer patients" (71%). Nurses without fertility training, those who did not read fertility-related guidelines, and those in departments lacking such guidelines reported significantly higher barriers (all $p < 0.05$). The prevalence of oncofertility barriers among nurses is high. Educational programs should be developed to address these barriers, improving the quality of oncofertility care for women with breast cancer.

Keywords Nurse, Breast cancer, Oncofertility barriers

Breast cancer ranks as the most prevalent cancer among women globally, including in China[1]. While advancements in systemic treatments have significantly increased survival rates to around 90%, these therapies often come with complex long-term effects that can impact quality of life[2]. In particular, chemotherapy can lead to ovarian damage, raising concerns about future fertility[3]. Moreover, the requirement for prolonged endocrine therapy, lasting five to ten years, complicates fertility planning and exacerbates age-related ovarian decline[4]. Young women with breast cancer frequently face emotional distress related to their reproductive options, which can negatively affect their mental health and treatment compliance[5]. Thus, the integration of oncofertility care into cancer care is essential, providing tailored support to address the fertility needs of women with breast cancer and helping them navigate fertility challenges throughout their cancer journey[6].

In 2006, the American Society of Clinical Oncology (ASCO) issued its first guideline on oncofertility care. This guideline emphasized the need for early discussions about fertility risks and fertility preservation between cancer patients and healthcare providers and recommended referring interested patients to fertility specialists for counseling[7]. Notably, advancements in fertility preservation techniques have expanded reproductive options for women with cancer, offering them greater hope. In addition to embryo and oocyte cryopreservation, ovarian tissue cryopreservation (OTC) has emerged as a viable option, particularly for prepubertal girls with breast cancer and women who need to initiate cancer treatment urgently[8]. Evidence shows that providing oncofertility care can alleviate fertility concerns and enhance the quality of life for women with breast cancer[9–11]. Over the past two decades, national and international guidelines have evolved to further guide the practice of oncofertility care[12]. Despite these efforts, significant gaps remain between guideline recommendations and actual practice. Research indicates that only 44% of young people with cancer had fertility risk communication with their clinicians[13], and 64% of women with breast cancer did not have fertility preservation discussions with any healthcare providers[14]. These gaps underscore the need to understand and address barriers to optimal oncofertility care.

Barriers to oncofertility care have been identified at multiple levels: patient, healthcare provider, and organizational[15]. At the healthcare provider level, challenges include a lack of knowledge, limited awareness, time pressure, concerns about recurrence risk, the priority of cancer treatment over fertility issues, and perceived limited benefits. Much of the existing research has focused on qualitative aspects and primarily involved oncology physicians[16–21]. In 2013, ASCO updated its guidelines to extend the responsibilities of oncofertility care

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beyond clinicians to include other healthcare providers, such as nurses[22]. As integral members of the healthcare team, nurses frequently interact with patients and are well-positioned to provide oncofertility care to women with breast cancer. Literature reviews highlight that nurses can play various roles in promoting oncofertility care, including providing fertility information, offering psychological support, assisting in referrals to fertility specialists, serving as oncofertility nurse navigators, and delivering continued follow-up fertility care[23–26]. To meet the demands of these patients, nurses must be adequately prepared to deliver high-quality oncofertility care. However, a systematic review demonstrated that most nurses did not provide oncofertility care routinely[27]. Previous research has shown that barriers such as inadequate knowledge and role confusion can impede nurses' engagement in oncofertility care[19,23]. Therefore, it is essential to investigate the specific oncofertility barriers encountered by nurses, which will provide a foundation for developing targeted educational programs aimed at enhancing nurses' competencies and facilitating their involvement in oncofertility care.

Research on the barriers to oncofertility care among nurses has predominantly focused on Western countries, primarily through qualitative studies[19]. In contrast, China has seen limited exploration, with one qualitative study exploring nurses' perceptions toward oncofertility care for males with cancer[28]. Importantly, there is a lack of research quantifying the specific oncofertility barriers faced by nurses, underscoring the urgent need for further study in China. This research aims to investigate oncofertility barriers encountered by nurses caring for women with breast cancer. A comprehensive understanding of these barriers may inform the development of targeted educational programs designed to enhance nurses' competencies and involvement in oncofertility care.

Methods

Study Design

This is a cross-sectional study conducted among nurses caring for women with breast cancer.

Study Setting and Participants

This study was conducted in hospitals across Guizhou province of China. Participants were nurses who meet the following eligibility criteria. Inclusion criteria include: (1) registered nurses; (2) engaging in clinical working; (3) caring for women with breast cancer. Nurses who were rotating and on leave were excluded from the study. The sample size was determined based on the rule of thumb that five to ten participants per item. Considering this study involves 27 items related to oncofertility barriers, a sample of 135 to 270 nurses was required.

Instruments

General characteristics questionnaire

A self-developed questionnaire was used to collect data on participants' characteristics, including age, gender, education level, marital status, level of the working hospital, years of experience in breast care, professional title, experience of fertility training, experience of reading fertility-related guidelines, the availability of fertility guidelines in their working department, and the presence of a fertility department in their working hospital.

Self-perceived barriers to oncofertility care

Oncofertility Barriers Scale (OBS) was used to measure barriers to oncofertility care among nurses caring for women with breast cancer[29]. The OBS consists of 27 items covering six dimensions: (1) lack of information and education (8 items), (2) rigid thinking about oncofertility care (7 items), (3) cancer patient stereotypes (3 items), (4) fertility risk (3 items), (5) insufficient support (4 items), and (6) interrupted oncofertility care (2 items). Each item is rated on a five-point Likert scale, ranging from disagree to highly agree (1 = disagree, 2 = somewhat agree, 3 = agree, 4 = quite agree, and 5 = highly agree). Higher scores indicate greater self-perceived barriers in providing oncofertility care, with a score ≥ 3 indicating a high level of oncofertility barriers that need further attention. The original scale demonstrated good reliability, with Cronbach's alpha coefficients of 0.91 for the total scale and 0.72 to 0.93 for the subscales. In this study, the original traditional Chinese scale was translated into simplified Chinese, and the face validity of the scale was confirmed by ten nurses. The Cronbach's alpha coefficient for the scale in this study was 0.96 for the total scale and 0.82 to 0.95 for the six subscales.

Data Collection

This cross-sectional study was conducted online from July to August 2024. Recruitment and data collection occurred within member hospitals of a central hospital's medical alliance in Guizhou Province, comprising 72 hospitals. The data collection process followed these steps: (1) The research team initially distributed a study poster (with detailed study information) and a survey link (managed by Wen Juan Xing) to groups involving nursing directors from member hospitals, requesting their assistance in data collection; (2) Nursing directors who agreed to participate were asked to promote the poster and survey link to nurses involved in caring for women with breast cancer; (3) Nurses could click the survey link to access the online survey and complete an eligibility assessment. Only those meeting the eligibility criteria were allowed to proceed, while ineligible participants were automatically exited.

Data Analysis

Data analysis was performed using IBM SPSS 29.0 (IBM Corp., Armonk, NY, USA). First, the normality distributions of self-perceived oncofertility barriers were assessed via skewness and kurtosis statistics, with the absolute value of skewness ≤ 2 and kurtosis ≤ 7 considered acceptable[30]. Second, descriptive statistics were used to summarize characteristics of participants and self-perceived barriers to oncofertility care. Third, independent t test, one way ANOVA and Mann-Whitney U test were used to compare difference in self-perceived oncofertility barriers based on participants' characteristics. Significance was set at $P < 0.05$.

Ethical Considerations

This study was conducted following the principles outlined in the Declaration of Helsinki and received ethical approval from the Institutional Review Board of a hospital (No. 2024035 K). An information sheet detailing the study's objectives and procedures, emphasizing voluntary participation and the privacy and confidentiality of the collected data, was attached at the beginning of the survey. Electronic informed consent was obtained from all participants.

Results

Characteristics of Participants

A total of 372 nurses caring for women with breast cancer completed the survey. The mean age of the participants was 33.37 years, with a standard deviation of 6.84. Most participants were female, held at least a bachelor's degree, were married, had children, and worked in tertiary hospitals. Most participants held either a medium-grade or advanced professional title, had more than two years of work experience. Regarding fertility-related training experiences, more than half reported that they had not received fertility training or read fertility-related guidelines. Additionally, 59.14% of participants indicated that fertility-related guidelines were available in their department and 76.88% reported that a fertility department was not available in their hospitals (Table 1).

Characteristic	*n*	%
Age (M: 33.37, SD: 6.84)		
< 30	114	30.65
30–40	212	56.99
> 40	46	12.37
Gender		
Female	360	96.77
Male	12	3.23
Educational level		
Junior college	57	15.32
Bachelor and above	315	84.68
Marital status		
Unmarried/divorced	72	19.35
Married	300	80.65
Parenthood status		
Have children	287	77.15
Have no children	85	22.85
Level of working hospital		
Secondary hospital	144	38.71
Tertiary hospital	228	61.29
Working years in breast department (M: 6.24, SD: 5.07)		
≤ 2 years	103	27.69
3–5 years	100	26.88
> 5 years	169	45.43
Professional title		
Primary professional title	183	49.19
Medium-grade/Advanced professional title	189	50.81
Fertility training experience		
Yes	134	36.02
No	238	63.98
Whether read fertility related guideline		
Yes	158	42.47
No	214	57.53
The availability of fertility related guideline in department		
Yes	220	59.14
No	152	40.86
The availability of fertility department in working hospital		
Yes	86	23.12
No	286	76.88

Table 1. Demographic characteristics of participants ($N = 372$). Note. M = mean; SD = standard deviation; % = percentage

Characteristic	Mean (SD)	Statistics	*p*
Age		F = 0.747	0.474
< 30	2.86 (0.86)		
30–40	2.96 (0.80)		
> 40	2.85 (0.86)		
Gender		t = -0.637	0.525
Female	2.91 (0.81)		
Male	3.06 (1.21)		
Educational level		t = 1.934	0.054
Junior college	2.72 (0.95)		
Bachelor and above	2.95 (0.79)		
Marital status		t = 1.125	0.261
Unmarried/divorced	2.82 (0.77)		
Married	2.94 (0.84)		
Parenthood status		t = 1.794	0.074
Have children	2.96 (0.82)		
Have no children	2.78 (0.82)		
Level of working hospital		t = 1.221	0.223
Secondary hospital	2.85 (0.81)		
Tertiary hospital	2.96 (0.83)		
Working years		F = 1.920	0.148
≤ 2 years	2.78 (0.83)		
3–5 years	2.97 (0.88)		
≥ 6 years	2.97 (0.77)		
Professional title		U = 16,736	0.590
Primary professional title	2.91 (0.90)		
Medium-grade/advanced professional title	2.93 (0.74)		
Fertility training experience		t = -4.147	< 0.001
Yes	2.68 (0.85)		
No	3.05 (0.78)		
Whether read fertility related guideline		U = 11,874	< 0.001
Yes	2.70 (0.90)		
No	3.07 (0.73)		
The availability of fertility related guideline		t = -2.817	0.005
Yes	2.82 (0.84)		
No	3.06 (0.78)		
The availability of fertility department		U = 11,574	0.407
Yes	2.88 (0.96)		
No	2.93 (0.78)		

Table 2. Comparison of oncofertility barriers based on characteristics of participants ($N = 372$). Note. SD = standard deviation; t, Independent t test; F, one way ANOVA; U, Mann-Whitney U test.

Self-perceived Oncofertility Barriers

The mean score of the overall OBS was 2.92 (SD 0.87), with 45.40% of participants reporting a high level of oncofertility barriers, as indicated by an overall score ≥ 3. Furthermore, 85.56% ($n = 322$) of participants reported high levels of oncofertility barriers in at least one domain; 78.23% ($n = 291$) reported high levels of oncofertility barriers in at least two domains; 67.20% ($n = 250$) reported high levels of oncofertility barriers in at least three domains; 52.96% ($n = 197$) reported high levels of oncofertility barriers in at least four domains; 38.98% ($n = 145$) reported high levels of oncofertility barriers in at least five domains; and 27.42% ($n = 102$) indicated high levels of oncofertility barriers in all six domains.

The most common area of barrier was "Stereotype of cancer patients," with 71% of participants reporting a score ≥ 3. This was followed by "insufficient support" (68.3%), "fertility risk" (56.2%), "lack of information and education" (55.1%), "interrupted oncofertility care" (51.1%), and "rigid thinking on oncofertility care" (43.3%).

Role of the Nurses' Individual Characteristics in Oncofertility barriers

Table 2 presents the results of comparisons of oncofertility barriers based on nurses' characteristics. Statistically significant differences were found between nurses with and without fertility training, those who had read fertility-related guidelines versus those who had not, and those working in departments with fertility-related guidelines compared to those in departments without such guidelines. Specifically, nurses without fertility

training reported higher oncofertility barriers (Cohen's d = 0.81, $p < 0.001$), as did nurses who had not read fertility-related guidelines (Cohen's d = 0.80, $p < 0.001$) and those working in departments without fertility-related guidelines (Cohen's d = 0.82, $p = 0.005$). No significant differences were observed for other nurses' characteristics.

Discussion

The findings of this study indicate that oncofertility barriers are a common and significant issue among nurses caring for women with breast cancer. Overall, 45.54% of participants demonstrated significant oncofertility barriers, as indicated by a score ≥ 3 on the total scale. Notably, 85.56% demonstrated significant barriers in at least one domain, and 27.42% faced challenges across all six domains. These findings underscore the urgent need for targeted support and interventions to address the diverse aspects of oncofertility barriers, ultimately enhancing nurses' involvement in oncofertility care and improving the quality of care for women with breast cancer.

The domain of "Stereotype of cancer patients" emerged as the most prevalent barrier to oncofertility care, with 71% of participating nurses perceiving women with breast cancer as inherently weak and unable to manage the demands of pregnancy and parenting. This result is not surprising, as previous studies have indicated similar misconceptions about cancer patients, particularly regarding their physical capabilities[31,32]. However, research shows that women with breast cancer who experience no further disease events report a quality of life comparable to that of the general population[33]. Additionally, there is evidence that women with breast cancer cansuccessfully give birth and embrace motherhood after treatment[34]. Therefore, educational programs are crucial for correcting nurses' stereotypes toward women with breast cancer, which will enhance nurses' involvement in oncofertility care, helping women with breast cancer to make informed decisions about their fertility and family planning.

With 68.30% of nurses reporting a score of ≥ 3 in the domain of "Insufficient support," it is evident that many nurses perceive significant gaps in the support systems for oncofertility care. This finding underscores the importance of equipping nurses with knowledge about available oncofertility resources for women with breast cancer. For instance, as many provinces in China begin including assisted reproductive technologies in medical insurance[35], awareness of these resources can empower nurses to provide essential information, facilitating informed decision-making for their patients regarding future fertility options. Additionally, resources like fertility decision aids and the first oncofertility website (IfertiCare) in China can serve as valuable tools for nurses, enhancing their ability to offer comprehensive oncofertility care.

In the domain of "fertility risk", 56.20% of participants reported high scores, indicating a prevalent belief that pursuing fertility increases risk for women with breast cancer. These perceptions reflect significant barriers to oncofertility care, which is consistent with previous study findings that healthcare professionals prioritize immediate cancer treatment over the reproductive needs of patients[36]. This underscores the necessity for educational programs that provide evidence-based information about the safety and feasibility of pregnancy in women with breast cancer. Research has shown that with appropriate planning and protocols, fertility preservation can be safely integrated into cancer treatment regimens without compromising patient safety or treatment outcomes[37]. Furthermore, there is no evidence to suggest that childbirth leads to worse prognoses for women with breast cancer[38,39]. By addressing these misconceptions, nurses can play a crucial role in advocating for the fertility rights of women with breast cancer and ensuring that their fertility needs are considered and honored.

The high scores in the "Lack of Information and Education" domain, reported by 55% of nurses, highlight a critical gap in the knowledge base. This finding aligns with previous studies indicating that insufficient knowledge about fertility is a significant barrier to providing effective oncofertility care[21]. The lack of specific fertility knowledge may hinder nurses' ability to address reproductive concerns, leading to an avoidance of discussing these important issues with patients[40]. In contrast, oncology nurses who are knowledgeable about fertility preservation are 2.6 times more likely to discuss the impact of cancer treatment on fertility and 1.9 times more likely to feel comfortable discussing fertility preservation compared to those who perceive themselves as lacking knowledge[41]. Strategies such as integrating oncofertility education into nursing curricula and ongoing professional training should be developed to enhance nurses' competency in the field of oncofertility[28].

Although previous studies have revealed that women with breast cancer require ongoing oncofertility support from diagnosis to the later stage after treatment[27], our findings indicate that most nurses (51%) face significant barriers in engaging in the continuity of care. This gap in oncofertility care continuity suggests a need for training programs that emphasize the importance of follow-up care in oncofertility for nurses, which may empower them to take an active role in supporting women with breast cancer regarding reproductive health throughout the cancer care continuum.

Despite being the least prevalent, 44% of nurses still hold rigid beliefs about fertility for women with breast cancer. This finding aligns with previous research indicating that healthcare professionals often assume that women with children or those who do not express a desire for fertility have no fertility needs. Consequently, these assumptions may lead to a lack of prioritization of fertility issues in their care[42]. Additionally, some nurses believe that it is the physicians' responsibility to address fertility issues in women with breast cancer. In 2013, ASCO extended the responsibilities of oncofertility care to nurses. This finding highlights the critical need to clearly define the role of nurses in oncofertility care to enhance their involvement. For example, in western countries, it has been reported that nurses can serve as an oncofertility navigator to facilitate the provision of oncofertility care for individuals with cancer[43].

Significant differences were observed based on nurses' characteristics. Specifically, nurses without fertility training, those who did not read fertility-related guidelines, and those in departments lacking such guidelines reported higher barriers, with Cohen's d values indicating large effect sizes (0.81, 0.80, and 0.82, respectively). These findings further underscore the importance of including the topic of oncofertility in the curriculum of medical schools and in ongoing professional training to prepare nurses to provide oncofertility care. Moreover,

proper regulations and guidelines about fertility preservation should be established and communicated to the public and nurses to facilitate their involvement in oncofertility care.

Limitations

While this study offers valuable insights into understanding oncofertility barriers among nurses, it is essential to acknowledge certain limitations. The cross-sectional design restricts the ability to establish causal relationships between nurses' characteristics and perceived barriers. Additionally, the self-reported nature of the data may introduce bias, as nurses might underreport barriers due to social desirability concerns. Furthermore, the use of convenience sampling from hospitals in a single province may affect the representativeness of the sample, limiting the generalizability of the findings to other regions. Future research should aim to include participants from diverse regions to enhance the generalizability of the results and provide a more comprehensive understanding of oncofertility barriers in nursing practice. Finally, our study focused solely on identifying the perceived barriers to oncofertility care, without examining the actual practices of nurses in providing oncofertility care to women with breast cancer. Future research could investigate the implementation of oncofertility care by nurses and exploring how perceived barriers impact the delivery of care.

Implications

This study highlights the urgent need for educational programs and materials to better equip nurses in providing oncofertility care for women with breast cancer. These programs should aim to correct misconceptions surrounding oncofertility and enhance nurses' oncofertility knowledge, ensuring they can effectively address the diverse fertility needs of women with breast cancer. Practical strategies, such as providing accessible online training, establishing peer-led learning initiatives, or incorporating oncofertility education into nursing education curricula or continuing education programs for nurses could be considered. Furthermore, future research should explore the effectiveness of specific education programs in addressing oncofertility barriers and facilitating nurses' participation in oncofertility care. The findings could inform the improvement of the training programs that ultimately improve the quality and accessibility of oncofertility care for women with breast cancer.

Conclusion

The findings of this study revealed that the prevalence of nurses holding oncofertility barriers was high. Future research should focus on developing and evaluating targeted interventions aimed at addressing these barriers, ultimately improving the quality of oncofertility care.

Data availability

The dataset of this study is not publicly available to ensure the confidentiality of the information. However, they can be obtained from the corresponding author upon reasonable request.

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Author contributions

L.H. conceptualized the study and wrote the draft of the manuscript; C.Z. contributed to the data collection and analysis; B.X. reviewed the manuscript and provided suggestions for revisions; W.T. reviewed the manuscript and provided feedback on the manuscript; H.L. provided support in data collection and reviewed/revised the manuscript. All authors read and approved the final manuscript.

Declarations

Competing interests

The authors declare no competing interests.

Additional information

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