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Original Article

Knowledge, Attitudes, and Practice of chemotherapy management among nurses at Obafemi Awolowo University Teaching Hospital, Ile-Ife, Nigeria

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ABSTRACT

Objective: Cancer is a leading global health challenge with increasing morbidity and mortality. In Nigeria, cancer leads to over 100,000 new cases and 70,000 deaths annually. In resource-constrained countries such as Nigeria, registered nurses (RNs) that provide oncology care lack specialty education in oncology nursing care. Nigerian nurses are the largest portion of the healthcare workforce and can play a key role in improving oncology care. This study aimed to assess RNs' knowledge, willingness, and ability to perform tasks related to chemotherapy administration and symptom management, assess current practices, identify available resources, and identify gaps in RNs' knowledge of oncology care.

Methods: A descriptive, correlational, Institutional Review Board (IRB)-approved study was conducted using a modified Knowledge, Attitudes, and Practice questionnaire and a questionnaire adapted from the Organizational Readiness to Change Assessment. The principle investigator (PI) adopted the role as an observer to witness an accurate picture of nursing practice at Obafemi Awolowo University Teaching Hospital (OAUTH) and identify gaps in education and knowledge around oncology nursing care. A Research Electronic Data Capture database was developed using paper-formatted questionnaires that were exported to Excel for statistical analysis.

Results: This study supports findings from literature highlighting that nurses working in oncology units lack specialized oncology training, which leads to gaps in knowledge and practice. Questionnaire responses and clinical observations at OAUTH support RNs' willingness to learn skills related to oncology nursing care. Nurses are self-aware that they have more to learn about how to prepare and administer chemotherapy, and 90% of nurses reported that an ongoing chemotherapy training program would be helpful at OAUTH.

Conclusions: By identifying gaps in education and knowledge about oncology care and by identifying available resources, an oncology training program could be developed for nurses working in oncology units at OAUTH and other Nigerian hospitals, leading to improved oncology patient care and outcomes.

Introduction

Cancer is the leading cause of death and disability worldwide.[1] According to the World Health Organization (WHO), cancer accounted for nearly 10 million deaths in 2020.[1] Furthermore, 70%–80% of global cancer deaths occur in low- and middle-income countries. Thus the disproportionate burden of cancer in low- and middle-income countries is expected to worsen over the next decade.[2] In Nigeria, the most populous country in Africa with a population of over 200 million people, cancer leads to over 100,000 newly diagnosed cases and 70,000 deaths annually.[3,4] In Sub-Saharan Africa, the WHO noted that advances in oncology patient care, treatment, and research are crucial to improving outcomes.[5]

The number of new cancer cases and deaths in Nigeria results from many factors.[6] One factor is related to the limited number of healthcare professionals with oncology experience.[6] According to the State of the Health Workforce in the WHO African Region (2021), nurses, midwives, and community health workers make up 41.5% of all healthcare workers

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and in Nigeria; nurses and midwives account for 32% of the healthcare workforce.[7] Registered nurses (RNs) are the largest healthcare workforce in Nigeria, and they are in a unique position to improve cancer control and treatment.[7] Although Nigeria has a large number of nurses, there is concern related to clinical practice quality surrounding cancer care in Nigeria, in particular administration of chemotherapy.

In the United States (US) and other high-income countries, oncology nursing is a specialty practice in hospitals where RNs contribute to the care and clinical outcomes of oncology patients.[6,8–12] At Obafemi Awolowo University Teaching Hospital (OAUTH), Ile-Ife, Nigeria, RNs do not receive specialty oncology training. The current practice at OAUTH is that physicians (MDs) prepare and administer chemotherapy. This clinical practice differs from the current practice for chemotherapy administration in the US; that specially trained RNs are responsible for the administration of chemotherapy.[12] Unfortunately, there is a lack of formalized oncology training programs in Nigeria, which prevents nurses there from taking on this role.[8]

In Nigeria, patients diagnosed with cancer are cared for by RNs trained in medical–surgical nursing with no formal oncology training. Because of this, RNs learn about oncology care on the job.[8] In a literature report by Adjumo et al. (2021), they reported that there are knowledge gaps related to cancer care. Authors revealed that 89% of nurses at a Nigerian teaching hospital who were caring for oncology patients had no formal training in oncology.[8] Nigerian RNs report that in the oncology setting, they rate their nursing practices as poor and identify a lack of formal training as the reason for this poor care.[8] In Nigeria, opportunities for nurses to engage in formal oncology education are rare.[10] In a literature report by Nwozichi et al. (2017), it is reported that nonspecialized oncology nurses lack knowledge about the complexities of oncology care.[11]

Nurses working in these settings are learning their oncology-specific skills on the job, which can lead to life-threatening medication errors and unsafe working conditions for both patients and staff due to a lack of knowledge of proper chemotherapy handling and administration.[6,8–10] In another study, nurses admitted incompetence in chemotherapy preparation and administration.[8] The research literature highlights that a competent nursing workforce improves patient outcomes and reduces patient mortality.[6,9,10,12] Hence, nurses are in a position to lead the cancer-control agenda within healthcare policy restriction, and enhancing education and training for nurses in the area of oncology care would have a positive impact on cancer care in Nigeria.[10]

The purpose of this article is to report on an assessment of RNs' perceived knowledge, willingness, and ability to perform tasks related to chemotherapy administration and symptom management at OAUTH in Ile-Ife, Nigeria. We identified gaps in oncology nurse education, knowledge, and practice in chemotherapy administration and symptom management and identified both barriers and facilitators to the role of the nurse in oncology practice at OAUTH. Results can be used to identify how the RNs' role could change and the education needed to enhance the RNs' role while improving care for cancer patients at OAUTH. Hospital administrators are aware of the goal of this study and are willing to provide leadership and funding to support a specialized oncology education program. Once required, oncology education and training is provided to RNs, and leadership can implement a change in the RNs' current role in caring for oncology patients at OAUTH.

Methods

Study design

We designed a descriptive, correlational study to examine knowledge, practice, and attitudes of nurses working in oncology units in Ile-Ife, Nigeria. The study included RNs working in several oncology wards at OAUTH. The Knowledge, Attitudes, and Practices (KAP) survey model is a quantitative instrument with predefined questions that provides access to quantitative and qualitative information about healthcare practices and beliefs.[13] Additional questions were adapted from the Organizational Readiness to Change Assessment (ORCA) that uses a Likert scale.[14] This tool can be used to identify and monitor organizational strengths and weaknesses to support implementation of evidence-based practices in a clinical situation.

A modified version of Foundations in Oncology Nursing—Chemotherapy/Biotherapy examination from Memorial Sloan Kettering Cancer Center was used to assess baseline knowledge on safe chemotherapy handling and administration, management and monitoring of peripheral intravenous (IV) access, common side-effects and toxicities of chemotherapy, and management of patient side-effects. On-site observations collected first-hand accounts of behaviors and interactions of RNs with cancer patients and the multidisciplinary healthcare team members. The researcher acted primarily as an observer while shadowing the nurse and thus became a participant observer.[15] This allowed the researcher to witness an accurate picture of nursing practices at OAUTH.[16]

Description of participants

We recruited nursing participants from oncology wards and clinics at OAUTH. Participants were eligible for the study if (1) they were willing to participate in the study and (2) they were currently working in an oncology unit. Individuals were excluded if they had prior foreign formal oncology nursing training. The total number of eligible nurses for this study is 60. Our sample included 30 nurses (50%) who were willing to participate and currently worked in wards and clinics treating oncology patients.

Data collection

A member of the research team introduced the questionnaires to participants during the first meeting, and an introductory letter accompanied the questionnaires and served as informed consent. Responses were anonymous and voluntary, and 30 questionnaires were distributed and 30 were returned.

The questionnaire was organized into three sections. Section Introduction included questions about professional and educational background and years of experience. Section Methods was the KAP questionnaire composed of seven questions using a three-point scale asking participants to rate their knowledge of and willingness and ability to perform tasks related to safe handling and administration of chemotherapy. Section Results included 13 questions adapted from the ORCA using a Likert scale to identify potential areas of improvement in the safe handling and administration of chemotherapy at their hospital.[14]

A member of the research team distributed the Foundations in Oncology Nursing examination to participants. Participants took the examination home and returned this test at the end of the week. The RNs used resources to assist in completing their exam. However, 21 out of the 30 RNs accepted examinations, and 17 were returned with an 80% response rate.

Observational data were collected through field notes of observations and detailed conversations. Observational data included current oncology nurse training and available resources, specific oncology skills and competencies, and identified gaps in oncology nurse knowledge in chemotherapy administration and symptom monitoring and management.

Data analysis

Data were transcribed from paper records to a Research Electronic Data Capture database and were exported to Excel for analysis. Descriptive statistics (frequency, median, mean, mode) were used to report responses for each of the subsections.

Ethical considerations

This study was conducted after obtaining approval from the institutional review board of both the investigators' institution and the study setting. All participants provided verbal informed consent.

Results

Demographics

All 30 participants were nurses with a diploma or a bachelor's of nursing degree from a Nigerian college or university and held an active Nigerian nursing license. The average number of years in the current profession was 17.7 years, with a range from 2 to 31 years of experience. Among the clinical settings where RNs worked, approximately half worked in in-patient settings ($n = 13$; 48.1%), followed by out-patient settings ($n = 12$; 44.4%), pediatrics ($n = 2$; 7.4%), and other areas ($n = 4$; 14.8%). The results illustrated that RNs are eager and willing to obtain higher education and training. Eighty percent of the RNs have a bachelor's degree in nursing, and 13.3% have a diploma. When asked about the highest degree they would like to obtain, 10.3% stated they sought a bachelor's degree, 6.9% a masters, and 82.8% a PhD. Participants' socio-demographic characteristics are detailed in Table 1.

Clinical practice—safe chemotherapy handling/administration

Results from the modified KAP questionnaire are shown in Table 2 and demonstrate that nurses identified several areas where their knowledge needed improvement. This included how to prepare chemotherapy (81.5%), safe preparation of chemotherapy (64.3%), and administration of IV chemotherapy (62.1%). However, in all the categories, most nurses identified their willingness to engage in the activities as moderate or high. The questionnaire revealed activities where nurses identified their knowledge level as moderate to high, including monitoring adverse effects of chemotherapy (75.8%) and management of adverse effects of chemotherapy (79.3%).

Organizational readiness to change assessment questionnaire

Results from the ORCA questionnaire found that participants agreed that chemotherapy is packaged, stored, and transported well at the hospital and that chemotherapy material is handled with single-use gloves. Most participants agreed that chemotherapy containers have clear warning labels. There was a mixed response about whether chemotherapy drugs were safely transported to the wards, whether the training on the use of personal protective equipment (PPE) was sufficient, and whether there was satisfaction the hospital procedures to handle hazardous drugs such as chemotherapy.

The majority disagreed with statements "I am satisfied with how my hospital assesses personnel preparing and administering chemotherapy" and "I am satisfied with chemotherapy preparation at my hospital." Responses strongly favored that an ongoing chemotherapy training program is needed, that PPE would be needed in the clinical setting, and that the hospital needs to invest in resources for safe chemotherapy preparation and administration.

Lastly, the majority of RNs believed that the hospital required personnel to obtain certified training prior to handling chemotherapy, and most participants disagreed that there is a training course available at their institution. Results from the questionnaire are detailed in Fig. 1.

Table 1
Socio-demographic characteristics ($N = 30$).

	Years	
Current profession		
Mean duration of working in profession	17.7 years	
Range	2–31 years	
	Participant	**Percent (%)**
Clinical area		
In-patient	13	48.1
Out-patient	12	44.4
Pediatrics	2	7.4
Other	3	14.8
Highest degree		
Diploma	4	13.3
Bachelors	24	80.0
Masters	2	6.7
PhD	0	0.0
Desired highest degree*		
Diploma	0	0.0
Bachelors	3	10.3
Masters	2	6.9
PhD	24	82.8
Are you currently enrolled in a masters of PhD program?		
Yes	3	10.0
No	27	90.0

* One participant did not answer this question.

Exam results

A major responsibility of RNs at OAUTH is to monitor patients during their chemotherapy infusion and properly dispose of chemotherapy equipment. The Foundations in Oncology Nursing Chemotherapy/Biotherapy examination included four major topics: toxicities and side-effects, monitoring IV sites, proper PPE for safe handling, and disposal of chemotherapy. These are areas that were identified as RN responsibilities. There were 24 questions on the examination with the mean number of correct answers being seven. The average score for the exam was 24.0%, with a range of 12.5%–50.0%.

Some key findings stood out regarding the examination. Nurses scored the lowest on monitoring IV sites, toxicities and side-effects, and PPE, yet this is their responsibility. The examination had a question on calculating chemotherapy dosage, and only two out of 17 participants answered correctly. In contrast, 17 participants correctly answered the question on the first step to take during an infusion reaction. The RNs scored the highest on questions related to safe handling and disposal. Table 3 highlights the breakdown of correctly answered questions for each category.

Observations

During our initial meeting, a representative from each ward at OAUTH described the RNs' roles and responsibilities and their day-to-day workflow. By adopting the role of participant observer, I was able to witness a picture of nursing practice during a typical shift on the unit and then build comparisons to what nurse representatives reported on Day 1. RNs reported monitoring patient's vital signs (VSs) before, during, and after chemotherapy administration as one of their main responsibilities. In addition, RNs stated that they reviewed laboratory results and were expected to report abnormal findings to the Medical Doctor (MD) prior to the start of the patient's treatment. It was also told that RNs were responsible for monitoring the flow rate of chemotherapy as well as monitoring the patients for adverse reactions during the chemotherapy infusion. RNs stated a key role was to educate patients about potential side-effects of their treatment and their home care. Finally, RNs were responsible for disconnecting the chemotherapy and proper disposal of equipment such as removing the peripheral IV, obtaining VSs, and discharging the patient home.

The observer witnessed RNs review of patients' charts and the VSs prior to the MD initiating premedication and chemotherapy. They also observed RNs reviewing patient's laboratory results and accurately identifying key values that would warrant reporting and interventions. The researcher observed the responsibilities of RNs to include documenting patients' VSs, premedication doses, the time when chemotherapy was started and completed, and monitoring patients during their chemotherapy infusion for adverse reactions.

Table 2
KAP questionnaire results.

	Knowledge (low–moderate–high)	Willingness (low–moderate–high)	Ability (low–moderate–high)
How to prepare chemotherapy	81.5%–14.8%–3.7%	16.7%–25.0%–58.3%	33.3%–29.2%–37.5%
Safe preparation of chemotherapy	64.3%–28.6%–7.1%	18.5%–37.0%–44.4%	44.4%–18.5%–37.0%
Administration of oral chemotherapy	39.3%–53.6%–7.1%	25.0%–25.0%–50.0%	29.6%–33.3%–37.0%
Administration of IV chemotherapy	62.1%–34.5%–3.4%	22.2%–25.9%–51.9%	33.3%–29.6%–37.0%
Monitoring adverse effects of chemotherapy	24.1%–44.8%–31.0%	14.8%–25.9%–59.3%	25.9%–37.0%–37.0%
Management of adverse effects of chemotherapy	20.7%–55.2%–24.1%	11.1%–29.6%–59.3%	18.5%–40.7%–40.7%

IV, intravenous; KAP, Knowledge, Attitudes, and Practices.

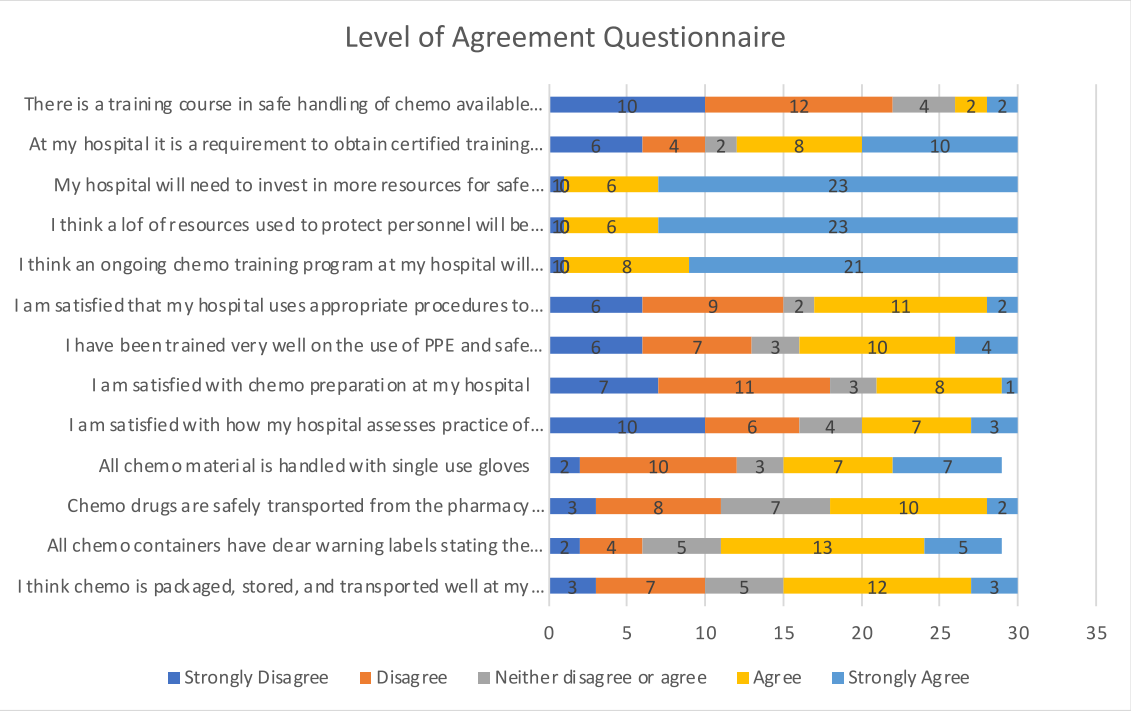

Fig. 1. Level of agreement questionnaire.

Table 3
Oncology exam scores.

Exam topic	Lowest score	Highest score	Mean score
Toxicities and side effects	1 (7.7%)	7 (53.8%)	3 (23.1%)
IV site	0 (0.0%)	2 (40.0%)	3 (60.0%)
PPE	0 (0.0%)	2 (66.7%)	1 (33.3%)
Safe handling and disposal	0 (0.0%)	2 (100.0%)	1 (50.0%)
Drug calculation	0 (0.0%)	0 (0.0%)	0 (0.0%)

IV, intravenous; PPE, personal protective equipment.

A major difference between the nursing practice at OAUTH and the nursing practice in the US is that OAUTH RNs do not place peripheral IVs. Surgical residents and medical students are responsible for starting IVs in all patients. The oncology nurses' role in the US is performing a patient assessment about the symptoms, side-effects, and toxicities from chemotherapy prior to treatment. The observer did not witness this role. RNs neither assessed side-effects, nor did they document side-effects or toxicities. MDs administered premedication to patients, which differs from the clinical practice in the US, where premedication is administered by the RN. At OAUTH, MDs also prepared and administered the chemotherapy agent to the patients, whereas in the US, this is the role of the pharmacist and the RN. The physicians calculated and documented infusion rates, and RNs were not observed monitoring the flow rate. These observations identified key differences in nursing practice at OAUTH compared to that in the US.

Discussion

A strong oncology nursing workforce can impact the quality of care patients receive and their overall outcomes.[9] This study supports the findings from literature, highlighting that nurses working in oncology units in Nigeria lack formalized oncology training, leading to gaps in knowledge and lack of standardized practice in oncology units.[5,6,8,10] Nurses report that they do not receive formal training in oncology care or safe chemotherapy handling and administration. Through responses to the KAP and ORCA questionnaires, examination scores, and observations, it is evident that RNs at OAUTH have a desire to further their oncology education and that they are willing to learn new skills related to safe chemotherapy handling and administration. These results build upon results from African Research Group for Oncology needs assessment in 2019 in Ile-Ife, Nigeria, where Nigerian RNs expressed an interest in expanding nursing knowledge and skills (Protocol X20-001A). This previous study revealed that nurses are interested in transitioning chemotherapy administration from MDs to RNs. This shift in job responsibilities would allow MDs to take on screening, epidemiology, diagnostics, and surgery that are needed as cancer incidence increases.

Nurses are self-aware that their knowledge of ordering chemotherapy, safe preparation of chemotherapy, and administration of IV chemotherapy is low. The Foundations in Oncology Nursing examination supported their self-awareness and highlighted areas where education and training are needed. Nurses could identify common side-effects of

chemotherapy, yet, when asked by the observer if they could identify side-effects of specific chemotherapy agents that their patients were receiving, they could not be specific for those side-effects. Examination results supported these observations. Finally, nurses reported that their knowledge was moderate to high for monitoring and managing chemotherapy side-effects, but examination results revealed a different result.

Although several gaps were identified, the RNs at OAUTH demonstrated strength in their clinical practice that includes competence in monitoring VSs, accurate and timely documentation, and interpretation of lab values, including identification of anemia and neutropenia, two common and serious consequences of chemotherapy. Observations of RNs demonstrated good hand-hygiene practices in all wards and units. Nurses were attentive to patients' physical and emotional needs and provided support to patients and their family.

Limitations

This study has limitations. The sample size for our study was small, including only 30 participants. These participants were not randomly selected; instead, they self-selected to be a part of the study. We used convenience sampling to recruit participants that work with oncology patients and were willing to participate during the specific time frame. A larger sample size allows for stronger statistical results.

Our study also encountered time constraints since the investigator was only observing the study participants for one week. A longer participant observation study period might provide for more in-depth observations of RNs' knowledge and practice related to oncology care. Lastly, the study took place at a single site, which limits its generalizability. The study site is a private university teaching hospital in Ile-Ife, Nigeria, making results not generalizable to nurses working at public hospitals or hospitals in other areas of Nigeria.

Conclusions

In this study, we observed nursing practice at OAUTH and identified knowledge gaps related to nursing oncology care and chemotherapy administration. Specialized oncology training for nurses is scarce in Nigeria, leaving nurses without specialized skills needed to care for and treat oncology patients. Literature has revealed that there are no oncology training programs within universities in Nigeria. Recently, continuing education programs in oncology nursing were identified and are hospital-based in Nigeria.[9] Despite the lack of educational opportunities, nurses at OAUTH demonstrated a willingness and desire to learn oncology specialized skills. With the appropriate educational resources, there can be a shift in chemotherapy administration to become a nursing responsibility. By identifying gaps in education and knowledge of oncology care and chemotherapy administration, and by identifying available resources, a hospital-based oncology training program could be developed for nurses working in oncology units at OAUTH and other Nigerian hospitals, leading to improved oncology patient care and outcomes.

CRediT author statement

Amy Winn: Conceptualization, Methodology, Formal analysis, Investigation, Writing – original draft, review and editing, visualization, funding acquisition. **Esther Afolabi**: Resources, Writing – review and editing, project administration **Mary Bifarin**: Resources, Writing - review and editing, project administration **Temidayo Avwioro**: Investigation, resources, Writing – review and editing **Margaret Barton-Burke**: Conceptualization, Methodology, Validation, Resources, Writing – review and editing, visualization, supervision, project administration, funding acquisition. **Peter Kingham**: Supervision, Project administration **Olusegun Isaac Alatise**: Supervision, Project administration. All authors had full access to all the data in the study, and the corresponding author had final responsibility for the decision to submit for publication. The corresponding author attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.

Declaration of competing interest

All authors have no conflicts of interest to declare. The last author, Professor Margaret Barton-Burke, is a member of the editorial board of the *Asia-Pacific Journal of Oncology Nursing*. The article underwent the journal's standard review procedures, with peer review conducted independently of Professor Barton-Burke and their research groups.

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Ethics statement

The study was approved by the Institutional Review Board of Memorial Sloan Kettering Cancer Center (IRB No. X19-017 A(7)) and the Institutional Review Board of Obafemi Awolowo University Teaching Hospital. All participants provided verbal informed consent.

Data availability statement

The authors confirm that the data supporting the findings of this study are available within the article.

Declaration of Generative AI and AI-assisted technologies in the writing process

No AI tools/Services were used during the preparation of this work.

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