



Oncology nursing research: a global perspective

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Abstract: The specialty of oncology nursing began around the 1970s when oncology as a science became a significant practice in the clinical areas. As the practice of oncology grew in health care settings, physicians focused on providing care for individuals diagnosed with cancer with treatments like surgery, radiation, and novel chemotherapy agents. Physicians treated the physical disease, while oncology nurses cared for, and became specialised in, the assessment and management of side effects and symptoms, and supporting patients and families in coping with the impacts from the disease and treatments. Thus, the oncology nursing speciality focus is on physical, psychosocial, and practical management of patients' care; education of patients and families; and co-ordination of the complex care provided. This article focuses on how the science, or the evidence base, of oncology nursing has grown globally since those early years. The aim of this paper is to illustrate the growth and development in the body of evidence underpinning the oncology nursing speciality by highlighting scientific studies, publications, and evidence-based practice. Over the years, there has been a steady growth in the research evidence supporting the speciality, yet future challenges are ahead. These challenges include demonstrating impact of nursing interventions; infrastructure support; resources for capacity building; building research-mindedness; and strengthening equality, diversity, and inclusion.

Keywords: Oncology nursing research; nursing research priorities; cancer nursing research; nursing research challenges

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Introduction and background

One of the fundamental requirements for high quality patient care is having a body of knowledge (evidence) to inform care delivery. The specialty of oncology nursing is influenced to a great extent by advances in research, science, and technology that transformed cancer care and led to increasing complexity in the care of cancer patients and their families (1). In turn, nurse scientists responded

to the need to grow scientific knowledge underpinning the care of individuals with cancer. The past decades have seen an ever-increasing number of cancer nurses around the world engage in research-related activities, resulting in improvements in cancer care delivery and patient outcomes.

The aim of this paper is to offer a perspective on oncology nursing research from a global perspective. To determine the scope of this article, we asked the question

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‘What is oncology nursing research?’ and found that “*oncology nursing research is investigation or experimentation aimed at developing or discovering knowledge to inform nursing practice*” (2). Given that nurses work throughout the cancer care continuum, from health promotion, prevention, and early diagnosis through treatment and survivorship or end of life (3), it is difficult to conceptualize a research topic that would not ultimately have implications for or inform cancer nursing practice. Work in genetics, pharmacology, molecular science, spirituality, psychology, or health services have relevance given the breadth of our definition.

For the purpose of this paper, we highlight research that is aimed at improving the lives of patients that informs direct oncology nursing practice (what nurses do directly with patients and families) and is conceptualized and led by nurses. We anticipate this reflection provides insight into arenas where oncology nurses can take action to increase their research productivity. Notably, this paper will not fully acknowledge the contribution nurses have made as clinical trials nurses or as members of multidisciplinary research teams. The paper focuses on the overall growth of oncology nursing research, the emerging trends for this area, and the challenges that lie ahead.

Growth of oncology nursing research

Since the mid-1970’s, oncology nursing has been recognized as a specialty and there has been steady growth in global oncology nursing research to support practice. The number of oncology nurses engaged in research-related activities has increased steadily (4,5) influenced by the establishment of new graduate education programs in various parts of the world (6). Evidence of the productivity of cancer nurse scientists can be observed in the steady growth of peer-reviewed grants led by oncology nurse scientists and their publications appearing in a wide range of journals.

Illustrating research productivity

In a bibliometric study in 2021, Yanbing *et al.* (7) reported a steady growth in global nursing research over the past two decades, with a fivefold increase from 1,691 in 2000 to 8,630 in 2019. In total, there were 88,665 publications in 3,280 different journals overall, with the United States, the United Kingdom, Australia, and Canada accounting for the most publications. Within this total, oncology was ranked in third place with 4,110 papers (4.6%). Yanbing and colleagues noted the trends of increasing numbers of

publications and more research collaborations or networks were disproportionately distributed between high and middle/low-income countries. Also, in 2021, Zhu *et al.* (8) assessed the overall trends in citation impact of high-impact papers in nursing research worldwide. There were 6,886 high impact nursing research papers between 2008 and 2019 with United States, Australia, the United Kingdom, Canada, and Sweden accounting for the highest numbers. Of these papers, oncology was ranked in second place with 643 high-impact papers. In turn, these oncology papers were cited in 7,167 other research articles during that period.

Zhang *et al.* (9), in 2011, also used a bibliometric analysis to report specifically on cancer nursing research output and topics in the first decade of the 21st century. Between January 1, 2001, and March 31, 2011, a total of 2,933 publications on cancer nursing from 246 journals were indexed in PubMed. The United States (70.4%), United Kingdom (18.3%) and Canada (3.9%) accounted for the largest number of articles. Most appeared in the Oncology Nursing Forum. Less than 0.1% were from low/middle-income countries (LMIC).

Focusing specifically on cancer, Molassiotis and colleagues (10) completed a systematic review of cancer nursing research as reported worldwide between 1994 and 2005. A total of 619 papers were included with 49% from United States, followed by the United Kingdom, Sweden, Canada, and Australia. Interestingly, more than half (52%) were focused on health care professionals as study participants. The patient populations included mixed cancer diagnoses or patients with breast or haematologic cancers. Two-thirds were quantitative designs and most descriptive in nature.

Uchinuno *et al.* (11) reported on cancer nursing research articles by Japanese authors published in between 2009–2011. A total of 46 articles appeared primarily in the Japanese Cancer Nursing Journal. Many of these were qualitative studies aimed at understanding the response of cancer patients to disease along with their symptoms and background. In Korea, systematic nursing research began in the 1970’s but cancer research by nurses emerged in the mid-1980’s. According to Choi and colleagues, thirty oncology nursing studies were published in Korean journals between 1980 and 1989 (12) growing to 119 from 1990 to 1998 (13). Although high income countries dominate the oncology nursing publication landscape, as the specialty is emerging in LMIC research publications are emerging from these settings. Several examples are highlighted below.

For paediatric oncology nursing in LMIC, Challinor

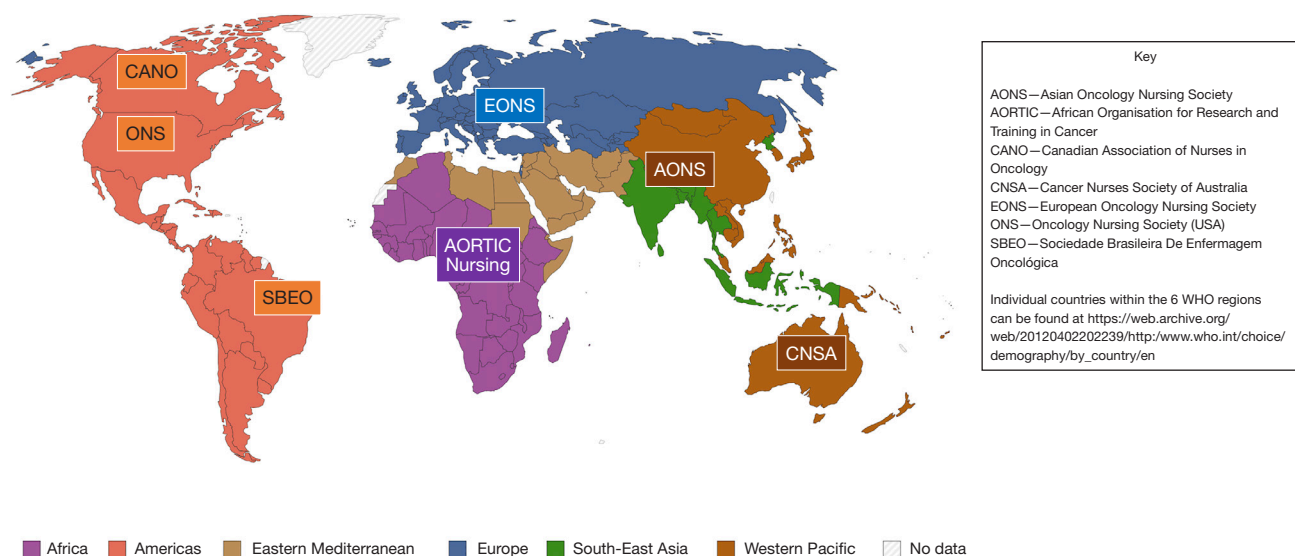


Figure 1 Regional and large country oncology nursing societies. WHO, World Health Organization.

et al. reported on 137 articles in five languages from 2008 to 2018, demonstrating that research activities for topics such as parent coping, symptom management (in particular pain and fatigue), and children's quality of life, across all six World Health Organization (WHO) regions (14). In mainland China, Luo *et al.* carried out a systematic search of paediatric oncology nursing research revealing 133 articles: 106 in Chinese and 27 in English (15). The most frequently researched topics were psychosocial care, clinical nursing practice, and psychometric testing accounting for 63.2% of all publications.

Iribarren *et al.* (16) provides a glimpse of nurse-led clinical research published by researchers in Latin America and the Caribbean. The scoping review covered 404 articles published in English, Spanish, or Portuguese. The majority were conducted in Brazil (90.6%) followed by Chile (2.5%). Most were nurse-led projects (95.8%) and about half were implemented in hospitals (48.6%). Studies explored patient knowledge or characterized patient populations (61.3%) and commonly assessed chronic disease (19.3%) or maternity/child health outcomes (15.9%).

From Africa, Maree *et al.* (17) reported an integrative review of 50 articles on cancer nursing research across the continent between 2005 and 2014. Most articles focused on cancers in women (78%) and the focus of many was on prevention and early detection (62%). Papers were primarily quantitative, gathering some aspect of knowledge from women in the community. Approximately half were published in African-based journals and originated from

nine African countries. Maree *et al.* (18) updated this work in 2021 with a scoping review of 84 articles on cancer nursing research in Africa between 2015 and 2019. These articles came from fourteen African countries. Cervical cancer was the diagnostic focus of 44% of the papers and cervical cancer screening the most investigated topic (28.6%).

Clearly, oncology nursing research is gaining prominence. In LMIC, oncology nursing research is expanding often within partnerships between LMIC and high-income countries (HIC) with nurses from LMIC taking the lead author position.

Identifying research priorities

Since the beginning of the specialty, oncology nursing societies from various parts of the world (see *Figure 1*) have identified important topic areas or priorities for oncology nursing research. These initiatives produce documents to guide the science, develop research agendas, advocate for funding, and drive activity for specific investigations. Some priorities remained throughout the years (e.g., quality of life, symptom management) while others have shifted with health care priorities and cultural issues.

The Oncology Nursing Society (ONS) in United States of America began this activity of identifying research priorities for oncology nursing. The ONS is the one association that has reported research priorities consistently since 1980 (19) with regular updates. *Table 1* highlights

Table 1 Selected illustrations of cancer nursing research priorities reported by the ONS (USA). The Society administered surveys to members on a regular basis to track the shifts in topics needing research attention by oncology nurses for care of cancer patients/survivors

Reference— selected reports	Priorities identified for oncology nursing research
1991 Mooney (20)	Quality of life and symptom management consistently were ranked as the highest priority items
1995 Stetz (21)	Priorities were pain; prevention; quality of life; risk reduction/screening; ethical issues; neutropenia/immunosuppression; patient education; stress, coping, and adaptation; detection; and cost containment
2005 Berger (22)	Quality of life; participation in decision making about treatment in advanced cancer; patient/family education; pain; tobacco use; screening/early detection; prevention of cancer/cancer risk reduction; palliative care; EBP; nurse as advocates; fatigue; cancer recurrence; curative treatment; patient outcomes; cognitive impairment; late effects of cancer; hospice/EOL; initial cancer diagnosis; ethical issues
2008 Doorenbos (23)	Individuals and family psychosocial and behavioral topics, quality of life, symptoms and side effects... survivorship and end-of-life
2014 LoBiondo-Wood (24)	Ranked topics included descriptive research on patient adherence; intervention studies to optimize adherence; achieving concordance with cancer screening guidelines in minority populations; manage neurologic and cardiovascular late effects; manage symptoms and symptom clusters; and studies to identify optimal delivery models for survivorship care
2015 Knobf (25)	The 2014–2018 Research Agenda—The Project Team identified eight high-priority research areas: symptoms, late effects of cancer treatment and survivorship care, palliative and end-of-life care, self-management, aging, family and caregivers, improving healthcare systems, and risk reduction. In addition, four cross-cutting themes were identified: biomarkers, bioinformatics, comparative effectiveness research, and dissemination and implementation science
2019 Von Ah (26)	Agenda 2019–2022—Three priority areas for scientific development were identified: symptom science, health disparities, and palliative and psychosocial care in oncology. In addition, cross-cutting themes that provide context and elaboration for these priorities emerged: aging, survivorship, healthcare delivery, health disparities. The need for Interventional work was emphasized
2021 Jones (27,28)	Recently multiculturalism, equity, racism and workforce development have been added as additional priorities for the research agenda for ONS

EBP, evidence-based practice; EOL, end of life; ONS, Oncology Nursing Society.

some of the priorities that ranked in importance in various reports from this organization. Over the years, priorities were reported in degrees of specificity beginning with single symptom to symptom clusters identification, and moving to thematic descriptions and needs for different research methodology. This may reflect the growth and sophistication in the field.

In Canada, this emergence of cancer nursing research priorities was seen in 1987. Cancer nurses reported results of a Delphi study identifying priorities to guide the Canadian research agenda for a network of cancer nurse researchers (29). The top-ranked topic with respect to patient welfare was “*find ways to prevent and/or treat stomatitis from chemotherapy*”, whereas the top-ranked topic with respect to nursing practice was, “*determine strategies for promoting morale and preventing burnout among nurses in oncology*”. In 1999, Fitch *et al.* (30) reported research

priorities identified through a national survey of Canadian cancer nurses conducted in collaboration with the Canadian Association of Nurses in Oncology/Association Canadienne des infirmières en oncologie (CANO/ACIO). The top issues from practicing nurses, included anxiety, coping/stress management, bereavement/death, fatigue, metastatic disease, comfort, pain control and management, quality of life, recurrence of primary cancer, and nurse burn-out. Top issues from the CANO/ACIO members were communication, symptom management, quality of life, pain control/management, and standards of practice. The top research priorities from nurse scientists were pain control/management, family issues, patient participation in decision making, symptom management, and communication. Clearly, opinions about priorities for research differed between nurses in clinical practice and in academic research settings.

Other countries have reports regarding cancer nursing research priorities. In 2000, the Norwegian Society of Nurses in Cancer Care (31) reported quality of life as the most important research priority among members. Psychosocial support/counseling, communication between patient and nurse, patient participation in decision making, nurse burnout, and ethics were also identified. Yates *et al.* (32) reported research priorities for cancer nurses in Queensland, Australia, in 2002, including psychosocial support, pain management, and symptom management. While in Ireland, in 2003, McIlpatrick and Keeney reported psychosocial issues (e.g., communication and information needs), professional issues relating to nurse burnout, stress and nurse-led care; and context of care issues including continuity of care were ranked as top priorities (33).

More recently, from Italy in 2020, Cadarin *et al.* (34) completed a systematic review of literature describing the cancer nursing research priorities as seen by cancer nurses and patients. The literature search between 2000 and 2018 included 15 studies. The research priorities were categorized as disease control and management, patient-related issues, and professional dimensions and issues. In this review, the management of symptoms including pain, education, information, and communication were consistently present research priorities across the articles.

In 2023, the European ONS reported several topics of priority for research throughout Europe (35). These included needs of patients related to communication, information, and education; symptom management; experiences of disease and its treatment; cancer nursing research issues (e.g., research facilitation), and cancer nursing education issues.

From Asia, both China and India contributed reports on nursing research priorities although not specifically for cancer research. Yin *et al.* reported on a participatory process involving nurses from service and education who identified priorities for nursing research for the Republic of China in 2000 (36). Care quality, care of the elderly, infectious disease prevention were priority topics. In nursing education, research addressing advanced role preparation, and bridging education and practice were priorities. Nursing management identified economic evaluation, personnel administration, and effectiveness as the priority.

India has a long tradition in nursing research traced back to 1955 (37,38). Recent developments include formation of The Nursing Research Society of India and the launch of a journal in 2007. A National Consortium for Nursing PhDs

formed in 2005 with the National Consortium for Nursing Research in 2009; both provide leadership for research in that country. The Indian Nursing Council identified nine key areas for nursing research (39) with integration of research into practice seen as an important direction for the country. The ONS of India, inaugurated in 1994, actively supports research. Recently, they announced support for research projects on topics including (I) antibiotic prophylaxis for clean head & neck surgery; (II) efficacy of Duoderm *vs.* Gention violet in post radiation breast cancer patients; (III) efficacy of high protein food in patients of head and neck cancer receiving external radiation therapy; (IV) the role of nurse in tumour lysis syndrome; (V) infection rate in long term central venous catheters; (VI) complication rate in bone marrow transplantation; and (VII) quality of life in breast cancer patients (40).

Finally, the Korean ONS first reported on research priorities in 2003 (41). Over 70% of their respondents had hospital experience with only two identifying research as their primary function. The top research priorities were identified as prevention of cancer/cancer risk reduction, pain, quality of life, hospice/end of-life care, and standards of care. Pain was voted most frequently as the top priority.

It is important to note that health research priorities, and those of cancer nursing research, are highly context dependent. They tend to vary based on culture, traditions, belief systems, resources, health care systems organizational structures and processes. Of particular influence is the availability of resources for research in a country. The availability is frequently linked to the priorities for health care in that setting and the nature of research funding programs. Nurses have faced challenges in obtaining funding for nursing research given this context. Co-operative clinical trials approaches, multidisciplinary research teams and aligning research questions with existing health care priorities have been utilized by nurses to assess funding for their unique work.

Identified research priorities also vary based on who is involved in the efforts to identify the priorities. Throughout the priorities reports cited in this article, authors wrote about differences between the views of nurses from clinical practice and nurse researchers about priorities. Many urged, closer collaboration between the two groups. Nursing is like other health disciplines with different domains and expertise (e.g., clinical practice, education, management, research), yet research serves to connect the three and is vital if we are to produce relevant/meaningful/impactful research for practice.

Emerging trends in oncology nursing research

Several important trends emerged over the past decade in the nature and direction of cancer nursing research. Although these trends reflect the broader cancer literature, cancer nurses make significant contributions in these areas and the trends are likely to continue influencing future directions for cancer nursing. Each will be highlighted below.

Use of complex research study designs

One trend in cancer nursing research is an evolution in the types of research designs used by nurse scientists. Early studies in the field of cancer nursing focused on descriptive designs, a necessary first step for gathering insight into a topic area or needs of a population and understanding nursing practice. These types of designs are easily handled by novice nurse scientists and can constitute much of the early nursing research reporting in a region or country. Many studies report cross-sectional survey results and explore associations between and among variables. As the evidence grew in a topic area, more complex designs emerged including experimental (i.e., pre-experimental, quasi-experimental, randomized clinical trials) and psychometric approaches (5,42,43). These design approaches allowed cancer nursing scientists to develop and test new measurement tools and mount interventional studies, a design needed to improve patient outcomes and deliver high-quality care (44).

Two recent systematic reviews illustrated the growing base of intervention research. Gomez Del Pulgar *et al.* reported a review of nursing interventions effective in the prevention of non-communicable diseases (NCD) (45). Included were fifteen studies from eight countries, all of which were randomized trials contrasting usual practice with a new interventional strategy offered by nurses. Effective nurse interventions included house calls, home care, and individual and group health education demonstrating 76.4% effectiveness on patient outcomes of promoting healthier lifestyles and quality of life in NCD. Alfaro-Díaz *et al.* reviewed the characteristics and effectiveness of nursing interventions for patients with cancer and their family members (46). The systematic review of literature from 2009 to 2020 resulted in 19 studies. The interventions were (I) support and cognitive

components (n=3); (II) skills training for the caregiver (n=3); (III) managing symptoms to enhance care (n=8); (IV) dyadic or family-patient relationship (n=4); and (V) targeted to the patient's condition (n=1).

Increasingly complex study designs appear with regularity in the cancer research literature and reflect the capacity to produce a high level of evidence in both the quantitative and qualitative arenas (47). One is the application of meta-analysis, a design approach only available once there is sufficient original research on a topic from which to draw and combine robust analysis. An example is Eche *et al.* who utilized a systematic review and meta-analysis to explore research evaluating moral distress of nurses (48). This work included eight cross-sectional studies consisting of 2,686 participants (1,654 were cancer nurses). Moral distress among oncology nurses was a significant predictor for burnout, provider communication, decisions surrounding end-of-life care, work conditions (e.g., patient assignment, type of unit), and the inability to provide compassionate care.

Another complex type of study design used with increasing frequency by nurse scientists is a mixed method approach where quantitative and qualitative approaches are combined to answer a research question. This design adds depth and breadth of understanding to a topic and allows greater insight into its complexity. These types of studies can make use a various types of quantitative and qualitative approaches selected for their relevance in answering the particular research question posed. An example, Waelli *et al.* (49) used mixed methods to understand patient experiences regarding the attention given to important clinical and non-clinical concerns. Investigators used a questionnaire to assess importance that breast cancer patients attach to clinical and non-clinical demands and the extent to which each demand was taken into account by health care professionals. The qualitative analysis based on semi-structured interviews explored the content of specific non-clinical demands. It is imperative that mixed method studies link both the quantitative and qualitative aims for sufficient patient outcomes.

The need to demonstrate the impact of nursing interventions on patient outcomes continues to drive the importance of interventional research. As countries continue to grow their cadre of cancer nurse scientists, skills must be built to conduct interventional studies with

sufficient sample sizes is a priority.

Co-design involving stakeholders: patients, caregivers, policymakers

Engaging patients as partners in care decision-making and in making improvements in health care systems and facilities has gained prominence with the movement toward person-centered care (3,50,51). Similar directions emerge in the research world where the phrase ‘engaging stakeholders’ is used to reflect a broader constituency than patients alone. Stakeholders refers to any person or organization who has an invested interest in the outcome of the research. This could include patients, family members/caregivers, allied health professionals, oncologists, administrators, and decision makers (52).

Engaging stakeholders, including people with cancer and their carers, aims to generate relevant and meaningful research questions, data collection approaches and interpretation, and future implementation of results (53,54). Models for engaging stakeholders in research projects have been developed and include involvement in generating priorities, designing questions and data collection instruments, gathering data, and planning dissemination of results (55). The stakeholders can be integrated into the investigative team or serve on advisory groups.

Examples illustrating how cancer nursing scientists embrace this trend are seen in Cox *et al.* (56) and Bird *et al.* (57). Cox and colleagues, in collaboration with the United Kingdom ONS, used a Delphi approach with cancer nurses and patients to reach consensus on research priorities for the United Kingdom (56). There was consensus regarding research relating to prevention, screening, early diagnosis, and psychological care across the cancer trajectory, but little consensus related to symptoms. Patients reached consensus on palliative care, while nurses reached consensus on eHealth and technology research. Bird and colleagues reviewed studies evaluating the impact of patient partnerships in research (57). They identified fourteen studies describing patient involvement in various research activities. Barriers were reported such as power imbalances between patient partners and researchers, and valuing patient partner roles by researchers. Facilitators included inclusive recruiting and training. Patient engagement in research continues with models for meaningful engagement. Strategies for

interaction with stakeholders are influenced by cultural and professional norms related to global location (58).

Paying attention to meaningful equality, diversity, inclusion, and unique needs

Awareness regarding health disparities has gained significant prominence in cancer-related work. Disparities in cancer incidence and outcomes reflect general health disparities underpinned by deep rooted social and economic inequalities (59). Variations in patient outcomes have been reported from country to country linked to variations in health care systems, ethnicity, financial, social, and economic status as well as access and availability cancer care facilities (60,61). Whilst these challenges are longstanding in research, positive action is required. Strategies aimed specifically at broadening participation in research offer a range of activities to consider (62-64).

Cancer nurse scientists were early and continuing innovators in this domain. Their research, using a disparities lens, was directed toward understanding barriers and facilitators for various populations in accessing cancer screening and early detection (65), documenting unmet needs of patients (14) and survivors, and implementing targeted education programs (66,67). As the evidence about variation in needs emerged, there are calls for tailoring approaches in cancer care based on sociodemographic, personality, and epigenetic characteristics. Personalized care is not only about molecular-based interventions and is embraced in cancer settings in LMIC. A Turkish study reported nurses’ and patients’ perspective on ‘individualized’ care revealed a difference between the two groups (68). Nurses expressed positive perspectives about this concept especially those with years of clinical experience.

Identifying those at risk is an important initial step to implementing tailored interventions for people with or at risk of cancer. It is a key role for nurses in daily practice. Cancer nursing researchers have been leaders in developing approaches to identify those at risk and incorporate workable tools for risk identification into practice. For example, implementing the 6th vital sign work in Canada, updating the supportive care framework from Australia, and promoting stepped triage for cancer survivors (69,70).

Meeting the physical, cultural, and spiritual needs of

the patient is a priority in oncology nursing care. This is illustrated with an example of the palliative oncology nurse and his patient's family worked together to mitigate cultural barriers (3). The patient dying in Cameroon with a protruding abdomen, which according to culture signifies that people are prohibited to console the bereft family and only the immediate family can take part in the burial. The oncology nurse worked with the patient and family finding a solution for both parties—minimizing stigma and providing comfort.

Cancer nursing scientists make significant contributions to the study of unique populations, raising awareness about the needs of various cancer in these groups. Recognizing that meeting the needs of these populations requires different, even unique, approaches to resolve patient issues and provide best care has led cancer nurse scientists to focus on needs assessments and develop tailored programs. Although there may be common needs that all cancer patients share (e.g., all have physical needs), yet how needs are experienced, expressed and handled differ depending on characteristics such as cancer type and stage, age, and gender preferences.

Hence cancer nurse scientists describe needs of individuals with different types of common cancers such as breast (71) and lung (72) and recent work on populations with rare types of cancer (73,74) and individuals considered survivors (75,76). Research focused on needs of various age groups describes the needs of adolescent and young adult populations (77,78) and older adults (79–81). These populations show wide heterogeneity in need; and a 'one size fits all' approach will not be effective for meeting their needs. In LMIC, there is significant concern about low survival rates for pediatric oncology patients, nurse scientists are adding to the evidence for care of pediatric patients. As an example, Mezgebu *et al.* offered pediatric oncology exemplars from LMIC settings of three WHO regions: Eastern Africa, Latin America and Eastern Mediterranean area (4). Participants emphasized the need for locally derived evidence to guide practice but faced many challenges in conducting the research (e.g., lack of training, mentors, funding, and opportunities).

To date, relatively little investigation has been published to understand the unique needs of cancer patients who are lesbian, gay, bisexual, queer, and other sexual and gender minority groups (LGBQ+). These groups, alongside care partners and advocates can shape the cancer research

portfolio with increased research (82).

Additionally, cancer nurse scientists make contributions to the study of caregiver needs and palliative care. A systematic review and meta-analysis by Zhu *et al.* drew a total of 26 studies from seven databases describing the experiences of family caregivers caring for individuals with advanced disease (83). A systematic review on nurses' knowledge regarding palliative care identified 20 studies from 10 different countries. Overall there was a lack of knowledge linked to several factors including education, sociodemographic, years of experience and clinical setting (84).

Contextualizing investigation for local settings

There is a growing recognition of the need for contextualized knowledge. This need emerged not only from nurses in LMIC (e.g., slums of India/Nairobi, the jungles of Brazil), but also from those in HIC working in challenging locations (i.e., the Far North of Canada, the Outback of Australia) and from those caring for Indigenous populations in countries around the world (85,86). The living conditions, cultures, traditional practices, and beliefs about health and illness are contextual realities that need to be understood if relevant solutions are to be identified for cancer nursing care. Solutions generated using Euro-American contexts are not going to be helpful across all regions where health systems and available solutions vary widely. Partnerships with nurse scientists from HIC can be helpful, but there is a need to emphasize the importance of building research capacity and leadership within the local environments and communities.

As oncology nursing emerges in a region and graduate education programs are established, publication of context-specific evidence for cancer nursing practice is growing (87). For example, doctoral research by oncology nurse scientists is growing following the establishment of PhD programs in South Africa and Nigeria (87,88). Oncology Masters' programs at the University of Nairobi, Aga Khan University, and the University of Rwanda have seen research productivity from graduates (89,90). Subsequently, some graduates are working in clinical settings where they apply their research knowledge and conduct clinical studies (91). Collectively, research projects are beginning to describe the needs of local populations laying the foundation for building more complex interventional

designs.

However, the process of producing and growing context-specific science in local settings can be slow requiring long-term commitment to build capacity and realize success. Partnerships and research collaborations/networks are useful, helping to enhance this process, if there is bi-directional exchange (92). Building on existing work can be helpful but often adaptation is necessary. One popular framework for this purpose of adapting existing work for a new setting, the Knowledge to Action Framework, was developed by a Canadian nurse (93).

Conducting research that produces contextualized evidence will likely require new designs and data collection approaches. The 'gold standard' of randomized clinical trials needs to be questioned regarding whether this is helpful in every situation. Participatory action approaches and designs that allow for questions and methodologies to emerge organically as a project unfolds are more in keeping with implementing contextualized approaches (94). As this trend continues to drive future investigations, both engagement and leadership from those who know and understand local context will be needed. Understanding how work is conducted and how relationships are established and operationalized varies from setting to setting. Funding for these types of projects needs to include both the strategies to engage stakeholders as well as the actual data collection and analysis.

Integrating research into practice

For cancer nurses, findings from research studies must impact the care and well-being of patients and families. This requires not only generating relevant findings, but also knowledge exchange (i.e., ensuring those results are known and taken up in practice settings). Nursing leaders call for the integration of cancer nursing research into daily practice. Yet how this unfolds varies widely around the world. Different interpretations of what it means to integrate research emerged resulting in a wide range of strategies used to enhance research-based or evidence-based practice. Strategies range from education programs, expecting advanced practice nurses to be knowledge brokers, and establishing departments of nursing and multidisciplinary research units in health facilities, including cancer centres.

A critical aspect of integrating research in practice settings is exposing cancer nurses to research and the research process while developing attitudes of curiosity and freedom to question. Some argue that this exposure ought to begin in basic nursing education programs and be strengthened in practice settings (95). Yet there are barriers for this activity since the nature of clinical settings include shortage of staff, task-oriented cultures, poor attitudes toward nurses as knowledge workers, and lack of value for an inquisitive attitude regarding improvements/change (96). These barriers can interfere with the integration of evidence-based care particularly in LMIC (97).

Factors interfering with the integration of research into cancer nursing practice are documented in HIC (98,99). Interestingly, the factors are similar in LMIC although the magnitude of the challenge(s) and solution(s) differ (100,101). Factors include staff shortages, high patient to nurse ratios, lack of access to research-related education, lack of research relevant results, lack of researchers with expertise, and low levels of funding for nurses to engage in research related activity. Focused attention on these issues is needed to see better integration of research into clinical practice (102). There are challenges facing cancer nursing scientists to a greater or lesser degrees around the world. In *Table 2* barriers are presented that cancer nursing research will encounter in the years ahead. These concepts must be integrated into future research studies. But today cancer nursing research is strong with a foundation to expand studies globally. The evidence for cancer nursing care is laid but it must continue to be tested, examined, and enlarged.

Conclusions

This paper offers a perspective on oncology nursing research from a global point of view. As the speciality has grown, so has nursing research productivity. Although the predominant activity has occurred in HIC, the number of nurse scientists in LMIC is growing. Clearly, a body of evidence exists to support nursing care of cancer patients globally. However, the future requires continued efforts to demonstrate the impact of nursing interventions relating to patient outcomes, while engaging in research through collaboration with stakeholders to build infrastructures and capacity for on-going oncology nursing research productivity across the globe.

Table 2 Significant future challenges facing oncology nurse researchers globally

Area of challenge	Explanation of challenge
Demonstrating impact	Oncology nurses will continue to be challenged to produce rigorous high-quality evidence concerning the impact of nursing interventions, yet ensuring the evidence is contextualized. The evidence will likely be demanded regarding patient outcomes as well as economic impacts. This will require skill regarding complex research designs, engaging with stakeholder partners, leadership by researchers who are well-versed in the local setting, and adequate funding for the work
Infrastructure support	Obtaining and building the necessary infrastructure supports to conduct research and produce the required evidence will require consistent sources of funding for projects as well as for personnel. Additionally, creating the necessary structures that will foster research environments for nurse researchers is a priority. These structures may include partnerships, mentorship programs and collaborative networks not only within nursing, but also across disciplines and sectors
Resources for building capacity	Access to financial and human resources that will support capacity building is likely to be an on-going concern for the growth of oncology nursing research. Capacity is required first and foremost for faculty who can engage learners in developing solid research knowledge and skills. Secondly, there is a need for support of educational programming that will foster building of research skills, not only in the educational systems but also in the practice settings
Building research mindedness	A continuing challenge for nursing research development is the need for building the attitudes and mindsets which are open to curiosity and asking questions. Embracing an attitude of inquiry is of paramount importance for incorporating research endeavours and results into practice settings. Practitioners need to see the practice arena as a place to identify research questions based on gaps in patient care which need to be examined and resolved. Concerted efforts within the clinical arena regarding finances and programming will be necessary to achieve these outcomes
Strengthening equality, equity, and diversity	Disparities amongst people with cancer and society at large are multifactorial in nature. Increased inclusion in oncology nursing research and acknowledgement of different experiences and other personalised factors should be encompassed. This approach is essential to the development of an improved cancer care continuum to enable optimal and fair outcomes for all

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