

The Oncology Nursing Society Rapid Review and Research Priorities for Cancer Care in the Context of COVID-19

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OBJECTIVES: To identify research priorities addressing COVID-19 that build on the 2019–2022 Oncology Nursing Society (ONS) Research Agenda, in alignment with ONS's mission to promote excellence in oncology nursing and quality cancer care.

METHODS & VARIABLES: Priority areas were identified using a multistep approach combining rapid review of the literature; consultation with experts/stakeholders; and review of priorities from other funding agencies, public health, and cancer-focused organizations.

RESULTS: The rapid research response team identified five priority areas for research related to COVID-19: (a) effect of COVID-19 on disparities in cancer care; (b) symptom science, palliative care, and end-of-life care research; (c) access to safe and effective cancer care, clinical trials, and research; (d) communication and partnerships with patients and caregivers; and (e) effect of COVID-19 on nursing workforce, support, and professional development. Cross-cutting themes were also identified.

IMPLICATIONS FOR NURSING: Oncology nurses are well positioned to address the research priorities and cross-cutting themes identified through this review. The use of innovative methodologic approaches and attention to disparities are necessary to advance cancer care related to COVID-19.

KEYWORDS oncology; nursing; coronavirus; COVID-19; SARS-CoV-2; disparities; research
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During the past year, the novel coronavirus (SARS-CoV-2) has caused unprecedented disruption to the fabric of cancer care worldwide (Richards et al., 2020). In addition to affecting patients' ability to access screening, diagnosis, treatment, and survivorship care for their cancer, growing data indicate that the pandemic has deepened existing racial, socioeconomic, geographic, and other disparities in disease burden and care (Killerby et al., 2020; Selden & Berdahl, 2020), undercutting decades of work in these areas. To continue providing safe, effective cancer care and continue the mission of providing just, equitable cancer care for all, oncology nurses need clear, rigorous evidence to drive clinical decision-making, health policy, and public health messaging.

To address these needs, the Oncology Nursing Society (ONS) tasked a team of researchers to review the literature related to oncology and COVID-19. Goals of the resulting research agenda were to (a) identify critical gaps in the knowledge related to COVID-19 and cancer care and (b) describe research priorities to guide nurse-led research during the pandemic and its aftermath. The resulting priorities build on the 2019–2022 ONS Research Agenda (Von Ah et al., 2019). The priorities were refined related to COVID-19 and introduce new areas for knowledge discovery, translational research, and policy development that will be critical for addressing the evolving pandemic.

Methods

Search Strategy

To account for the rapid pace of research and evidence that emerged related to COVID-19, the team employed a broad strategy using PubMed®, Scopus®,

FIGURE 1. Oncology Nursing Society COVID-19 Research Priorities and Cross-Cutting Themes

Oncology Nursing Society COVID-19 Research Priorities

- Effect of COVID-19 on disparities in cancer care
- Symptom science, palliative care, and end-of-life care research
- Access to safe and effective cancer care, clinical trials, and research
- Communication and partnerships with patients and caregivers
- Effect of COVID-19 on nursing workforce, support, and professional development

Cross-Cutting Themes

- Evaluating healthcare delivery models
 - New and adapted models of delivering cancer care during COVID-19 need to be evaluated.
- Reducing inequities in care
 - Research describing inequities and interventions targeting inequities are lacking.
- Evaluating rapid public health communication methods
 - New and adapted methods of communication among patients, caregivers, and providers need additional testing.
- Employing collaborative research methods
 - Rapid, multicenter collaborations to sample diverse populations, achieve adequate sample sizes, and conduct policy analyses are needed.
- Using data science and other innovative methods
 - Integrating innovative methodologies and data science tools for knowledge discovery, intervention delivery, and/or analysis has great potential to advance oncology nursing science.

CINAHL[®], and medRxiv databases to search for full-text, freely available, English-language original studies, reviews, meta-analyses, clinical guidelines, and opinions addressing COVID-19, cancer, and nursing published from January 1, 2020, to August 12, 2020. Peer-reviewed and non-peer-reviewed articles were considered. Articles meeting these criteria were reviewed for knowledge gaps, and research priorities addressing these gaps were identified. During the review process, to minimize the potential for bias, anonymous feedback on the proposed priorities was solicited via electronic survey from oncology nurse researchers from diverse locations, practice settings, and research foci, as well as the ONS Board of Directors and key stakeholders. In addition, because of the extremely high rate of publication during the pandemic, authors reviewed the literature in each

area multiple times over several months to ensure initial topics identified as priorities continued to be relevant.

Key Definitions

The ONS team defined several terms for the purpose of this review. “Cancer care” refers to all aspects of the cancer continuum including screening, diagnosis, treatment, supportive care (e.g., palliative care, hospice, end-of-life care, bereavement services), psychosocial and spiritual care, survivorship, and long-term follow-up care. “Caregiver” refers to members of patients’ personal networks (e.g., family, friends) who directly support their well-being during cancer care. The term “underrepresented group” refers to individuals who have been systematically excluded from equitable access to services that promote health based on social constructs of race, ethnicity, religion, culture, sexual orientation, gender identity, socioeconomic status, or other characteristics.

Results

Research Priorities

Synthesis of available literature identified five areas in which research is urgently needed related to COVID-19 and oncology. These include research addressing (a) effect of COVID-19 on disparities in cancer care; (b) symptom science, palliative care, and end-of-life care research; (c) access to safe and effective cancer care, clinical trials, and research; (d) communication and partnerships with patients and caregivers; and (e) effect of COVID-19 on nursing workforce, support, and professional development (see Figure 1). Knowledge gaps related to each priority are summarized in Table 1, with recommendations for disparities-focused research corresponding to each priority. Relationships between new COVID-19 research priorities and existing ONS research priorities are illustrated in Figure 2.

Cross-Cutting Themes

After review of the literature related to COVID-19 and cancer and discussion with external stakeholders, the ONS Board of Directors and current authors identified a number of cross-cutting topics or themes for COVID-19 research that would apply equally to each of the five research priorities. These include the need for descriptive and interventional research in each priority area addressing (a) the need for new healthcare delivery models tailored for COVID-19; (b) methods for reducing inequities in care; (c) faster, more accurate public health communication methods; (d) research employing collaborative,

TABLE 1. Summary of Knowledge Gaps and Recommendations for Disparities-Focused Research on COVID-19 and Cancer

Research Priority	Evidence Gaps	Recommendations for Research
Effect of COVID-19 on disparities in cancer care	<ul style="list-style-type: none"> ■ How COVID-19 is affecting underrepresented groups with cancer and their families at state, local, tribal, and territorial levels ■ How COVID-19 is affecting access, continuation, and transitions in cancer care for underrepresented groups ■ Infrastructure and support needed to improve cancer care at state, local, tribal, and territorial levels 	<ul style="list-style-type: none"> ■ How COVID-19 is influencing cancer care and health outcomes among underrepresented racial groups ■ Effect of COVID-19 among underrepresented sexual and gender groups affected by cancer
Symptom science, palliative care, and end-of-life care research	<ul style="list-style-type: none"> ■ Role of palliative care for managing COVID-19 in patients with cancer ■ COVID-19 symptom experience, trajectory, mechanisms, and long-term effects on health and quality of life ■ Impact of COVID-19 on delays in seeking palliative care 	<ul style="list-style-type: none"> ■ Symptom experiences of underrepresented groups with cancer who have COVID-19 ■ Short- and long-term effects of COVID-19 on quality of life for underrepresented groups ■ Culturally informed symptom management interventions that holistically address all domains and social determinants of health contributing to symptom trajectory, quality of life, and well-being
Access to safe and effective cancer care, clinical trials, and research	<ul style="list-style-type: none"> ■ Patient, family, and caregiver perspectives on the impact of COVID-19 on access to safe and effective cancer care and balancing cancer care with infection risk ■ Acceptability and effectiveness of new models of nursing care delivery on access to care, quality of life, and well-being in patients with cancer and their families 	<ul style="list-style-type: none"> ■ Cancer care needs and preferred modes of delivery among underrepresented patients and families during COVID-19 ■ Facilitators and barriers to accessing alternative modes of cancer care delivery among underrepresented groups, including culturally informed use of technology ■ Effectiveness of and satisfaction with new models of care delivery (e.g., telehealth) among underrepresented groups during COVID-19
Communication and partnerships with patients and caregivers	<ul style="list-style-type: none"> ■ Methods for effective communication and partnership among patients with cancer, their families, and clinicians during COVID-19 ■ How changes in the delivery of oncology services affect patient and caregiver outcomes 	<ul style="list-style-type: none"> ■ Cancer care communication experiences among underrepresented patients and families ■ Effectiveness and patient satisfaction with distance-based interpretation services ■ Telemedicine and patient portal practices addressing structural inequities, racism, health disparities, social determinants of health, unequal access to resources (e.g., broadband, cellular), and inclusiveness of patients who speak languages other than English ■ Social services addressing financial toxicity for families without a preexisting safety net ■ Support for personal, home, environmental, and workplace safety in areas disproportionately affected by COVID-19
Effect of COVID-19 on nursing workforce, support, and professional development	<ul style="list-style-type: none"> ■ Methods to decrease distress, reduce burnout, and improve well-being in the nursing workforce ■ Access to, use of, preferences for, and outcomes resulting from COVID-19 workforce support services ■ Effectiveness of distance-based approaches to support, training, and continuing education for students, newly hired nurses, and experienced nurses ■ Impact of staff redeployment and suspensions of in-person conferences, nonessential research, and student clinical placements on advancing oncology nursing science, workforce development, and retention 	<ul style="list-style-type: none"> ■ Addressing biases in workforce support ■ Ensuring recruitment and retention from all communities ■ Monitoring equity in access to training ■ Addressing overt and covert racism from patients, families, and colleagues

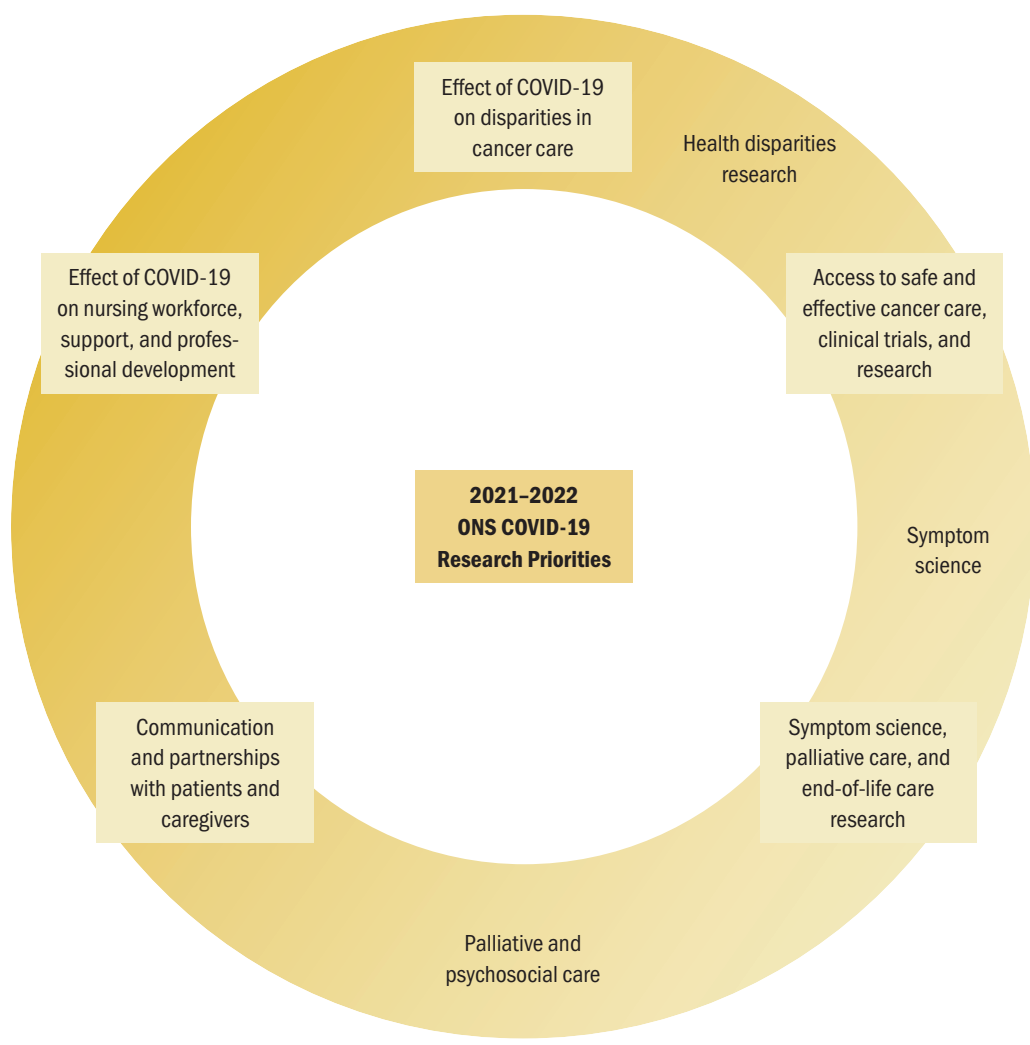
interprofessional methods; and (e) use of data science and other innovative research methods. Details on these cross-cutting themes for the current research agenda are summarized in Figure 3.

Priority 1: Effect of COVID-19 on Disparities in Cancer Care

The full portrait of how COVID-19 has affected disparities in cancer care is still emerging. However, early evidence paints a disturbing picture, emphasizing multiple ways that the pandemic has

amplified (and continues to amplify) disparities, including many biases and systemic barriers that have plagued underrepresented groups throughout history (Killerby et al., 2020; Selden & Berdahl, 2020; Yancy, 2020). Current data indicate that COVID-19 infection rates and outcomes in the general population mirror many of the existing patterns of inequality (Kim & Bostwick, 2020; Millet et al., 2020; Webb Hooper et al., 2020) while similar patterns emerge at the intersection of cancer and COVID-19. For example, a study of COVID-19

FIGURE 2. Relationship Between ONS COVID-19 Research Priorities and the ONS Research Agenda



- New research priorities for 2021-2022 ONS COVID-19 Research Priorities
- Existing research priorities offered in the 2019-2022 ONS Research Agenda

ONS—Oncology Nursing Society

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FIGURE 3. Cross-Cutting Themes for COVID-19 Research Relevant to All Priority Areas

Evaluating Healthcare Delivery Models

Delivery of cancer care has undergone major transformations within a short period of time to meet the unique needs of patients and their caregivers across the cancer care continuum related to COVID-19 (Brown & Lutz, 2020). In addition to reshaping the landscape of clinical cancer care, the emergence of the COVID-19 pandemic onto the global stage has had a profound effect on topography of cancer research. Research is needed to evaluate the new care models that were abruptly put in place because of the COVID-19 pandemic, as well as care models that have evolved over time along with other mitigation efforts.

Reducing Inequities in Care

The intersection of social determinants of health and COVID-19 has created an urgent need to identify those most at risk, as well as to implement interventions to prevent infection and mitigate negative outcomes, particularly among the most vulnerable, such as those with cancer. Research to examine the effectiveness of interventions that target the root causes of health inequities (Weinstein et al., 2017) and improve the delivery of quality cancer care is critical for oncology nursing science and practice.

Evaluating Rapid Public Health Communication Methods

New and adapted modes of communication between patients, families, and healthcare clinicians have been put into place for mitigation purposes; however, there is a lack of research on the effectiveness, overall experience, and satisfaction from the lens of healthcare consumers, providers, and clinicians.

In addition, obtaining and disseminating accurate and timely information is critical during a pandemic or other health emergency, and there is currently little evidence to guide best practices in this area. Research that incorporates and evaluates rapid health communication use, effectiveness, and experiential outcomes is needed.

Employing Collaborative Research Methods

Collaboration with varied disciplines and the creation of partnerships across academic, clinical, community, and civic sectors of society are needed to address the complex problems of the current global pandemic. Collaborations for research focused on innovation science, translational science, and quality improvement, as well as for recruiting adequate samples of diverse participants, will enhance studies led by oncology nurses.

Using Data Science and Other Innovative Methods

During times of rapid change, it is essential for oncology nurse scientists to stay current with emerging scientific trends, as well as to leverage the use of contemporary research designs, methods, and analytical techniques. Data science offers unparalleled opportunity to seek new discoveries, identify trends, and make predictions using existing data repositories or by developing new ones. Research incorporating epidemiologic and data science methodologies (e.g., sophisticated data extraction, machine learning), social media, and/or knowledge translation methods and platforms, can facilitate new discoveries and insights to improve cancer care during the COVID-19 pandemic and other health crises.

treatments and outcomes in patients with cancer found that non-Hispanic White patients were more likely to receive treatments thought to have an effect on COVID-19 survival than patients of other races and ethnicities (Rivera et al., 2020). In addition, data from the Centers for Disease Control and Prevention (CDC) show that age-adjusted death rates for African Americans with COVID-19 are 2.6 times higher than for White Americans (National Academies of Sciences, Engineering, and Medicine, 2020). Recently, the U.S. Department of Health and Human Services (2020) issued guidance on strategies to increase enrollment of underrepresented populations in clinical trials to support new drug or biologic license applications; however, these remain recommendations and not requirements.

Given the often-unpredictable spread of COVID-19 in the United States and globally, difficulty in

understanding how the virus is affecting screening, diagnosis, and treatment for cancer in different populations was inevitable. However, emerging health disparities research related to COVID-19 is highlighting what researchers have long known but have yet to address: data collection for characteristics needed to evaluate equity in cancer care, such as race, ethnicity, gender, age, and socioeconomic status, is poor (Chowkwanyun & Reed, 2020). Many of the constructs specifically needed to perform health equity research for COVID-19 have yet to be defined, leading to critical research gaps in this science. For example, in a national analysis of COVID-19 disparities, fewer than half of U.S. states were able to contribute to the report because of inadequate collection of data on race and ethnicity and inadequate levels of testing in underrepresented communities (Hatcher et al., 2020).

The following are recommendations for research:

- Examine the effect of COVID-19 on cancer care and health outcomes in underrepresented groups.
- Improve data collection needed to characterize underrepresented groups accurately and holistically.
- Explore the experiences of underrepresented patients, caregivers, and families related to cancer and COVID-19.
- Identify the social determinants of health (e.g., discrimination, experienced racism, multigenerational housing, community density, pollution, clean water and food access, transportation access, distance to services for employment options, insurance coverage) affecting COVID-19 morbidity and mortality in underrepresented patients with cancer.
- Develop and evaluate community-informed and culturally responsive interventions to address disparities in COVID-19 prevention and treatment and access to cancer care.
- Develop systematic efforts to monitor and include underrepresented groups in cancer and COVID-19 research going forward.

Priority 2: Symptom Science, Palliative Care, and End-of-Life Care Research

As of February 15, 2021, more than 480,000 individuals in the United States have died from COVID-19, and that number increases daily (CDC, 2021). Despite the magnitude of this number, research investigating the role that palliative and end-of-life care—cornerstones of evidence-based care—play in caring for patients with cancer who have COVID-19 is limited (Paterson et al., 2020). In addition, studies show that supportive care, which includes palliative and end-of-life care and efforts to improve quality of life across the entire cancer continuum, may be vital in enhancing patients' physical and psychological well-being, particularly in the context of alternative care delivery models that have emerged in response to COVID-19 (Paterson et al., 2020).

People of all ages affected by cancer during the pandemic can have supportive care needs requiring unique responses (Sullivan et al., 2020), but evidence describing these needs is lacking. For example, although children are less likely to be infected with and experience serious illness from COVID-19, children with cancer may be disproportionately affected by policies restricting visitors and social interaction in hospitals and community settings (Sullivan et al., 2020).

In addition, many individuals affected by cancer and their loved ones are deeply concerned about the real-life effects of COVID-19 (Paterson et al., 2020). Oncology nursing has a rich history of leading symptom science, emphasizing quality of life, and supporting patient autonomy (Cooley & Siefert, 2016; Withycombe et al., 2019). Given that much about the experience of COVID-19 remains unknown, nurses' holistic perspectives and unique expertise can provide essential insights into what is meaningful to patients and caregivers related to their symptoms. These insights include helping to understand the mechanisms underlying severe, persistent, or particularly disabling symptoms; documenting the experiences of patients living with long-term symptoms from COVID-19; and developing interventions to help patients with cancer better manage symptoms related to COVID-19 (Hsiao et al., 2020).

The following are recommendations for research:

- Identify characteristics needed to distinguish COVID-19 symptoms from symptoms of cancer, cancer treatment, and treatment-induced toxicities.
- Determine the effects of COVID-19 on palliative and supportive care services for patients with cancer and caregivers; develop interventions to address these needs and preferences.
- Determine best practices for reporting symptoms remotely, including use of mobile applications and technology, to facilitate timely initiation of interventions.
- Explore strategies for managing symptoms in patients with cancer who have COVID-19 while minimizing the effect of symptoms on quality of life.
- Evaluate interventions to decrease loneliness and increase social functioning among patients with cancer who have COVID-19.

Priority 3: Access to Safe and Effective Cancer Care, Clinical Trials, and Research

The arrival of COVID-19 to the United States in early 2020 sent shock waves through the healthcare system as entities scrambled to redistribute resources and develop safe methods to care for patients (Ćurković et al., 2020). The risks and benefits of providing care to patients with cancer, once well understood, have had to be largely reimaged in the context of COVID-19, leading to sweeping changes in how cancer care is being accessed and delivered (Johnston et al., 2020; Zeidan et al., 2020).

Initial publications addressing access to cancer care during COVID-19 consisted of recommendations

from expert panels and oncology-focused organizations (Chen et al., 2020; Maniakas et al., 2020; Pothuri et al., 2020; Yahalom et al., 2020). Many guidelines discussed how to make priorities and decisions about changes in care delivery; however, research evaluating the implementation and effects of these guidelines has been limited (Al-Shamsi et al., 2020; Garg et al., 2020). Most articles focused primarily on treatment and secondarily on screening, with relatively sparse information on prevention, follow-up, and survivorship care. In particular, research addressing innovative strategies for accessing specific elements of cancer care, such as telechaplancy (Sprik et al., 2020), remote genetic counseling (Mahon, 2020), and telehealth for tobacco-dependent patients with cancer, is lacking (Kotsen et al., 2020).

Access to clinical trials in the wake of COVID-19, another vital dimension of cancer treatment for many patients, also remains a serious concern. In the short term, the pandemic has caused massive disruption to clinical trials, triggering waves of protocol deviations, challenges with recruitment, and trial discontinuations. This has disrupted much of the fabric of modern oncology research (Cancer Research Institute, 2020). However, research investigating the specific effects that the pandemic has had on different aspects of oncology trials, including trial access, patient monitoring, specimen collection, questionnaire completion, physical examinations, and experimental treatment administration, is lacking (Upadhaya et al., 2020).

The following are recommendations for research:

- Develop and evaluate new models for delivering cancer care designed to reduce risk of COVID-19 exposure and improve access, particularly among those most at risk.
- Develop and validate decision tools designed to help patients and caregivers assess the risks and benefits of pursuing cancer care during COVID-19.
- Evaluate the ability of existing support service models to holistically address treatment coordination, basic needs (e.g., housing, food, water, medication), mental health, and household responsibilities (e.g., patients with cancer who care for children and family members) during COVID-19.
- Examine barriers to accessing cancer care during COVID-19, including social distress, isolation, and financial insecurity; develop and test interventions to reduce these barriers.
- Determine care and support needs for patients with dual diagnoses of COVID-19 and cancer.

Priority 4: Communication and Partnerships With Patients and Caregivers

Two of the areas of cancer care most affected by COVID-19 have been communication and partnerships with patients with cancer and their caregivers. Early data suggest that social distancing—one of the principal strategies used to reduce COVID-19 transmission—has had a profound impact on the delivery of family-centered care in the oncology setting (Hart et al., 2020). Policies restricting the presence of visitors, including families who are critical to the success of cancer treatment in the home setting, have only increased the need for skilled communication by oncology nurses to promote psychological adjustment, quality of relationships, patient and family education, and goal-concordant cancer care (Bowman et al., 2020; Hart et al., 2020). As crisis standards and response protocols continue to be developed and refined, the effect of new practices on the roles of communication and partnerships with caregivers, as well as the health and well-being of caregivers themselves, must be considered (Kent et al., 2020).

The following are recommendations for research:

- Assess caregiver readiness and capacity for providing serious illness care in the home before, during, and after COVID-19 onset in both patients and caregivers.
- Explore the experiences of caregivers caring for patients with dual diagnoses of cancer and COVID-19.
- Develop and evaluate technological interventions to enhance clinical communication and social engagement as means to mitigate loneliness in patients and caregivers.
- Develop and test communication strategies to reduce inequities in access to information and resources.
- Develop communication guides with palliative care, pastoral, social services, and behavioral health teams to help patients, families, and clinicians navigate the unprecedented conversations focused on anticipatory grief, cognitive and emotional acceptance of death, and other elements of grief, loss, and bereavement.
- Evaluate outcomes of family meetings used to support patients and families during serious illness conversations related to COVID-19, particularly in the context of poor prognosis.
- Establish and evaluate clinical practice guidelines to advocate for patients with serious illness and their families.

Priority 5: Effect of COVID-19 on Nursing Workforce, Support, and Professional Development

Prior to COVID-19, groups like the National Academy of Medicine (2020) had already issued a nationwide call-to-action to address workforce issues facing healthcare staff, such as well-being, burnout, and suicide. The arrival of COVID-19 added a veritable avalanche of new stressors to the tens of thousands of healthcare staff that make up the U.S. healthcare workforce. These stressors included serious risks to staff's short- and long-term physical, psychological, and emotional safety, triggered by issues ranging from shortages of personal protective equipment (PPE), to questions about how to maintain safe working conditions, to ethically challenging situations related to COVID-19 (ONS, 2020). Early evidence suggests that clinical and nonclinical staff, particularly those working on the front line, faced significant feelings of loss of control and difficulty making decisions during the pandemic (Dewey et al., 2020; Gasper et al., 2020; Paterson et al., 2020). In addition, growing evidence indicates that nurses have been disproportionately affected by COVID-19, including having some of the highest rates of COVID-19-related hospitalizations (Kambhampati et al., 2020). Although it is clear that frontline staff bore much of the brunt of these stressors, these risks were not limited to frontline staff; spouses, partners, and families of healthcare workers shared many of the risks related to the pandemic as well.

At the same time, schools of nursing began to shift didactic teaching to virtual platforms, shorten academic terms, and eliminate on-site clinical placements for students (Jones et al., in press). Professional meetings integral to supporting education and the dissemination of research were canceled or converted to virtual meetings. Many healthcare institutions adopted distance-based approaches to care delivery, shifting large segments of their workforce off-site. In consequence, much of the research conducted by nurse scientists and nursing faculty was deemed nonessential, slowing the advancement of oncology nursing science and requiring immediate modifications in study procedures to allow continued progress of studies (Jones et al., in press).

The following are recommendations for research:

- Explore the impact of COVID-19 on burnout and moral distress among oncology nurses; develop short- and long-term interventions to support nurses and other oncology providers.
- Investigate the effects that factors related to COVID-19 (e.g., changing staffing policies, staffing

shortages, PPE shortages, changing workflows, staff redeployment) had and continue to have on the oncology nursing workforce; develop interventions to address the effects on frontline oncology nursing staff.

- Develop and evaluate strategies to optimize the use of PPE safely and effectively by oncology nurses in various care settings.
- Evaluate the effectiveness of distance-based and hybrid learning strategies to complement on-site clinical training for nurses and students.
- Evaluate the impact of COVID-19 on nursing student training (e.g., restrictions, delays, and modifications in training quality for pre-RN licensure and clinical/research doctorate training), and evaluate implications for the oncology nursing workforce.
- Describe and evaluate the consequences of the shift to virtual meetings on professional development and continuing education for oncology nurses.
- Describe and evaluate the effects of the changing scope of practice for oncology-focused providers, such as oncology-focused advanced practice RNs, on patient outcomes.
- Describe and evaluate the consequences of institutional restrictions on the work of oncology nurse scientists and the advancement of oncology nursing science.

Methodologic Considerations for COVID-19-Focused Research

To advance the science related to COVID-19 and cancer, researchers will need to employ methods capable of addressing the scale and complexity of the issues that have emerged during the pandemic. Methodologic considerations to support COVID-19 research priorities are highlighted in the following sections.

Infodemiology

The term “infodemic” refers to a deluge or overabundance of information, including information that can be inaccurate or harmful (Tangcharoensathien et al., 2020). The sheer volume of information that emerged related to COVID-19 since the onset of the pandemic has made it difficult for the public at large to separate fact from fiction (Bunker, 2020), contributing to media fatigue, decline in public trust, and resistance to even fact-based messaging (Ceron et al., 2020; Chong et al., 2020). In addition, the negative impact of the infodemic was exacerbated by the nearly

unrestricted reach of modern social media (Bunker, 2020), absence of fact-checking on many platforms (Ceron et al., 2020), and widespread sharing of false information related to the virus, which was extensive at points (Nsoesie et al., 2020).

In response, the World Health Organization (WHO) convened its first international conference focusing on infodemics in June 2020, underscoring the importance of infodemiology (the branch of health informatics dedicated to studying “the determinants and distribution of health information and misinformation in an electronic medium” [Eysenbach, 2009, p. e11]) as a critical area for research (Mavragani, 2020). In addition, WHO introduced a framework for managing the COVID-19 infodemic, summarized in Figure 4. Because of the instrumental role that information has played and continues to play in all aspects of the pandemic, research using infodemiology will be essential to not only understand the impact of the infodemic on cancer care, but also develop strategies for protecting patients and families. Because nurses consistently rank among the most trusted health professions (Reinhard, 2020), continued engagement by nurses with the public around science and health information will be vital (Chong et al., 2020).

Social Media

With an estimated 3.8 billion users worldwide, social media platforms, such as Twitter and Facebook, are among the most widely used sources of information (Cuello-Garcia et al., 2020). During the pandemic, use of social media—already at an all-time high—grew exponentially as public and health professionals alike sought to find and share information related to the virus (Nsoesie et al., 2020). Although filled with potential pitfalls, social media platforms have proven to be powerful tools for oncology nurses to engage the public in discussions about the safety and timeliness of cancer care, including how to optimize the delivery of different forms of cancer care, encourage healthy habits, and reduce loneliness and isolation (Elran-Barak & Mozeikov, 2020; Lai et al., 2020; Lucini et al., 2020; Prochaska et al., 2017; Subbiah et al., 2019).

These same social media platforms also provide nurse scientists with new methods for raising public awareness of clinical trials and enhancing study recruitment, intervention delivery, and retention, particularly for hard-to-reach communities (Burke-Garcia et al., 2017). Social media has also been used to educate clinicians in academic and community settings about opportunities for oncology clinical trials; however, issues such as unblinding participants have

been raised (Thompson, 2014; Thompson & O’Regan, 2018). New resources, such as the National Cancer Institute (2020) workshop on social media and clinical trials and the Social Media ADEPT framework for online patient–investigator communication about clinical trials (Lynch et al., 2018), are helpful for researchers wanting more information on research using social media, such as consenting, data security, bias, and representation of different populations on various platforms (Pozzar et al., 2020).

Reliance on Best Evidence at the Time

Information on COVID-19 continues to emerge at an astounding pace, with articles and pre-prints related to the pandemic emerging multiple times per day. In this environment, evidence and perspectives related to COVID-19 are evolving almost continuously as new research emerges and new local, regional, national, and global data become available (El-Jardali et al., 2020). The fluidity of knowledge around different aspects of the virus throughout the pandemic has led to the concept of best evidence at the time (BET) as nurses and other providers adapt to an environment in which changes to their understanding of the critical topics needed to care for their patients become the norm, not the exception (Eysenbach, 2020). The

FIGURE 4. Policy Implications From the World Health Organization Framework for Managing the COVID-19 Infodemic

- Interventions and messaging should be evidence- and science-based, and able to reach people and enable them to make informed decisions on how to protect themselves.
- Knowledge should be translated into actionable messages that enable behavior change and should be presented in understandable and accessible ways.
- Community outreach is needed to ensure that concerns and information needs are understood, and that advice and messages are tailored to address the targeted audience.
- Strategic partnerships should be created across sectors, such as social media, technology, academic, and clinical, as well as society at large, to strengthen and amplify the impact of the messages.
- Infodemic management approaches should be further developed to mitigate risk through data science and other types of research.

Note. Based on information from Tangcharoensathien et al., 2020.

urgency of the pandemic also led to strategies for developing reliable evidence-based guidelines under pandemic conditions (Akl et al., 2020).

Organizations that synthesize and update BET (see Figure 5) can be helpful for clinicians, policymakers,

and researchers navigating rapidly changing knowledge (El-Jardali et al., 2020). In addition, because of the high degree of uncertainty in the current knowledge environment, studies addressing COVID-19 and cancer should prioritize producing the strongest evidence possible to support effective public health policy and clinical decision-making.

FIGURE 5. Platforms for COVID-19 Knowledge Translation

American Society of Clinical Oncology

- Guidance on cancer care delivery during COVID-19
- Patient care information
- Provider and practice
- Government, reimbursement, and regulatory updates
- Question-and-answer forum
- Data registry

COVID-19 Evidence Network to Support Decision-Making

- Inventory of best evidence syntheses
- Horizon scans for emerging issues
- Community for those involved in decision-making
- List of COVID-19 knowledge hubs
- Resources for researchers interested in conducting COVID-19 evidence syntheses and/or guidelines

EPI-WIN World Health Organization Network for Epidemics

- COVID-19 updates
- Infodemic management
- Webinars
- Guidance for risk communication and community engagement
- Science in 5: COVID-19 advice for the public
- Publications

GO₂ Foundation for Lung Cancer

- Patient and caregiver resources
- Provider resources
- Policy updates
- Telehealth
- Rapid response videos for patients and caregivers
- Blogs

Oncology Nursing Society

- Community to share questions and answers
- Personal protective equipment and safety
- Telehealth
- Patient care and support resources
- Webinars
- Guidelines
- Self-care and wellness
- List of data repositories
- Advocacy and policy initiatives

EPI-WIN—Information Network for Epidemics

Epidemiologic Methods

The pandemic has highlighted many of the challenges inherent in community surveillance and observational research, such as confounding, selection bias, and information bias, which are particularly common in initial reports describing a new phenomenon. These limitations underscore the need to interpret findings cautiously when developing policy and practice guidance. Oncology researchers should consider whether patients with cancer and patients receiving certain therapies are adequately represented in epidemiologic studies, and whether patterns suggesting that COVID-19 susceptibility, prevention, treatment, or outcomes are different in these subpopulations. With two vaccines approved for use in the United States and multiple candidate vaccines in clinical trials as of January 2021, questions about the safety and efficacy of COVID-19 vaccines in patients who are immunosuppressed or undergoing treatment with immune checkpoint inhibitors are important to ask. With previous vaccines (e.g., influenza), clinicians were left with little evidence guiding use of vaccines for certain patients with cancer, having to rely on data generated from clinical studies with inherent design limitations. Moving forward, oncology researchers should generate definitive evidence using study designs that reduce bias.

Data Science, Big Data, and Machine Learning

Data have been at the heart of nearly every effort to stay ahead of the pandemic and provide timely, accurate information about the virus to clinicians, patients, and their families. In particular, the growing availability of big data, which refers to datasets so large that they require specialized methods for analyzing, related to the virus provides important opportunities for studies modeling phenomena such as viral incubation, transmission, and symptoms, which can be used to track the virus, deliver tailored public health messaging, and provide real-time updates about COVID-19 (Bullock et al., 2020). Although gaining access to data related to COVID-19 has been easier than in the past because of the ubiquity of electronic health records (EHRs) and improvements in data infrastructure, the heterogeneity

of COVID-19 data (which often reflect multiple datasets, time periods, and formats, each with varying degrees of precision) highlights the need to combine traditional research methods with emerging methods from areas like data science.

In particular, techniques like machine learning and artificial intelligence (AI) have garnered attention for their potential to provide insights into issues like which symptoms and laboratory values are most predictive of infection and outcomes (Soltan et al., 2020). In addition, algorithms have been developed to improve the speed and accuracy of time-consuming activities, such as COVID-19 triage, screening, and diagnosis, by synthesizing information from multiple sources, including medical imaging, comorbidities, and other details from the patient's EHR (Tayarani-Najaran, 2020). These technologies have created alternative methods for tracking the spread of the virus using noninvasive devices and making predictions on potential outcomes for patients who test positive for COVID-19 (Bullock et al., 2020; Debnath et al., 2020; Soltan et al., 2020). Future applications using techniques like AI for COVID-19 have been proposed (Tayarani-Najaran, 2020). For example, using machine learning to stratify individuals based on their risk for deterioration from COVID-19 may allow clinicians to prioritize patients who require more resource-intensive care and avoid unnecessary hospital admission (Debnath et al., 2020).

Despite the tremendous potential that techniques like machine learning and AI have for improving the understanding of the effects of COVID-19 on different aspects of cancer care, significant challenges remain (Zame et al., 2020). These challenges include practical issues, such as variability in the quality and completeness of COVID-19 data coming from different data sources, regions, and time periods, which will require careful analysis, as well as input from multiple stakeholders (including nurses) to generate accurate conclusions (Zame et al., 2020). In addition, challenges like the continued lack of accessibility of COVID-19 data in many settings, lack of availability of researchers with expertise in data science, pressure to implement AI or machine-learned algorithms before being properly validated, and basic questions about which data techniques are best suited for different COVID-19-related issues are all hurdles that researchers will need to address moving forward (Zame et al., 2020). Ongoing concerns around data privacy, ownership, and consumer protections (already critical to responsible research) have become particularly salient as public trust in research and public health

KNOWLEDGE TRANSLATION

- The COVID-19 pandemic has had a profound effect on cancer care and oncology nursing worldwide.
 - This article outlines priorities for research needed to inform clinical practice, health policy, and public health messaging around COVID-19 and cancer care.
 - Nurses and nurse scientists will be a critical part of advancing knowledge at the intersection of COVID-19 and cancer care.
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institutions vacillates and the power of datasets grows (Ienca & Vayena, 2020; Zame et al., 2020).

Conclusion

For the many individuals on the cancer care continuum, the emergence of the novel coronavirus in late 2019 represented a seismic shift in health care, tilting the axis of cancer care worldwide. The ensuing pandemic (which, as of this writing, continues to spread aggressively in many locations) has had a profound effect on the field of oncology that researchers are only beginning to understand. Over the past year, oncology nurses showed unheralded bravery, resilience, and ingenuity—often at great personal risk to themselves—to continue to provide care to their patients. In addition, nurse scientists, faculty, research nurses, public health nurses, nurse informaticists, epidemiologists, and other knowledge workers labored around the clock in many locations to build infrastructure, analyze data, share ideas, and develop the evidence needed to inform practice and policy and protect frontline workers. Their contributions, along with those of many others, laid the foundation for a new generation of COVID-19-compatible cancer care needed to continue to improve outcomes for patients with cancer.

However, to ensure that oncology nurses can continue to offer safe and effective cancer care and protect the well-being of their fellow healthcare providers, evidence related to a variety of COVID-19 topics is needed. Current literature related to the intersection of COVID-19 and cancer care is remarkably sparse, and those gaps must be filled to keep pace with the ongoing public health crisis. In this research agenda, the authors have identified five critical areas with insufficient evidence, as well as five cross-cutting themes for research in these areas, needed to fill current gaps to inform policy and guide clinical decision-making.

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