Systematic Review of Interprofessional Oncology Simulation

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Abstract

BACKGROUND With the evolving complexity surrounding cancer care, interprofessional education through simulation must be examined as a novel pedagogy.

OBJECTIVE To provide a systematic review by way of an evolutionary concept analysis of interprofessional oncology simulation to advance understanding of its antecedents, attributes, and consequences.

DESIGN Rogerian evolutionary concept analysis method.

DATA SOURCES A convenience sample of peer-reviewed publications were retrieved from MEDLINE, CINAHL and PsycINFO from 2002-2019.

RESULTS Literature investigating interprofessional oncology simulation is growing. Findings (N=16 articles) revealed congruent antecedents, while attributes included: (1) realistic oncology care scenarios, (2) training in complex oncology care, and (3) oncology care communication. The conceptual consequences were identified as improved interprofessional team, trainee, and patient care outcomes.

CONCLUSIONS Findings advance knowledge in the growing area of interprofessional oncology simulation by providing conceptual clarification for healthcare providers. As professional organizations continue to emphasize interprofessional educational methods, additional research is critical in furthering this area of knowledge development.

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Implications for Interprofessional Practice

- Interprofessional education (IPE) has been shown to improve patient outcomes and increase staff satisfaction.
- Novel approaches to team-based education, such as interprofessional simulation, are emerging as effective strategies within the intricate field of oncology.
- Using the Rogerian method of concept analysis, interprofessional oncology simulation is clarified with articulation of its antecedents, attributes, and consequences and a related conceptual definition.
- This article provides conceptual clarity for interprofessional oncology simulation to advance rigorous research aimed at development and implementation of innovative education strategies to favorably impact oncology patient outcomes.

Introduction

Oncology is a dynamic specialty within our healthcare system that is rapidly evolving. With the development of novel treatments and technologies, healthcare professionals are thrust into a complex environment. In 2018, there were about 1.7 million new cases of cancer in the United States (U.S.) population (National Cancer Institute, 2018). By 2020, there are expected to be over 20% more new cases of cancer for men and women in the U.S. compared to 2010 (Centers for Disease Control, 2018). These staggering numbers illustrate the need to educate healthcare providers on how to care for the growing oncology population.

Healthcare provider-led education for patients has been shown to impact patient outcomes (Zhou et al., 2015). Furthermore, interprofessional education (IPE) among healthcare providers has been associated with improvement in patient outcomes (Reeves et al., 2013). In 2010, the World Health Organization (WHO) called for a focus on IPE, citing over 50 years of data showing improved patient outcomes and staff satisfaction following collaborative education. IPE is defined as "when students from two or more professions learn about, from and with each other to enable effective collaboration and improve health outcomes" (WHO, 2010). This definition also extends into the post-licensure world of healthcare providers.

To prepare clinicians to provide evidence-based care, effective IPE approaches are increasingly examined among interprofessional teams across varying contexts. Simulation has emerged as a promising education approach. The Society for Simulation in Healthcare (SSH) defines simulation as: "A technique that creates a situation or environment to allow persons to experience a representation of a real event for the purpose of practice, learning, evaluation, testing, or to gain understanding of systems or human actions" (Lopreiato, 2016). When a simulation activity includes multiple professions, there is an opportunity for a collaborative team approach to education. Therefore, IPE provides a unique opportunity for educating healthcare professionals to improve patient outcomes.

Previous concept analyses have sought to define the concept of IPE simulation. One concept analysis was identified in the literature involving interprofessional simulation. In Failla and Macauley (2014), the attributes of this concept were defined as experiential simulated and shared learning involving persons from various professional backgrounds. Antecedents for interprofessional simulation included curriculum development and inadequate collaborative practice, patient safety and outcomes. Consequences for interprofessional simulation were identified as "meaning and knowledge creation through shared learning, information and thoughtful decision making through simulation, cohesive and collaborative team functioning, trust and relationship building through reflection, and improved patient care" (Failla & Macauley, 2014, p. 578). This concept analysis provides guidance on how interprofessional simulation can be implemented. Furthermore, the International Nursing Society for Clinical Simulation and Learning

(INACSL) has published best practice standards for developing and implementing IPE Simulation initiatives (INACSL Standards Committee, 2016). This standard provides consistent support for simulation activities with a focus on different professions with shared learning objectives.

Interprofessional simulation education is a growing area of science and must be examined in the context of oncology care. Oncology care is complex, requiring interprofessional teams to provide sophisticated treatment regimens, manage complicated side effects, and deliver psychosocial care. Clarification of the concept of interprofessional oncology simulation education is needed to foster development of education interventions that can improve oncology patient outcomes across various healthcare professions. Concept clarification has the potential to contribute to associated measurement and theory development while advancing knowledge of interprofessional oncology simulation education. The purpose of this article is to provide a systematic review by way of an evolutionary concept analysis of interprofessional oncology simulation to advance understanding of its antecedents, attributes, and consequences.

Methods

The Rogerian concept analysis method was utilized to clarify the concept of interprofessional oncology simulation. This method acknowledges the contextual dependence and evolution of a concept over time. The Rogerian method is iterative and creates a description of a concept as it has developed into the present (Rodgers & Knafl, 1993). Since IPE through simulation is an emerging concept, investigating its origins in the oncology specialty is essential to understanding its potential. The Rogerian method consists of the following steps: (1) identify the concept, (2) identify an appropriate setting and sample, (3) data collection, (4) identify attributes, surrogate terms, antecedents, and consequences related to the concept, (5) analyze the above terms or phrases, and (6) identify implications for further research of the concept (Rodgers & Knafl, 1993). Antecedents are aspects that occur prior to the manifestation of the concept. Attributes are terms that define and represent the essence of the concept. Consequences represent what happens after the concept takes place. Surrogate (synonyms that are interchangeable for the concept term) and related terms (phrases that are connected to the concept but have different defining attributes) are also ascertained from each article. At the conclusion of this analysis, a conceptual definition will emerge from the data.

Eligibility Criteria

Articles that examined interprofessional simulation in the setting of oncology were included in this concept analysis. The inclusion criteria for sampled articles were: (1) IPE focus; (2) contextual reference to oncology or oncology simulation; and (3) published in the English language. No restrictions on study design were made and review articles that met the above criteria were considered for inclusion.

Information Sources and Search

The nonprobability sampling design was conducted with a computer-generated search of the literature. The following databases were searched: MEDLINE, CINAHL, and PsycINFO from January 2000 to November 2019. The key search terms of "interprofessional or interdisciplinary," "oncology or cancer," and "simulation" were used, with more specific subject headings utilized for each database. For example, the search strategy for CINAHL included the terms: (MH "Education, Interdisciplinary" OR interprofessional) AND (MH "Simulations+") AND (oncology OR cancer), with a limit of English language. The last search was run on November 30th, 2019.

Study Selection

Articles were gathered from a thorough database search. Then, they were screened systematically with consideration of the eligibility criteria. If an article met the inclusion criteria, it was assessed for quality using the Critical Appraisal Skills Program (CASP) guidelines (CASP, 2018).

Data collection and analytic methods

Each article was analyzed using an iterative process and read thoroughly twice. Terms or phrases that corresponded to the antecedents, attributes, and consequences of interprofessional oncology simulation were identified. The essence of each extracted term or phrase was identified and data were combined into a data collection matrix. These data were then organized by category by thematic analysis into spreadsheets as they related to the overall concept of interprofessional oncology simulation. An audit trail was established to promote confirmability of the study findings, beginning with a PRISMA diagram and continuing to data extraction into spreadsheets.

Results

Selection of the Literature

As depicted in the PRISMA diagram, a total of 317 English-language articles were identified (Figure 1). A hand search also contributed two articles that met inclusion criteria. Duplicates (n = 17) and research involving genetic or molecular simulation (n = 245) were removed, yielding 57 articles for full-text review. Screening for eligibility was performed and 41 articles were eliminated for the following reasons: no identified interprofessional simulation (n = 27), no oncology scenario (n = 13), and no description of the simulation (n = 1). A total of 16 articles that met inclusion criteria were identified spanning the years of 2002 to 2019.

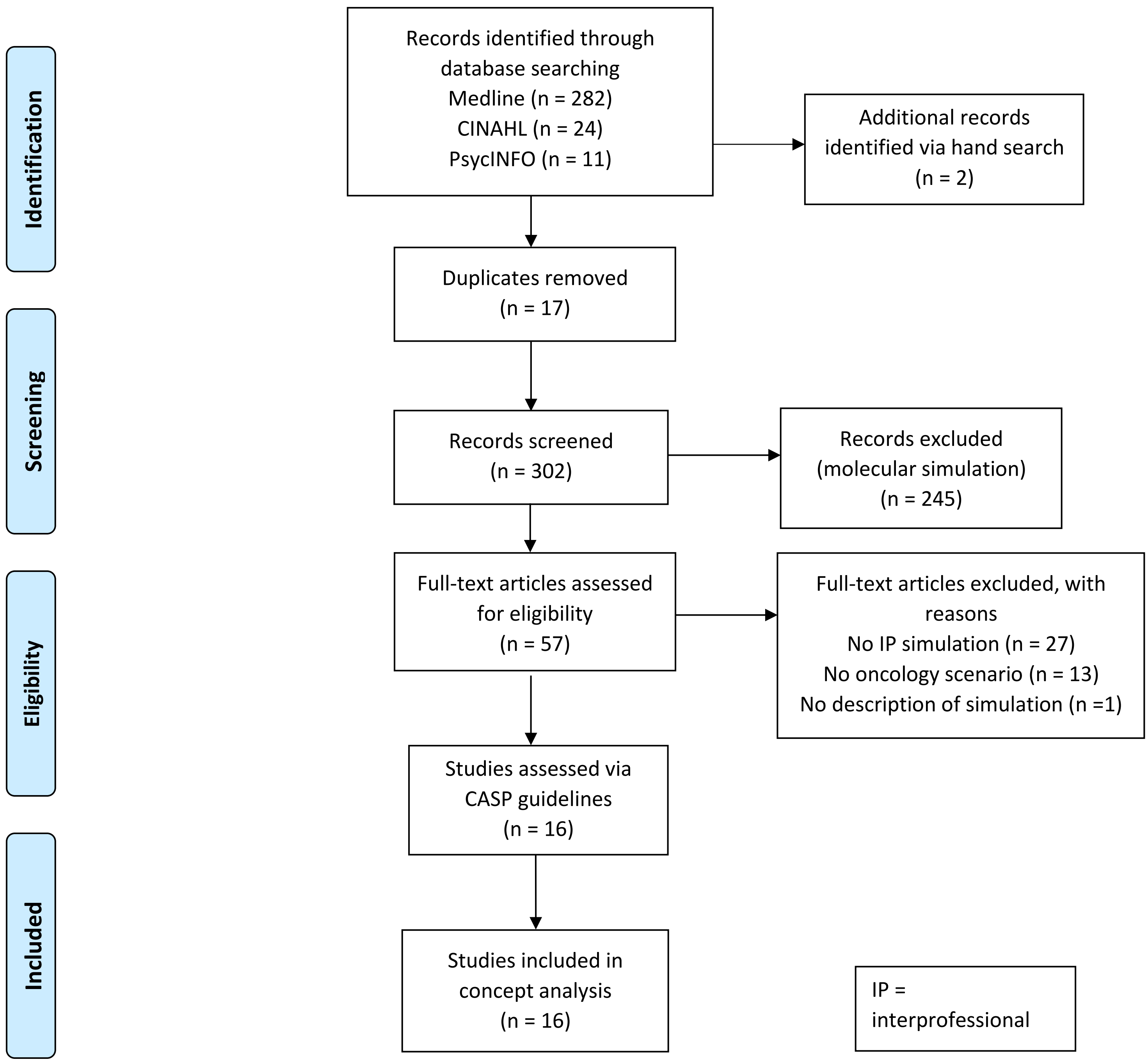

Figure 1. *Review of interprofessional oncology simulation. Flow chart is based on Preferred Reporting Items for Systematic Reviews and Meta-analyses guidelines.*

Quality Appraisal

Each of the 16 studies were then assessed via the Critical Appraisal Skills Program (CASP) guidelines (CASP, 2018). The CASP guidelines provide a systematic method of assessing quality in both qualitative and quantitative literature. Guideline questions include, "Can the results be applied to the local population?" and "How valuable is the research?" None of the studies were excluded based on the CASP criteria, so all 16 articles were included in this concept analysis.

Risk of Bias

There are a variety of research designs and article types included in this analysis, including mostly observational and quasi-experimental designs. Due to the characteristics of articles involving interprofessional oncology simulation, risk of bias was assessed at the study level. The lack of randomization and high-level evidence on this concept represents a risk that the evidence is weak, suggesting that the design of interprofessional oncology simulation research should be improved.

Study Characteristics

The 16 articles included in this analysis originated from a diverse array of countries: five from the United States (Bagley et al., 2018; James et al., 2016; Klipfel et al.; 2014; Rodriguez-Paz et al., 2009; Weston et al., 2018), four from Canada (D'Alimonte et al., 2019; Gillan et al.; 2015; Giuliani et al.; 2014; Thompson et al., 2017), three from Australia (Giles et al., 2017; Ha & Parakh, 2018; Nestel et al., 2011), one from the United Kingdom (Donovan et al., 2003), one from Germany (Neuderth et al., 2019), one that included both the United States and Europe (Murgu et al., 2018), and one that covered the Greater Region, which includes parts of France, Germany, Belgium, and Luxembourg (Vogin et al., 2018). Various interprofessional care settings were represented in the sample of 16 articles including inpatient care units (Bagley et al., 2018; James et al., 2016; Klipfel et al., 2014; Neuderth et al., 2019), radiation oncology (Gillan et al., 2015; Giuliani et al., 2014; Rodriguez-Paz et al., 2009; Thompson et al., 2017; Vogin et al., 2018), general oncology care areas (D'Alimonte et al., 2019; Donovan et al., 2003; Murgu et al., 2018), imaging (Giles et al., 2017), undergraduate oncology education (Ha & Parakh, 2018), surgical oncology (Nestel et al., 2011), and family medicine (Weston et al., 2018). Two of the articles presented the same sample of participants in a radiation oncology simulation but described slightly different outcome measurements from the study (Gillan et al., 2015; Giuliani et al., 2014). Key demographic characteristics of the 16 articles are included in Table 1. The diverse demographic of articles provided a comprehensive analysis of the concept of interprofessional oncology simulation.

Synthesis of Results

The literature provided a comprehensive analysis of the concept of interprofessional oncology simulation. The present concept analysis exposed congruent antecedents, attributes, and consequences of interprofessional oncology simulation throughout research studies in various oncology clinical settings. These are depicted in the working model of this concept (Figure 2). The following sections will describe the antecedents, attributes, consequences, surrogate terms and related terms for interprofessional oncology simulation.

Antecedents

Data analysis revealed the following as antecedents for interprofessional oncology simulation: (1) training, (2) team, (3) organizational, and (4) treatment approaches. The training approach centered on suboptimal oncology training across disciplines and care settings. This included gaps in knowledge among medical-surgical nurses, junior doctors, social workers, and radiation therapy teams caring for oncology patients (Bagley et al., 2018; Giuliani et al., 2014; Ha & Parakh, 2018; Neuderth et al., 2019; Rodriguez-Paz et al., 2009). An overall lack of formal training in oncology was characteristic of interprofessional teams working in oncology, as well as primary care providers knowledge of oncology prevention (James et al., 2016; Weston et al., 2018). In addition to inadequate oncology training, the influence of siloed training was present in the literature. This included in the radiation oncology clinical setting and providers working in the typical breast cancer pathway, and additionally in the general education of doctors, nurses, and other care providers (Giles et al., 2017; Giuliani et al., 2014; James et al., 2016). This training approach, among various healthcare professionals, has limited interprofessional oncology exposure and knowledge.

Author (Year)	Country	Sample size	Design	Type of Health Professionals	Clinical care setting	Interprofessional Simulation Topic(s)	Main outcomes
Bagley et al. (2018)	USA	n = 57	Two group pre-/ post-test	Medical-surgical nurses, providers, pharmacy staff, oncology nurse practitioner	Inpatient medical-surgical unit	Chemotherapy administration	Improved self-efficacy of nurses in the combined didactic/ simulation group, compared to the only didactic group
D'Alimonte et al. (2019)	Canada	n/a	Review	IP oncology groups	Oncology	Team communication	Literature supports use of simulation among IP oncology groups
Donovan et al. (2003)	United Kingdom	n/a	Post-workshop evaluation	Nurses, physical therapists, dieticians, radiology technicians	Oncology	Communication skills training with simulated patients	Positive feedback from participants regarding training specific to communication in oncology care and use of simulated patients to practice communication strategies
Giles et al. (2017)	Australia	n = 35	Quasi-experimental, pre-/ post test	Radiography and sonography students and post-graduates	Imaging	Breast cancer screening in mammography	Statistically significant improvement in attitudes toward interprofessional collaboration ($p = 0.046$)
Gillan et al. (2015)	Canada	n = 21	Pre-/post-survey	Radiation therapists, medical physicists, radiation oncologists	Radiation oncology	Brachytherapy emergency; CT artifact management; scalp electron CMU; infant CMU; larynx CBCT	High satisfaction ratings following completion of simulation cases
Giuliani et al. (2014)	Canada	n = 21	Pre-/post-survey	Radiation therapists, medical physicists, radiation oncologists	Radiation oncology	Brachytherapy emergency; CT artifact management; scalp electron CMU; infant CMU; larynx CBCT	Benefits to IP simulation, but challenged by cost of resources
Ha & Parakh (2018)	Australia	n/a	Review	Undergraduate medical students	Undergraduate oncology education	Clinical examination through simulation; IP team communication	Realism and authentic simulated interactions are essential to gaining clinical skills
James et al. (2016)	USA	n = 23	Observational case study and questionnaire in cross-sectional analysis	Oncology nurses and medical fellows	Inpatient oncology	Anemia; chemotherapy extravasation; acute delirium in inpatient oncology	Simulation experience was valued by participants
Klipfel et al. (2014)	USA	n = 23	Pre-/post-survey	Nurses and urology residents	Inpatient urology unit	In-situ urosepsis following surgery for bladder cancer; unresponsive patient emergency	Improvement in mean scores of team performance following the simulation
Murgu et al. (2018)	USA and Europe	n = 416	Pre-/post-survey	Doctors, nurses, physician assistants, nurse practitioners	Oncology	Non-small cell lung cancer mediastinal staging; needle aspiration; diagnosis	High trainee satisfaction, improved team-based attitudes
Nestel et al. (2011)	Australia	n/a	Review	IP surgical oncology groups	Surgical oncology	Communication	Improved communication skills
Neuderth et al. (2019)	Germany	n = 19	Post-simulation evaluation	Social work and medical students	Inpatient oncology	Cancer diagnosis communication	High satisfaction with simulation and improved role awareness
Rodriguez-Paz et al. (2009)	USA	n/a	Post-simulation evaluation	Surgeons, anesthesiologists, radiation oncologists, physicists, nurses	Radiation oncology	HDR-IORT	No adverse events have occurred during any HDR-IORT treatments following simulation initiative
Thompson et al. (2017)	Canada	n = 27	Two group pre-/ post-survey	Students and graduates of radiation therapy, medical physics, and radiation oncology programs	Radiation oncology	Hazard and risk detection in radiation procedures	High satisfaction in simulation group compared to discussion group, however perceptions of educational value were not statistically significant between the two groups
Vogin et al. (2018)	Greater Region (parts of France, Germany, Belgium, and Luxembourg)	n/a	Review	Radiation oncology professionals	Radiation oncology	Cross-border education initiative to share radiation oncology simulations	IP research initiatives are shared throughout the Greater Region
Weston et al. (2018)	USA	n = 76	Pre-/post-survey	Family nurse practitioners, family medicine residents	Family medicine	Screening for cervical and breast cancer	Significant improvement in confidence levels of students following simulation

Table 1. *Note: Table 1 contains demographic and methodological data for the 16 articles included in this review. (IP = interprofessional; CT = computed tomography; CMU = clinical mark-up; CBCT = cone-beam computed tomography; HDR-IORT = high dose rate intraoperative radiation therapy)*

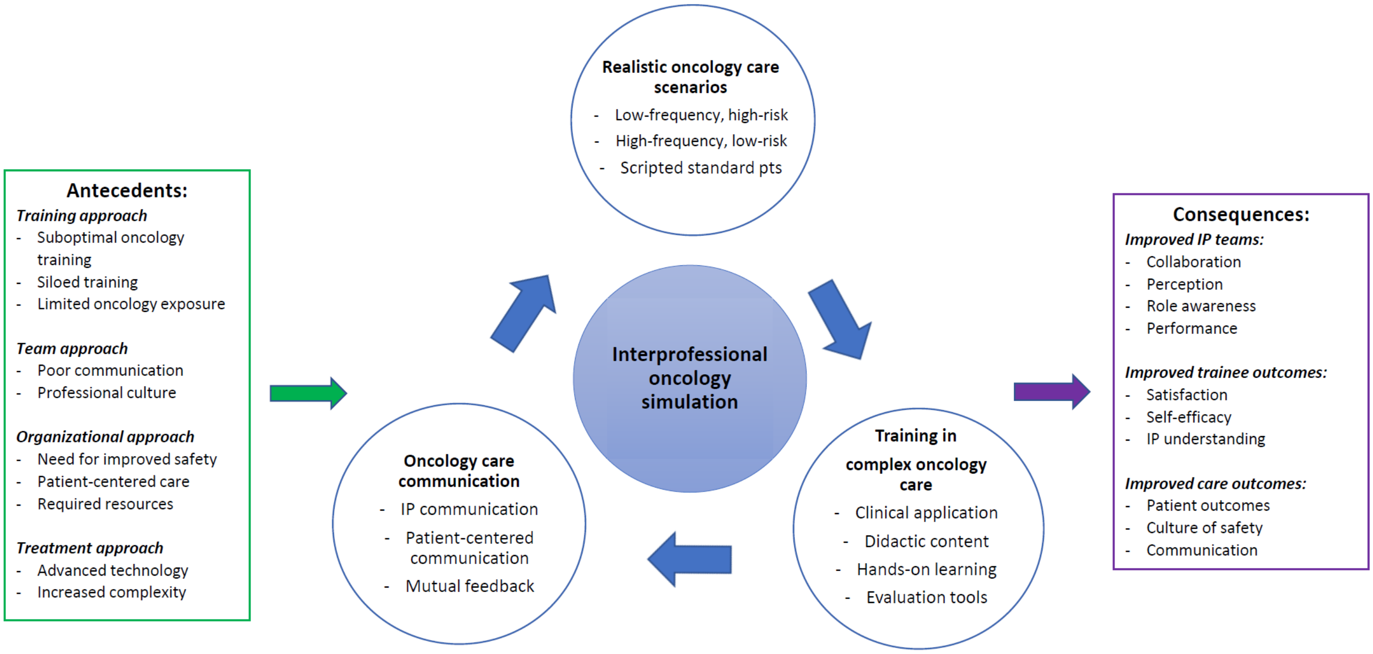

Figure 2. *Working model of analysis findings*
Note: The working model of the analysis findings illustrates the antecedents in the far-left box, which influences the attributes of an interprofessional oncology simulation, depicted in the center circles. The consequences of this concept are the final output box of this flow diagram, containing improved outcomes for teams, trainees, and care delivery following successful simulation implementation.

Team approach, as an antecedent, focused on poor communication and professional culture as areas that interprofessional oncology simulation may address. The literature discussed the prevalence of poor communication in oncology care and the numerous issues this creates in providing safe and effective care (D'Alimonte et al., 2019; Donovan et al., 2003; Gillan et al., 2015; Murgu et al., 2018; Nestel et al., 2011; Thompson et al., 2017; Weston et al., 2018). Research has shown a need for clear and accurate information exchange in the oncology setting, among healthcare professionals and patients. Examples include communicating treatment options to patients prior to cancer surgery, and competency in counseling women in cancer screening and abnormal test results (Nestel et al., 2011; Weston et al., 2018). Professional culture and territoriality influenced the team approach to interprofessional simulation in oncology. This included a lack of understanding about the roles and responsibilities of other professions and differing linguistic styles of medical professionals (Bagley et al., 2018; Donovan et al., 2003; Giles et al., 2017; Giuliani et al., 2014; Klipfel et al., 2014; Nestel et al., 2011). Role clarity is an essential component of the pre-brief of a simulation, which includes an introduction to the scenario and delineating roles. The pre-brief is a time to address the differences in terminology used by medical professionals, by establishing standard language for the team.

Organizational approach involved a need for improved safety, an emphasis on patient-centered care, and required resources for the simulation. Serious safety events for patients, such as radiation toxicity, and corresponding gaps in practice were identified within the setting of oncology care (James et al., 2016; Klipfel et al., 2014; Nestel et al., 2011; Rodriguez-Paz et al., 2009; Thompson et al., 2017; Vogin et al., 2018). Prior to the interprofessional oncology simulation, significant human and physical resources were gathered for implementation (Bagley et al., 2018; Donovan et al., 2003; Giuliani et al., 2014; Rodriguez-Paz et al., 2009). Therefore, organizational support was necessary for the oncology simulation success.

Treatment approach was found to refer to advanced technology present in oncology care across care settings (Giuliani et al., 2014; Klipfel et al., 2014; Murgu et al., 2018; Nestel et al., 2011; Vogin et al., 2018). These advances corresponded to an overall increase in complexity within different areas of oncology care (D'Alimonte et al., 2019; Donovan et al., 2003; Giuliani et al., 2014; James et al., 2016; Klipfel et al., 2014; Nestel et al., 2011; Neuderth et al., 2019; Rodriguez-Paz et al., 2009; Vogin et al., 2018). The growing complexity of oncology demonstrates the need for innovative approaches to education, like interprofessional simulation.

Antecedent outliers are events that occur before the concept, but only emerge in a limited quantity of data. An example from the analysis was the outlier of a needs assessment prior to the interprofessional oncology simulation to identify gaps and lead to creation of cancer case studies (James et al., 2016; Weston et al., 2018). Therefore, in some settings, a formative evaluation can be useful in determining the content and context of an interprofessional oncology simulation.

Attributes

Analysis revealed the following attributes of interprofessional oncology simulation: (1) realistic oncology care scenarios, (2) training in complex oncology care, and (3) oncology care communication for the concept. The simulated clinical encounters were based on real experiences and situations. These included low-frequency, high-risk scenarios, such as radiation stuck source emergencies, chemotherapy extravasation, and urosepsis following surgery for bladder cancer (Bagley et al., 2018; Giuliani et al., 2014; Klipfel et al., 2014). Common care events (i.e. high-frequency, low-risk, oncology events) were simulated, including a standard care pathway for a newly diagnosed breast cancer patient and positioning for typical radiation therapy treatment (Giles et al., 2017; Ha & Parakh, 2018; Vogin et al., 2018). The use of scripted standardized patients allowed for healthcare professionals to interact with authentic simulated cancer patients (Donovan et al., 2003; Gillan et al., 2015; Giuliani et al., 2014; James et al., 2016; Nestel et al., 2011; Neuderth et al., 2019). In some studies, realism of the scenario was supported by use of an in-situ simulation – one that is conducted in an actual clinical environment.

The attribute of training in complex oncology care was prevalent in the literature. Training was described in terms of clinical application in the simulation, such as training emulating actual oncology care delivery that incorporates props and authentic resources. This included simulations in an in-situ radiation medicine department, a mammography workshop, and a primary care setting (Giles et al., 2017; Gillan et al., 2015; Weston et al., 2018). Didactic content was also reported to brief participants and provide instructional learning before the simulation (Bagley et al., 2018; Giles et al., 2017; Murgu et al., 2018; Nestel et al., 2011; Thompson et al., 2017). These applied clinical scenarios involved hands-on learning; e.g., radiation therapy and chemotherapy administration (Bagley et al., 2018; Gillan et al., 2015; Giuliani et al., 2014; Murgu et al., 2018; Rodriguez-Paz et al., 2009; Thompson et al., 2017). Training was also found to incorporate evaluation tools, such as radiation therapy web-based and video-assisted evaluations (Thompson et al., 2017; Vogin et al., 2018). The complexity of oncology care was met with complex simulation development and implementation.

Oncology care communication was an attribute interwoven throughout the sampled literature. This involved interprofessional communication in the form of "closed-loop" techniques within a team as well as in patient-centered communication that highlighted shared problem-solving (Bagley et al., 2018; D'Alimonte et al., 2019; James et al., 2016; Klipfel et al., 2014; Neuderth et al., 2019; Rodriguez-Paz et al., 2009; Vogin et al., 2018; Weston et al., 2018). An open, mutual feedback process was emphasized through the simulation events to create a team-based communicative environment (D'Alimonte et al., 2019; James et al., 2016; Thompson et al., 2017). The feedback process of the simulation began in the pre-brief, the orientation session prior to a simulation, culminated in the debrief, the "collaborative, reflective process within the simulation activity" (Lopreiato, 2016, p. 8). Both simulation design components are integrated into the best practice standards for IPE simulation, demonstrating the importance of this attribute (INACSL Standards Committee, 2016). Communication emerged as a common component as it was tied to team evaluation and successful outcomes.

Consequences

Consequences of interprofessional oncology simulation included improved: (1) interprofessional teams, (2) trainee outcomes, and (3) care outcomes. Following a simulation intervention, teams reported improved collaborative behaviors across oncology settings as well as heightened interprofessional performance (Giuliani et al., 2014; James et al., 2016; Klipfel et al., 2014). The attitudes and perceptions of interprofessional collaboration and teamwork improved following the simulation (Giles et al., 2017; Gillan et al., 2015; Murgu et al., 2018). By increasing the participants' exposure to other professionals, there was increased role awareness and understanding of multiple professionals' work (Giles et al., 2017; Gillan et al., 2015; Giuliani et al., 2014; Neuderth et al., 2019; Weston et al., 2018). Role clarity and awareness are important factors in interprofessional teams and can be practiced in a simulation scenario.

Improved trainee outcomes were noted after the interprofessional oncology simulation. The simulation was perceived as beneficial and trainees were satisfied with the educational mechanism (Bagley et al., 2018; Donovan et al., 2003; Gillan et al., 2015; Giuliani et al., 2014; James et al., 2016; Murgu et al., 2018; Neuderth et al., 2019; Thompson et al., 2017). Trainees felt the exposure to various oncology cases prepared them for clinical practice and increased their confidence and self-efficacy in standard and emergency oncology situations (Bagley et al., 2018; Giuliani et al., 2014; Ha & Parakh, 2018; Klipfel et al., 2014; Weston et al., 2018). This included learning outcomes such as critical thinking (Bagley et al., 2018; D'Alimonte et al., 2019; Giuliani et al., 2014; Weston et al., 2018). Interprofessional simulation participants also raised overall interprofessional understanding. For example, the holistic nature of interprofessional collaborative care in the oncology setting was reported (Giles et al., 2017; Weston et al., 2018).

Improved care outcomes emerged as a consequence of interprofessional oncology simulation. Improved care outcomes included optimization of patient outcomes in the cancer care pathway with an emphasis on patient-centered care (D'Alimonte et al., 2019; Ha & Parakh, 2018; Giles et al., 2017; Gillan et al., 2015; Nestel et al., 2011; Rodriguez-Paz et al., 2009; Thompson et al., 2017). A culture of safety accompanied the simulation experience, as teams simulated oncology safety events in varying clinical areas while finding it useful in reducing errors (Bagley et al., 2018; Giuliani et al., 2014; James et al., 2016; Rodriguez-Paz et al., 2009; Thompson et al., 2017; Vogin et al., 2018). Another consequence was improved communication among interprofessional care teams and patients following the oncology simulation. Communication training was incorporated into the interprofessional oncology simulation and led to high perceived value of this skill exercise (Donovan et al., 2003; Gillan et al., 2015; Giuliani et al., 2014; Ha & Parakh, 2018; James et al., 2016; Klipfel et al., 2014; Nestel et al., 2011).

Enhanced collaboration and communication were identified as consequence outliers across geographical borders, including interprofessional research initiatives incorporated across a country (Vogin et al., 2018). The identified consequences of this concept emerge from a simulation through the debrief period, identified as the time of greatest learning and involves discussion among team members. Simulation represents a low-stakes, low pressure learning activity. Establishing a safe zone during the pre-brief, or introduction, to the simulation allows for successful debriefing, supporting the positive consequences of enhanced collaboration and communication. The consequences of collaboration and role awareness relate to a successful simulation debrief. Since the debrief is the period of learning and reflection of teamwork following a simulation, these consequences rely on a productive debriefing session.

Surrogate and Related Terms

The literature examined in this concept analysis provided surrogate and related terms for the concept of interprofessional oncology simulation. Few surrogate terms were identified for this concept in the literature. Surrogate terms were oncology team-based simulation (Giuliani et al., 2014), "interprofessional team training opportunities using simulated cancer scenarios" (James et al., 2016), interactive, team-based approach in oncology (D'Alimonte et al., 2019), and team training using simulated cancer care (D'Alimonte et al., 2019).

Related terms were abundant as they included interprofessional and simulation aspects in a general sense. Hence, related terms were grouped into the following categories: interprofessional terms, simulation terms, team terms, and training terms. Examples of interprofessional terms are: "interprofessional communication" (D'Alimonte et al., 2019; Giuliani et al., 2014), "interprofessional collaboration" (D'Alimonte et al., 2019; Giuliani et al., 2014; James et al., 2016; Nestel et al., 2011; Neuderth et al., 2019; Thompson et al., 2017; Weston et al., 2018), "interprofessional competency" (Gillan et al., 2015; James et al., 2016; Weston et al., 2018), and "interprofessional learning" (D'Alimonte et al., 2019; Giles et al., 2017). Related terms in the simulation category included: "simulation scenarios" (Giuliani et al., 2014; Klipfel et al., 2014) and "simulation-based learning or training" (Giuliani et al., 2014; James et al., 2016; Nestel et al., 2011; Vogin et al., 2018). Team terms were rich and encompassed: "teamwork" (Bagley et al., 2018; Giuliani et al., 2014; Klipfel et al., 2014), "multidisciplinary and multiprofessional teams" (Donovan et al., 2003; Neuderth et al., 2019; Rodriguez-Paz et al., 2009), "team synergy" (Weston et al., 2018), "team learning" (Klipfel et al., 2014), "team collaboration" (Giles et al., 2017), and "team performance" (James et al., 2016). The training terms included "communication skills training" (Donovan et al., 2003) and "competency-based training" (Thompson et al., 2017). These related terms comprised the essence of the concept interprofessional oncology simulation, demonstrating its complex nature.

Discussion

With consideration of the identified antecedents, attributes, and consequences, the proposed definition of interprofessional oncology simulation is:

> Collaborative training in complex oncology care that involves mutual respect in care communication, realistic oncology care scenarios, and team-based debriefing, which evolve from suboptimal training, team, and organizational approaches, and subsequently, leads to improvements in shared team, trainee, and patient outcomes.

Summary of evidence

This analysis provides a general overview to support the future of IPE oncology simulation. By examining the antecedents that contribute to the manifestation of this concept, areas that may benefit from this educational pedagogy are identified. The antecedents included deficits in various approaches to workplace functionality, such as training inadequacies, poor team communication, organizational safety risks, and advances in technology and complexity. The usefulness of simulation in oncology is apparent, given the vast complexity, risk, and reliance on teamwork in this care setting. As these characteristics are found in other care settings, this model is useful in identifying multiple areas where IPE simulation can be effectively implemented.

The central aspect of this analysis focused on the attributes of IPE oncology simulation. These attributes defined and represented the essence of the concept, allowing for a comprehensive understanding of IPE oncology simulation. Attributes included realistic oncology care scenarios, with authentic props and standardized patients to enhance its receptibility to participants. This finding can be applied to future IPE simulation in oncology and beyond, as both students and professionals appreciate realistic aspects to enrich their experience. A sense of "buy in" is created when participants feel the scenario applied to their real-life practice. Another attribute that emerged was oncology care communication, which includes interprofessional and patient-centered communication. Many of the articles included in this analysis emphasized a need to improve communication between team members to improve care and outcomes. The attribute of mutual feedback was present in this category as it appeared in the debriefing sessions, considered the time of greatest learning in a simulation.

The last attribute of training in complex oncology care permeated through the literature in this analysis. The intricacies and advanced technology of oncology care, due to expansive new treatments and diagnostic procedures, lead to an innovative approach to education: IPE simulation. The clinical application, didactic content, and hands-on learning involved in this pedagogy compliment the complexities of oncology care, as well as other complex areas of healthcare.

The consequences of this concept include the results of IPE oncology simulation. These included improved interprofessional teams, in terms of collaboration, perception of the team, role awareness, and overall performance. It has been suggested that enhanced teamwork can lead to improvements in overall care delivery, so this consequence can support the use of IPE simulation across multiple disciplines (WHO, 2010). Other consequences included improved trainee outcomes, meaning participant satisfaction, self-efficacy, and understanding of interprofessional collaboration was elevated following the IPE oncology simulation.

Perhaps most notable in this analysis was the consequence of improved care outcomes. Only a few included articles measured patient care outcomes, but the link between improvements in individuals and teams was consistently mentioned (Rodriguez-Paz et al., 2009; Vogin et al., 2018). The ability to connect IPE oncology simulation, and any simulation, to patient outcomes is an essential goal for the growth of this area of research. Although challenging, connecting education initiatives to tangible outcome measurements in healthcare would secure the future of IPE simulation as a viable research and education strategy.

The findings from this analysis are transferable to interprofessional simulation educational strategies of different specialties in nursing, medicine, and other groups. This is due to the applicability of the individual concepts of "interprofessional" and "simulation," and aspects of the working model may also be modified to apply to multiple medical specialties.

Limitations

The limitations of this review reside mainly in the lack of high-quality evidence found in the literature of IPE oncology simulation. Most of the included articles were observational studies, as many simulation research projects are guided by quality improvement aims. However, even low-quality evidence contributes to an overview of a concept for an evolutionary analysis, by providing support for future, well-designed studies in this realm.

Conclusion

Further study is essential to enhance the understanding and application of interprofessional oncology simulation. As cancer care grows increasingly complex, innovative strategies are required to address changes in technology, training, teams, and organizations in the field of oncology. The practice implications of this concept analysis include an emphasis on oncology education and exposure among teams and organizations to improve cancer care. Communication training is essential and was incorporated into many of the interprofessional oncology scenarios involved in this study. The clinical application of hands-on training, including authenticity and realism, is important in simulation-based education.

The need for further research concerning consequences and outcomes of interprofessional oncology simulation is warranted. Designing research studies to address complex oncology care with interprofessional simulation to examine patient, trainee, team and organization outcomes must be a priority as the cancer population increases. Empirical measurement of interprofessional oncology simulation should focus on the outcomes of this concept. Beginning with established guidelines for IPE simulation development (INACSL Standards Committee, 2016), oncology scenario creation can follow current strategies. Reporting guidelines for simulation research have been established and should be incorporated to create standardization as this area of interprofessional simulation expands (Cheng et al., 2016). These guidelines will be essential to determine the quality of interprofessional simulation research as this field continues to grow.

The concept of interprofessional oncology simulation can be measured by existing reliable instruments that measure teamwork and collaboration. These include the Attitudes Toward Health Care Teams scale and the Assessment of Interprofessional Team Collaboration scale (Heinemann et al., 1999; Orchard et al., 2012). With no specific instrument for the oncology setting, generalized instruments are appropriate to gather empirical data measuring this concept. Other empirical measurements include patient outcome data, which can be examined pre and post an IPE simulation intervention.

Investigating the link between educational interventions for students and health professionals and patient care outcomes is a priority for this concept. Carefully developed simulation-based interventions need to continue to be implemented in the oncology setting to demonstrate impact on care outcomes. In all, research efforts that focus on interprofessional education to improve healthcare and outcomes must be supported and implemented to increase understanding of interprofessional oncology simulation.

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