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UNIVERSITY OF SAN DIEGO

Hahn School of Nursing and Health Science: Beyster Institute for Nursing Research

DOCTOR OF NURSING PRACTICE

DOCTOR OF NURSING PRACTICE PORTFOLIO

by

Spana Patel

FACULTY OF THE HAHN SCHOOL OF NURSING AND HEALTH SCIENCE:
BEYSTER INSTITUTE FOR NURSING RESEARCH
UNIVERSITY OF SAN DIEGO

In partial fulfillment of the requirements for the degree

DOCTOR OF NURSING PRACTICE
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Abstract

Purpose: In a diverse southern California outpatient oncology clinic, assess the need for standardized pre-chemotherapy education for newly diagnosed cancer patients to aid in the improvement of health literacy, self-management of side effects, satisfaction, and reduction of anxiety.

Background: Cancer patients often feel anxious, overwhelmed, and confused by the abundance of information and medical jargon that they must digest. One southern California outpatient oncology clinic identified the need for consistent, standardized procedure in providing chemotherapy education and assessing treatment knowledge in newly-diagnosed cancer patients as evidenced by: inconsistent attendance in educational classes and or appointments, inability to articulate treatment after presentation of written material, numerous follow-up telephone calls, and uncertainty about techniques to self-manage symptoms and side effects. Evidence shows that when done appropriately, providing multiple methods of pre-chemotherapy education is effective in preventing and reducing anxiety, improvement in health literacy recall, and ability to self-manage side effects in patients receiving chemotherapy for the first time.

Process: This evidence-based practice project was built on the foundation of the Ace Star Model of Knowledge Transformation framework and the gate control pain theory. An integrated literature review was piloted to examine the best methods of providing chemotherapy education in the effort to improve patient's health literacy, self-management of treatment side effects, patient satisfaction, and the reduction of anxiety.

Outcomes: The implementation of standardized procedure in methods of pre-chemotherapy education are pending.

Conclusion: Standardizing the process of chemotherapy education can provide measurable improvement in quality of care, productivity, adherence to treatment, and morale for chemotherapy patients by enhancing their level of health care literacy and skills for self-management of chemotherapy-related side effects.

Assessing the Need for Standardized Pre-Chemotherapy Education:
An Outpatient Oncology Clinic Initiative

Purpose and Significance

Among the chronic diseases impacting the Nation's healthcare system, cancer is among the leading causes of mortality globally. In 2019, it is estimated that 1,762,450 new cases of cancer will be diagnosed in addition to 600,880 cancer-related deaths (American Cancer Society [ACS], 2019a). The incidence rate for cancer in the United States is slightly higher among males compared to females (498.8 per 100,000 males and 419.3 per 100,000 women), and the incidence rate in California is slightly fewer at 438.2 males and 382.2 females per 100,000 people (ACS, 2019a). Although cancer can often become terminal, as of 2015, incidence and mortality rates were on a steady regression and correspondingly, the percentage of a 5-year relative survival rate were trending upward (National Cancer Institute [NCI], 2017a). Currently, the prevalence of cancer as of 2016 is approximately 14.7 million people living with cancer in the United States and the trajectory of cancer survivors by 2026 is projected to be 20.3 million (American Society of Clinical Oncology, 2018).

Advancing age is associated with a higher risk of developing individual cancers. The rapid growth of the geriatric population is driven by the increase in life expectancy due to early preventative measures and treatment options. However, preexisting comorbidities often complicate cancer diagnosis and treatment for this population. According to the recent statistical data from the National Cancer Institute Surveillance, Epidemiology, and End Result program, new cancer diagnoses are significantly higher in this population ranging between ages 65 to 74 with a median age of 66 (NCI, 2017b). Although the sequential patterns of aging are inevitable, early lifestyle modifications can decrease cancer-related incidences and mortality.

Evidence suggests among cancers, incidence and mortality rates are disproportionate to disparities in sex, race, ethnicity, geographic location, and socioeconomic status. For all cancers combined between 2012-2016 for new incidence of cancer diagnosis, Black men had the highest with 520.8 per 100,000 people, whereas, White females had 430.9 per 100,000 people (NIH, 2017a). Cancer related mortality rates were equally high in both Black men and Black women, however, national cancer mortality trends have declined by a steady rate of 1.5% per over the past decade (ACS, 2019b). This can be attributed to the phenomenal breakthroughs in cancer research and progressive treatment procedures leading to longer life expectancies for patients with cancer. Yet, gaps continue to exist between extraordinary innovations in treatment and the longitudinal impact these therapies have on quality of life.

Chemotherapy

Annually, approximately 650,000 cancer patients receive chemotherapy treatment in an outpatient oncology clinic in the United States (Centers for Disease Control and Prevention [CDC], 2019). Chemotherapy involves therapeutic chemical agents classified into four goal orientated categories: (a) curative; (b) neoadjuvant; (c) adjuvant; or (d) palliative (Institute for Quality and Efficiency in Health Care, 2016). Curative chemotherapy eradicates the presence of cancer cells completely, thereby achieving a cure. Neoadjuvant chemotherapy targets large tumor cells to decrease their size prior to surgery whereas adjuvant chemotherapy is administered to eliminate any remaining cancer cells present post-surgical intervention. Although these methods are effective, palliative chemotherapy focuses primary on relieving symptoms and reducing the extent of tumor size simultaneously (Institute for Quality and Efficiency in Health Care, 2016).

Chemotherapy can be administered by several different methods. Common forms of delivery consist of intravenous (IV), subcutaneous (SQ), intramuscular injections (IM), oral, and topical. Patients receiving chemotherapy intravenously commonly are required to visit outpatient infusion center during specific days in their treatment cycle. The length time of each cycle varies depending on the type of cancer, staging, treatment regimen, and recovery time between each dose administered (ACS, 2019a). The type of chemotherapy regimen is determined by factors relating to cancer characteristics (i.e., type, size, grade), overall health status, response rates of a single or a combination of drugs, and prospective outcomes to be achieved (ACS, 2019c).

Chemotherapy Education

Cancer patients often feel anxious, overwhelmed, and confused by the abundance of information and medical jargon they must digest. Cancer patients may have concerns regarding their decline in health, upcoming treatment, side effects, and the burden of confronting death (Valenti, 2014). Robust studies suggest that patients initiating chemotherapy treatment need multiform of educational materials targeting diverse learning styles: written documentation, verbal instructions, and audiovisual presentation (Apor et al., 2018; Dalby et al., 2013; Lovell et al., 2014). By increasing informational needs surrounding chemotherapy, oncology providers can prepare patients for the consequences of chemotherapy effects. Conversely, discrepancies persist in determining the most effective method of education; patient preference largely determines retention (Jivraj et al., 2018).

Chemotherapy education is imperative to equip patients with the knowledge in early detection and management of side effects associated with treatment, which if neglected could potentially cause life-threatening complications. Unfortunately, no nationally recognized standard set of guidelines exist for the optimal timing, frequency, duration, or delivery of

educational content to patients (Lovell et al., 2014). Numerous strategical approaches result in varying effects, and challenges in understanding the discrepancies between results. It is clear that providing written or verbal information alone is insufficient, no strong evidence supports optimal modes of delivery. Strategical teaching methods include written, verbal (e.g., one-to-one, group, video), personnel (e.g., nurse, physician, peer educators), and intensity (e.g., one session, repeated in-person follow-up visits, telephone; Apor et al., 2018; Dalby et al., 2013; Lovell et al., 2014).

Nurse's Role in Chemotherapy Education

Patient education is a multifarious process intended to facilitate in learning and evaluating of health outcomes. The process consists of assessment, planning, implementation, and evaluation. Nurses play a pivotal role in chemotherapy education among cancer patients in empowering self-management techniques and coordinating their care while in treatment (Flanders, 2018). Examples of teaching materials include printed documents, verbal instructions, audiovisual or electronic interactive programs operated on a computer (Flanders, 2018; Lovell et al., 2014; & Shinnick, 2019). Printed documents can include complimentary resource brochures, medication inserts, chemotherapy management, and home-care instructions. Verbal instructions can assist in the purpose of defining type of cancer, chemotherapy rationales, required dosage, and duration of treatment. Audiovisual or electronic methods include educational DVD video or modules on a computer in the effort to engage patient participation. "Teaching is not a task; it is a practice," (Flanders, 2018, p. 55) that requires nurses to empower patients to meet individual learning needs in order to maximize comprehension.

Delivering evidence-based teaching tactics with a patient-centered focus can efficiently and effectively establish key standards are clinically practiced for the management and care of

oncology patients. Essentially, chemotherapy education is to prepare patients with self-care skills by promoting or encouraging awareness and knowledge of chemotherapy. Patients' understanding of chemotherapy education is distinctive to personal preference in learning style and the mode of instruction (Lovell et al., 2014; Jivraj et al., 2018). A crucial component in improving chemotherapy knowledge for cancer patients is examining their level of health literacy.

Health Literacy

Conceptually, health literacy is not a result of individual capabilities (e.g. ability to read or write) but rather the capacity for individuals to take responsibility in their potential health-related situations (Parker et al., 2018). Although numerous definitions of health literacy exist, frequently cited is Nutbeam's (1998) definition:

Health literacy implies the achievement of a level of knowledge, person skills and confidence to take action to improve personal and community health by changing personal lifestyles and living conditions. Thus, health literacy means more than being able to read pamphlets and make appointments. By improving people's access to health information and their capacity to use in effectively, health literacy is critical to empowerment. Health literacy is itself dependent upon more general levels of literacy. Poor literacy can affect people's health directly by limiting their personal. Social and cultural development, as well as hindering the development of health literacy. (p. 357)

In a literature review conducted by Papadakos et al. (2018), health literacy is commonly defined as "the degree to which individuals can obtain, process, and understand the basic health information and services they need to make appropriate health decisions" (p. 4204). These

definitions of health literacy outline the common knowledge and skills individuals must uphold to address specific demands for improving comprehension.

Health Literacy in the United States

According to the 2013 data analysis by the Center for Health Care Strategies (CHCS), nearly 36% of adults in the United States have low health literacy. In 2003, the National Assessment of Adult Literacy (NAAL) conducted a survey that measured the level of health literacy on a scale (i.e., below basic, basic, intermediate, proficient) of three categories: (a) clinical (e.g., ability to fill out a patient forms and read medication labels); (b) prevention (e.g., understand the need for health services); and (c) navigation (e.g., determine benefits and eligibility for health insurance; Ballard & Hill, 2016). Health literacy surveys measured an individual's ability to accurately complete a task as tasks progressively became more complex. Over 19,000 participant completed the 28 health literacy items that resulted in: 14% below basic, 22% basic, 53% intermediate, and 12% proficient in health literacy (Ballard & Hill, 2016). Findings indicate that only 12% of adults in the United States have proficient health literacy; therefore, health literacy assistance is crucial for all patient interaction within the complexities of the health care system.

Adults with low health literacy experience use and spend more on health care individuals with proficient health literacy. Vulnerable populations with low health literacy include people of lower socioeconomic status, with less education, with low English proficiency and non-native speakers, who receive public financial health coverage or other socio-economic assistance, and who are elderly (Center for Health Care Strategies [CHCS], 2013). People's health literacy is contingent on a variety of factors, including educational opportunity, culture, cognitive disabilities, and the complexities of information (Ballard & Hill, 2016; National Network of

Libraries of Medicine [NNLM], 2019). For example, treatment options for a newly diagnosed cancer patient with low health literacy may not meet their needs for understanding information about adverse reaction management; this increases risk for potential negative outcomes.

Conceptually, health literacy is difficult to measure clinically. It involves the universal precautions of practicing plain language, written or verbal, and the use of teach-back methods in patient standard of care (Ballard & Hill, 2016). Thus, various educational techniques can effectively lead to patients retaining crucial information about their health and well-being.

Patient Implications

Patients with limited health literacy experience four times greater health care costs and 6% more hospital visits compared to those with higher health literacy. Consequently, the national economic impact related to low health literacy costs the U.S. economy approximately \$236 billion yearly in medical errors, loss of wages, and disabilities (CHCS, 2013).

Clinically, low health literacy can result in medication errors, treatment compliance, ineffective management of adverse reactions, poor outcomes, increase in hospital admissions, rise in costs, and higher incidence of mortality (Altin & Stock, 2016; Papadacos et al., 2018). Health literacy is critical, particularly for cancer patients who encounter challenges navigating through a fragmented healthcare system while facing life-altering diagnosis of cancer (Halverson et al., 2015). To relieve such burdens, The Institute of Medicine (IOM) encourages health organizations to disseminate health literacy at a patient level that is centered on patient-provider communication (Halverson et al., 2015; NNLM, 2019).

Health Literacy and Chemotherapy Education

Verbal Communication

Nurses are primary educators in optimizing patient knowledge, skills, capability in self-care management, and resource to informing treatment options (Flanders, 2018). Effective verbal communication can build trust between patients, family caregivers, and health care teams to ensure quality of care. Cancer patients are often unfamiliar with medical terminology such as *metastasis or tumor*, which can result in misunderstanding vital cancer-related information (Altin & Stock, 2016). Patients with lower health literacy can have difficulty communicating about specific cancer-related topics, such as chemotherapy adverse effects, that can result in treatment delay, management, and unnecessary hospitalization (CHCS, 2013). Additionally, patients can be unclear about chemotherapy regimens and the treatment cycle, leading to potential concerns regarding therapy adherence. (Ballard & Hill, 2016).

Written Communication

Newly diagnosed cancer patients receive an abundance of written material regarding their cancer, treatment regimens, drug information, and management. Often, provided materials use complex medical jargon, difficult to understand by those with low health literacy (Schultz et al., 2017). Written material should use plain language to optimize comprehension for patients with multiple health literacies.

Plain Language. Easily comprehensible written materials use plain language are to convey information using active voice, less complex medical terminology, and shorter sentences (Schultz et al., 2017). Written material in plain language allow readers to establish what they need, comprehend information, and interpret data to meet their needs (Wittenberg et al., 2017). Researchers suggest supporting plain language in written materials with a conventional tone, bullet list, tables, and basic headings to support body of text (Osborne, 2013). One technique that

improves communication is the teach-back method, which evaluates comprehension by asking patients to re-state material relayed by the health care provider (Wittenberg et al., 2017).

Visual Communication

Visual and graphical presentation effectively teaches new material or furthers knowledge acquired through other channels of communication (Doak, Doak, Friedell, & Mead, 1998).

Essential characteristics for visual communication include: the placement of images appropriate to context, one objective per visual depiction, meaningful use of white space, and fluidity.

Graphics and descriptive captions should be direct, clear, and useful to draw viewers' attention to the subject matter. A combination of plain language and use visuals can strengthen patient-provider communication and comprehension (Johnson & Sandford, 2004).

Problem Statement

One southern California outpatient oncology clinic identified the need for optimizing the standardized protocol in chemotherapy education and assessing anxiety levels routinely in newly diagnosed cancer patients receiving chemotherapy for the first time. The clinic defined the usual practice for chemotherapy education included: all patients to receive written and verbal education and attend a 30-minute nurse-led educational class scheduled on the Monday prior to initial-day of treatment. If unable to attend class, patients will receive a customized 1:1 nurse-patient verbal education via telephone or appointment as a substitute. All staff will reinforce education provided on the day of the patients' first chemotherapy infusion. Anxiety levels are assessed by utilizing the National Comprehensive Cancer Network Distress Thermometer (NCCN distress thermometer) when clinical symptoms are presented. All patients are offered to complete a satisfaction questionnaire upon completion of their chemotherapy cycle.

The clinic staff addressed concerns regarding the inconsistencies in conforming to the instituted standard guidelines for patient education practices developed by American Society of Clinical Oncology (ASCO) and National Comprehensive Cancer Network Guidelines (NCCN). Furthermore, the staff recognized incongruities in standard procedures as evident by patients' attendance in a nurse-led 30-minute educational class, missed follow-up appointments, inability for to articulate materials presented, and uncertainty about self-managing techniques of side effects. Staff also verbalized the amount of unnecessary phone calls related to adverse reactions, delay in treatment, high anxiety levels and satisfaction in care. Thus, the clinical question is: "Does standardizing prechemotherapy educational processes improve patients' health literacy, ability to self-manage side effects, and satisfaction, and decrease anxiety by their mid-cycle of chemotherapy treatment compared to the usual educational methods?"

Conceptual Framework

The Ace Star Model of Knowledge Transformation

The Ace Star Model of Knowledge Transformation (the Ace Star Model) focuses on the understanding of cycles, nature, and characteristics of knowledge, which is utilized in various evidence-based practices. Unlike other theoretical frameworks, the Ace Star Model emphasizes the vitality of knowledge necessary to transform practice. Each point of the star represents a systematic approach to translating evidence into practice; discovery research, evidence summary, translation of guidelines, practice integration, process and outcome evaluations (Stevens, 2012). Each stage is further defined for the purpose of the Ace Star Model fundamentally underpinning this EBP project.

Discover research. The initial stage of discovering knowledge involves new knowledge attained through traditional empirical research in quantitative and qualitative studies (Stevens,

2012). Health care practices are continuously subjected to reforming as new emerging data is evident in research. This is critical for integrating new evidence into the decision-making process for delivering high quality of care.

Evidence summary. In this stage, the synthesis of evidence collected across research is adopted for the purposeful in finding solutions to a specific clinical question or concern (Stevens, 2012). This is imperative for integrating best supportive evidence to clinical practice. The summary of evidence is essentially the underpinning for implementing clinical guidelines and discovering areas for quality improvement.

Translating of guidelines. During the third stage, research evidence is translated into recommended guidelines for clinical practice. This incorporates the summarized research evidence in combinations to other credible sources such as clinical expertise and is translated for practice in a specific setting or population (Stevens, 2012). Additionally, guidelines place an order of consistency, setting standards and rules, maintaining objectives, and recognizing areas for improvement.

Practice integration. In the fourth stage of integration, guidelines are incorporated into individual or organizational practices that allow policies to be held to a standard through formal and informal channels (Stevens, 2012). The integration of guidelines is issued for the purpose of defining set principles for individual and organizational setting. Often, this stage is difficult due to the complexities of individual or organizational resistance to change, however, overtime can be overall beneficial.

Process and outcome evaluations. The final stage assesses the process of implementation and evaluation of outcomes associated to change and rationale intended for patient or provider satisfaction (Stevens, 2004). Of these stages, the Star Model of Knowledge

Transformation, can facilitate this EBP project by identifying specific gaps in current practice and improving quality of chemotherapy education.

Gate Control Pain Theory

Theoretical frameworks provide a foundation to implement process change for quality improvement, whereas, theory, are abstracted ideas in which proposition the underlying process for implementing change. For this EBP project, the theory of pain perception is significantly pronounced when managing chemotherapy side effects. One of the universally known theories is the gate control pain theory, written by Ronald Melzack and Patrick Wall in 1965 (Moayedi & Davis, 2012). This theory suggests that stimuli or impulses originate at the level of the skin that is carried by fibers known as T-cells, enters the dorsal horn of the spinal cord, and then transmits to the brain (Moayedi & Davis, 2012) . The “gate control” system, associated to *substantia gelatinosa*, adapts to the response from the stimuli from the T-cells. These T-cell fibers influence smaller fibers, to trigger pain stimulation, whereas, larger fibers inhibit communication signal to brain (Moayedi & Davis, 2012). Melzack and Wall’s gate-control pain theory revolutionized the understanding of pain mechanisms in order to provide the best care available. Therefore, this theory is appropriate for piloting chemotherapy education focused on self-perception of pain and methods of control management.

Literature Review

The two main concepts for this EBP project is to assess the need for standardizing pre-chemotherapy education and health literacy for managing side effects. Robust studies suggest integrating education formatted in alternative methods such as nurse-led classes, written resources, and video recordings have shown to be successful in assisting in patient’s ability to maximize their capacity of retaining information, managing adverse reactions, and decrease

overall anxiety. Since there is little research proven regarding optimal time of education, literature suggests applying multiple forms of teaching strategies within a standard educational program can prepare patients significantly in self-manage skills while in chemotherapy treatment.

Methods

A thorough review of literature began by searching determining strategies that potentially could be utilized to improve delivery of the standardize procedure of chemotherapy education. An electronic search was completed using EBSCOhost, PubMed, CINAHL, and the Cochrane Library. The majority of relevant articles originated from EBSCOhost and PubMed. Some combination of key search terms included, “standardized education,” “chemotherapy,” “antineoplastic infusion,” “outpatient,” “treatment compliance,” “teaching strategies,” “timing,” “anxiety,” “satisfaction,” “self-management,” “side effects, “health literacy,” and other medical terminology using MeSH terms. To limit the number of search results, parameters were designated to Boolean operators, subject headings, and truncations. Full text and abstracts were reviewed for obtaining pertinent articles.

Identifying Relevant Studies

Inclusion criteria for synthesis of literature consisted of articles published between 2013-2018 to ensure up-to-date research available. Additional inclusion criteria included: (a) applicable to human subjects over the age of 18, (b) content on standard chemotherapy education, (c) emphasize on education for patients in outpatient clinic, and (d) health literacy or patient comprehension. Exclusion criteria included patients receiving radiation, previous chemotherapy treatment, prevention of cancer, pediatric population and genetic predisposition to

cancer. Publications related to academic journals, dissertations, post-conference articles, expert opinion and editorials were also excluded.

The search generated 68 results. After reviewing for duplicates and assessing abstracts, potential 35 article met established criteria for full-text review. Of the 35 articles, 26 articles were further excluded because description of pre-chemotherapy education ($n = 9$); use of multiple methods of teaching ($n = 5$), form of health literacy principles ($n = 7$), and self-management skills ($n = 5$). Nine articles were of significance that met objectives of evaluating for standardized pre-chemotherapy education and patient literacy to manage side effects.

Critique and Synthesizing of Literature

The foundation of evidence based medicine is the “hierarchical system of classifying evidence,” to endow validity in clinical decision-making and practices (Burns et al., 2011, p. 305). This approach to grading literature is known as the levels of evidence, which critically-appraises individual articles according to the quality of their design, validity, and pertinence to patient care. Respectfully, the conventional advanced health care providers conform to fining the highest level of evidence to find solutions behind clinical questions. Thus, this literature review will discuss the supportive evidence relevant to improving and assessing the clinical question for the need in standardizing pre-chemotherapy education.

The process of appraising articles to validate the best current practice that is applicable for oncology patients, literature focused on specifically chemotherapy and methods for education. Chemotherapy education and education on particular cancers are different for management of side effects in addition to the challenges of comprehending the diagnosis itself (Valenti, 2014). It is also important to assess the specific types of educational methods and its effects on patient anxiety, satisfaction, health literacy and outcomes. Articles were appraised

using the Critical Appraisal Skills Programme Tool (CASP), a 10-questionnaire tool developed to understand research evidence and apply it to practice was utilized for literature review. Table 1 represents the literature of evidence review including the level of evidence and CASP appraisal percentage for the studies evaluated.

Table 1

Literature of Review of Included Evidence

Study and Design	Setting & Sample	Rationale	LOE CASP
Apor et al., 2018 Individual Cohort Study	Evaluate standard nurse-led chemotherapy education sessions in a multi-Hospital setting in Providence RI, on patient's knowledge anxiety and preparedness on cancer-directed therapy ages 18 and older. 196 participants enrolled and completed surveys, of which 32 were subjected to withdrawal in study.	After implementation of teaching sessions, statistically significant increase in perceiving knowledge of treatment schedule, side effects, and use of anti-emetics ($p \leq 0.0001$) Significant reduction in patient reported anxiety after intervention was noted ($p = 0.0294$).	Level II CASP: 90%
Dalby et. al., 2013 Individual Cohort Study	Improving strategies to developing a standardized approach to patient education and eliminate variation; quality improvement study at a satellite Dana-Faber Cancer Institution. Three interventions implemented: treatment calendars, checklist, and patient education survey. 57 subjects participated in completing surveys at baseline, implementation of process change, and post 4-month interval.	Based on Likert-scale (0-5, with higher scores indicating greater satisfaction), surveys resulted on average 4.86 satisfaction regarding knowledge of management of chemotherapy side effects. Significant satisfaction related to feeling prepared. Baseline 91% knowledge, managing side effects 86% and after 4 months increase in both knowledge and management was up to 97%.	Level II CASP: 80%
Garcia, 2014 Systematic Review	Ten systematic reviews and meta-analysis identifying five key components contributing to education and effects on anxiety based on studies in the United States.	Psychoeducation, format of education, timing, environment, key role of nursing staff on education and effects on anxiety.	Level I CASP: 80%
Honker et al., 2018	Determine knowledge in temperature monitoring during chemotherapy in Maury Reginal Cancer center in Columbia TN.	Knowledge scores averaged 68%, most participants correctly identified elevated temperatures at 91%; less than 50% correctly	Level III CASP: 85%

Individual Case Control Study	Intervention of 5-minute DVD teaching with a paper-pencil test evaluating knowledge. 60 adult participants.	identified signs and symptoms of infection, and less than 25% correctly identified false positive temperature readings.	
Jivraj et al., 2018 Individual Cohort Study	Gynecologic Oncology site in Toronto, CN analyzed barriers to education comprehension of chemotherapy. 538 patients and 506 caregivers participated with testimonials on change in size of group and time of educational class to individual 20-minute educational sessions.	Three metrics identified: the number of new chemotherapy teaching sessions, the amount of time spent on patient teaching, and the number of phone calls related to chemotherapy management including side effects, medication, and schedules. Significant improvement in education and adherence noted.	Level II CASP: 80%
Keener & Winokur, 2018 Individual Case Control Study	Implementation of a digital recorded educational video compared to the usual standard of care at St. Joseph Hospital infusion clinic in Orange, CA. 96 adult patients participated in pre-post intervention (75-English speaking, 12-Spanish speaking). In a 22-month period.	Following implementation of intervention anxiety scores significantly lower in English speaking ($p < 0.0001$), whereas, Spanish speaking did not show much significance ($p = 0.161$). Knowledge recall increased in both groups post intervention.	Level III CASP: 85%
Papadakos et al., 2018 Systematic Review	Seventeen articles reviewed summarizing the health literacy as the predictor for successful self-management of chronic conditions.	Health literacy is associated to increase in self-management behaviors in cancer patients.	Level I CASP: 90%
Parker et al., 2018 Systematic Review	Eight articles were reviewed that met objective criteria examining health literacy principles in chemotherapy education with patients' breast cancer.	Findings were limited in research regarding health literacy; however, review suggests providers awareness of health literacy when providing education can improve alter the process of overall comprehension of education and treatment adherence. Education and health literacy must be patient specific.	Level I CASP: 80%
Tan et al., 2018 Individual Cohort Study	Evaluating the effects of implementing educational video in a Singapore tertiary cancer center on knowledge, anxiety, and satisfaction on surgical decision making. Subjects included 62 newly diagnosed breast cancer patients (32 women intervention group, 30 women non-intervention group).	Results indicated a statistically significant interaction effect of group and timing of the education ($p = 0.008$), wherein knowledge increased for both groups, although comparably steeper for the video group .	Level II CASP: 71%

Note: The hierarchy of evidence rating system developed by Melnyk and Fineout-Overhold (2001) was used to organize the level of evidence (LOE): level I, systemic reviews; level II, individual cohort study, level III, individual cohort study. Appraisal based on Level of Evidence (LOE) and Critical Appraisal Skills Programme Tool (CASP) scoring. Critical Appraisal Skills Programme (CASP) was utilized to configure percentage scores. Scores in percentage reflect the following: 90% or higher is considered an excellent resource, 65-80% is considered good, and scores below 65% are considered fair.

Results

The level of evidence ranged from level I through level III pertaining to a systemic review through individual cohort studies. Literature considered level I systematic review studies, revealed mean validity score of 80% for evidence related to chemotherapy education. Study designs varied between randomly controlled clinical trials and case controlled clinical trials. However, the literature review lagged in examining educational process adherence to an instituted practice guideline in patient education.

Nine studies epitomize patient education as an effective method of in reducing anxiety, improving self-management of side effects, satisfaction and retention of knowledge for newly diagnosed cancer patients receiving chemotherapy for the first time (Apor et al., 2018; Dalby et al., 2013; Garcia, 2014; Honaker et al., 2018; Jivraj et al., 2018; Keener & Winokur, 2018; Papadacos et al., 2018; Parker et al., 2018; Tan et al., 2018). Within the synthesis of these articles, four pertinent factors were identified to be beneficial in improving outcome variables regarding patient education and management of side effects: (a) format of education to maximize learning and retention; (b) timing of education, (c) and patient health literacy.

Format of Education. According the ASCO/NCCN standardized guidelines, chemotherapy education must be provided prior to the initial treatment cycle informing patient and surrogate decision maker regarding goal of treatment, results, frequent adverse effects, and potentially rare but rather significant toxicities (Neuss et al., 2016, National Comprehensive

Cancer Network [NCCN], 2019). The standard of care in practice is providing concise written and verbal instructions pertaining to patient's diagnosis and therapy plan. Additionally, written and verbal presentation can ensure that patients are able to continue learning and reviewing material much after the initial education was offered (Garcia, 2014). When appropriately, evidence suggests offering a combination of educational methods in conformity to patient preference can potentially result in significant improvement in patient comprehension and treatment adherence (Flanders, 2018).

A combination of written, verbal, audiovisual, and with one patient can be substantially advantageous (Garcia, 2014). In a study conducted by Tan, Lee, Yong, and Rodgers (2018), the impact of implementing a 30-minute educational video was assessed on women newly diagnosed with breast cancer in regard to three categories: (a) comprehension, (b) effects on anxiety, and (c) satisfaction for decision-making for surgical intervention. There were 62 women recruited of which 32 women participated in the non-video group and 30 women received the 30-minute video presentation; all participants received the usual standard of care of nurse-counselling sessions and written material (Tan et al., 2018). Knowledge and anxiety were collected at baseline and two weeks post-surgical intervention. Satisfaction scores were also obtained at the two-week post-surgical intervention. Results showed to be statistically significant in the interaction effect of group and timing of the education, wherein knowledge was increasing higher comparably in the video group (Tan et al., 2018).

Another study by Keener and Winokur (2018), examined the effect of adopting a standardized, digitally recorded education as an alternative teaching method aimed to improve time-efficiency, teaching protocol, and reduction of patient anxiety. The current practice consisted of written resources with discharge instructions, a 20-minute one-on-one teaching

session with a certified oncology nurse (Keener & Winokur, 2018). A 90-minute digitally recorded presentation was created and incorporated teaching procedures. Knowledge recall surveys and anxiety questionnaires were obtained within a pre-post design for both groups prior to assigned intervention and following the completion of infusion. There were 92 patients, who completed pre and post educational surveys within a 22-month period (Keener & Winokur, 2018). Results implicated significant improvements in knowledge recall and reduction of anxiety with additional digitally recorded education. There was no significant change in time efficiency, however, staff involved within the study perceived the adaptation of digital education improved time and process.

Conversely, a study piloted by Honaker et. al (2018) assessed validity of an additional five-minute educational DVD session with the usual standard of care focused specifically on temperature-monitoring knowledge and technique. In a 13-month period, 87 patients (46 in DVD group, 41 in standard practice) were studied in a pre-post design assessing purpose, frequency, and accuracy of temperature monitoring. Even though there were no significant difference between two groups based on knowledge, study is suggestive of further review regarding time of education and patient's psychological readiness (Honaker et al., 2018).

Based on these studies, a combination of chemotherapy techniques can contribute to improving patient knowledge with subsequent effects on patient anxiety and satisfaction. To minimized variability in care, clinical practices guidelines must be conformed to as instituted by the organization in assure continuity in patient care and educational needs. As cancer treatment advancements continue to develop, respectively, policies and procedures must be assessed of quality improvement in maintaining up-to-date standards of practice. Literature also suggests

incorporating a multifaceted approach in teaching strategies to meet the desired outcome in patient education (Dalby et al., 2013).

Timing. The provision of patient information during the initiation of chemotherapy treatment for newly diagnosed cancer patients have been shown to be anxiety producing. ASCO/NCCN guidelines state patient education should be performed before the start of treatment, however, there is guideline lack specifying optimal timeframe education should be performed (ASCO, 2018; NCCN, 2019). Apor et al. (2018) discovered timing is of significance during a study aimed to assess the validity of a 60-90-minute nurse-led teaching session on patients' anxiety, knowledge of treatment schedule, anticipated adverse reaction, and medication management. Patients discussed initial treatment plan with their oncologist prior to first treatment and were given a brief survey in assessing their perceived knowledge on the aforementioned topics. Once patients participated in the nurse-led teaching session, surveys were re-administered congruently during first day of cycles 1 and 2 (Apor et al., 2018). Results revealed a significant improvement in patient' comprehension about their treatment schedule, potential adverse reaction, and symptom controlling medication by their first cycle, whereas, chemotherapy-related anxiety reduced by the second cycle of therapy (Apor et al., 2018).

Timing of prechemotherapy education requires a comprehensive assessment of current procedural practices conducted in the health care setting. Minimal studies have specified optimal time for education from the time patient is diagnosed to their first chemotherapy treatment. However, robust studies suggest pre-chemotherapy education must be provided at minimum with verbal, written, or electronic documents prior to their initial chemotherapy treatment and consecutively with follow-up education (ASCO, 2018; NCCN, 2019; Neuss et al., 2016).

Health Literacy. Communication is particularly challenging for newly diagnosed cancer patients for whom are faced with substantial emotional trauma associated with a cancer diagnosis and must digest an abundance of information regarding life-sustaining treatments options. In two systematic reviews, deficits in health literacy were attributable to dissatisfaction between patient-provider communication, poorer treatment compliance, limitations in self-managing behaviors, and higher health-care costs (Dalby et al., 2013). Similarly, chemotherapy causing adverse effects have been correlated to adherence concerns, however, research suggests effective chemotherapy education centered around patient health literacy can significantly improve patient's perception of treatment regimen. Studies have shown as much as 28% of breast cancer patients do not continue their prescribed dose of chemotherapy due to the uncertainty of chemotherapy regimen and treatment cycles (Parker et al., 2018).

Papadakos et al. (2018) identified health literacy as a multidimensional concept that requires an exploration of all components ranging from cognitive skills to the attributes of patient relations with health care providers or the social support and self-management behaviors of the individual (Papadakos et al., 2018). Currently, there is no consensus in the definition of health literacy or studies exploring its conceptual dimensions, which has resulted in limited guidance for incorporating patient health literacy into chemotherapy education. Teaching methods need to be adjusted to tailor patients' health literacy level when receiving education. Parker et al. (2018) found multiple studies with discrepancies in key principles of health literacy including use of plain language, active voice, friendly tone, simple definitions, graphics, and written material at fifth to sixth grade reading levels. Thus, it is imperative to develop and modify existing educational resources to meet the basic principles of health literacy for cancer patients.

Another study conducted by Jivraj et al. (2018), discovered challenges were evident in providing appropriate patient education based on providers restraints in time, managing high level of patient anxiety, timing of diagnosis, health literacy, and fear of initiating chemotherapy. These challenges were marked by increased number of patient phone calls related to side effect management, clarity in instructions, anti-emetic use, and when to refer to the emergency room. These barriers prompted the oncology clinic to develop an interdisciplinary team to evaluate current teaching practices in collaboration with the Patient Education Program on strategical methods for improving outcomes (Jivraj et al., 2018).

The study found 83% of phone calls were related to symptom management due to limitation in a 20-minute nurse-led education class and materials written in a higher literacy (Jivraj et al., 2018). Practice protocols and guidelines were instituted on the premise to provide a tailored 60-minute nurse-led education class by a certified oncology nurse and materials modified to meet literacy at a sixth-grade level. Results showed a significant reduction of time spent on patient phone calls regarding chemotherapy, a decrease in patients' anxiety and fear of treatment, whereas, improvement in patients' ability to self-manage side effects and knowledge improved (Jivraj et al., 2018). Consequently, new initiatives were considered for further development such as video series, material available on the internet, translation for all resources into priority of languages, chemotherapy resources package for caregivers, and e-learning modules available on a platform based on the educational objectives (Jivraj et al., 2018).

For many patients, the lack in health literacy is of growing concern attributable to the complexity of the health care system, especially in the cancer setting (Koay et al., 2012). Creating pathways for promoting effective and efficient education can potentially empower patients with knowledge and self-confidence in their ability to manage cancer treatment.

Incorporating a variation of teaching strategies, could potentially benefit those with literacy issues. By standardizing the process of delivering chemotherapy education, may be optimal in achieving better outcomes in patient knowledge, self-management of side effects, satisfaction in care and overall reduce in anxiety.

The Role of the Nurse. Patient education is a complex process composed of practical, evidence-based methods and logical teaching tactics requiring actively engage patients in order to meet their individual learning needs. A commonality identified throughout literature is the of utilization of nurses as primary coaches in chemotherapy education. Nurse patient educators are often subjected to challenges in a structured approach for teaching, lack of teaching materials, absence of managerial support, interruptions, and heavy workload that can be contributable to ineffective patient education (Lovell et al., 2014). Adopting structured teaching process and policies can eliminate these challenges and facilitate nurse's ability to efficiently deliver patient education.

Learning is a process that transpires over time. Studies suggests, the nurse must identify and priorities patient self-care needs during the initial education encounter to ensure time necessary for questions and answers (Ballard & Hill, 2016; Flanders, 2018). The nurse must identify learning goals with the patient to strategical plan, implement, evaluate, and re-evaluate learning accomplished through educational practices. Literature recommends, "no more than one to three key points should be taught" per teaching session to minimize information overload (Flanders, 2018, p. 56). By applying these teaching principles to educational practices, patients can have the ability to retain information better, specifically for those cancer patients undergoing chemotherapy education.

Implications in Clinical Practice

Standardizing pre-chemotherapy education process can significantly contribute to the establishment of continuity in educational materials, provide structured teaching sessions, offer diverse teaching strategies, and adapt to patient's needs and abilities. For the southern California outpatient oncology clinic, recommendation of eliminating process variation is a practical approach to assessing the quality of chemotherapy education provided and the adherence to the ASCO/NCCN standardized guidelines. Targeting important pathways within the organization can facilitate the process in identifying key factors influencing the efficiency of patient education. Literature and ASCO/NCCN guidelines strongly recommend providing various techniques in patient education prior to their initial chemotherapy treatment. Therefore, the recommendation of providing additional DVD-video presentation, re-evaluating of literacy of materials, minimizing the extent of time between education and initiation of treatment, and implementing routine anxiety and satisfaction scores for quality improvement can be feasibly attained in the dissemination of this EBP project.

Conclusion

In this literature review, several approaches in chemotherapy education were proven to be effective in providing vital information to newly diagnosed cancer patients undergoing chemotherapy treatment. Efficient methods included written, verbal, audiovisual, and nurse-led class discussion, however, health literacy, anxiety, and satisfaction can contribute to decreased comprehension. Remarkably, one southern Californian outpatient oncology clinic identified suboptimal methods of chemotherapy education resulting greater anxiety, dissatisfaction in care, and unnecessary phone calls about chemotherapy side effects. Optimizing educational process according to modes of communication and health literacy can subsequently allow patients to have realistic expectations that translate to better management of chemotherapy side effects and

patient outcomes. Therefore, health care providers must bridge the gaps in order to empower cancer patients with the knowledge, confidence, and support during the chemotherapy treatment.

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