Digitally Recorded Education

Effects on anxiety and knowledge recall in patients receiving first-time chemotherapy

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BACKGROUND: Prechemotherapy information is overwhelming, and retention of critical information can be challenging. Patients from a Southern California infusion clinic had varying degrees of retention when nurses used traditional one-on-one teaching with supplemental handouts.

OBJECTIVES: The intent of this article is to determine the effectiveness of standardized, digitally recorded education as an alternative teaching method for increasing knowledge recall and decreasing anxiety in English- and Spanish-speaking patients receiving first-time chemotherapy.

METHODS: Baseline data were obtained from five patients who received traditional teaching. Using a pre-/post-test design, 92 patients receiving digitally recorded education completed a paper-and-pencil instrument that rated their anxiety and knowledge recall.

FINDINGS: The digitally recorded education method produced significant decreases in anxiety and increases in knowledge recall.

KEYWORDS
anxiety, knowledge recall, first-time chemotherapy, digitally recorded education

DIGITAL OBJECT IDENTIFIER
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MANY PATIENTS WITH CANCER WILL RECEIVE CHEMOTHERAPY, and they may have preconceived thoughts that range from viewing it as a toxic poison to considering it to be a life-saving treatment. Patients may seek information online prior to starting treatment as a method of coping with concerns and questions about their illness. However, seeking health information online may have negative consequences. Oh and Song (2017) reported that patients who engaged in seeking health information online had greater odds of having emotional distress than those who did not.

Stress and anxiety can have a negative impact on patients. Chen, Dubé, Rice, and Baram (2008) found that even short-term stress, lasting as little as a few hours, can impair brain cell communication in areas associated with learning and memory. High levels of anxiety among patients with cancer decreased comprehension and information retention (Mann, 2011). Improper prevention and management of anxiety can lead to poor psychological outcomes, such as depression, dissatisfaction with care, and decreased adherence to treatment (Garcia, 2014).

Regardless of personal beliefs, patients often are anxious and overwhelmed at the first chemotherapy infusion and may have difficulty remembering key information given to them (Malone, 2007). Lack of retention of critical information can have serious, even fatal, consequences in patients receiving first-time chemotherapy because many side effects need to be managed at home, placing a substantial burden on patients and families (Aranda et al., 2012). For example, the effectiveness of chemotherapy is based, in part, on maintaining a preplanned dose and treatment schedule. Misunderstanding or poor retention of information can lead to incorrect dosing or treatment delays that have consequences affecting patient survival (Tortorice, 2005).

Most patients with cancer are eager for information about their disease and treatment. However, studies have shown that patients lack sufficient information regarding their illness (Dumrongpakaporn, Hopkins, Sherwood, Zorn, & Donovan, 2009). Oncology nurses are responsible for much of the patient’s and family’s education as it relates to cancer and its treatment (Brant & Wickham, 2013). In the outpatient setting, preparing patients for their first chemotherapy treatment can be complex. Nurses are challenged with teaching large amounts of information in a short time period (Valenti, 2014).
Identifying the optimal time for learning is important. Effective teaching during the initial stages of treatment can decrease anxiety, improve decision making, diminish treatment side effects, and improve quality of life (Mann, 2011). However, the content taught is equally significant. Providing specific information about chemotherapy is imperative in the first teaching session, and some topics have been shown to be more beneficial than others (Garcia, 2014). The topics most associated with anxiety reduction are familiarization with the facility (including the infusion center) and expected side effects of chemotherapy and the associated management approaches (Garcia, 2014). Because adult patients learn in a variety of ways, using multimodal strategies is essential to optimize learning (Bastable, 2008).

Standardizing teaching so that every patient receives the same information is one important teaching strategy for nurses. Standardization increases efficiency and quality and contributes to enriched patient understanding and satisfaction for patients and staff (Dalby et al., 2013). Adjunctive teaching methodologies may be beneficial. After adding a teaching video to the standardized chemotherapy education process, researchers found enhanced information retention regarding management of common side effects and reporting of them to healthcare providers (Kinnane & Thompson, 2008).

Background
At the St. Joseph Hospital infusion clinic in Orange, California, patients are referred by private community oncologists. How much patient education is provided in physician offices is unknown, but patient baseline knowledge often is limited. In addition, when patients are referred for chemotherapy, the infusion staff is likely to be interfacing with them for the first time. Understandably, many patients appear anxious during their first chemotherapy treatment. Nurses at the infusion clinic were concerned about patients’ ability to learn and retain information when they appeared so anxious.

Nurses also noticed that retention of critical information was at times poor, leading to delays in chemotherapy treatment or resulting in unwanted hospitalizations. Some patients had extended visits to receive blood transfusions, and others needed to have treatments rescheduled because they were missing critical information. The following were the most common knowledge deficits noticed in patients:
- Signs and symptoms of anemia
- Understanding neutropenia and its associated risks
- Symptoms of infection
- How to take nausea medication as ordered
- When laboratory tests were required

These knowledge deficits can lead to life-threatening consequences. An example is when patients misunderstand the significance of fever in the presence of neutropenia; this misunderstanding could lead to failed or late treatment, predisposing patients to sepsis, which has high mortality rates in this population (Sepsis Alliance, 2017).

Standard of Care
The long-standing method of educating new patients at the clinic was a 20-minute one-on-one teaching session with a chemotherapy-certified RN, followed by a question-and-answer period. In addition, patients were given take-home materials, including drug-specific information and National Cancer Institute booklets on site-specific cancer, chemotherapy agents administered, and eating hints. Patient-specific written discharge instructions also were provided.

The lack of standardized content led to inconsistencies in patient teaching. Nurses also had differing comfort levels in discussing topics like sexuality. Lack of standardization made it difficult to orient new nurses to the teaching process. Complicated by a rising volume of patients with increasingly complex chemotherapy and biotherapy regimens, development of an effective method of educating patients was needed.

Preparation and Decisions
Team meetings with staff members from the infusion clinic, nursing management, and clinical education occurred. The current state was reviewed, and goals were developed. Priorities were to achieve the following:
- A more time-efficient teaching approach
- Standardization of teaching content
- Reduction of patient anxiety

A literature review was completed to identify potential solutions. Kinnane and Thompson’s (2008) suggested video teaching and Dalby et al.’s (2013) standardized teaching methodologies were combined with an idea presented by an experienced oncology nurse from the clinic related to technology-enhanced patient education. The team concurred with the approach, and the idea was adopted.

Discussion among experienced oncology nurses at the clinic determined content essential for the presentation. Topics included information pertinent to almost every patient receiving chemotherapy and infusion clinic information. Content included chemotherapy consent forms, treatment plans, common side effects, tips for home care, lifestyle changes, chemotherapy administration, what to expect during an infusion, healthcare team overview, and discharge instructions.

Educational Intervention
A nine-minute digitally recorded presentation was created, incorporating clinic staff input, Oncology Nursing Society standards, and literature review findings. A short length was chosen to hold patients’ attention. On completion, it was uploaded to the shared hospital server to allow access among the three cancer center clinics. The initial presentation was in English; three months later, the
Spanish version became available. Because the process was new, team leaders sought a way to determine the effects of the new teaching methodology. After a discussion with department leadership, a study to evaluate the practice change was proposed.

The goals of the study were to determine the effects of a digitally recorded, standardized prechemotherapy education module on patients’ anxiety and treatment-related information recall levels. The following were the study’s research questions:

- What effect does a digitally recorded, standardized prechemotherapy teaching method have on knowledge recall in patients receiving their first chemotherapy treatment?
- What effect does a digitally recorded, standardized chemotherapy teaching method have on post-treatment anxiety in patients who are receiving their first chemotherapy treatment?

**Methods**

To determine oversight status, the study was submitted to the St. Joseph Health System Institutional Review Board. The study received an exempt status designation.

**Sample and Setting**

Inclusion criteria were adults aged 18 years or older who were able to speak and read English or Spanish and were receiving chemotherapy for the first time. Patients with all cancer diagnoses were eligible. All patients were notified that participation was voluntary. Patients were excluded if they were receiving a single-agent immunotherapy without a concurrent chemotherapy regimen.

The sample was divided into a group of patients receiving traditional education and an intervention group. The traditional group was used to determine teaching efficacy for the customary lecture-based teaching method. The intervention group was used to determine the effectiveness of the digitally recorded teaching method. This group was subdivided by language spoken.

The study was conducted at the St. Joseph Hospital Center for Cancer Prevention and Treatment in Orange, California. Teaching and data collection occurred in private chemotherapy infusion rooms within the center.

**FIGURE 1.**

**SURVEY INSTRUMENT TO ASSESS ANXIETY AND KNOWLEDGE RECALL ABOUT CHEMOTHERAPY**

Please read each statement and circle the answer that best describes your present anxiety.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Not at all</th>
<th>Somewhat</th>
<th>Moderately</th>
<th>Very much</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I feel calm</td>
<td>Not at all</td>
<td>Somewhat</td>
<td>Moderately</td>
<td>Very much</td>
</tr>
<tr>
<td>2. I am tense</td>
<td>Not at all</td>
<td>Somewhat</td>
<td>Moderately</td>
<td>Very much</td>
</tr>
<tr>
<td>3. I am worried</td>
<td>Not at all</td>
<td>Somewhat</td>
<td>Moderately</td>
<td>Very much</td>
</tr>
</tbody>
</table>

Please read each statement and circle the best answer (true or false) that describes your knowledge recall about chemotherapy.

<table>
<thead>
<tr>
<th>Statement</th>
<th>True</th>
<th>False</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I need to report a temperature of 100.5°F or greater to my doctor, even if it is at night.</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>2. I should take my nausea medication as soon as I feel sick to my stomach.</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>3. I am not at risk for an infection while I am on chemotherapy.</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>4. I should tell my doctor if I feel fatigued or tired, dizzy, or short of breath.</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>5. Once I start chemotherapy, I will not need more laboratory or blood work.</td>
<td>True</td>
<td>False</td>
</tr>
</tbody>
</table>

*Note. For the true or false questions, correct responses are as follows: 1. True, 2. True, 3. False, 4. True, and 5. False.*
IMPLICATIONS FOR PRACTICE

- Use creative teaching methodologies to improve knowledge retention.
- Reduce patient anxiety with standardized digitally recorded education.
- Explore the most effective teaching methodologies for Spanish-speaking patients.

Anxiety Levels

Anxiety scores were significantly lower following education for all groups (see Table 1), with greater average decreases for those receiving the digitally recorded education than for those receiving traditional education. Specifically, items measuring being tense and being worried demonstrated statistically significant ($p < 0.001$) changes in English-speaking participants receiving digitally recorded education; Spanish-speaking participants did not show statistical significance for anxiety, comparing traditional to digitally recorded education ($p = 0.161$).

Knowledge Recall

Knowledge recall scores significantly increased following education for all groups, with greater increases reported in the traditional education group; this is probably because the traditional education group had substantially lower average baseline scores than did the digitally recorded education group. No individual knowledge item achieved statistical significance. However, items regarding risk of infection and need for additional laboratory work had the most incorrect responses at baseline and after education. The question focusing on reporting signs and symptoms of anemia had the highest number of correct responses (87 of 92)

During the study, some patients provided additional feedback about their experience receiving digitally recorded chemotherapy education. After receiving standardized, digitally recorded chemotherapy education and follow-up from nurses for clarification of information, most patients reported having an understanding of the importance of monitoring for and notifying providers of signs and symptoms of anemia (89 of 92) and infection (79 of 92).

Discussion

Findings from the current study demonstrated decreased anxiety levels and increased knowledge recall for the traditional education and digitally recorded education groups. However, the digitally recorded education group demonstrated a more substantial reduction in anxiety, suggesting that digitally recorded education may be more beneficial in reducing anxiety levels in this type of situation (before chemotherapy is initiated). After receiving the chemotherapy education, all patients demonstrated significant reductions in anxiety; however, English-speaking patients demonstrated lower posteducation scores (less anxiety) than Spanish-speaking patients. Because the English-speaking group reported higher levels of baseline anxiety than the Spanish-speaking group, anxiety reduction may be even more important for them prior to a teaching experience; this needs further evaluation in subsequent studies.
Few studies have reported on emotional distress in Hispanic patients with cancer. However, one study reported pretreatment anxiety in 52% of 198 patients (Lee et al., 2017). This may be attributable to cultural differences in coping techniques or comfort in the expression of feelings to healthcare providers (Nápoles-Springer, Ortiz, O’Brien, & Díaz-Méndez, 2009). It also may reflect lack of prior knowledge or preconceived fears about cancer treatment, resulting in increased treatment-day anxiety (Nápoles-Springer et al., 2009).

Knowledge recall scores improved for both groups, with all items demonstrating a positive change toward improved knowledge recall following education. Baseline knowledge recall levels were higher than expected, particularly in the English-speaking group receiving digitally recorded education. The traditional group, starting with the lowest scores, showed the most substantial positive change in scores. Scores comparing traditional to digitally recorded education knowledge recall showed significant difference, suggesting the digitally recorded teaching method is effective in increasing patients’ knowledge recall about key information.

The current study findings related to knowledge recall increases are interesting because many patients obtain information from the Internet prior to beginning treatment (Davies & Yeoh, 2012; Lee & Hawkins, 2016). The effect of the Internet on knowledge acquisition and anxiety is not fully known. In addition, not all patients use the Internet to the same degree. Research reports that patients aged older than 70 years, those with less than a 10th-grade education, those with a higher stage of cancer, and those who are non–English-speaking use the Internet less for disease-related information (Davies & Yeoh, 2012; Kowalski, Kahana, Kuhr, Ansmann, & Pfaff, 2014). Some patients are overwhelmed by information obtained from the Internet and experience increased anxiety, which then leads to decreased learning (Lee & Hawkins, 2016).

The current study did not evaluate nursing satisfaction related to digitally recorded education. However, anecdotal comments from nurses involved in the study indicated that nurses perceived that the digitally recorded teaching method saved time and increased their satisfaction with the newly implemented process.

**Limitations**

The current study took place in a Southern California community hospital outpatient infusion clinic with a small sample. Other than the language spoken, demographic data were not gathered, so age, gender, race, education level, and diagnosis of participants were not documented. Because of the timing of project implementation, few participants were available for enrollment in the traditional teaching group. The Spanish-speaking sample size also was small, in part because of the implementation plan that started with English-speaking patients while awaiting translation of the tool to Spanish.

The baseline group was small; statistical significance between the effects of the two different methodologies could not be clearly established. Based on the literature and staff input, the team developed the survey instrument. It was not tested as reliable or valid. The five knowledge questions reflected recurrent issues of concern to patients in the clinic. The questions did not include all information covered by the digitally recorded education. The tool was purposely brief to reduce the burden for patients to respond during an already stressful situation. As a result, generalization of the results to larger populations is limited.

### TABLE 1.

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>TRADITIONAL (N = 5)</th>
<th>DIGITAL ENGLISH AND SPANISH SPEAKERS (N = 87)</th>
<th>DIGITAL ENGLISH SPEAKERS (N = 75)</th>
<th>DIGITAL SPANISH SPEAKERS (N = 12)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
<td>SD</td>
<td>X</td>
<td>SD</td>
</tr>
<tr>
<td>Anxiety levels</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-education</td>
<td>6.6</td>
<td>2.2*</td>
<td>6.38</td>
<td>2.3*</td>
</tr>
<tr>
<td>Posteducation</td>
<td>5.75</td>
<td>3.1*</td>
<td>4.94</td>
<td>1.9*</td>
</tr>
<tr>
<td>Knowledge recall levels</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-education</td>
<td>4</td>
<td>1*</td>
<td>4.32</td>
<td>0.72*</td>
</tr>
<tr>
<td>Posteducation</td>
<td>4.75</td>
<td>0.5*</td>
<td>4.6</td>
<td>0.66*</td>
</tr>
</tbody>
</table>

* p < 0.001; ** p = 0.019

Note. Anxiety level scores ranged from 3–12, with higher scores being indicative of greater levels of anxiety. Knowledge scores ranged from 0 (none correct) to 5 (all correct).
Based on findings from the current study, the clinic’s educational procedures were changed. The digitally recorded teaching method has become a standard of care. Further research is suggested to validate this study’s findings and to determine the optimal method of providing patient education during stressful situations. In addition, investigations must target different primary languages and cultures to determine preferred teaching methodologies and identify strategies that enhance information recall.

**Implications for Practice**

The current study illustrates how clinic nurses are equipped with the skills necessary to use innovative, time-saving, computer-based digital technology to enhance patient education. This low-cost project easily can be replicated in other oncology settings and used for alternative educational topics.

**Conclusion**

Preparing patients for their first day of chemotherapy treatment can be challenging. Nurses strive to provide education that is not only informative but essential for managing life-threatening complications. Patients often express feelings of anxiety before chemotherapy, which ultimately may affect their ability to retain important information about their care. In this study, the addition of a standardized and customized digitally recorded teaching method demonstrated promising results to decrease patient anxiety levels while increasing patient knowledge of critical and beneficial treatment-related information.

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**REFERENCES**


