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Tiffany Brown

tcbrown2@dons.usfca.edu

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Reducing Frustration with Wait Times Utilizing Technology and Education: A Patient  
Satisfaction Improvement Model

Tiffany C. Brown, DNP, FNP, BSN, RN

University of San Francisco

DNP Chair: Dr. Jo Loomis

DNP Committee Member: Dr. Prabjot (Jodie) Sandhu

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## Section I: Abstract

**Problem:** Patients spend considerable amounts of valuable time waiting to be seen by physicians in outpatient clinical settings. Many consider waiting as wasted time, inactive time, or as a lost opportunity which can cause frustration. Research suggests that long clinic wait times have a major impact on patients with cancer causing a significant amount emotional distress. **Context:** At the hospital and thoracic oncology clinic implementation site which is located in northern California, the target time for a New Patient Visit (NPV) is less than or equal to 90 minutes, and less than or equal to 60 minutes for a Return Patient Visit (RPV). For the months of January 2018-May 2018, approximately 70% of NPV appointments were greater than 90 minutes and approximately 65% of RPV appointments were greater than 60 minutes. **Intervention:** A DNP student developed a project in the thoracic oncology clinic utilizing entertainment and education through technology to help address dissatisfaction with long waiting times. **Measures:** The ‘Entertainment Options’ portion utilized post-intervention questionnaires to evaluate if an iPad used for entertainment makes clinic wait times more tolerable. The ‘Education video’ portion used a post-intervention test to evaluate efficacy of a chemotherapy education video in patient knowledge retention. **Results:** Ninety-three percent of the patients who used the iPad for entertainment either ‘agreed’ or ‘strongly agreed’ that using the iPad while waiting to see a provider made the wait time more tolerable thus increasing overall satisfaction with the visit. The patients who watched the chemotherapy education video received a score of 80% or greater on the chemotherapy posttest indicating knowledge retention. **Conclusion:** To effectively improve patient satisfaction with waiting and improve chemotherapy medical knowledge, integration of iPad tablets used for both entertainment and education is an effective method.

## Section II: Introduction

### Problem Description

Literature defines *waiting time* as the time from which a patient waits in clinic before being seen by a provider (Bleustein et al., 2014; Catania et al., 2010). Patients spend a considerable amount of time waiting to be seen by providers in the outpatient clinical setting and many consider waiting as wasted time, inactive time, or as a lost opportunity which can cause frustration and reduce overall patient satisfaction (Atack et al., 2012; Bible et al., 2018; Bleustein et al., 2014; Press Ganey Associates, Inc., 2018). Studies indicate that the maximum amount of time patients are willing to wait to be seen by a provider during a clinic appointment is 20 minutes before becoming frustrated (Bleustein et al., 2014; Gallop, 2005). The connection between wait time and patient satisfaction is an important topic of discussion for health care institutions (Bible et al., 2018; Biddiss, Knibbe, & Mcpherson, 2014; Bleustein, et al., 2014; Burke & Bomba, 2018; Catania et al., 2010; Kreitz, Winters, & Pedowitz, 2016; Matthews, Ryan, & Bulman, 2015; Press Ganey Associates, Inc., 2018; Sriram & Noochpoung, 2018). How long a patient waits is considered to be an important determinant of patient satisfaction because long wait times decrease patient satisfaction (Atack et al., 2012; Basu, 2017; Bible et al., 2018; Bleustein et al., 2014; Press Ganey Associates, Inc., 2018). The Institute of Medicine (IOM) lists timely delivery of the service with minimal waiting time as one of the most important predictor's of quality for the patients (IOM, 2003). Many studies of waiting room utilization have focused on interventions which can decrease patient wait times as well as providing technological interventions (i.e. televisions in the waiting area) focused on the patient who is waiting in the waiting area. Not as much research has been completed on interventions that make patient waiting in the clinic exam rooms more tolerable. This project aims to highlight evidence-

based entertainment and educational options in exam rooms purposed to occupy patient's time while waiting to see a provider.

### **PICO(T)**

Although the human experience of waiting is well known, and hospitals and ambulatory centers are prone to exhaustive waiting times, finding a thorough solution for this particular problem has been difficult to obtain (McGuire, Kimes, Lynn, Pullman, & Lloyd, 2010; Berlow, 1960; Basu, 2017; Dube-Rioux, Schmitt, & Leclerc, 1988; Durrande-Moreau, 1999; Morrow, 1984; Taylor, 1994) . A literature review was conducted to and available knowledge with the purpose to integrate areas of conceptual knowledge that contribute to a better understanding of the issue presented in the 'Intervention PICO(T)' question: In the adult oncology population, how does offering patient entertainment options such as watching a movie/television program, listening to music, using a game app, or receiving chemotherapy education via a clinic issued iPad while waiting in the exam room, compared to doing nothing while waiting, make the time waiting to see a provider more tolerable?

### **Search Process**

From May 2018 through December 2019, the databases of Cumulative Index of Nursing and Allied Health Literature (CINAHL) Complete, PubMed, and Medline were searched for articles focusing on patient satisfaction, patient waiting, entertainment such as television, music, games, and patient education. During this search process, the following English language terms were utilized: *frustration, waiting, patient experience, patient satisfaction, cancer, distraction, positive distraction, oncology, music, patient education, iPad, television, and online education* . The article search was limited to the English language, the academic journals were peer reviewed, and published during the years 2008 to 2019.



## Search Results

A total of 92 potential articles were discovered using the above search methods for *patient, waiting, satisfaction, cancer*, but decreased to 20 when using terms *patient, waiting, satisfaction, cancer, and education* together which were more relevant to the subject matter. When searching the terms *waiting, frustration, distraction, hospital, and patient* a total of 18 articles populated, but many were excluded due to irrelevance. After searching the terms *patient, patient satisfaction, cancer, education and online* a total of 33 articles populated, but again many were excluded due to irrelevance to the topic matter. Also searched the terms *patient, waiting, and music* which yielded 23 articles and the articles excluded did not reference cancer patients. The total number of qualified articles chosen to use in this paper were 34; 12 of which will be utilized in the appraisal tool and the others for additional topic support (see Appendix L). The John Hopkins *Research Evidence Appraisal Tool* (Dang & Dearholt, 2012) was used to critically appraise the strength and quality of the evidence with ratings ranging from level I A to level II B indicating they provide strong evidence. (Appendix L).

## Available Knowledge

### Elements affecting patient satisfaction

There are multiple circumstances that affect patient satisfaction. Some of the circumstances include: amount of time it takes to schedule an appointment until the actual clinic appointment, clinic wait time, clinic hours and clinic location, cost of a clinic visit, treatment quality, pain management, clinic coordination and coordination of the care team, and communication from staff to patients about wait times (Dragovich, Beltran, Baylor, Swanson, & Plunkett, 2015; Kreitz, Winters, & Pedowitz, 2016; Bible et al., 2018; Gallop, 2005). Additionally, key

attributes of health care valued by patients comprise of care that is patient-centered and includes interpersonal interaction with the provider (Thiers, 2008).

According to the Institute of Medicine (IOM) report, *patient-centeredness* is defined as “providing care that is respectful of and representative to individual patient preferences, needs, and value and ensuring that patient values guide all clinical decisions” (National Academy Press, 2001). Dimensions of these values include: treating the patient as an individual, listening to the patient’s story and concerns, providing informed consent, engaging in partnerships with patients, showing patience, compassion, and respect, and communicating the expectations for treatment clearly (Cheraghi-Sohi et al., 2006; Moore, Hamilton, Krusel, Moore, & Pierre-Louis, 2016). Farzianpour, Byravan, and Amirian (2015) completed a literature review on patient satisfaction and factors affecting it. The following dimensions were found to be statistically significant: quality of service, quality of hospital, cleanliness of hospital facility, education level of physicians and nurses, provision of information, and waiting time (Farzianpour et al., 2015).

### **Relationship between wait time and patient satisfaction**

While there are multiple elements which indicate sources of patient satisfaction, there are also elements that can cause patient dissatisfaction. Press Ganey Medical Practice survey is the most widely used measurement of outpatient patient satisfaction in the United States (Graham, Green, James, Katz, & Swiontkowski, 2015). A survey of 2.4 million patients across the United States conducted by Press Ganey in 2008 revealed that one of the strongest key variables associated with patient satisfaction was exam room wait time (Press Ganey, 2009). Not surprisingly, studies have also shown that long wait times during their clinic visits are associated with tremendous source of dissatisfaction and also a major topic of conversation amongst patients (Bleustein et al, 2014; Matthews, Ryan, & Bulman, 2015). A Press Ganey Survey

completed in 2018 indicated patients who waited five minutes or less expressed a 99 percent satisfaction with their experience. The score dropped steadily as wait times went up, all the way down to 19 percent satisfaction for those patients who waited more than 30 minutes to see a provider (Press Ganey, 2018). As wait time increased, patient satisfaction decreased. Willis, Ozturk, and Chandra (2015) explored the impact of patient-to-patient interaction in an outpatient pain management clinic and it was shown that long wait times was the second highest topic of discussion between patients waiting in the lobby waiting areas.

Investigations have demonstrated that waits of uncertain duration and unexplained waits are perceived by patients as an unfair time period which could be occupied by doing something other than waiting (Burke & Bomba, 2018). Waiting has also been described as isolating, troubling, and frustrating (Catania et al., 2009). To better explore the emotional impact waiting has on cancer patients and suggestions given from patients, Catania et al. (2009) collected survey data from 355 patients who came to an Outpatient Oncology Clinic for visits and/or treatments. They found that 83% of patients felt that waiting has an emotional cost attached and 89% of the patients suggested alternative activities be organized during the waiting period (Catania et al., 2009). Additionally, 65% suggested fun activities such as music therapy, drawing courses, library, or TV (Catania et al., 2009).

Waiting for services is not solely a healthcare problem and is also an important issue for retailers and other consumer service providers. Borges, Herter, and Chebat (2014) looked at the influences of retail environment distracters (TV screens) in reducing consumers' perceived waiting time and improving waiting satisfaction. It was discovered that TV screens displaying congruent content was established as a reduction in consumers' perceived waiting time and increased the consumers' satisfaction with waiting. An important factor highlighted within their

research indicated that unoccupied time was often perceived as longer than occupied time (Borges, Herter, & Chebat, 2014). Several similar studies have shown that filling wait time with entertainment activities or audio and/or visual environmental distractors can reduce perceived waiting time and can have a positive effect on the consumers emotions (Hernandez-Maskivker, Ryan, & del Mar Pamies, 2016; Silverman, 2015).

### **Relationship between watching a television program and its effects on time**

Technology has advanced tremendously over the past 20 years including the development of Internet video programming (i.e. Amazon Prime, Netflix, Hulu, etc.) along with hand-held/lap devices such as mobile phones, iPad's, and laptops. Considering this, Internet video programming has become a mobile concept. Internet video programming can now essentially be accessed anywhere, including hospital waiting areas. Internet TV is fundamentally conventional television which is streamed over the Internet and accessed by a computer, iPad, or mobile phone using video streaming technology (Noam, 2003). According to Pew Research Center, a survey completed in August 2017 revealed that ninety eight percent of people ages 18-49 use online streaming services as means of viewing television programs (Pew Research Center, 2017).

Studies have revealed that watching television can decrease one's stress level. For example, Nabi, Prestin, and So (2016) conducted research to examine media diet's influence on health; specifically its effect on stress biomarkers. Their investigation included two hundred and forty adults (50% were men and 50% were women) who completed self-assessment questionnaires demonstrating their media habits 2 days prior to attending a lab session. The lab sessions included giving a saliva sample to be sent to the laboratory for cortisol testing. The self-assessment questionnaire inquired about the number of hours per day each participant watched television. The researchers hypothesized that the greater cumulative TV consumption would

overall correlate to a lower cortisol level. Surprisingly, this was found to only be true for the women in this study (Nabi et al., 2016).

Watching a television program also can be a positive distraction that can not only assist with passing time, but can be used as a distractor while having painful procedures or doing unenjoyable activities making them more enjoyable. For example, Bellieni et al. (2006) conducted a study to determine if providing children with TV while performing a venipuncture served as a more effective active distraction versus the standard passive distraction of using the child's parent as the distractor. In this study, 69 children, ages 7-12, presented with their mothers to a hospital for blood sampling between the hours of 8am and 10am. The children were randomly assigned to three different groups: A) puncture performed without distraction, B) puncture performed while the mother interacted with the child in order to distract him or her, and C) puncture performed while the child was watching an age appropriate cartoon program on TV with mother present, but not doing anything to distract the child (Bellieni et al., 2006). The children in group A were the patients in the control group, whereas groups B and C were the patients in the intervention groups. For the children in group C, 120 seconds prior to the venipuncture they sat in front of a TV screen 2.5 m away and a cartoon movie was played.

At the conclusion of the venipuncture all groups were asked to score the pain experience using a pediatric pain scoring system called the Oucher Scale, which is a visual pain scale scoring pain 0 (no pain) to 100 (maximum pain) (Bellieni et al., 2006). Both the children and their mothers completed the pain scale. The results revealed that the children in the control group scored their pain levels more than three times more than those given the TV distraction intervention. The score results of both the children and their mother's suggest that a TV

distraction intervention has an analgesic effect while getting a venipuncture when compared to not having a distraction at all.

Besides using television programming in the healthcare setting as a positive distractor, there are also research projects investigating the effects of using television programming in other situations. One example is the work of Privitera, Antonelli, and Szal (2014) which showed that watching television is an enjoyable distraction while exercising and has the ability to cause pleasant mood changes post-exercise. Their study consisted of 84 undergraduate student volunteers who were light to moderate exercisers, non-smokers, and overall were otherwise in good health. They were separated into four groups based on their liking of the show “Two and a Half Men” which was going to be playing on a television. The students who ranked the show as top 3 of their liking were placed in the ‘enjoyable distraction group’, and the students who disliked the show were placed in the ‘not enjoyable distraction group’ (Privitera et al., 2014). The groups were as follow: A) Enjoyable distraction (ED) + Exercise group, B) not as enjoyable distraction (NED) + Exercise group, C) Exercise Only group, and D) ED Only group.

The students in the exercise groups were instructed given different exercise platforms of which to perform while watching the fore-mentioned television show. Mood and arousal ratings were tested using a single-item scale that assessed both dimensions pre and post exercise. The results revealed that the participants in group A had a significant increase in pleasant mood when compared to groups B, C, and D. This study indicates that adding an enjoyable distraction such as watching a television show one likes, has positive effects on a person’s mood while doing an unenjoyable activity.

### **Relationship between music and its effect on waiting**

Music plays a significant role in the everyday lives of people, is considered the most prevalent leisure activity, and is present in every culture (Mantie & Smith, 2017). Music is considered to be a form of therapy and can provide distraction, alleviate pain, promote wellness, decrease anxiety, relieve nausea, and enhance expression of feelings (Bro et al., 2017; Bro et al., 2019, Spilioti, Galanis, Konstantakopoulou, & Kalokairinou, 2017; O'Callaghan et al., 2012). Not only can it affect one physiologically, psychologically, and stimulate one's emotions, it also has the power to change relationships with time. Studies have shown that time seems to move faster when listening to the pleasant melodies of music and can be a positive distractor from current circumstances (Cassidy & MacDonald, 2010). For this reason music is often used in hospital waiting areas.

The effects of music in healthcare environments has been well studied and documented. For example, in a quasi-experimental designed study Silverman, Christenson, Golden, and Chaput-McGovern (2012) evaluated the effects live music in a university clinic waiting room to determine if there was a correlation between live music and patient satisfaction. The experimental group listened to live music in the clinic waiting room, whereas the control group did not listen to music during their wait in the waiting room. Participants completed a survey to indicate their perception of time and one question inquired how much time was patients spent in the waiting room. Approximately 44% of the patients in the experimental group perceived they were seen earlier than the scheduled appointment time (Silverman et al., 2012). Additionally, out of the 66 patients who participated in the study, 79% of the patients surveyed gave higher positive satisfaction ratings after the music intervention (Silverman et al., 2012). Therefore the results showed that more than half of the patients reported greater satisfaction and a shorter perceived waiting time after listening to the music in the waiting area.

Music is also increasingly offered as an adjunct to cancer treatment in the outpatient clinical setting. In one study, music was introduced in an outpatient medical center to adult patients with cancer requiring IV chemotherapy treatment (Lin, Hsieh, Fetzer, & Hsu, 2011). Data was collected from January-December in 2007 to determine the effect of music therapy (MT) and verbal-guided relaxation (RX) on state anxiety and anxiety-induced physiological manifestations among cancer patients before and after chemotherapy treatment. The trial participants were randomized to one of three groups: 1) an intervention group to receive a 60 minute session of MT, 2) a comparison group to receive a 30 minute RX session, and 3) a control group that received routine nursing care. Music was applied utilizing head phones for the intervention and comparison groups. Prior to chemotherapy and the intervention, all participants completed a Chinese State-Trait Anxiety Inventory (C-STAI) upon arrival, and prior to the chemotherapy treatment the Emotional Visual Analog Scale (EVAS) was completed. After the intervention group completed the chemotherapy treatment and received the intervention at the same time, the C-STAI and the EVAS was repeated. The results revealed that patients who had high state anxiety level prior to chemotherapy and were given the intervention, also had the largest decrease in anxiety levels after the music intervention. Other studies have had similar findings on music's effect to reduce the anxiety levels of patients receiving chemotherapy and radiotherapy (Bro et al., 2017; Bro et al., 2019, Spilioti, Galanis, Konstantakopoulou, & Kalokairinou, 2017; O'Callaghan et al., 2012). These studies show that a music intervention shows great benefit to patient's psychological status while they are receiving chemotherapy or radiotherapy treatment.

**Significance of patient education**



Patient education is a fundamental component of enhancing medical self-care. The importance of patient education is based on the basic argument that an educated and knowledgeable patient has the capability to actively participate in his or her own cancer treatment. According to Vawdrey et al. (2011), the key objective of patient education is aimed at increasing the levels of participation and comprehension of cancer patients towards the self-management of medical care requirements to improve their quality of well-being. Ventola (2014) asserted that patient education should be a well-developed methodical process which is individualized and capable of assessing and evaluating information before it is relayed to patients and their families to improve their overall health condition. Health literacy contributes to this argument in that poor health outcomes increase with lower levels of health literacy (Hoover et al., 2008; Mantwill & Schulz, 2017; Tsai et al., 2018). Health literacy has been defined as having a “limited capacity to obtain, process, and comprehend basic health information needed to make appropriate health care decisions” (Ratzan & Parker, 2000). Interventions for addressing health literacy includes simplifying health information in education materials which can include visuals such as iPad tablets with video education, and interactive self-health tools (Sudore & Schillinger, 2009). Hibbard and Greene (2013) demonstrated that cancer patients who are actively involved in their treatment process have a higher probability of cooperating and understanding their diagnoses. Ultimately, a health literate patient can contribute to his or her treatment and overall well-being by identifying and reporting worsening symptoms or treatment side effects at early stages. Additionally, patient safety is increased, anxiety levels can be decreased, and the level of satisfaction can appreciably be enhanced the more health literate patients are (Koay, Schofield, & Jefford, 2012).

**Patient Education Methods**

It is documented that educating oncology patients as a part of their care is essential to their survival (Turner et al., 2005; Attack & Luke, 2012). This population of patients needs easy and reliable access to accurate clinical information and resources to help them cope with all aspects of their disease. Furthermore, inadequate oncology related patient education can be a potential barrier to patient understanding and treatment adherence. To date, written pamphlets are the standard tool used for delivering patient education to oncology patients. However, according to a survey in the article *Health Online 2013* most often patients prefer to use both information received from the internet and information received from their clinician to assist with their learning (Pew Research Center, 2013).

### **Effectiveness of Patient Education via Online Educational Videos**

Armstrong, Idriss, and Kim (2011) compared the effectiveness of online education video versus standard pamphlet education in the education and utilization of adult patient sunscreen. The investigators of this study evaluated whether patient education pamphlets versus viewing an online education video improved patient purposeful sunscreen usage, patient adherence to sunscreen usage, and patient satisfaction with the method of education received (i.e. pamphlet versus online video). Of the total number of participants which completed the study (n=83), 40 participants were randomized into the pamphlet group (control arm). The participants in the pamphlet group were given pamphlets to read which focused on the following: 1) purpose of sunscreen, 2) how to apply sunscreen properly, 3) the various types of sunscreen, and 4) the mechanism of sunscreens protecting abilities (Armstrong et al., 2011). The participants were instructed to view the information in the pamphlet at least once, but they could also view it as often as they wished. A pre-test and a post-test design was used to assess baseline knowledge and usability of sunscreen. The standardized questions for this study were received from the

National Health and Nutrition Examination Survey (NHANES). Armstrong et al. (2011) found with the post-test that the pamphlet group demonstrated considerable improvement in their sunscreen knowledge ( $7.6 \pm 1.2$ ,  $p < 0.001$ ), following the pamphlet intervention.

Bol et al. (2012) also conducted a study which compared cancer-related information given to lung cancer patients in either online text only, online text with non-personalized video, and online text with personalized video. The participants in this study were randomized to one of the three groups and the investigators aimed to determine which tool improved patient information recall and increased patient website satisfaction. Out of the total number ( $n=169$ ), 57 were randomized to the online text only group. The information given to all 3 groups was located on a webpage created by The Netherlands Cancer Institute (NKI) and explained a procedure called Radio Frequency Ablation (RFA) as a treatment to destroy lung tumors. The content of information for all 3 groups remained the same, and the text only group was exposed to the webpage with text only information. Recall of cancer-related information was assessed using 11 open-ended questions from *The Netherlands Patient Information Recall Questionnaire* with possible scores ranging from “0 (not recalled), 1 (recalled partially), to 2 (recalled correctly)” (Bol et., 2012, p. 406). Similar to Armstrong et al. (2009), Bol et al. (2012) found that the online information in text only format group had much lower scores (33% recall) than the other groups.

Karunagaran, Babu, Simon, Sukumaran, and Antonisamy (2016) conducted a randomized experiment to assess the effectiveness of a video assisted teaching tool compared with standard teaching on decreasing anxiety levels and increasing the knowledge base of patients preparing to undergo gastroscopy procedures. The total number of participants selected was 72 and half of the participants were randomized to the standard teaching group. A pre and post questionnaire

was given to assess patients' anxiety levels using the State Trait Anxiety Inventory, and a questionnaire was given to assess patient knowledge of gastroscopy. The post-test results indicated that 75% of the patients within the standard teaching group still had inadequate knowledge of the gastroscopy procedure (i.e. scores increased from 3.97 to 5.11) and their mean scores of anxiety increased from 43.77 to 44.86 (Karunagaran et al., 2016). On the other hand, the post test results revealed that the video assisted teaching group had a significant increase in mean scores related to knowledge (i.e. from 4.55 to 12.38) and their anxiety level mean scores decreased from 43.83 to 35.75 (Karunagaran et al., 2016). Therefore, the researchers conclude that teaching patients as they prepare to undergo a gastroscopy procedure via the video education method, increases patient knowledge and decreases anxiety levels.

A randomized control trial investigated whether a cervical cancer education video in American Sign Language (ASL) was culturally and linguistically the most appropriate method of increasing cervical cancer knowledge amongst deaf women when compared to *The Basics* (a National Cancer Institute's clinical trials PowerPoint ASL education program) (Choe et al., 2009). The participants were randomly assigned to either the experimental arm and viewed the ASL cervical education video, or the control arm and received *The Basics*. All participants completed a 13 question survey to identify their knowledge of general cancer and cervical cancer before, after, and two months following the intervention. The researchers found that the participants in the experimental arm who viewed the ASL cervical education video had increased knowledge retention than the control group who read the written material.

Similar to Choe et al.'s (2009) research, a study conducted by Shabaik et al. (2010) provides further data which supports the effectiveness of an ASL patient education video for the deaf community. Similar to the study conducted by Choe et al. (2009), the purpose of Shabaik et

al. (2010) study was to investigate if an ASL colorectal cancer (CRC) education video would help increase understanding and knowledge of patients in the deaf community when compared to *The Basics*. Again the patients were randomized into either the experimental group and viewed the ASL video, or the control group and utilized *The Basics*. The participants had to complete a pre-intervention survey which addressed general cancer knowledge and specific knowledge about colon cancer. The results indicated that immediately post-intervention the ASL CRC video intervention experimental group had higher scores related to both general cancer knowledge and CRC (Shabaik et al., 2010). These results suggest that an ASL oncology related education video is an effective patient education tool for increasing knowledge retention in the deaf community.

### **Effectiveness of Patient Education via iPads**

To begin with, ‘the effects of iPad video education on patient knowledge’ was studied by Wischer et al. (2018). The researchers set out to examine the possible outcomes of applying video education as a supplementary technique to the conventional education that is accorded to patients upon discharge. Their study was focused on patients with cardiac disease. The outcomes of their study was centered on patient knowledge about the disease, their level of satisfaction and level of understanding of the discharge instructions. A total of 224 participants were included in this study. In addition to the standard discharge education, a video was delivered to the percutaneous coronary patients via iPads. At the end of the videos, the participants were then tested to gauge the level of knowledge and information acquired. The efficacy of the education level was statistically described through the paired t-test as well as the Fischer test.

On examining the results, a paired t-test showed an improvement in patient knowledge from a pretest mean of 88.97 to a posttest mean of 96.62 which was equivalent to a deviation of

9.657. In regards to the satisfaction levels, a larger number of the study participants were comfortable with the video education at 98.1%. This population of the participants stated that they confidence and knowledge on heart care had improved. As a result, the study concluded that the use of video education through iPads was adequate in supplementing the conventional discharge education that is usually given to patients upon discharge. Despite the study focusing on patients with heart disease, similar conclusions can be applied to the case of cancer patients.

Moshtaghi et al. (2017) sought to assess and evaluate the ‘use of interactive iBooks for patient education in otology’. A total of 66 patients with chief complaints of tinnitus, dizziness, hearing loss, or cochlear implants were included in this study. Two thirds of the patients were randomly assigned to the intervention group and given the iBooks, whereas one third were utilized as the control. A pre-survey was given to assess baseline knowledge and a post-survey was given to assess knowledge perception after the intervention. The results showed that massive improvements were observed on the perception levels of the experimental group. In addition, the experimental group demonstrated a more compact understanding of their hearing conditions when compared to the control group. It is clear that the introduction of the iBooks could directly be attributed to the increase in knowledge for the patients in the experimental group.

Additionally, the use of the iBooks has the potential of personalizing information in a form that was simpler to comprehend for the otology patients.

Morgan et al. (2015) focused on the using iPad tablets for enhancing the education levels of cancer patients. In this study, patients who had been newly diagnosed with breast cancer and having their first oncology visits were examined. As part of the study, the participants were taken through an elaborate presentation on iPad’s tablets entailing the procedures, rationales, risks, and benefits of adjunct systematic chemotherapy in addition to the discussion with their oncologist.

The measurement indicators were the levels of patient satisfaction and their knowledge levels. Out of the 25 patients who participated in this study, 88% were able to answer correctly to all the questions pertaining to treatment. In addition, a higher level of clinic satisfaction was recorded at 4.53 out of a possible 5. The study concluded that the use of iPad tablet presentations in enhancing the knowledge levels of cancer patients was fundamental towards knowledge acquisition and retention.

Finally, the efficiency on the use of iPads, tablets and online videos in oncology treatment has been reviewed in several studies by Clifton et al. (2018), Richards et al. (2018) and Nogueira et al. (2013). Clifton et al. (2018) focused on the use of mobile technology in the diabetes education of the pediatric population and was led by physicians. In this study 86% of patients in the intervention group liked the use of iPad tablets and it influenced their knowledge on diabetes positively. Richards et al. (2018), examined the use of mobile devices in the treatment of cancer patients in outpatient conditions. A systematic review was done to aid in the process of identification of mobile interventions that could better aid in the process of knowledge acquisition for patients with cancer. In addition, the effects of the interventions were to be reviewed. The study concluded that the use of mobile interventions in oncology treatment was only effective in meeting basic information requirements such as symptom related conditions. From this study, it is possible to propose that studies on the use of technology in the treatment of cancer should be taken at a higher level to reveal all the relevant information that cancer patients are required to know. Finally, the study by Nogueira et al. (2013), focused on the use of educational technologies by caregivers in enhancing patient care. The research relied on a systematic review of existing literature to determine the effectiveness of educational technology

in patient care. This study concluded that the use of educational technology could positively influence the overall trend of patient education and hence their overall well-being.

### **Rationale**

#### **Theoretical Framework: Theory of Adult Learning**

Malcom Shepherd Knowles is known to have created the first Theory of Adult Learning model via the notion of ‘andragogy’ (Knowles, Holton, & Swanson, 2015). Andragogy focuses on the basic principles of adults as learners which assists in tailoring education for an adult (Knowles et al., 2015). Knowles is also said to be the first to introduce the concept that adults learn differently than children (Knowles et al., 2015). This concept/model of andragogy (‘Theory of Adult Learning’) was introduced in the 1970s by Knowles, and while seemingly its creation was geared towards adult educators as a resource/tool to assist education designers in shaping the learning process for adults, it has surmountable benefits to health care models which focus on discovering the best way healthcare providers can deliver health education to patients (Knowles et al., 2015). Specifically, because Knowles’ adult learning theory (andragogy) addresses the concept that learning success highly involves the active engagement of the adult learner in the learning process. In this way, the learning-based agenda is established by the adult learner (patient).

There are six core principles of Knowles’ Theory of Adult Learning (Andragogy): 1) what the learner’s need to know, 2) self-concept of the learner, 3) prior experience of the learner, 4) readiness to learn, 5) orientation to learning, and 6) motivation of the learner (Knowles et al., 2015, Location No. 269). Knowles et al. (2015) asserts that these core principles are what affect adult learning regardless of learning situation, and goals/purpose of learning. However, it is said



that Knowles' Theory of Adult Learning (Andragogy) is most beneficial when it is adapted to the learners' needs and situation (Knowles et al., 2015).

It is imperative that oncology patients receive appropriate patient education. Because their needs are often complex, proper education is essential prior to receiving treatment for cancer. Furthermore, inadequate oncology related patient education can be a potential barrier to patient understanding and treatment adherence. Thus, Knowles' theory of adult learning was used as a guide in reviewing the evidence which sought to examine the relationship between providing patients with access to online patient education videos on topics related to oncology versus the standardized education pamphlets, and how this provision affects their knowledge of cancer, cancer treatment, along with their satisfaction with the level of education received.

### **Specific Aims**

The aim of this project was to develop a range of entertainment and educational options for patients waiting for chemotherapy treatments in the Thoracic Oncology clinics. Such options might include: watching a movie/television program, listening to music, using a game app, or a chemotherapy educational video via a clinic issued iPad. Included in this aim is a goal to determine if the entertainment options make the time waiting to see a provider more tolerable, and if creating a chemotherapy education video used to educate patients will assist with knowledge retention. The DNP Student worked with oncologists, nurse practitioners, nurse coordinators, and medical assistants to assist with providing patients the entertainment and education options once they were placed in the exam rooms.

### **III. Methods**

#### **Context**

Wait time is both relevant and meaningful to the field of nursing because patient satisfaction is a key metric in healthcare quality improvement and patient-centered care. The clinical ambulatory patient experience is heavily influenced by time spent waiting to be seen by a provider. According to the clinic Cancer Center ‘Visit Duration Report’, patients wait over 60 minutes to complete a Thoracic Oncology clinic appointment (California Hospital and Clinics Visit Duration Report, 2018). The target for a New Patient Visit (NPV) is less than or equal to 90 minutes, and less than or equal to 60 minutes for a Return Patient Visit (RPV). In the Thoracic Oncology clinics for the month of May 2018, 69% of NPV appointment were greater than 90 minutes and 63% of RPV were greater than 60 minutes.

#### Current Practice

There are four categories of patient waiting when a patient enters the lobby: 1) patient stands in line to check in at the front desk for his/her appointment, 2) after checking in, the patient is placed in a waiting queue and waits in the waiting area with other patients who are waiting to be called back to the exam room, 3) the patient is called back to be roomed, vital signs are taken by Medical Assistant, and then the patient waits to be seen by an Advanced Practice Practitioner (APP) or Resident/Fellow, 4) after being assessed by an APP or Resident/Fellow and he/she leaves, the patient waits for the APP or Resident/Fellow to return with the MD (Appendix J). In the meantime, there is empty wait time while patients are in an exam room with minimal options to occupy his/or her time.

#### Cost/Budget

The key stake holders include the following list:

- Target Hospital- Thoracic Oncology Clinic
  - Thoracic Oncology Physicians
  - Family Nurse Practitioners (FNPs)
  - Nurse Coordinators (NCs)
  - Medical Assistants (MAs)
  - Director of Nursing
  - Thoracic Oncology Clinic Manager
  - DNP Student as project manager.

The project was presented to the stakeholders during a monthly staff meeting and estimated that in order to implement this project, ten iPads will be needed for use between two clinics per day. The use of Thoracic Oncology SQIMM (Cancer Quality Council funds available to streamline and improve quality metrics, reporting and communication, and incentive plans) funds was requested to purchase the iPads and pay for one year of Amazon Prime (Appendix C). There is an estimated \$100,000 in SQIMM funds available for projects. The DNP Project Manager proposed the purchasing of ten iPad Air's with 10.5" Retina displays, A12 Bionic chip, and Touch ID. The cost was \$499 per iPad with 64GB and \$69 for 24 months of AppleCare Protection (technical support and accidental damage coverage). The estimated budget was \$6740.20. In addition to the iPad's, the DNP Project Manager proposed using Amazon Prime to stream videos, television shows, and music. Amazon Prime can be used simultaneously on multiple devices and the cost is \$119 per year. After consideration of my project idea, the Director of Nursing allowed me to borrow 4 iPads to pilot this project. The Thoracic Oncology Physicians and Thoracic Oncology Clinic Manager were all in agreement with doing a 4 month pilot project before committing to fully implement the project into clinic. For the 4 month QI

project pilot, the Director of Nursing allotted the DNP Student to utilize 4 of his department iPad's to implement the project.

### Work Breakdown Structure

Each of the stakeholders played a key role in the work breakdown structure of the project development and implementation. The MA's primary function is to support delivery care process and ensure that patients are roomed and their vital signs are taken. After the MA's roomed the patient's and took their vital signs, they gave the patient the "Be Our Guest" flyer and offered them the use of the iPad. If the iPad was used, the MA retrieved an iPad from the clinic work room and explained to the each patient what the options were. The MA or the DNP Project Manager gave the patient the post-intervention questionnaire. The NC's and FNP's have the role of assessing the complexity of the patients current visit, anticipation of the patients expected wait time, assessing the patients readiness to learn if education will be given during the visit, and initiating the use of an iPad for chemotherapy education if indicated.

### Communication Plan

The communication plan will include all stakeholders involved and weekly emails will be sent out to all the stakeholders with project status updates weekly on Mondays. Another portion of the communication plan will be on print. Paper flyers were given to all patients and placed in all the exam rooms utilized by the Thoracic Oncology Department which will include the options on the iPads, as well as including the code to unlock the device, and instructions to ask the MA or NC if he/she would like to use the iPad during the clinic visit. (Appendices I, J, and K).

### **Intervention**

There are five Thoracic Oncologist's employed in the project site's Thoracic Oncology Department. Three of the Thoracic Oncologists have two very busy clinics per week, and the

other two Thoracic Oncologists have one clinic per week and see less patients. The first portion of the project focused on the ‘Entertainment Options’ and was piloted in one provider’s clinic who had the highest volume of patients per clinic prior to expanding to the other four provider’s clinics. The pilot in the first physicians clinic started the first week of September in 2018 (see GANNT chart Appendix D). To prepare for the QI Project, the DNP student had several meetings with the stakeholders and one of the Stanford IT Project Developers. The Stanford IT Project Developer configured the iPad’s for clinic use by adding the Amazon Prime App and Game Apps to each of the iPad’s.

During the configuration period, the DNP Project Manager prepared a process and procedure training manual for the MA’s, NC’s, and NP’s to utilize prior to distributing the iPad’s for patient use. Prior to the initiation of the project, the DNP Project Manager completed a short one hour training for the MA’s, NCs, and NP’s which included the following:

- 1) The purpose of the QI project.
- 2) The addition of offering iPad’s to patients after the MA’s take them to the exam room.
- 3) Reviewing the ‘Distributing iPad’s During Clinic’ instruction sheet which instructs the MA on the process of offering patient’s an iPad and maintaining iPad sanitation (see handout in Appendix K).
- 4) Reviewing the location of the iPad’s, how to access the iPad’s, the process of dispersing and signing out the iPad’s, cleaning the iPad’s in between patient use, and how to lock up the iPad’s one hour prior to the conclusion of clinic.
- 5) Reviewing the location of the iPad storage unit and where the keys to access the unit are located.

In this project when patients were taken from the lobby into the exam rooms and after their vital signs were taken by the MA, the MA gave the patient an iPad flyer which invited the patient to ‘Be our guest and please use our iPads during your visit’ and discussed the options of use on the iPads (watch a movie or show with Amazon Prime, listen to music on Amazon Prime, or play a game using one of the game apps). When a patient decided to use an iPad, the MA went to the clinic workroom to retrieve one from the iPad storage locker, signed it out, and brought it to the patient. The patient was then given the screen code to unlock the iPad and taught how to navigate the options for use of the iPad. At conclusion of the patient appointment and following the patient’s use of the iPad, the iPad’s were returned to the MA, the MA sanitized the iPad, and the DNP Project Manager asked the patient to complete a post intervention questionnaire.

When the pilot of the first portion of the project was completed, the DNP Project Manager met with the Stakeholders to discuss the idea of adding a new patient education tool to the iPads. All the Stakeholders were fully supportive of this idea after the DNP Project Manager described what the education tool would entail. The DNP Project Manager described that second portion of the project included creating a chemotherapy education video for patient’s to view while they were in the clinic exam room during the appointment. In considering patient health literacy and the variety of individual learning styles, using Microsoft Power Point and Screencast-O-Matic the DNP Student created an 8-minute chemotherapy education video with voice over on power point slides. The development of the education video took the DNP Student 3 hours to develop from the clinic ‘Care Notes’ on the chemotherapy drug Osimertinib (Tagrisso). The education video was saved on a MP4 format and given to the clinic IT Developer who added the videos to four thumb drives.

Patient education was only given to newly diagnosed patients with an EGFR mutated Stage IV Lung Cancer patients who were starting the chemotherapy drug Tagrisso as first line or second line treatment. If the patient needed chemotherapy education, the physician informed the DNP Project Manager who then went into the patient's room, introduced herself and explained the process of what to expect while viewing the education video. The DNP Project Manager then connected the thumb drive to a desktop computer and instructed the patient how to view the 8 minute 'Osimertinib and You' education video. The DNP Project Manager invited each patient who viewed the video to take a post-video test.

### **Outcome Measures and Study of the Interventions**

The following topics were measured with survey methodology: 1) patient perception of wait time, 2) patient satisfaction with iPad options, and 3) patient knowledge. Survey methodology is a low-cost approach to collecting subjective patients' opinions of interventions and other variables (Pew Research, n.d.). To evaluate patient satisfaction with the iPad options offered and used during the wait time, the NC's and NP's invited the patient to take a 4 question survey. The questions on the survey were focused on the device and if the options used on the iPad made the patient wait time pass by more quickly. The questions used to assess patient satisfaction were as follow and the full questionnaire is also available in Appendix E:

- 1.) Did any of the options given on the iPad make the wait time pass faster?
- 2.) Which option did you use to pass the time while waiting?
- 3.) Compared to your previous visits, did any of these options make the wait time pass more quickly?
- 4.) Do you have any suggestions to make the wait time more bearable?

Likert Scales were created in 1932 by Renis Likert and are commonly used today in medical research as a reliable measuring tool to determine attitudes by respondents which helps assess the degree to which one agrees or disagrees with a statement or question (Joshi et al., 2015). It is also used can be used as a tool to measure patient satisfaction. For this project's data collection, a structured questionnaire with three-closed answers in the form of a six-point Likert Scale was used. The fourth question in the questionnaire was an open-ended question for the purpose of allowing patient feedback and recommendations. The overall satisfaction results from the summation of the scores of individual questions (1= strongly agree to 6-strongly disagree). The above questionnaire was created by myself, reviewed and approved by the project site Thoracic Oncology physicians, one Nurse Research Scientist, and the clinic IRB manager to determine questionnaire format, length, and questions presented before it was finalized and given to patients.

To evaluate patient understanding of the chemotherapy from using the video, the DNP Project Manager asked the patients to take a 5-item questionnaire post-video knowledge test to assess knowledge retention of the basic information conveyed during the presentation (i.e. purpose of treatment, common side effects, when to call the physician, etc.). The questions on the posttest covered all main topics discussed in the education video and were multiple choice with five response options to each question. The questions were tailored to the type of drug the patient was being prescribed (i.e. Tagrisso) and each answer to the posttest question was worth 1 point. The questions included (Appendix F):

- 1.) Why are you taking Tagrisso?
- 2.) How often should you take Tagrisso?
- 3.) What are some common side effects of Tagrisso?



- 4.) How often will I need to have my blood drawn while taking Tagrisso?
- 5.) I should contact my doctor right away when...?.

Because of the uniqueness of the chemotherapy drug, an available post-test had not been created by the manufacturer to utilize. The knowledge test was developed by myself utilizing Stanford Hospital and Clinics patient education sheets located on clinic's Lexicomp portal. It was reviewed and approved by two clinic Specialty Pharmacists, three clinic Thoracic Oncology Physicians, one Nurse Research Scientist, and the clinic IRB manager before it was finalized and given to patients. Due to the unavailability of a validation tool, the test can be considered reliable and valid due to the credibility and professional expertise of the reviewers. For future post-tests, a validation rubric guide may help to overcome any potential weaknesses in the test.

### **Timeline**

The GANNT chart presents the timeline of the DNP project (see Appendix D). The DNP Project Manager emailed the QI project proposal to the Stakeholders for initial feedback in early January 2018. On the 3<sup>rd</sup> Tuesday in January 2018 during the first Thoracic Oncology Clinic Staff meeting of the year the DNP Project Manager attended and fully discussed the clinic problem, proposed the intervention, and discussed the project outcomes. Additionally the DNP Project Manager had a separate meeting with the Nurse Research Scientist on the last Tuesday of January 2018 to discuss the clinic's protocol and procedures for initiating a QI project in the clinics. During the Spring of 2018, following the initial meeting with the Nurse Research Scientist, the DNP Project Manager then began having monthly meetings with her and she assisted with recommendations while the DNP Project Manager was developing the post intervention questionnaires. The DNP Project Manager began researching topics for the project during the Summer of 2018, and initiated the pilot project in the Fall of 2018. The pilot QI

project concluded in early Spring 2019, and after presenting the results to the Stakeholders, the decision was made to add patient education on to the QI project, and pilot the addition during the Fall/Winter of 2019. Data synthesis and outcome findings were concluded on January 17, 2020.

### **Gap and SWOT Analysis**

The development and implementation of the “Entertainment and Educational Options iPad Project” is purposed to improve the waiting experience for patients. The success of the project is based on the contribution and support received by key stakeholders. In order to determine the overall operational efficiency and worthiness of the project, a Gap Analysis (Appendix A) and SWOT analysis (Appendix B) was conducted. A few of the main strengths in the Gap Analysis include: the ‘Entertainment Options’ given on the iPad’s will provide a positive distraction for patients while they are waiting in the exam rooms. Some of the main strengths identified in the SWOT analysis include: the iPad is user-friendly, has large screens for viewing, patients’ can use the iPad free of cost, there are 4 options of use, it has a low overhead for the Amazon Prime Account, it increases opportunities for engagement for patients’ and their families, and establishes individual-level learning priorities to develop and carry out an education plan for the patient. These strengths translate to better provision of patient occupied time versus empty waiting times. On the other hand, one weakness includes the need for locating a safe and accessible space to lock up the iPads to prevent loss.

### **Cost-Benefit Avoidance Analysis**

The cost of a NPV in the Oncology Department is \$1081.00. The expected time for an appointment is 90 minutes or less. It costs the patient approximately \$12 per minute for a 90 minutes appointment. The cost of a RPV in the Oncology Department is \$999.00 The expected time for an appointment is 60 minutes or less. This means that it costs the patient approximately

\$17 per minute for a 60 minute appointment. The average NPV scheduled in each thoracic oncologists' clinic is two per day. There are two thoracic oncologist's with clinics on Mondays and Thursdays, one thoracic oncologist with a clinic every Tuesday, two thoracic oncologists' with clinics every Wednesday, and one thoracic oncologist with a clinic every Friday. This equates to approximately 16 NPV visits per week which equates to \$17, 296 per week in revenue for the clinic. Regarding RPV's, each provider sees on an average 15 patients per day, or 120 patients per week, which equates to \$119, 880 per week in revenue. The potential total monthly revenue for clinics combining NPV's and RPV's equates to approximately \$548, 704.

The above numbers reflect the surplus of money which comes into the thoracic department by the number of NPV's and RPV's. According to a Press Ganey publication, wait time is ranked 12<sup>th</sup> out of 21 in predicting a patient's likelihood of recommending a physician (Press Ganey Associates Inc., 2018). Additionally, research has also shown that wait time is also associated with patient retention (Bleustein, et al., 2014 and Press Ganey Associates Inc., 2018). If patient's perception of the time they are waiting to see a physician are not perceived in a positive manner, then the clinic system could potentially lose the patient to follow up, and/or the patient may seek out a different physician which could potentially result in a substantial loss of revenue in the thoracic oncology department. For example, if one or two patients were lost per week this could cost the clinic approximately \$8000.00 per month. With the DNP student's QI project intervention purposed to increase patient satisfaction and make wait times more tolerable, the DNP student can potentially help the clinic to avoid the risk of losing at least \$8000.00 per month in revenue.

**Budget Return on Investment**

The return on investment in utilizing the ‘Entertainment and Education Options via iPad’ QI project is focused on overall improving the patients waiting experience by assisting in making the time period a patient is waiting in the exam room more tolerable. This QI project will help not only occupy the patient’s time while he/she is waiting, but also assist in increasing patient knowledge retention of the chemotherapy drug Tagrisso. MA’s, NC’s, and NP’s will have the resources and knowledge to follow the steps of how to deliver the iPad’s to the patient’s during their appointments, and the NC’s and NP’s will also be able to utilize the education video during the teaching moment for the patients’ loss to follow up or return. Given the potential total monthly revenue of \$548, 704 for a RPV and a NPV, the return of investment utilized the ‘Entertainment and Education Options’ iPad Project is avoidance of potential revenue loss from patients’ lost to follow up.

**Analysis**

The first portion of the iPad projects’ (‘Entertainment Options’) success was evaluated at 180-days to evaluate the topics listed within the survey methodology (see results in Appendix H). The second portion of the iPad project (‘Education Option’) was piloted in three Thoracic Oncology clinics and was evaluated at the 30-day mark to evaluate patient knowledge retention by way of the scores received on the post-video test (Appendix H). Microsoft Excel was used for plotting, graphing, and analyzing data. The DNP Project Manager predicted that the patients’ who use the iPads for entertainment options they would perceive their wait time as passing faster and those who use the iPads for chemotherapy education would have a knowledge retention score greater than 50%.

**Ethical Considerations**

Patient privacy and confidentiality was maintained as per American Nurse Association (ANA) code of ethics and existing healthcare laws. The medical health records of each patient participating was not be used. Each survey was numbered and each patient was de-identified. All information that was collected, stored, and/or exchanged was kept confidential. This project followed the ANA code of ethics, wherein as per provision 3.1, nurses advocates promote, and protect the rights, health, and safety of patients; as well as provision 3.2 whereas the protection of human participants in research will be upheld (ANA, 2015). In this case, the nurse would protect the rights of confidentiality and privacy as per ANA code of ethics. Determination of Human Subject Research Application to IRB form was submitted via the project site hospital's department of human resources and project development. It was reviewed and on July 26, 2018 and determined that this project did not meet the definition of human subject research as defined in federal regulations and qualifies as a Quality Improvement Project (Appendix N).

**Section IV: Results****Results**

The first portion of the project took place at a northern California clinic in the Thoracic Oncology Department from September 2018-February 2019. The total number of patients that participated in the 'Entertainment Options' portion of the project and completed questionnaires were 156. All patients were adults with stage IV lung cancer being treated with either IV or oral chemotherapy. The patients were offered an iPad tablet of which they were given the options of watching a video or movie on Amazon Prime Video, listen to music on Amazon Prime Music, or play a game such as chess, checkers, etc. on the iPad and asked to complete a post-intervention questionnaire.

As shown in Table 1, out of the total 95 patients who watched a video or movie during the six month pilot, the mean value for each month was 15.8 and the standard deviation (*SD*) value was 5.19. The results in table 1 showed that 60% of the patients used the iPad to watch a video or movie, 11% listened to music, 25% played a game, and 6% used the iPad for other things. Because of the minimum and maximum values, the *SD* was considered low indicating the results are valuable.

Table 1: *Which option did you use to pass the time while waiting?*

	Sept-18	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mean	<i>SD</i>
Video/movie	11	21	16	22	16	9	15.8	5.19
Listen to music	6	4		3	3	1	3.4	1.82
Played a game	2	8	6	10	6	7	6.5	2.66
Other		5		4		1	3.3	2.08

Table 2 shows the level of satisfaction with the options given on the iPad to assist in making the waiting time more tolerable. The results revealed that 93 % of the patients either strongly agreed or agreed, while 7% of the patients either slightly agreed or disagreed. Out of the sample of 156 patients, most simply agreed that the iPad options made waiting more tolerable. The mean value for those who ‘agreed’ over the six month pilot’s use was 17.7 with a *SD* of 7.34. The minimum value for each month for those who ‘agreed’ was 12 and the maximum 31.

Table 2: *Did any of the options given on the iPad make waiting more tolerable?*

	Sept-18	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mean	<i>SD</i>
Strongly agree	5	16	8	3	4	3	6.5	5
Agree	12	18	12	31	20	13	17.7	7.34

Slightly agree	3	1		2	1	2	1.8	0.84
Slightly disagree								
Disagree				2			2	0
Strongly disagree								

Because I did not create a pre-intervention questionnaire to evaluate patient satisfaction with waiting prior to the intervention, I asked the question “Compared to your previous visits did any of these options make the wait time pass more quickly?” and as Table 3 depicts 93% of patients either strongly agreed or agreed, whereas less than 1% disagreed. A N/A section was added due to the patients that hand wrote on their questionnaires answers such as “This is my first time visiting” or “I have never been to this clinic before”.

Table 3: *Compared to your previous visits, did any of these options make the wait time pass more quickly?*

	Sept-18	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mean	SD
Strongly agree	2	9	6	4	4	2	4.5	2.66
Agree	11	15	13	29	19	10	16.17	6.43
Slightly agree	3			2	1	6	3	2.16
Slightly disagree								
Disagree				1			1	
Strongly disagree								
N/A	4	11	1	2	1		3.8	4.20

The second portion of the project took place from December 18<sup>th</sup>, 2019-January 17<sup>th</sup>, 2020. The total number of patients that participated in the ‘Education Option’ portion of the project were 5. All patients were adults with newly diagnosed Stage IV EGFR mutated Lung Cancer who were going to be starting the first-line oral chemotherapy drug Tagrisso. After viewing the education video, all patients took the five question post-education video knowledge test and the following questions were asked: 1) Why are you taking Osimertinib (Tagrisso)?, 2) How often should you take Osimertinib (Tagrisso)?, 3) What are some potential side effects of Osimertinib (Tagrisso)?, 4) What should I avoid while taking Osimertinib (Tagrisso), 5) How often will I need to have my blood drawn while taking Osimertinib (Tagrisso)?, and 6) I should contact my doctor right away when...?. There were five answer options to each question: three answer responses were definitive question answers whereas two of the answer responses were either ‘all of the above’ or ‘I am not sure’ (Appendix F). Each question was worth 1 point. The first 3 patients that took the posttest all answered 4 out of 5 questions correctly scoring 80% on the test (Table 4). When reviewing the patient’s posttest answers, it was noted that the first 3 patients answered question #5 incorrectly. Because of the question style, the DNP Project Manager discussed possibly revising question #5 with the Research Nurse. It was decided to revise question #5 to ask “What tests will I need to have prior to starting Tagrisso?” as well as modified the answers (Appendix G). The changes were reviewed by the stakeholders again and it was approved with the revisions. When the DNP Project Manager gave the revised post-knowledge test to the final 2 patients, both patients answered 5 out of 5 questions correctly and scored 100% on the posttest (Table 5). Results for both questionnaires can also be found in Appendix H.

Table 4: *Osimertinib (Tagrisso) Post-video Knowledge Test #1*



Question	# of patients answering correctly	# of patients answering incorrectly
Why are you taking Osimertinib (Tagrisso)?	3	0
How often should you take Osimertinib (Tagrisso)?	3	0
What are some potential side effects of Osimertinib (Tagrisso)?	3	0
What should I avoid while taking Osimertinib (Tagrisso)?	3	0
How often will I need to have my blood drawn while taking Osimertinib (Tagrisso)?	0	3
I should contact my doctor right away when...	3	0

Table 5: *Osimertinib (Tagrisso) Post-video Knowledge Test #2*

Question	# of patients answering correctly	# of patients answering incorrectly
Why are you taking Osimertinib (Tagrisso)?	2	0
How often should you take Osimertinib (Tagrisso)?	2	0
What are some potential side effects of Osimertinib (Tagrisso)?	2	0
What should I avoid while taking Osimertinib (Tagrisso)?	2	0
What tests will I need to have prior to starting Tagrisso?	2	0
I should contact my doctor right away when...	2	0

### Modifications Made to the Intervention

After completing the pilot of the first portion of the QI project in February 2019 (i.e. ‘Entertainment Options’), the Stakeholders were pleased with the results and it was a consensus decision to implement this project into the Thoracic Oncology Clinic. In August 2019, the

iPad's were ordered and delivered to the IT Project Manager whose job was to standardize all the iPad's by placing the same applications on the purchased iPad's that were placed on the iPad's used for the pilot (i.e. Amazon Prime Video, Amazon Prime Music, YouTube, and Solitaire and Candy Crush Game Apps). In addition to the applications being placed on the iPads, the DNP Project Manager sent the IT Project Manager the Osimertinib (Tagrisso) chemotherapy education video and was assured by the IT Project Manager that he would be able to add the education video to each iPad.

The IT Project Manager's plan was to create a hospital URL specifically for adding a video hyperlink which would allow patients access to the education video. Additionally, this hyperlink with the education video would ideally be shared with the patient who would also have the ability to view it from home as often as they'd like. However, there were two unexpected problems which occurred from the period of August 2019 when the iPad's were purchased, to when and how they were delivered to the DNP Project Manager.

- 1.) Due to the expected opening of the new Hospital in November 2019, and the similar iPad project being implemented by the concierge department, the IT Project Manager had to delay the build and standardization of the DNP student's iPad's to be used in the Thoracic Oncology Department until after the opening of the new hospital (see 'Limitations' for details).
- 2.) Because of the delay in receipt of the iPad's for the DNP student, the IT Project Manager placed the chemotherapy education video on three thumb drives which could be used to connect to the desk top computers in each exam room when patient chemotherapy education was needed.

This change in process of how the education was to be delivered to the patients was modified due to the iPad's not being available for the second portion of the iPad project roll out. The DNP student did not receive the thumb drives until late November 2019, but this did not affect the expected outcome.

Another modification for the second portion of the project included a small change to question #5. Because the first three patient's that took the post-video all answered question #5 incorrectly, the DNP student, with the support of the Stakeholders, made the decision to modify this question to increase the reliability and validity of the test (Appendix F).

## **Section V: Discussion**

### **Summary**

#### **Goal 1**

This QI project was designed to be implemented in two different phases. Goal #1 for the first portion of the project, 'Entertainment Options', was to use Amazon Prime as a platform in creating entertainment options for patient to use via a Stanford iPad. The purpose was to give patients something to do while waiting to see a provider in the exam rooms with the hopes of making the wait time more tolerable. The DNP Project Manager received full support from the Stakeholders, and was able to successfully implement the pilot project in the Thoracic Oncology clinic at target Hospital and Clinics located in Northern, California. The post-intervention questionnaire revealed the pilot's success as the results showed that 93% of the patients who used the iPad for entertainment either 'agreed' or 'strongly agreed' that using the iPad while waiting to see a provider made the wait time more tolerable.

#### **Goal 2**

Goal #2 for the second portion of the project was for the DNP student to create an education video on the chemotherapy drug Tagrisso to increase patient knowledge retention. The DNP student was able to implement the second portion of the pilot project and provide patient's chemotherapy education using the video that was added to a thumb drive. The posttest showed that patients who watched the chemotherapy education video received a score of 80% or greater indicating post-intervention knowledge retention.

### **Interpretation**

Long waiting times are a major source of patient dissatisfaction and can adversely affect patient adherence to medication treatment regimes, clinical outcomes, the likelihood of the patient returning to see their care provider, and the likelihood that the patient will recommend their care provider to others (Atack et al., 2012; Basu, 2017; Bible et al., 2018; Bleustein et al., 2014; Press Ganey Associates, Inc., 2018). Cancer patients generally require longer consultation times which can have the domino effect of increasing the waiting times of other patients also waiting to be seen. The results from this QI project showed high satisfaction rates for oncology patients who utilized the entertainment options offered on the iPad's to assist in making their wait times more tolerable. Particularly the largest rate of satisfaction with regards to the options offered on the iPad's was from those patients who utilized the iPad's to watch a video or movie. The results also suggests utilizing a chemotherapy education video for patient teaching greatly increases knowledge retention. Because patient's expectations and their interest in quality services will not decrease, the future of health care providers will need to adapt services to include use of technology to meet patient needs.

### **Limitations**

Key study limitations included the using a singular posttest design, convenience sampling strategy, lack of historical information on the psychometric properties of the patient satisfaction survey instrument, and lack of a formative posttest validation tool. The development and implementation of the 'Entertainment Options' portion of the iPad project was also associated with several challenges and barriers which were identified during the SWOT analysis. Some of the key limitations with regard to the iPad's specifically included:

- 1.) When not in use, the iPad's must be locked in a secure area.
- 2.) Patient's may bring his/her own device and choose not to use Stanford's iPad.
- 3.) Options offered may be of no interest to the patient.
- 4.) There may be an interruption of use when the provider enters the room.
- 5.) The patient may not finish watching a program he/or she started watching when the appointment concludes.
- 6.) Some of the services on the iPad will not be available to patients.
- 7.) Upfront cost to purchase the iPad's was high.
- 8.) iPad's must be sanitized in between each patient use.

A few other unexpected limitations to this project also occurred. As discussed briefly above in the project narrative, there was time delay from the purchase and delivery of the iPad's to the IT Project Manager, to the actual receipt of the iPad's to the DNP Project Manager. The delay was due to the opening of the new Hospital, which opened in late November 2019.

Another limitation to the implementation of the second portion of the project, 'Education Options' was that the chemotherapy education video had to alternatively be added to thumb drives versus the expected Stanford URL which was originally going to be created for the education

video. Because of this, iPad's were not used by the DNP Project Manager when the education intervention was completed, and patients were not able to take the thumb drives home to watch the video as often as they wanted. A second limitation to the second portion of the QI project was due to the time it took for the DNP Project Manager to receive the thumb drives, this caused the DNP Project Manager to shorten the pilot time which resulted in a small sample size.

The results of the analyses reported here serve to provide only preliminary support for the hypothesis that the strategies implemented during this pilot project resulted in meaningful improvements in making patient waiting more tolerable and increasing patient chemotherapy knowledge retention. Replication and consistent movement of the key measures, along with longer periods of time to evaluate the methods utilized, will provide the level of evidence required for informed decision making regarding future quality improvement efforts using this type of QI project in other oncology clinics.

### **Conclusion**

Integration of iPad tablets used for entertainment and integration of a chemotherapy education video in the Thoracic Oncology clinics had both a positive impact on patient satisfaction with waiting and knowledge retention. These results reveal that the use of iPad tablets in clinic can improve the overall patient waiting experience. Using an education video during a clinic appointment for patient education establishes individual-level learning priorities to develop and carry out education plan while using iPads for the purpose of giving patient entertainment options to occupy their time while waiting both can increase patient satisfaction. Due to the advancements in technology, health care providers should consider using educational videos as a way to deliver education to patients and entertainment options via iPads to assist with making long wait times more tolerable. Nurses can play an effective role in improving patient

satisfaction and are in an ideal stance to evaluate a patient's level of comprehension following an educational intervention.

## **Section VI: Other information**

### **Funding**

One hundred percent of funding for this project came from the Stanford Thoracic Oncology Department SQIMM funds. This included the cost of the Apple iPad tablets, iPad tablet covers, and all funds for printing flyers for dispersing to patients.

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## Section VIII: Appendices

### Appendix A: Gap Analysis Tool

Column 1	Column 2	Column 3	Column 4	Column 5
Best Practice	Best Practice Strategies	How Your Practice Differ from Best Practice	Barriers to Best Practice	Will Implement Best Practice (Yes/No; Why Not)
1.)Provision of a comfortable reception area and exam waiting room: magazines, providing complimentary coffee and tea, and offering free wifi.	1.)Provision of entertainment options while in exam waiting room: Hospital issued iPad to listen to music, watch videos, use game app via Amazon Prime Account. 2.)Provision of chemotherapy education while in exam waiting room via Hospital issued iPad.	1.)The Entertainment Options given on the iPad's will provide a positive distraction for patients' while they are waiting in the exam rooms, give them something to do while they wait, and make the time waiting to see a provider more tolerable.	1.)A few of the barriers towards implementation includes funds needed to purchase the iPad's and starting the Amazon Prime Account, as well as full buy in from the Thoracic Oncology Department.	1.)Yes, the best practice strategy will be implemented.

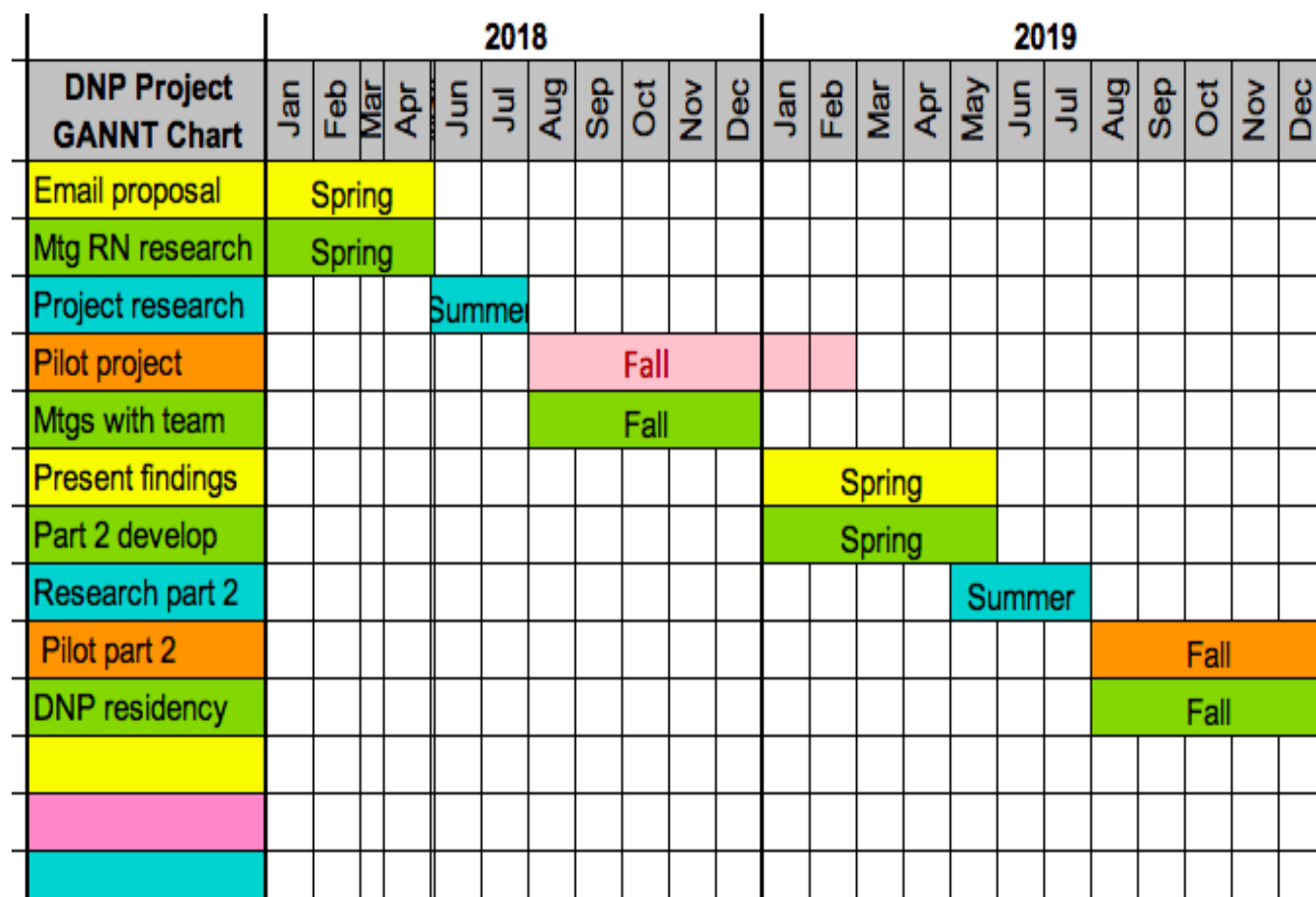
**Appendix B: SWOT Analysis**

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>• Hand held</li> <li>• User-friendly interface</li> <li>• Large screens for viewing</li> <li>• Patients can use iPad's free of cost</li> <li>• Accessibility to Stanford's non-public WIFI via iPad with faster connection</li> <li>• Patients have 4 options of what to do with their time while waiting</li> <li>• Can be fun to navigate</li> <li>• Movies/TV shows, music, or games can provide distractions from the discomforts associated with waiting</li> <li>• Low overhead for Amazon Prime Account</li> <li>• No additional staff is needed to provide patient with options while waiting</li> <li>• Increases opportunities for engagement of patients and their families</li> <li>• Education: Establishes individual-level learning priorities to develop and carry out education plan</li> <li>• Education: Measures and evaluates patients' learning outcomes</li> </ul>	<ul style="list-style-type: none"> <li>• When not in use, the iPad's must be locked in a secure area</li> <li>• Patient's may bring his/her own device and choose not to use Stanford's</li> <li>• Options offered may be of no interest to the patient</li> <li>• There may be an interruption of use when the provider enters the room</li> <li>• The patient may not finish watching a program he/or she started watching when the appointment concludes</li> <li>• Some services on the iPad will not be available to patients'</li> <li>• Upfront cost to purchase the iPad's</li> <li>• iPad's must be sanitized in between each patient use</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>• Opportunities for program extension to other oncology clinics.</li> <li>• Opportunities to create other patient chemotherapy education videos and add to the iPads</li> <li>• Opportunity to standardize patient education to video</li> </ul>	<ul style="list-style-type: none"> <li>• Patient's may bring his/or her own device and not use Stanford's iPad</li> <li>• Patient's may walk off with the iPad</li> <li>• Patient's may damage the iPad</li> </ul>

**Appendix C: Budget****Project Budget**

			Total Cost
Apple iPad's x10 iPads	\$499 per iPad	\$6740.20.	\$6740.20
Amazon Prime Account x1 year	\$119.00		\$119.00
Total			\$6859.20

## Appendix D: GANNT Chart



## Appendix E

### Patient Satisfaction Questionnaire

We would like to hear from you. Please answer the following questions using the scale given below.

For each question, please choose a number from 1-7 and write it on the line next to each statement to indicate your answer.

1) Did any of the options given on the iPad make the wait time pass faster?

1	2	3	4	5	6
Strongly agree	Agree	Slightly agree	Slightly disagree	Disagree	Strongly disagree

2) Which option did you use to pass the time while waiting?

1	2	3	4
Watch a video/movie	Listen to music	Play a game	Used your own device

3) Compared to your previous visits, did any of these options make the wait time pass more quickly?

1	2	3	4	5	6	7
Strongly agree	Agree	Slightly agree	Slightly disagree	Disagree	Strongly agree	N/A

4) Do you have any suggestions to make the wait time more bearable?

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Survey Number:
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**Appendix F****Tagrisso Therapy Post-video Knowledge Test**

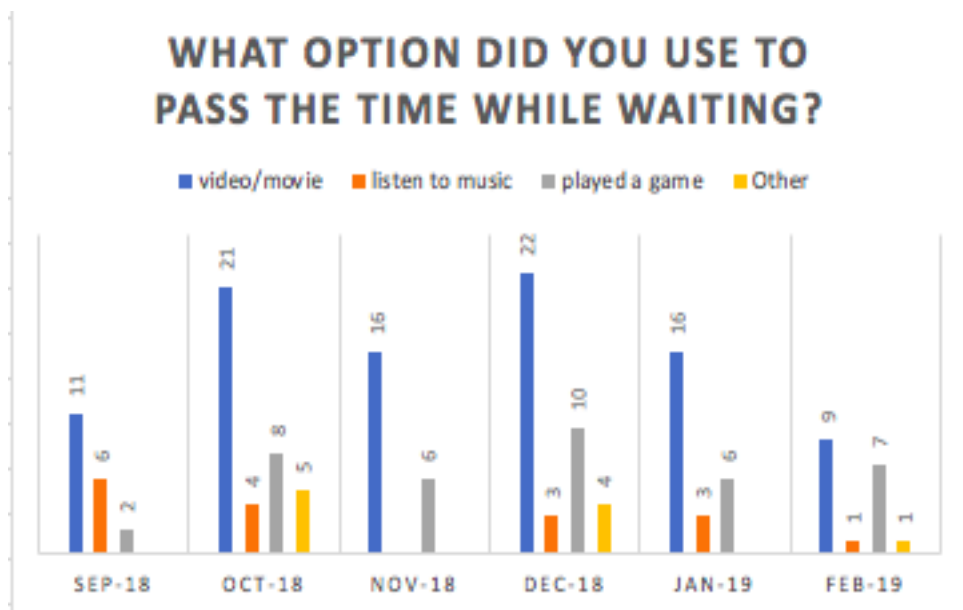
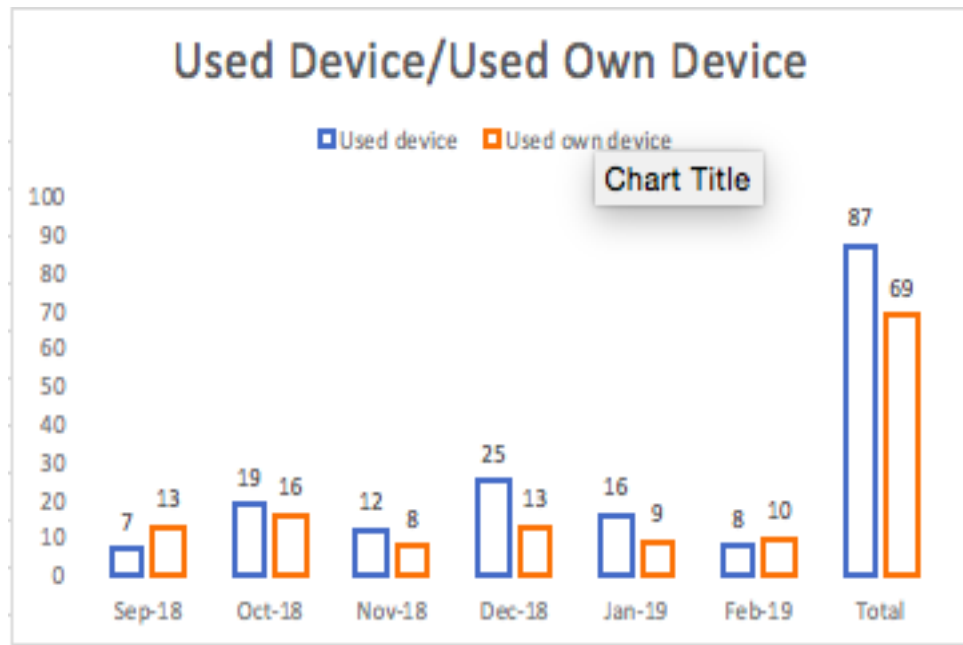
- 1.) Why are you taking Tagrisso?
  - a. To treat my shortness of breath
  - b. To treat my EGFR mutated Lung Cancer
  - c. To treat my cough
  - d. All the above
  - e. I am not sure
- 2.) How often should you take Tagrisso?
  - a. Once per day, at the same time each day
  - b. Once per week, at the same time each week
  - c. Twice per day
  - d. All of the above
  - e. I am not sure
- 3.) What are some potential side effects of Tagrisso?
  - a. Dry skin and changes in your nails
  - b. Rash and mouth sores
  - c. Diarrhea, decreased appetite, and fatigue
  - d. All of the above
  - e. I am not sure
- 4.) How often will I need to have my blood drawn while taking Tagrisso?
  - a. Before I start the medication
  - b. Two weeks after I start the medication
  - c. Six weeks after I start the medication
  - d. All of the above
  - e. I am not sure
- 5.) I should contact my doctor right away when...
  - a. If I have shortness of breath that worsens after starting therapy
  - b. If I develop a fever of 100.4 or greater after starting therapy
  - c. If I feel like my heart is pounding or I develop swelling of my ankles or feet after starting therapy
  - d. All of the above
  - e. I am not sure

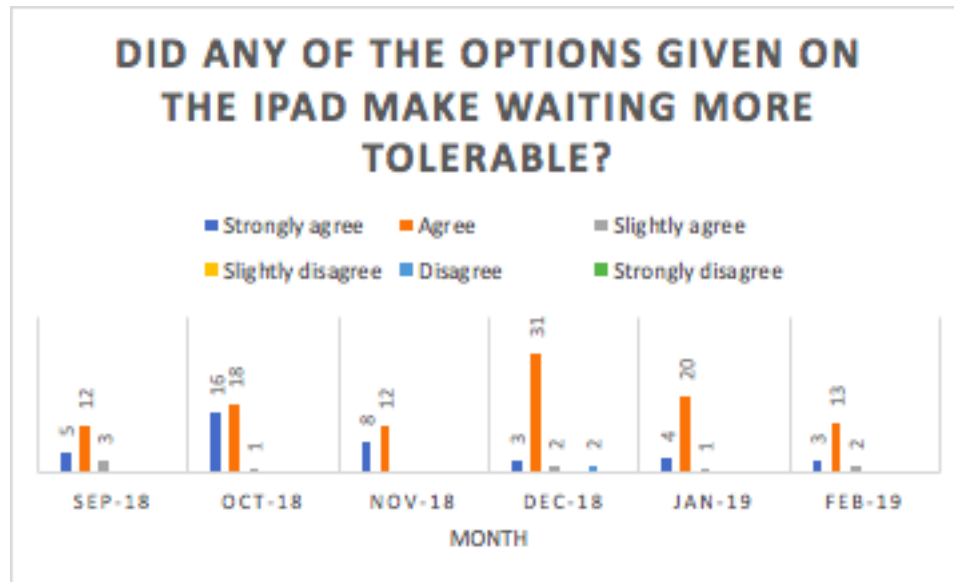
Survey Number:
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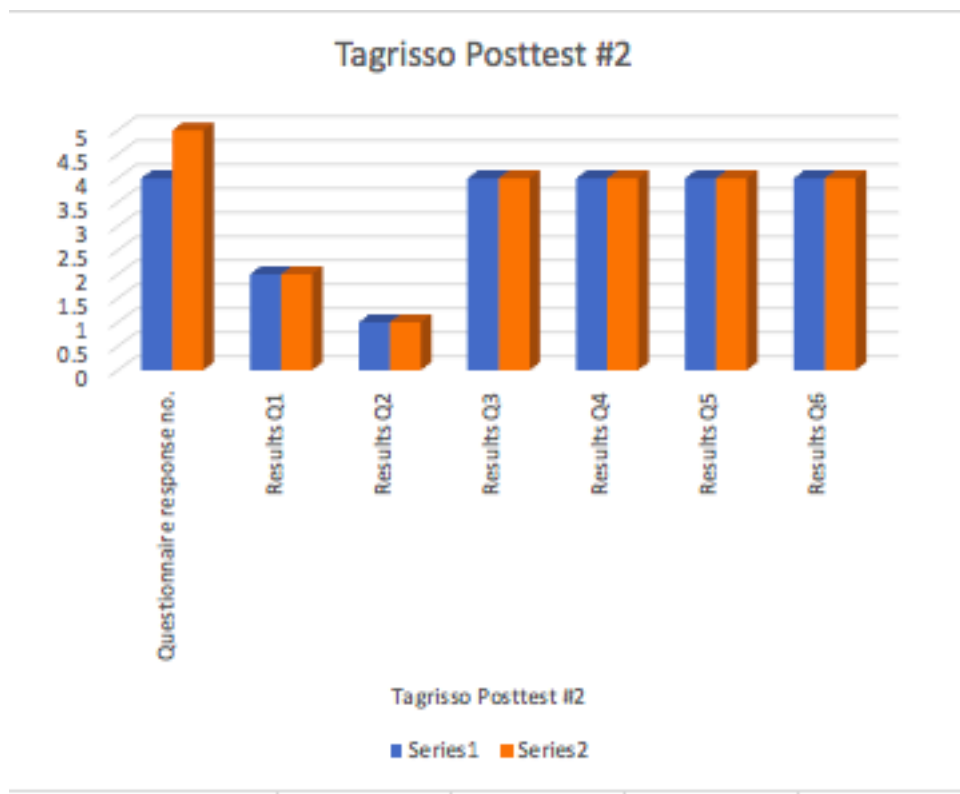
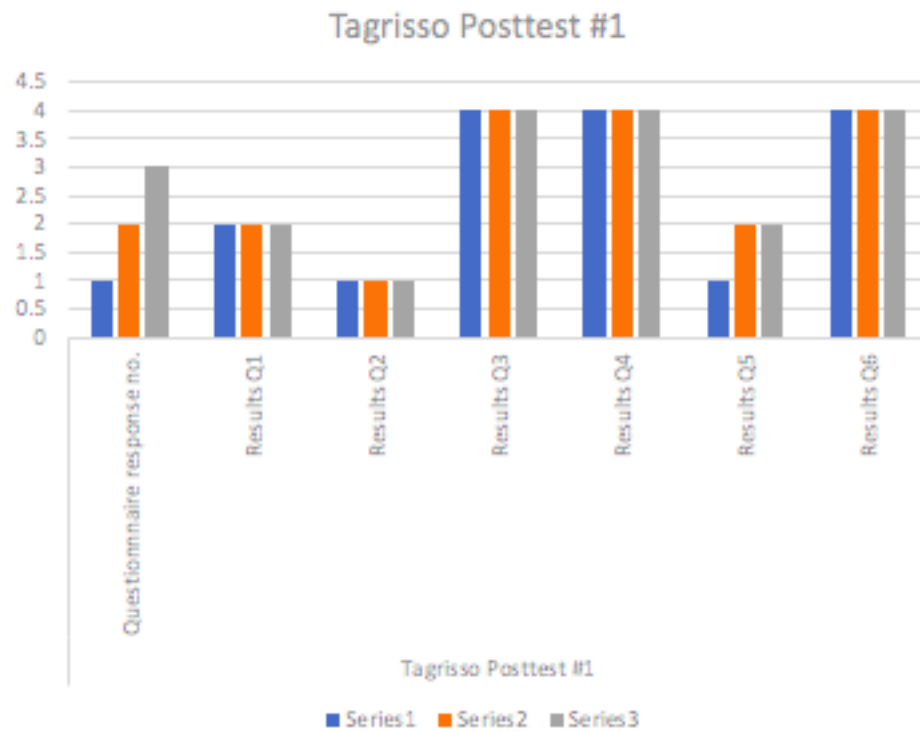
**Appendix G****Osimertinib (Tagrisso) Post-video Knowledge Test #2**

- 1.) Why are you taking Osimertinib (Tagrisso)?
  - a. To treat my shortness of breath
  - b. To treat my EGFR mutated Lung Cancer
  - c. To treat my cough
  - d. All the above
  - e. I am not sure
- 2.) How often should you take Osimertinib (Tagrisso)?
  - a. Once per day, at the same time each day
  - b. Once per week, at the same time each week
  - c. Twice per day
  - d. All of the above
  - e. I am not sure
- 3.) What are some potential side effects of Osimertinib (Tagrisso)?
  - a. Dry skin and changes in your nails
  - b. Rash and mouth sores
  - c. Diarrhea, decreased appetite, and fatigue
  - d. All of the above
  - e. I am not sure
- 4.) What should I avoid while taking Osimertinib (Tagrisso)?
  - a. Grapefruit- but all other foods are ok
  - b. Zofran and other anti-nausea medications without speaking with my care team first
  - c. Herbal supplements without speaking with my care team first
  - d. All of the above
  - e. I am not sure
- 5.) What tests will I need to have prior to starting Tagrisso?
  - a. Labs (blood draw)
  - b. Echocardiogram
  - c. EKG
  - d. All of the above
  - e. I am not sure
- 6.) I should contact my doctor right away when...
  - a. If I have shortness of breath that worsens after starting therapy
  - b. If I develop a fever of 100.4 or greater after starting therapy
  - c. If I feel like my heart is pounding or I develop swelling of my ankles or feet after starting therapy
  - d. All of the above
  - e. I am not sure

## Appendix H



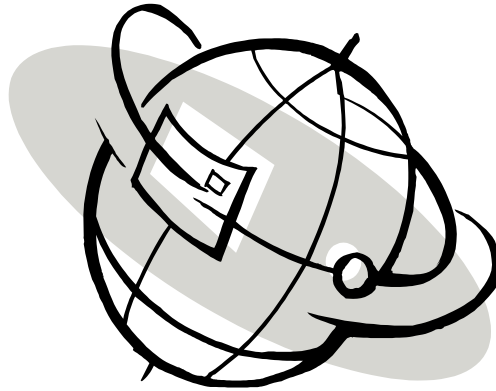




**Appendix I**

Be our guest and please use our iPads during your visit!

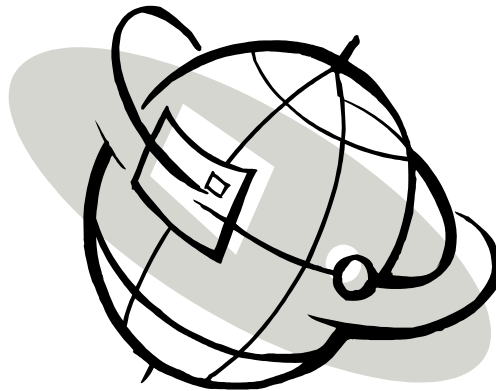
*Pass Code 2019 to open the iPad.*

**iPad options:**

- 1) Watch movies or shows with Amazon Prime Video
- 2) Listen to music with Amazon Prime Music.
- 3) Play a game using one of our available game Apps.

Be our guest and please use our iPads during your visit!

*Pass Code 2020 to open the iPad.*



**iPad options:**

- 4) Watch movies or shows with Netflix- just click on the App and sign in with your Netflix account if you have one.
- 5) Listen to music on Pandora-just click on the App and sign in with your Pandora account if you have one.
- 6) Watch the news
- 7) Play a game

**Code to unlock iPad is 2020**

[illegible]



## Appendix K

**DISTRIBUTING IPAD TABLETS DURING CLINIC**

- 1) Once the patient is roomed and vital signs are taken, the MA can give the patient the iPad flyer and offer an iPad to a patient and family while they are waiting in the exam room. Please explain the options that are available on the iPad which are also written on the flyer.
- 2) If the patient decides they would like to use an iPad:
  - Please go to the clinic room and take one of the iPads from the storage unit in Workroom B and record the **device identification number** located on the iPad onto the check out sheet along with the **name of the patient** and **date** the iPad is taken out of the storage location.
  - Bring the iPad back to the patient and ask them to return the iPad at the end of the clinic visit to either the MA when they exit, **OR** give the iPad to the Provider at the completion of his/or her appointment.
  - Once the iPad has been returned to the clinic room, record on the iPad sign out sheet the time it has been returned under 'time returned' and your initials.
  - Please use a sani-cloth to clean the iPad and iPad cover after each patient use.
- 3) DO NOT GIVE OUT IPADS AFTER 4PM
- 4) PLEASE LOCK THE IPADS BACK UP IN THE STORAGE UNIT IN WORKROOM B AFTER USE. THE KEY WILL BE LOCATED IN THE OFFICE SUPPLY CABINET ON A HOOK.

## Appendix L

Evaluation Table

Citation	Conceptual Framework	Design/ Method	Sample/ Setting	Variables Studied and Their Definitions	Measurement	Data Analysis	Findings	Appraisal: Worth to Practice
Armstrong et al., 2011	None	RCT	N=83/patient home or doctors office	1.assessment of sun protective behaviors 2. assessment of sunscreen knowledge 3. satisfaction survey 4. study endpoints and statistical analysis	Satisfaction survey- 10-point scale  Graphpad Prism 4.0  t-tests	1. Two-tailed tests were performed for all statistical analysis.  2. Unpaired Student t-test was used to analyze continuous variables 3. Paired t-tests were used to analyze cont. variables in pre- and post study comparisons for categorical variables	The post test that the pamphlet group demonstrated considerable improvement in their sunscreen knowledge ( $7.6 \pm 1.2$ , $p < 0.001$ ), but did not show improvement in their sunscreen usage and only used sunscreen $2.4 \pm 3.0$ days per week ( $p = 0.058$ ) following the pamphlet intervention.	Limitations: The avg education of participants is higher than the American public.  This study was limited to adults only.  Critical Appraisal Tool & Rating: John Hopkins Research Appraisal Tool Level I and “B” rating

Citation	Conceptual Framework	Design/Method	Sample/Setting	Variables Studied and Their Definitions	Measurement	Data Analysis	Findings	Appraisal: Worth to Practice
Belieni, et. al. 2006	None	RCT	N= 69 children aged 7–12 years undergoing venipuncture	Main pain levels rated by the children and main pain levels rated by mothers of the children.	Oucher scale, a validated visual pain scale scoring from 0 (no pain) to 100 (maximum pain). The Oucher scale is used to assess pain intensity in children as young as 3 years old and includes two separate scales.	The data were analyzed using the Mann-Whitney test with GraphPad InStat 3.05 software (Graph Pad Software, San Diego, CA).	Main pain levels rated by the children were 23.04 (standard deviation (SD) 24.57), 17.39 (SD 21.36), and 8.91 (SD 8.65) for the C, M, and TV groups, respectively. Main pain levels rated by mothers were 21.30 (SD 19.9), 23.04 (SD 18.39), and 12.17 (SD 12.14) for the C, M, and TV groups, respectively.	Limitations: this study was not blinded  Critical Appraisal Tool & Rating: John Hopkins Research Appraisal Tool Level I and “B” rating

Citation	Conceptual Framework	Design/Method	Sample/Setting	Variables Studied and Their Definitions	Measurement	Data Analysis	Findings	Appraisal: Worth to Practice
Bol et al., 2012	Cognitive theory	Experimental	N=169/setting in a place that there is internet access and access to a computer	1.Website satisfaction 2.Recall of cancer-related information 3.Patient characteristics	Power analysis with alpha set at .05 effect size at .25 and probability level of .80  Web Satisfaction Scale  The Netherlands Patient Information Recall Questionnaire	Descriptive statistics were used to describe the samples characteristics. F-statistics and chi-statistics  ANOVA's were conducted with satisfaction with comprehensibility, satisfaction with attractiveness, satisfaction with emotional support, and recall of information as dependent variables	Text with personalized audiovisual information can enhance website satisfaction and information recall.	Limitations: 1.Did not include a personalized text only condition 2.Questionnaire administered online only  Critical Appraisal Tool & Rating: John Hopkins Research Appraisal Tool Level I and "A" rating

Citation	Conceptual Framework	Design/ Method	Sample/ Setting	Variables Studied and Their Definitions	Measurement	Data Analysis	Findings	Appraisal: Worth to Practice
Choe et al., 2009	None	RCT	N=128 adult deaf women  Article is unclear as to where the setting for this study is located	1.General cancer knowledge 2.Cervical cancer knowledge	Survey/ Questionnaire	SPSS version 14.0  ANOVAs were run to test for overall cervical cancer knowledge and general cancer knowledge	The participants in the experimental arm who viewed the ASL cervical education video in general had higher scores on the posttest survey regarding cervical cancer (both immediate information retention and 2 months' post intervention) than the control group	Limitations: 1.one limitation is that the study did not address the overall cancer screening behaviors of women 2.A second limitation is that this study used one specific geographical location and the study cannot be generalized  Critical Appraisal Tool & Rating: John Hopkins Research Evidence Appraisal Tool this study was rated level I with a quality rating of "A".

Citation	Conceptual Framework	Design/ Method	Sample/ Setting	Variables Studied and Their Definitions	Measurement	Data Analysis	Findings	Appraisal: Worth to Practice
Lin et. al., 2011	None	RCT and permuted block design	N= 98/ outpatient chemotherapy clinic at a University medical center in southern Taiwan	Anxiety Levels	Spielberger State-Trait Anxiety Instrument, Emotional Visual Analog Scale, three biobehavioural indicators: skin temperature, heart rate and consciousness level were measured during and after chemotherapy.	SPSS	Both music and verbal relaxation therapy are effective in reducing chemotherapy-induced anxiety.	Critical Appraisal Tool & Rating: John Hopkins <i>Research Evidence Appraisal Tool</i> this study was rated level I with a quality rating of "A".

Citation	Conceptual Framework	Design/ Method	Sample/ Setting	Variables Studied and Their Definitions	Measurement	Data Analysis	Findings	Appraisal: Worth to Practice
Karunakaran et. al., 2016	None	Experimental	N=72/ physician office	1.Knowledge questionnaire on Gastroscopy (pre and post test) 2.Self-evaluation questionnaire on anxiety 3.Physiological response assessment tool 4.Behavioral response checklist	Knowledge Questionnaire  Demographic Profile  Self-evaluation Questionnaire on Anxiety  Physiological response assessment tool  Behavioral response checklist  Knowledge questionnaire  State-Trait anxiety inventory	t- test values  statistically significant at the level $p<0.001$ and $p<0.005$	1.Both the experimental and control group had inadequate knowledge during the pre-test. 2. 78% of the participants in the experimental group had adequate and an increase in knowledge, compared with 75% of the participants in the control group. 2. The mean score of anxiety in the experimental group decreased from 42.83 to 35.75 compared to the control group whereas the mean number increased from 43.77 to 44.86.	Critical Appraisal Tool & Rating: John Hopkins Research Appraisal Tool Level II and “A” rating

<b>Citation</b>	<b>Conceptual Framework</b>	<b>Design/Method</b>	<b>Sample/Setting</b>	<b>Variables Studied and Their Definitions</b>	<b>Measurement</b>	<b>Data Analysis</b>	<b>Findings</b>	<b>Appraisal: Worth to Practice</b>
<b>Silverman et. al., 2012</b>	<b>None</b>	<b>Quasi-experimental</b>	<b>N= 66/ university clinic waiting room</b>	<b>Live music condition versus non music condition in the university clinic waiting room</b>	<b>18 Likert-type scale questionnaire focused on questions concerning: 1)patient satisfaction with check-in, 2)patient recommendations to family or friends</b>	<b>MANOVA, Wilks Lambda, t-tests</b>	<b>Patients in the waiting room gave higher positive satisfaction ratings after the live music condition (n=52) than the no music control (n=14).</b>	<b>Critical Appraisal Tool &amp; Rating: John Hopkins Research Appraisal Tool Level II and “B” rating</b>



Citation	Conceptual Framework	Design/ Method	Sample/ Setting	Variables Studied and Their Definitions	Measurement	Data Analysis	Findings	Appraisal: Worth to Practice
Shabai k et al., 2010	None	RCT	N=144 deaf adult participants  Article is unclear as to where the setting for this study is located	1.General cancer knowledge 2.Colorectal cancer knowledge	Knowledge scales were created to test the general cancer items knowledge and colorectal knowledge	SPSS version 14.0  $P$ value- $p \leq 0.05$ is considered significant  Chi-square tests	1.The experimental arm demonstrated a significant increase in general cancer (mean change 5.6) and in CRC (mean change 8.4) following the post-test when compared to the control group who did not have significant change in general cancer understand (mean change 4.5) or CRC (mean change 3.9).	Critical Appraisal Tool & Rating: John Hopkins Research Evidence Appraisal Tool this study was rated level I with a quality rating of "A".

Citation	Conceptual Framework	Design/ Method	Sample/ Setting	Variables Studied and Their Definitions	Measurement	Data Analysis	Findings	Appraisal: Worth to Practice
Privitera et. al., 2014	None	Non-experimental	N= 84 undergraduate students/Life Fitness Gym	1)Enjoyable TV distraction + exercise, 2)Not enjoyable TV distraction + exercise, 3)Exercise only with no TV distraction, 4)Enjoyable TV distraction with no exercise	1)Tread mill, 2)Video clip, 3)Mood and arousal ratings	ANOVA, Tukey's HSD	Within group comparisons also showed that Group ED + Exercise (95% CI 1.58, 2.99), and Group Exercise Only (95% CI 0.61, 1.46) significantly increased the intensity of pleasant mood post-exercise. No change in the intensity of pleasant mood was evident in Group NED + Exercise (95% CI - 1.23, 0.18), and Group ED Only (95% CI - 0.23, 1.18).	Critical Appraisal Tool & Rating: John Hopkins Research Evidence Appraisal Tool this study was rated level III with a quality rating of "B".

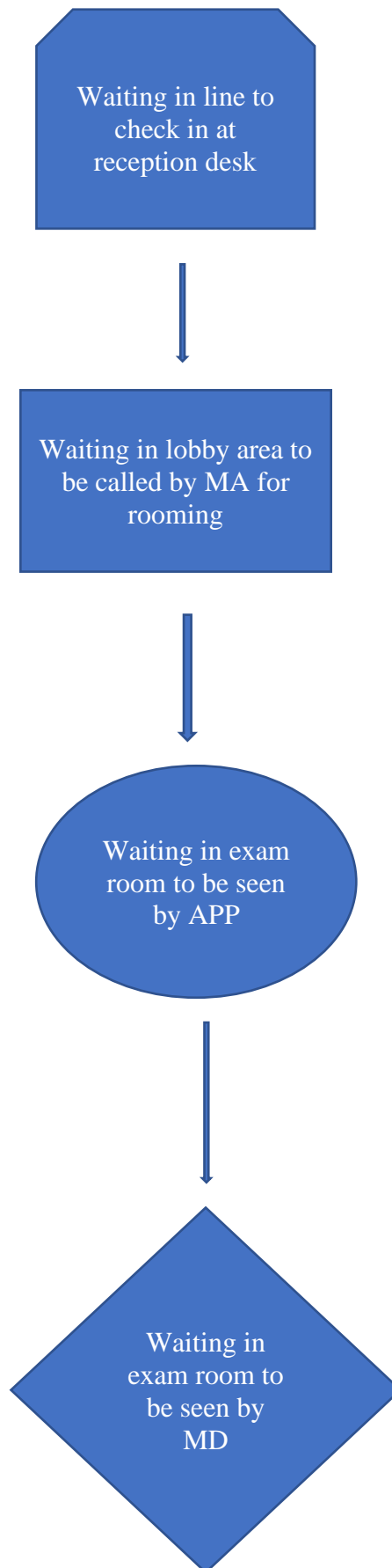
Citation	Conceptual Framework	Design/Method	Sample/Setting	Variables Studied and Their Definitions	Measurement	Data Analysis	Findings	Appraisal: Worth to Practice
Wischer et al. (2018).	Quasi	Survey/questionnaire	n=224/hospitalized patients on cardiac unit	1)Patient knowledge 2)Patient satisfaction	A video delivered via an iPad was used to provide adjunct discharge education to patients who underwent percutaneous coronary intervention procedures and were on the 24-hour overnight post-recovery unit.	1)paired t-test 2)Fischer test 3) descriptive statistics	1)improvement in patient knowledge from a pretest mean of 88.97 to a posttest mean of 96.62. 2)patient satisfaction level of 98% with use of education	Strengths: Large sample size  <b>Critical Appraisal Tool &amp; Rating:</b> <i>John Hopkins Non-research Evidence Appraisal Tool Level IVA</i>

Citation	Conceptual Framework	Design/Method	Sample/Setting	Variables Studied and Their Definitions	Measurement	Data Analysis	Findings	Appraisal: Worth to Practice
Moshtaghi et al. (2017)	Randomized control	Survey/questionnaire/pre and post survey questionnaires	n=66/outpatient neurology clinic	1) Surveys with Likert Scale to assess patient's technological comfort with the iPad.  2) patient understanding of their condition and potential treatments	1) iPad with iBooks corresponding to patient pathology  2) pre-survey and post-survey	Paired t-test	Patients that did not receive the iBook and received education only from the physician, were observed to have lower gains in both perception and factual knowledge. This was compared to gains from the group that received iBook supplementation.	Strengths: Large sample size  <b>Critical Appraisal Tool &amp; Rating:</b> <i>John Hopkins Non-research Evidence Appraisal Tool</i> Level IVA

Citation	Conceptual	Design/Method	Sample/Setting	Variables Studied	Measurement	Data Analysis	Findings	Appraisal: Worth to Practice
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	Framework			and Their Definitions				
Morgan et al. (2015)	Pilot study	Questionnaire	n=25/outpatient cancer center	1) patient satisfaction 2) patient knowledge	Knowledge retention was assessed by a 5-item questionnaire that tested understanding of the basic information conveyed during the presentation, including the goals of adjuvant systemic therapy, common side effects of treatment, and symptoms that should lead the patient to seek medical attention. The questions were presented in a multiple choice format, with 4 response options each.	Descriptive statistics for the demographic and clinical characteristics of the patients were calculated using IBM SPSS Statistics.	Correct answers to all questions related to treatment knowledge were given by 22 patients (88%).  Satisfaction with the clinic visit was high (mean satisfaction score: 4.53 $\pm$ 0.1 of a possible 5).	<b>Critical Appraisal Tool &amp; Rating:</b> <i>John Hopkins Non-research Evidence Appraisal Tool Level IVA</i>

## Appendix M



## Appendix N

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**\*\*\*Email from IRB Manager at Stanford indicating that my project did not need IRB approval and is considered QI**

From: tkhap@stanford.edu <tkhap@stanford.edu>  
Sent: Wednesday, July 25, 2018 6:01 PM  
To: Lough, Mary <MLough@stanfordhealthcare.org>  
Subject: HSR Form Processed 47258, Mary Lough

Protocol Number: 47258 (NEW)

Review Type: HSR

Protocol Director: Lough

Department: Med/Primary Care and Population Health Protocol Title: Distraction To Improve Patient Satisfaction with Outpatient Clinic Waiting times

Thank you for your submission. On the basis of the information provided, the IRB has determined that this project does not meet the definition of human subject research as defined in federal regulations 45 CFR 46.102 or 21 CFR 50.3. No further IRB review is required. Please see your HSR application form in eProtocol for the completed determination and any additional instructions.

Thank you,

Tessa Kennedy Hapanowicz

IRB 98 Manager

email: tkhap@stanford.edu

phone: (650) 725-0650

## Appendix O

July 1, 2019

To Whom It May Concern,

This letter is to confirm the Thoracic Oncology Department's support of Tiffany Brown's Quality Improvement Project: Entertainment options and/or Education via iPad Project To Improve Patient Satisfaction with Outpatient Clinic Waiting Times. The Entertainment Project commenced as a pilot August 2018 through February 2019 and will continue with the addition of an education prezi presentation video beginning August 2019.

If you have any questions, feel free to contact me.

Best,



Samjit Takaki RN, BSN, MBA

Clinical Operations Manager, Stanford Cancer Center

875 Blake Wilbur Drive

Palo, Alto, CA 94305

MailCode 6512

Office 650-498-8481