



Discharge Education for Pediatric Post-Operative Pain after Spinal Surgery

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Discharge Education for Pediatric Post-Operative Pain after Spinal Surgery

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Abstract

Background: Many pediatric orthopedic surgeries require legitimate opioid prescriptions for pain control, however caregivers report they do not have adequate discharge teaching.

Integrating videos into discharge processes shows promise in increasing patient and caregiver comprehension and satisfaction of discharge education.

Purpose: The purpose of this quality improvement project was to standardize discharge teaching by developing an educational video for caregivers on how to manage their child's post-operative pain after spinal surgery.

Methods: An educational video was created and viewed by caregivers at the DNP project site. Outcomes were measured through brief questions asked to caregivers after viewing the video to assess understanding and preparedness to care for their child's pain after discharge. A REDCap survey was given to staff nurses to assess video quality and ease of integration of the video into current the discharge process.

Results: One hundred percent of caregivers (n=5) who responded to the questions after viewing the video felt more prepared to care for their child's pain at home. REDCap survey results demonstrated 100% of nurses (n=15) felt that the video was easy to incorporate into the discharge process, 93.7% (n=15) felt more confident in their discharge teaching, and 86.6% (n=13) felt that the video was not too long. Video quality was deemed successful with a greater than 80% of quality indicators receiving a good or exceptional rating.

Conclusion: With the use of a patient education video, nurses felt more confident in their discharge teaching and caregivers felt more prepared to care for their child's pain at home.

Keywords: pediatric pain, discharge education, discharge teaching, video, analgesics, opioids

Discharge Education for Pediatric Post-Operative Pain after Spinal Surgery

Introduction

Effective pain management after pediatric spinal surgery can be a challenge for patients and their families. Not only is it important to have adequate pain control during the hospitalization, but it is equally as important to have safe and optimal pain control after discharge. Most children after major spinal procedures require legitimate opioid prescriptions. Pediatric patients must rely on their caregivers to determine when and what types of pain medications are given. A notable gap in practice is that caregivers are often confused by the discharge instructions given at the hospital. They are unclear how to manage their child's pain medications once at home, which prompts numerous phone calls for additional education and clarification. Lack of knowledge of pain medications can lead to unmitigated pain, and pose additional safety risks to patients such as increased adverse side effects, improper use, dosing, or storage (Allen et al. 2017; Dowell, Haegerich, & Chou, 2016; Gaither et al., 2016; Garbutt, Kulba, Dodd, Sterkel, & Plax, 2018; Glick et al., 2017; Grant et al., 2016; Kann et al., 2018; Meich et el., 2015).

Background

The opioid epidemic in the United States has become a considerable public health concern. In 2016, the Centers for Disease Control and Prevention (CDC) reported that approximately 165,000 people died during the years 1999-2014 from an opioid drug overdose (Dowell et al., 2016). The pediatric population is also at risk from opioid abuse. The CDC's 2017 Youth Risk Behavior Surveillance reported that 14% of 14,765 high school students surveyed admitted to misusing opioids (Kann et al., 2018). In 2015, Meich, Johnston, O'Malley, Keyes, and Heard surveyed over 6,000 senior high school students looking for risk factors for opioid

misuse. It was found that there was a 33% increased risk for misuse among teens that received prescribed opioids prior to high school graduation (Meich et al., 2015).

Having an opioid prescription in the home can also expose younger children and adolescents to poor secondary outcomes, both intentional and unintentional. Allen et al. (2017) looked at 188,468 opioid exposures reported to the Poison Control Center in the United States during the years 2000-2015. Children aged 0 to 5 had the greatest exposure to unintentional ingestion of opioids, most often due to access of opioids through improper storage. Teenagers had the second highest exposure to opioids, and approximately 60% of those exposures were intentional. Gaither, Leventhal, Ryan, and Camenga (2016) found that between the years 1997-2012 opioid poisoning hospitalizations rose 165% among children aged 1 to 19.

Almost all children who undergo spinal fusion surgery require opioids for post-operative pain control. The length of time a child requires opioids and non-opioid pain control medications can vary, but it is crucial that healthcare providers ensure that opioids are being prescribed according to current guidelines. The CDC's chronic pain recommendations (2016) are indicated for persons greater than 18 years of age with chronic pain, however they parallel the American Pain Society's (APS) guidelines on the management of post-operative pain recommendations which promote using minimum effective dose of opioids, and increased use of non-opioid pain management strategies such as acetaminophen and ibuprofen when managing pain (Chou et al., 2016; Dowell et al., 2016).

Lack of standardization and opioid prescribing discrepancies has been seen among pediatric orthopedic providers. There is a need for standardized post-operative opioid prescribing practices based on surgical procedure. Iobst, Singh, and Yang (2018) did a retrospective chart review looking at 1000 patients aged 0-18, who underwent orthopedic surgery. Prescriptions

written by residents and physician assistants gave patients higher number of doses in comparison to nurse practitioners and attending physicians. Patients received a generalized number of doses of opioids regardless of type of orthopedic surgery that they underwent. Furthermore, those patients who received opioids in tablet form were prescribed for more doses than if they received liquid form.

Discharge education provided to caregivers about their child's pain medications while in the hospital is critical to ensure optimal pain control and proper pain medication management once discharged. The 2011 Institute for Healthcare Improvement (IHI) guide to prevent adverse drug events with medication reconciliation, APS Guidelines on the management of postoperative pain (Chou et al., 2016), and the 2017 Agency for Healthcare Research and Quality IDEAL discharge planning strategy (AHRQ) recommend that discharge education should be patient and family centered and occur continuously throughout the hospitalization. The IHI (2011) emphasizes that medications reviewed during the discharge process must be reconciled and accurate.

Knowledge assessments of a child's caregiver need to occur during the hospitalization to ensure that patients and their caregivers have a clear understanding of their discharge instructions and medications. Berry et al., (2014) recommends a pediatric discharge framework in which key components of a discharge should include: written discharge instructions at the appropriate reading level and primary language, complete reconciliation of medications and health information, and an affirmation of an understanding of the discharge instructions and medications through assessment methods such as the teach-back method.

Problem Statement

Lack of standardized discharge pain management education provided by nurses to pediatric patients and their families after orthopedic surgery can lead to adverse pain medication side effects, poor pain control, opioid misuse, and undue parental stress; as indicated by parental reports of inconsistencies among discharge teaching provided on how to manage their child's pain after discharge. By providing additional education to caregivers through the development of an educational video, improvements could be made in caregiver knowledge and preparedness to care for their child after spinal surgery.

Organizational “Gap” Analysis of Project Site

A gap analysis was done of the project site utilizing the AHRQ’s gap analysis tool (2017). It has been observed that many caregivers lack an understanding of how to manage their child’s post-operative pain once they have been discharged from the hospital. Caregivers call the orthopedic department expressing confusion in regard to the pain management instructions the discharging nurse discussed at the time of discharge. Deviations from best practices include discharging nurses not utilizing the same family education sheets available within the hospital when discharging a patient after spinal surgery. Additionally, residents and fellows who rotate on a regular basis do not always include non-opioid pain control medications such as acetaminophen and ibuprofen on the discharge medication list. Caregiver lack of knowledge and inconsistent discharge instructions represent a safety concern and potential poorer outcomes by patients who have increased pain (Allen et al. 2017; Dowell et al., 2016; Gaither et al., 2016; Garbutt et al., 2018; Glick et al., 2017; Grant et al., 2016; Kann et al., 2018; Meich et el., 2015).

The practice solution identified to improve discharge pain medication management teaching was to develop an educational video. It was anticipated that the video would help standardize the discharge post-operative pain medication instructions that patients and caregivers

receive prior to leaving the hospital. Best practice strategies using educational videos as part of the discharge process have been shown to improve patient and caregiver knowledge and satisfaction (Botngard et al., 2013; Golden-Plotnik, et al., 2018; Ismail et al., 2016; Newnham et al., 2017). In addition, caregiver involvement and understanding of a patient's medication list is an integral part of the IHI's (2011) prevention strategy to avoid adverse drug events with accurate medication reconciliations.

A gap analysis was also performed utilizing a SWOT analysis (Bonnel & Smith, 2018; Davis-Ajami, Costa, & Kulik, 2014), the AHRQ gap analysis tool (2017), as well as the Precede-Proceed model (Porter, 2016). The internal strengths and facilitators of the project included developing a video in a large urban pediatric teaching hospital where there are many resources in place such as clinical experts from the pain team, pharmacy, and orthopedics. Additional facilitators included: a video design pathway already established from previously developed teaching videos within the hospital, current hospital use of the GetWellNetwork for educational videos, floor educator, Center for Families project manager, video editor, and graphic designer. Support for the QI project was elicited from the orthopedic spinal program, Center for Families project manager, DNP student nurse manager, and floor nurse manager.

Weaknesses and barriers to the proposed clinical site included: 84 staff nurses on the nursing unit who would have to integrate the video into their current discharge processes, rotating residents and fellows who are responsible for discharge paperwork and patient orders, and all video content must adhere to the hospital's marketing guidelines and patient education policies. External opportunities in addition to the DNP project site included the dire need to provide more education to caregivers and patients

about opioids and the use of non-opioid pain medication (Chou et al., 2016; Dowell et al., 2016). Threats identified to the project were patients and caregivers looking to other sources for information about pain management such as the internet, family, or friends that may not deliver accurate information. Additionally, potential discrepancies could occur among caregivers between post-operative pain control instructions and previous pain control strategies that may have been advised from other healthcare providers such as their pediatrician.

Review of the Literature

Literature was searched from the years 2013-2019 in the following databases: Academic Search Premier, Science Citation Index, Cumulative Index of Nursing and Allied Health (CINAHL), Academic Onefile, MEDLINE, Science Direct, Social Sciences Citation Index, PsycInfo, and ERIC. Searches were limited to peer reviewed journals, academic journals, and English language. Articles that were quality improvement projects or case studies were not included. Medical subject headings (MeSH) terms that were searched included *pain, patient education, patient discharge, nursing, and children*. Multiple combinations of terms were searched limiting to randomized control trial (RCT) or systematic review and meta-analysis. Those terms included: *pediatric pain management, discharge education, discharge teaching, pediatrics, patient education, children, patient teaching, video, and opioids*. PubMed was searched limited to RCT or systematic review and meta-analysis using the combination of terms: *pediatric pain, discharge, analgesics, pediatrics, children, discharge, and transitions of care*.

Databases were searched without limiting to RCT or systematic reviews and meta-analyses. Search terms included: *pain medication, children, patient education, opioid, patient education, misuse, pediatric, discharge, discharge education, transitions of care, nursing,*

nursing education, video, pain management, patient discharge, discharge teaching, discharge education, discharge instructions, and discharge planning. Guidelines were searched within the above databases with terms: *discharge guideline, pediatric, and patient education.* Guidelines for *pediatric pain, discharge teaching, and opioids* were searched within the CDC, IHI, and AHRQ websites.

Using the above search methods five RCT studies, two systematic reviews, and one quasi-experimental study was retained for review. In addition, one retrospective cohort study, two prospective cohort studies, one prospective observational study, two non-experimental survey analyses, one retrospective chart review, and one descriptive study were retained evaluated. In total there were a total of 17 articles retained for review, two guidelines, the IHI's how-to guide for best practices for medication reconciliation (IHI, 2011), and the AHRQ's IDEAL discharge planning strategy for care transitions (AHRQ, 2017). Johns Hopkins Medicine Evidence Level and Quality Guide (2017) was used to assess the quality of the evidence that was found in the retained articles in the literature review. Articles were included from levels 1, 2, and 3; but focus was given to articles that achieved evidence in level 1 or 2. The quality ratings for all articles were high or good quality.

Synthesis of the Evidence

Parent preferences and child personality related to pain management. Parental pain preferences and child temperament can contribute to pain management once a child is at home. Voepel-Lewis, Zkimund-Fisher, Smith, Zyzanski, and Tait (2015) conducted a prospective analysis that examined over 500 parents and their pain management preferences for their children. It was found that mothers and fathers varied in their personal preferences on how their

child's pain should be controlled, putting their children at risk for incorrect dosing of their pain medications and experiencing more adverse side effects of opioids.

Zolghadr, Fortier, Winkler, and Kain (2014) looked at the relationship between temperament and post-operative pain control among 268 children undergoing outpatient surgery known to cause severe pain post-operatively. It was found that a child's temperament, particularly increased emotionality was associated with the use of more post-operative doses of the pain medications acetaminophen, ibuprofen, and hydrocodone. Rullander, Lundstrom, Lindkvist, Hagglof, and Lindh (2016) looked at stress indicators before and after spinal surgery among 37 patients aged 13-18. Results showed that patients on post-operative day 3 had more pain if they had exhibited symptoms of anger, social issues, and attention concerns prior to surgery. It was further found that patients with increased pain on post-operative day 3 had increased levels of stress at the six to eight-month post-operative follow up.

Lack of caregiver knowledge of discharge teaching. Poor understanding of discharge instructions has been shown to have negative consequences. Glick et al. (2017) conducted a systematic review of 64 articles focused on parental knowledge of discharge instructions given when leaving the ER or inpatient unit. Studies reviewed showed that up to 48% of parents made mistakes in dosing their child's medications, and up to 40% of parents did not understand how to give as needed medications. Having a child that needed to be given multiple medications at home was a variable also associated with more medication errors.

Two recent studies looked at parental knowledge and disposal of opioids. In 2016, Grant et al. examined 72 parents with a child undergoing spinal surgery in a prospective cohort study. Thirty-three percent of parents stated that they were planning on keeping left over opioids for future use. Among parents who planned on disposing of their child's opioids, only 59% were

going to use approved disposal methods. Garbutt et al. (2018) analyzed 700 caregivers with children over 10 years of age in pediatric practices. Almost 35% of caregivers had an opioid prescription at home 30.6% of those caregivers did not know how to dispose of the medication.

Opioids given for acute post-surgical pain can also lead to chronic use. Harbaugh et al. (2018) did a retrospective cohort study looking at over 88,000 opioid naïve children aged 13 to 21 who underwent surgery and received an opioid prescription. Approximately 5% of those patients required a refill of their opioid prescription 90 days after their surgery.

Provider education. Opioid need and emphasis on giving non-opioid medications after pediatric orthopedic surgery needs to be considered by providers when prescribing pain medications. In 2017, Poonai et al. conducted a randomized control study comparing oral morphine to ibuprofen after outpatient orthopedic surgery. A total of 154 children aged 5 to 17 were included in the study; half of the children received oral morphine for pain control at home and the other half received ibuprofen. It was found that there was no difference in efficacy in pain control between the morphine and ibuprofen. Children who had taken the morphine reported having more side effects such as somnolence and nausea.

Costello and Thompson (2015) looked at nurse opioid education with a descriptive study of 331 nurses. Nurses who had received previous opioid education had significantly higher opioid knowledge, in comparison to nurses who had not received the education. Similarly, Costello, Thompson, Aurelien, and Luc (2016) conducted a quasi-experimental study looking at opioid knowledge among 73 inpatient nurses and 193 patients. Significant increases of opioid knowledge were seen among the nurses that received the additional education about opioids, as well as the patients that those nurses had discharged.

Video use and discharge education. Videos shown to caregivers at the time of discharge show promising benefits in increasing knowledge of pain medications and discharge instructions. Ismail et al. (2016) completed a pilot RCT involving 52 parents who had children discharged from the emergency room. Higher levels of understanding of their child's diagnosis and care after discharge were seen with families that received additional video instructions. Botngard, Skranes, Skranes, and Dollner (2013) conducted a RCT in Norway looking at parental anxiety, nursing care, and health educational material provided to parents with hospitalized children. Intervention groups who received videos in addition to written instructions, demonstrated an increased satisfaction with discharge teaching materials.

Zhu et al. (2018) conducted a RCT of a 152 parent-child pairs after a surgical procedure in Singapore to determine best discharge teaching approaches for post-operative pain control after discharge. Parents in the intervention groups who received additional education about their child's pain management with both in person education and videos used more non-pharmacologic pain relief strategies such as distraction, massage, or cold or heat therapies.

Newnham et al. (2017) completed a systematic review with 30 articles analyzing best practices for discharge communication among patients and providers. Among the articles reviewed, patients showed a better understanding of their discharge instructions when videos were used. Similarly, Golden-Plotnik et al. (2018) conducted a RCT among 311 children, aged 0-17 treated for a non-operative orthopedic fracture in an emergency room. Caregiver knowledge of pain management instructions given prior to discharge from the emergency room was examined. It was shown that the caregiver groups that received video or web-based modules for discharge instructions for pain management had a greater increase in knowledge than the standard of care group which received only verbal discharge instructions.

Guidelines for patient discharge and pain management. Guidelines reviewed included the 2011 IHI's guide to prevent adverse drug events with medication reconciliation, the CDC guideline for prescribing opioids for chronic pain (Dowell et al., 2016), AHRQ IDEAL discharge planning strategy (2017), and the APS Guidelines on the management of postoperative pain (Chou et al., 2016). The IHI, APS, and the AHRQ discharge strategy recommend that discharge education should be patient and family centered throughout the hospitalization (AHRQ, 2017; Chou et al., 2016; IHI, 2011). Medications reviewed during the discharge process should be reconciled and accurate (IHI, 2011). The CDC's chronic pain recommendations are aligned with the APS postoperative pain management guidelines that stress using the least effective dose of opioids, and increased use of non-opioid pain management strategies such as acetaminophen and ibuprofen (Chou et al., 2016; Dowell et al., 2016). The APS guidelines (2016) also recommend the use cognitive-behavioral modalities for pain control.

Discussion

Findings of this literature review support the need for more pain management education given to caregivers at the time of discharge. There are significant patient safety risks associated with lack of education about discharge pain medications; such as incorrect dosing (Glick et al., 2017). Children can also be at risk for improper dosing of their pain medications due to parental personal pain control preferences (Voepel-Lewis et al., 2015). Unused opioids are being stored after they are needed, and parents are unclear of proper disposal (Garbutt et al., 2018; Grant et al., 2016). Caregivers need to be aware of underlying personalities of their child such as increased emotionality or stress that could lead to more pain after surgery and increased pain

medication doses given (Rullander et al, 2016; Zolghadr et al., 2014). The APS post-operative pain guidelines (Chou et al., 2016) recommend using non-pharmacologic strategies such as cognitive-behavioral modalities. Although the recommendations for cognitive-behavioral modalities were made for adult patients, concepts can be extrapolated for pediatric patients. Caregivers with children with known pre-operative emotionality or stress symptoms could be provided with distraction techniques such as music or guided imagery that could help with coping and pain after surgery.

More pain management education could be beneficial to staff nurses who provide discharge teaching to patients. Costello et al. (2016) showed promising results with increased nurse and patient opioid knowledge after nurses received further education about opioids. Nurses were also found to have an increased opioid knowledge if they attended a past educational session about opioids (Costello & Thompson, 2015). With the incorporation of educational videos into the discharge teaching, nurses could feel more confident in their knowledge leading to increased caregiver knowledge. More education would be provided to residents, fellows, and providers who prescribe discharge pain medications with the video for there would be an emphasis on prescribing non-opioid pain medications for post-operative pain (Chou et al., 2016; Dowell et al., 2016; Poonai et al., 2017).

Improvement of discharge teaching with the use of videos has been shown to increase caregiver knowledge and satisfaction (Botngard et al., 2013; Golden-Plotnik et al. 2018, Ismail et al., 2016; Newnham et al., 2017). Current guidelines support the need for complete patient and caregiver comprehension of discharge pain management instructions. The APS and CDC guidelines for pain management stress that patients need to be given thorough education on how to evaluate pain, maximize non-opioid pain medications, and use least effective doses of pain

medications (Chou et al., 2016; Dowell et al., 2016). Prevention of medication adverse events can be improved with consistent patient and family involvement during a hospitalization and accurate medication reconciliations at the time of discharge (AHRQ, 2017; IHI, 2011).

Conclusion and Application to DNP Project

In conclusion the literature reviewed helps to support an observed need at the project site for increased discharge pain management education after pediatric orthopedic spinal surgery. Caregivers report confusion and varied discharge instructions from nurses on how to manage their child's pain once discharged, and the use of video for discharge education has been shown to improve caregiver knowledge and satisfaction (Botngard et al., 2013; Golden-Plotnik et al. 2018, Ismail et al., 2016; Newnham et al., 2017).

For this DNP quality improvement (QI) project, an evidence based educational video was created for caregivers to help standardize the post-operative spine pain management discharge instructions. The video was created in conjunction with the Center for Families and located within the GetWellNetwork at a large academic metropolitan children's hospital. Families were assigned the video prior to discharge and viewed it while their child was still inpatient at the hospital. The video focused on increasing caregiver knowledge of post-operative pain management after spinal surgery. It included education on the commonly prescribed opioids, benzodiazepines, non-opioid pain medications, medication safety and disposal, and non-medication pain management strategies. Emphasis was given on teaching caregivers to maximize non-opioid pain relief medications, using opioids sparingly, common side effects of pain medications, and use of cognitive-behavioral modalities such as distraction (Chou et al., 2016; Dowell et al., 2016).

Precise doses of each medication vary with a child's weight and could not be provided in the video, but a guideline was provided of when each pain medication should be given (Glick et al., 2017). The discharging nurse further reviewed individual medications and doses with caregivers prior to leaving the hospital, as per current practices. Proper storage and disposal of opioids was included in the video (Garbutt et al., 2018; Grant et al., 2016), as well as potential side effects from the pain medications and when to call their orthopedic provider (Glick et al., 2017; Voepel-Lewis et al., 2015). Additionally, the video helped standardize discharge pain management instructions and further educated nurses on how to teach caregivers about their child's post-operative pain (Costello & Thompson, 2015; Costello et al., 2016).

Evidence Based Practice: Verification of Chosen Option

Current pain management guidelines state that patients and their caregivers need to clearly understand how to manage their pain once at home (Chou et al., 2016; Dowell et al., 2016). Through this literature review it has been shown that educational videos can increase caregiver knowledge and satisfaction of discharge teaching provided (Botngard et al., 2013; Golden-Plotnik et al. 2018; Ismail et al., 2016; Newnham et al., 2017).

Theoretical Framework

The theoretical framework chosen to guide the proposed DNP project is the experiential learning theory (Kolb, 2015). This theory was chosen due to its principle that newly acquired knowledge is developed from a learner experience. Kolb's (2015) experiential learning theory is a cyclical process that begins with a concrete experience and ends with active experimentation (see Appendix A). In the given DNP project, the concrete experience would be caregivers seeing their child immediately after surgery. Although explained to caregivers prior to surgery, the

experience of a caregiver seeing their child after surgery is hard to conceptualize until after their child is seen in the recovery unit.

After having the concrete experience of seeing their child after spinal surgery, a caregiver would move forward in the cycle to reflective observation. This portion of the cycle would be focused on watching how healthcare providers care for their child in the hospital. A caregiver will gather information during this phase and attempt to understand the care that is involved for their child after surgery. For example, a caregiver would watch how a child is positioned by a nurse, how they ambulate with physical therapy, how medications are given, or how an assessment is made on when to give pain medications.

After reflective observation the learner will move into the abstract conceptualization phase. During this phase the caregiver will reflect upon their experience, and what has been learned. The caregiver will begin to think about how they will care for their child at home once their child is discharged from the hospital. They may think how they will time medications within their daily schedule, and whom will give the medications once home. Thought may be given about their physical home layout, and any needs for re-arranging furniture or sleeping arrangements (Kolb, 2015).

The final phase of Kolb's (2015) experiential learning cycle is active experimentation. During this phase the caregiver will apply the knowledge that they have learned in the hospital on how to care for their child after surgery and begin to provide care for their child at home.

Goals, Objectives, and Expected Outcomes

The primary objective of this DNP quality improvement project was to develop an educational post-operative pain management video for caregivers with children who have undergone spinal surgery at a large academic metropolitan children's hospital. The goal of this

project was to have the video located in the GetWellNetwork within the hospital be watched by all caregivers of children who had spinal surgery prior to being discharged from the hospital. This project was developed to help standardize the discharge pain management teaching provided to caregivers by staff nurses. The expected outcomes of the project were anticipated to have increased caregiver preparedness to care for their child's pain at home after spinal surgery, indicated by more than 80 percent of caregivers stating that after viewing the video they felt that they were more prepared to manage their child's pain. It was also anticipated that greater than 80 percent of staff nurses indicated that the video can be easily incorporated into the current discharge process. It was projected that nurse survey results demonstrated a high-quality video that can be used as an effective discharge education modality for caregivers, with a greater than 80% of the quality indicators receiving a good or exceptional rating. Additionally, it was envisioned that the video remained as a sustainable intervention that could be utilized to help improve discharge education after the DNP project was completed.

Methods

Project Design

Project site and population. The setting where the DNP project took place was on the orthopedic unit at large academic metropolitan children's hospital in Massachusetts. The unit was comprised of 43 inpatient beds dedicated to caring for orthopedic patients. There were 84 staff nurses in total who were employed on the unit. Prior to the video being created nurses provided verbal discharge instructions to caregivers as well as family education sheets that were available for use within the hospital. Education sheets were selected by the nurses based on orthopedic provider documentation in the discharge summary. Family education sheets that were regularly used for post-operative spinal surgery patients included: post-operative spine, pain

management, and educational handouts specific to each new medication that the patient was prescribed. Nurses had discretion as to what teaching sheets they utilized for each patient.

The GetWellNetwork is a nation-wide web based educational resource used within the hospital that contains hospital specific videos and learning resources for patients and their families. The GetWellNetwork was available to all caregivers and patients at the project site. It was directly streamed into bedside televisions and accessed at home through the web-based patient portal. Nurses could assign educational videos to patients and their families prior to discharge, or providers could order educational videos for patients to view. Prior to this DNP project there were no specific post-operative orthopedic educational videos at the project site.

The population for the project was the caregivers of post-operative spinal surgery patients and the staff nurses located on the orthopedic unit. Ages of the patients on the unit ranged from infants through 35 years of age. Inclusion criteria was having spinal surgery during the current admission, English speaking, and being discharged home with a caregiver. Additional inclusion criteria for staff nurses was current employment on the orthopedic unit and holding a license as a registered nurse in the state of Massachusetts. Exclusion criteria was non-English speaking caregiver, being discharged to another healthcare facility, or a spine patient who did not have surgery during the current admission. Exclusion criteria for the staff nurses was being a nurse employed by the float pool within the hospital.

Development and Implementation of the Video

Implementation and development of the video was done in conjunction with the Center for Families which is the department within the hospital responsible for patient education. Initial meetings were done during February 2019 to establish implementation plans with the project manager from the Center for Families and a graphic designer. A manuscript of the video content

was created by the DNP student and given to the project manager. Prior to submission, the manuscript was reviewed by an interdisciplinary team comprised of a pharmacist, pain service clinician, orthopedic spine attending, and a staff nurse representative to ensure content validity. An editor from the Center for Families reviewed the manuscript for the video and edited the content to an appropriate health literacy level. Once the video was reviewed by all departments the video images were created and filmed by the graphic designer. Video images were then reviewed again by the DNP student, pain service provider, and pharmacist to ensure that images captured the video content accurately. The manager from the patient education center also reviewed the video to ensure that the video complied with hospital branding guidelines. Voice recordings to accompany the video were done by the DNP student after the video images were drawn and integrated into the accompanying images by the graphic designer.

Once completed, the video was placed within the GetWellNetwork and assigned to patients recovering from spinal surgery by nursing staff and providers through patient care orders. Emails were sent to staff nurses on the orthopedic unit to alert them to the newly created video once it was available. Instructions were included within the email on how to assign the video to post-operative spine patients prior to discharge. An in-service was provided by the DNP student to the nursing staff to introduce the new video and how to access it. The development specialist who helps educate the nursing staff on the orthopedic floor included information about the video in the monthly staff education bulletin. Additionally, an interdepartmental email was sent to the orthopedic surgeons, advance practice clinicians, and nurses alerting them of the video.

Measurement Instruments for Project Evaluation

The outcome data of this DNP project was measured in two methods. The first method was a question developed by the DNP student that was asked to caregivers who viewed the video. Two additional standard questions were asked as per project site standards to caregivers after watching the educational video on the GetWellNetwork. The questions were yes and no questions and appeared immediately after viewing the video on the TV screen. All questions were answered with a remote control in the patient's room. The following standard questions were asked:

1. Did you understand the information in this video? Yes or No
2. Do you have any questions? Yes or No

The following question was also asked which had been developed by the DNP student:

3. Do you feel more prepared to manage your child's pain at home after watching the video? Yes or No

If the caregiver indicated that they had questions after watching the video the nurse caring for the patient received an alert within the electronic health record (EHR) that the caregiver had questions. After the video was viewed there was documentation within the EHR under the patient education flowsheet indicating that the video had been viewed.

The second method of measuring outcomes from the project was a REDCap survey sent to the staff nurses using an adaptation of Beaudin and Quick's instructional video evaluation instrument (1996). Permissions from the author were attempted through email correspondence, however the author was unable to be contacted. The instrument was developed through a literature review on how to evaluate educational videos when utilizing them for teaching purposes. The tool focused on four main areas of evaluation: content, instructional plan, technical considerations, and supplemental materials. Although the instrument was developed to

be used in an instructional classroom, concepts of the instrument were applicable to the DNP project. Efforts were made to look for best evidence-based approaches to evaluate educational videos, and there are limited tools available.

The REDCap survey was developed by using Beaudin and Quick's (1996) evaluation instrument and adapted to fit the quality improvement project. Four out of the original 17 questions that did not apply to the DNP project were omitted (see Appendix B). The survey was a Likert type survey had responses that were rated from poor to exceptional. In order to ascertain more targeted feedback of areas in the video in need of future improvements, the neutral response was removed. Five questions were further simplified by splitting them into separate questions to attain more directed responses. In total 19 questions were asked of nurses about the video content. In addition, there were two simple questions at the start of the REDCap survey developed by the DNP student to help define the population of staff nurses who completed the survey. The questions included: numbers of years as a nurse, and number of years as a staff nurse on the unit. Three yes and no questions were also included at the end of the survey. Nurses were questioned if the video was easy to incorporate into the current discharge process, if they felt more confident in their pain management discharge teaching after implementation of the video, and did they feel that the video length was too long. Qualitative responses were collected through an open-ended comments section.

Data Collection Procedures

Pre-intervention. Prior to the release of the video the additional question for caregivers to answer was given to the project manager from the Center for Families to add to the GetWellNetwork. The survey questions developed by the DNP student and the adaptation of Beaudin and Quick's instructional video evaluation (1996) for the nurses was given to a research

assistant within the orthopedic department, and a REDCap survey was created. During this time the DNP student also gained access to the REDCap survey at the project site.

Intervention. Once the video was being utilized, responses from the caregivers that viewed the video were gathered electronically and reported from the GetWellNetwork to the project manager from the Center for Families. The collected data was emailed to the DNP student. Caregiver responses are collected on a continuous basis per project site standards while the video is in use, however a subset of the data was collected after 1 month of use for the purposes of DNP project. Responses from the REDCap survey given to the nurses were accessed directly to the DNP student. Survey responses were anonymous to protect the identity of the nurses. The survey was given 3 weeks after the video was in use allowing for all nurses who rotate shifts to have an opportunity to use the video with their patients during discharge. Nurses had 1 week to complete the survey and were given reminder emails from the DNP student mid-way through the week and one day prior to survey closure.

Post-intervention. Data collection from caregiver responses will continue to be ongoing while the video is in use as per project site standards. REDCap survey results were reviewed and analyzed by the DNP student, orthopedic department nurse scientist, and an orthopedic department research assistant.

Data Analysis

Caregiver responses to the questions asked through the GetWellNetwork were quantitatively analyzed by the DNP student by giving percentages of overall responses to yes and no questions. The REDCap survey responses from the nurses were quantitatively and qualitatively analyzed in collaboration with the DNP student, departmental nurse scientist, and research assistant. Descriptive statistics were used to analyze the data from the survey to

determine which aspects of the video were successful and which aspects of the video should be changed in the future. The goal of each of the quality indicators was 80 percent of the responses given a rating of good or exceptional. Quality indicators that did not achieve 80 percent ratings of good or exceptional were considered areas within the video in need of improvement. All quality indicators used in the instrument were weighted equally. In addition, descriptive statistics were used to analyze the results of the questions developed by the DNP student which were given to the nurses. Qualitative data was summarized in a narrative manner from the responses that the nurses gave as additional comments at the end of the survey. All results were reported back to the Center for Families, nursing unit, and orthopedic department.

Cost-Benefit Analysis

The costs for this project were primarily the time for the pediatric nurse practitioner DNP student to create the video, meet with all consulting departments for approval, creation of the REDCap survey, and compilation of the results. The nurse practitioner was required to work 40 additional hours to complete this project. There was the cost for the graphic designer to create and film the drawings for the video, which was estimated to be an 8-hour workday. Lastly, there was the cost of the staff nurses' time to complete REDcap survey, which was estimated as 10 minutes. There were no additional capital investments required, no additional costs for materials, and the REDcap survey did not require any additional cost.

It was recognized that there is variability among different hourly salaries for staff nurses and nurse practitioners. An estimated hourly rate in Boston, Massachusetts was used for this cost analysis from Indeed's website ("Indeed," 2019) for the salaries of nurse practitioners, nurses, and graphic designers. The average hourly salary for a registered nurse in Boston, Massachusetts was \$42.85, and average hourly salary for a nurse practitioner in Boston, Massachusetts was

\$59.38. An average salary for a graphic designer in Boston, Massachusetts was \$22.47. The total estimated cost for creating the video was \$3,149.68 (see Appendix C). Due to the DNP student, staff nurses, and graphic designer being hospital employees, the cost of the quality improvement project was incorporated as part their current salary and within their job description.

The estimated cost savings if only one patient does not go on to misuse opioids after receiving an opioid prescription is staggering. In 2014, Meyer, Patel, Rattana, Quock, and Mody reviewed 23 studies looking at the economic burden of opioid abuse. Yearly direct healthcare costs were 8 times greater for opioid abusers in compared to non-abusers. The average cost of 6 months of treatment for opioid abusers was reported to range from \$11,597 for buprenorphine treatment and \$14,921 for methadone treatment. Opioid abusers were also 4 times more likely to utilize the ER than non-opioid users (Meyer et al., 2014).

The benefits of the video that did not have a monetary value but could have a great impact on quality of care was increased confidence of the staff nurses and standardization of information provided to caregivers. Nurses could feel more confident in the discharge instructions that they provide to caregivers, by knowing that they are giving accurate information about post-operative pain management. Patients in turn could have better pain control, less side effects from their opioid prescriptions, and decreased number of days that they require the medication. Caregivers who are more educated will cost the healthcare system less money by not having to access healthcare for their child for poor pain control after surgery through visits to the emergency room or orthopedic clinic. Additionally, when caregivers are provided with a greater amount of knowledge about their child's pain management, it would be anticipated that they would generate less phone calls and pages to the orthopedic department with further questions.

Ethical Considerations and Protection of Human Subjects

Both the University of Massachusetts, Amherst (UMASS) and the project site hospital Nursing Scientific Review committee approved the DNP project prior to initiation. The official UMASS IRB determination form was submitted after proposal approval. The data that was collected from the GetWellNetwork was associated with a patient due to being assigned through a medical record number. The results of the questions answered were only available to the project manager from the Center for Families and select staff who are assigned to collect data within the Center for Families. The data that was collected was de-identified and sent through the protected internal hospital email to the DNP student from the Center for Families project manager. This protected the privacy of caregivers who answered the questions and uphold Health Insurance Portability and Accountability Act of 1996 (U.S Department of Health and Human Services [HHS], 2013). This also protected the DNP student from any biases, for the student may have directly cared for the patient. The REDCap survey that was given to the staff nurses was anonymous in order to protect the identity of the staff nurses.

The risk for patients and caregivers that viewed the video was negatable. Caregivers still received the current standard of care for discharge instructions after spinal surgery in addition to the newly created video. There was no associated risk to the staff nurses who completed the REDCap survey. The perceived benefit of the video to patients and their caregivers was standardization of discharge instructions that they received, improved pain control after surgery, less risk for adverse side effects from their pain medications, less risk for opioid misuse, and feeling more prepared to care for their child's pain at home. The anticipated benefits for staff nurses were increased post-operative pain management knowledge and more confidence in the discharge teaching that they provided to patients and their families.

Timeline

The final project proposal was approved in September 2019. Internal Review Board (IRB) approval was completed by the University of Massachusetts, Amherst, and the DNP project site Nursing Scientific Review committee in September 2019. Video production was completed in December 1st, 2019, and the video was available for use January 21st, 2020. Data collection was done for 1 month from commencement of utilizing the video. Analysis of data was conducted in February 2020. Presentation of the results from the project will be delivered to Center for Families, staff nurses, and orthopedic providers during the months of April and May 2020 (See Appendix D for timeline table).

Results

The DNP project took place at a large urban children's hospital in Boston, Massachusetts. The educational video that was created was made available for viewing by caregivers during the month of January 2020. Staff nurses were sent a REDCap survey 3 weeks after the video was made available who then had 1 week to complete the survey. Immediately after viewing the video, caregivers with children who underwent spinal surgery during their hospitalization answered the yes and no questions on their child's television screen within their hospital room.

A total of 5 caregivers responded to the questions asked after viewing the video on the GetWellNetwork. One hundred percent of the caregivers responded yes when asked if they felt more prepared to care for their child's pain after viewing the video. Unfortunately, due to the GetWellNetwork being a company outside the hospital, the results of the other 2 questions asked to the caregivers inquiring if had questions or if they understood the video were not available to the DNP student.

Of the 84 staff nurses that were sent the REDCap survey on the orthopedic unit, 16 (19%) of staff nurses responded to the survey. Fifteen out the 16 (93.7%) nurses who completed the

survey responded to the demographic questions. Results demonstrated a mean of 10.1(SD=8.14) years of nursing experience. Additionally, survey results indicated a mean of 7.6 (SD=6.32) years working on the orthopedic unit. Table 1 provides a depiction of the staff nurse demographics who completed the survey.

Table 1

Staff Nurse Demographics (n=15)

Variable	M	SD	Range
Number of years working as a nurse	10.1	8.1	4-30
Number of years on nursing unit	7.6	6.3	1-20

Greater than 80 percent of each of the 19 items asked about the video quality were given a good or exceptional rating by nurse respondents (see Table 2). Only 4 items received a fair rating. Single fair ratings were given in each the following quality indicators: were objectives were made clear, did the video try to cover too much information, were suggestions for practice given, and was the speed of the video slow enough to understand. Overall, fair ratings only represented 1% of the overall responses. There were 9 data points that were missing from the 19 video quality questions which were given a rating of zero.

Table 2

Video content questions

Item	n	M	SD	Range
1. Video content accurate	16	3.62	0.50	3-4
2. Content useful to caregivers	16	3.75	0.45	3-4
3. Bias-free	15	3.60	0.51	3-4

4. Motivating introduction	16	3.56	0.51	3-4
5. Objectives made clear	16	3.68	0.60	3-4
6. Simplification of complex tasks	16	3.68	0.48	3-4
7. Too much material covered	15	3.33	0.62	2-4
8. Methods to apply knowledge presented	14	3.71	0.47	3-4
9. Suggestions for practice	16	3.5	0.63	2-4
10. Met learning objectives	16	3.68	0.48	3-4
11. Visual depiction of learning objectives	15	3.53	0.52	3-4
12. Integration into learning environment	16	3.56	0.51	3-4
13. Video well planned	16	3.62	0.50	3-4
14. Content avoided not related to subject	16	3.56	0.51	3-4
15. Drawings represent content	16	3.75	0.44	3-4
16. Vocabulary of narration	16	3.5	0.52	3-4
17. Speed of video	15	3.4	0.63	2-4
18. Music fitting	15	3.53	0.52	3-4
19. Audio-visual combined well	14	3.57	0.51	3-4

Note. Video quality indicators were given a rating of poor, fair, good, or exceptional. Numerical assignment was given to analyze the data: poor=1, fair=2, good=3, exceptional=4.

Fifteen nurses (100%) responded yes when asked if the video was easy to incorporate into their current discharge processes. Fifteen out of the 16 nurses (93.7%) stated that they felt more confident in their ability to teach caregivers about pain management after spinal surgery by incorporating the video in their discharge teaching. Thirteen (86.6%) out of the 15 nurses responded no when asked if the video length was too long (see Figure 1). There were single

missing data points for the questions asking if the video was easy to incorporate and if the nurse felt that the video was too long in length.

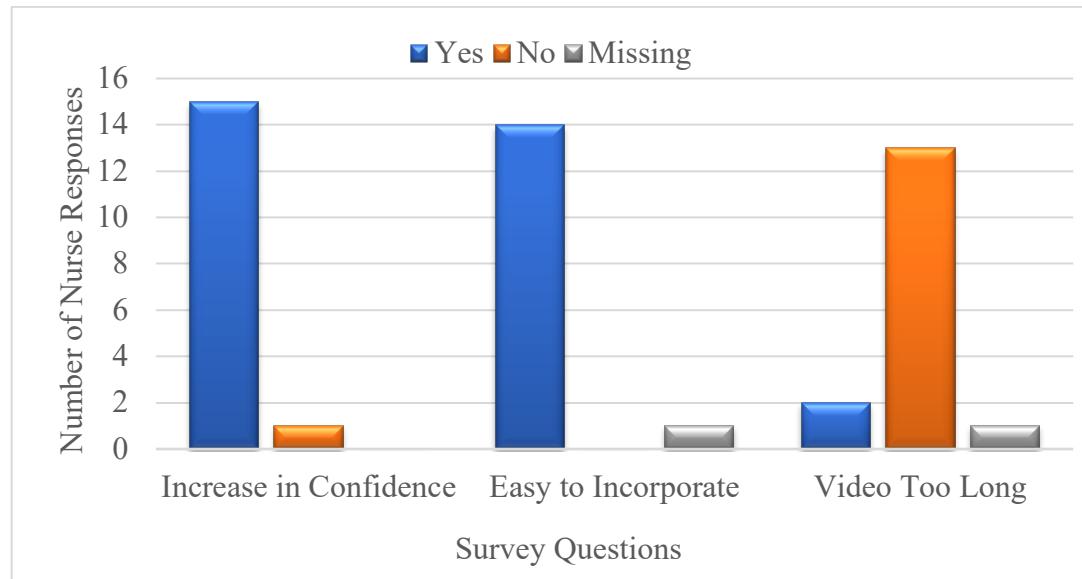


Figure 2. Nurse responses to video implementation into current discharge processes.

There were 5 written responses given by nurses in the open-ended comments section of the survey. One nurse queried if a printout could be given to caregivers who may learn better by reading verses watching a video. There was a single nurse comment that questioned the timing of when to give opioids and benzodiazepines that was presented in the video. Another nurse asked if it was possible to show a picture of the bottle of common opioid and benzodiazepine concentrations. One nurse felt that the video was slightly too long but covered all important comments. The last comment gave generalized positive feedback about the video stating that video was very informative and accurate.

Discussion

The quality improvement project done by the DNP student produced the first educational video for the department of orthopedics. The video continues to be a sustainable patient education modality at the project site where further data can be collected to determine its

successes or areas for improvement. Overall project goals were met with greater than 80 percent of the nurse respondents giving each of the 19 questions assessing video quality a good or exceptional rating. No specific aspect of the video quality was identified as an area to focus on for future improvements. All nurse respondents indicated that the video was easy to incorporate into their discharge processes, and 93.7% of nurses felt more confident in their ability to teach caregivers about pain management after spinal surgery. Of the caregivers who viewed the video all respondents stated that they felt more prepared to care for their child's pain after watching the video.

The results from this project indicated that nurses (93.7%) felt more confident in their ability to teach caregivers about pain management, which is aligned with studies done by Costello et al. (2016) and Costello and Thompson (2015). Nurses who receive additional education about opioids can result in both patients and nurses having increased opioid knowledge (Costello et al., 2016). Although caregiver knowledge was not assessed after viewing the video it could be projected that if nurses feel more confident in their discharge teaching, caregivers could acquire more knowledge. The DNP student provided additional staff nurse education by providing an in-service when the video was made available. The video was shown and was followed with a question and answer period discussing the video and its content. Nurse opioid knowledge was not assessed, however Costello and Thompson (2015) found that nurses had increased opioid knowledge if they attended an educational session.

Data from the project suggest that integrating videos into discharge teaching can easily be done at the project site and resulted in promising outcomes. Nurse respondents felt that the video was easy to incorporate into the current discharge processes for post-operative spine patients. Caregivers who viewed the video indicated that they felt more prepared to care for their child's

pain after watching the video. This is consistent with studies that have demonstrated that caregiver knowledge and satisfaction are increased when videos are used during discharge teaching (Botngard et al., 2013; Golden-Plotnik et al. 2018, Ismail et al., 2016; Newnham et al., 2017).

One nurse felt that print outs should be given with the information that was provided in the video. The nurse further remarked that some people learn better reading verses watching a video. Certainly, it is recognized that there are different learning styles, however caregivers receive numerous sheets of paper at the time of discharge and important information can get lost. Furthermore, literature shows that videos used as a modality for caregiver and patient education have improved outcomes (Botngard et al., 2013; Golden-Plotnik et al. 2018, Ismail et al., 2016; Newnham et al., 2017; Zhu et al., 2018).

Project results indicated that all caregivers who viewed the video felt more prepared to care for their child's pain at home. In following current guidelines for pain management, patients and caregivers need to have a thorough understanding on how to manage their child's pain prior to being discharged from the hospital (AHRQ, 2017; Chou et al., 2016; Dowell et al., 2016). With increased caregiver knowledge and preparedness to administer pain medications there could be decreased risks associated with pain medications that have been shown such as improper dosing, opioid misuse, poisonings, and improper storage and disposal (Allen et al., 2017; Gaither et al., 2016; Garbutt et al., 2018; Glick et al., 2017; Grant et al., 2016; Harbaugh et al., 2018).

Educational videos could help emphasize pain management strategies such as using minimum effective doses of pain medications and integration of non-opioid pain medications (Chou et al., 2016; Dowell et al., 2016; Poonai et al., 2017). Efforts were made in the

development of the video to emphasize the use of non-opioid pain medications. Non-pharmacologic strategies were also described in the video. Caregivers who feel more prepared to manage their child's pain after watching the video may be more likely to maximize non-opioid medications or utilize non-pharmacologic strategies. Less exposure to opioids could prevent pediatric misuse (Kann et al., 2018; Meich et el., 2015) and poisonings (Allen et al., 2017; Gaither et al., 2016).

Although all 19 questions asked of the nurse respondents about the quality of the video were deemed successful, 13% (N=2) of nurses felt that the video length was too long. Additionally, there was one written comment that stated that the video seemed too long but all important topics were covered. The total video length was approximately 9 minutes. The length of the video was discussed with all internal consultants and the project manager during production. Splitting the video into separate videos was considered, but it was felt that it would be less likely that caregivers would watch numerous videos. Splitting the video could have also led to segmented knowledge acquisition or omitted sections that were imperative to understanding the post-operative medications. All the information that was presented in the video should be discussed with caregivers by nurses as part of the discharge education. The GAP analysis that was performed by the DNP student during the development of the project suggested that information about pain management provided to caregivers by nurses was not standardized and led to a lack knowledge on how to manage post-operative pain after discharge. If further educational videos are made in the future, continued thoughtful consideration will be made to ensure that the video length is minimized while still ensuring that all relevant content is presented.

Other qualitative comments from nurses were limited but varied. One comment by a nurse respondent felt that it would be beneficial to add pictures of common post-operative medications such as opioids or benzodiazepines with their concentrations on the bottle. Providing precise concentrations or doses was strictly prohibited from being included in educational material. Internal consulting pharmacists, pain service provider, and the patient education manager ensured during the editing process that information that was given in the video about medications did not include specific doses, concentrations, or brands. Providing this information within educational materials could lead to medication errors for brands, doses, and concentrations of medications can differ and change.

Another nurse respondent questioned the timing of pain medications that was presented in the video. When patients are in the hospital nurses can give benzodiazepines and opioids closer together, which differs from the timing between each medication that was presented in the video. Through consultation with the pain service provider and pharmacist, it was felt strongly that doses of benzodiazepines and opioids should be separated by 3 hours when patients are at home as described in the video. The rationale of the medication timing that was presented in the video was to lessen the potential side effects that patients can have when receiving opioids and benzodiazepines together such as drowsiness or respiratory depression. The feedback provided does suggest that further educational sessions could be done with staff nurses to help better educate them on discharge pain medication management.

Kolb's experiential learning theory (2015) was chosen as the theoretical framework for the project. The theory helped guide the learning experience of the caregiver and fit with the introduction of a new education video. Caregivers began with a concrete experience of seeing their child immediately post-operatively and moved forward through the cycle to its endpoint of

active experimentation which was caring for their child at home. When caregivers were in the hospital they moved to reflective observation after the concrete experience of seeing their child after surgery. During reflective observation caregivers watched health care providers care for their child and manage their pain. After reflective observation caregivers progressed through the cycle to abstract conceptualization where they began to apply what they had observed and learned and thought about how they would care for their child at home. It was typically during this phase of the learning cycle when the video was viewed by caregivers. Project results indicated that all caregivers who watched the video felt more prepared to care for their child after watching the video suggesting that integration of the video into their learning cycle was successful in enhancing knowledge. This prepared caregivers for active experimentation the final phase of the learning cycle when they cared for their child at home.

Setting Facilitators and Barriers

Facilitators at the DNP project site were numerous. The DNP student was an employee at the project site and had access to the Center for Families which helps to develop and approve patient and family educational materials. Through this center there was a graphic designer, editor, and marketing resources available. There were supports through the Center for Families to ensure video content was at an appropriate level of health literacy for patients and their families. There was supplementary internal support from pharmacy, pain service, nursing, and an orthopedic spine surgeon who reviewed accuracy of the video content. The video was able to be attached as an order to the current post-operative spine orderset. This better ensured that caregivers would view the video both in the hospital and later have access to it at home through their patient portal. Furthermore, having the video embedded into the spine orderset meant that the video was automatically assigned to patients and did not have to be manually assigned by

staff nurses. An additional facilitator was that the GetWellNetwork was already established and being utilized at the project site.

Barriers to the project included introducing another step in the current discharge process for nurses. Although the video was assigned to patients through the GetWellNetwork, nurses had to prompt caregivers to view it. Video availability was delayed by almost one month due to delays from the GetWellNetwork, which is a company outside from the project site. The delayed rollout limited the data collection period for both the caregivers and shortened the time the nurses had to utilize the video prior to completing the REDCap survey. These delays could have accounted for the limited number of caregivers who viewed the video, and small percentage of nurses who completed the survey. Additionally, due to the GetWellNetwork being an outside company, data from the two standard questions that were asked to caregivers after the video was viewed was not available.

There was also an unanticipated one-week delay in attaching the video to the current post-operative spine orderset with the project site EHR after it was made available. During this time nurses had to manually assign the video to patients, which added to their other daily patient care tasks. Other barriers included the multiple departments that had to review the video and approve the content prior to release. Although all the departments helped facilitate the production of video, it took additional time to obtain their input and approval.

Conclusion

Interventions such as educational videos can better educate caregivers and patients about opioid medications, and aid in the prevention of the growing opioid epidemic. It has been found in practice that caregivers of children who have had spinal surgery report confusion and varied discharge instructions from nurses on how to manage their child's pain. Including videos as a

modality for discharge education suggests that caregivers can feel more prepared to manage their child's pain at home, and nurses feeling more confident in their discharge teaching. Greater understanding of pain medications could lead to less medication errors, proper use, storage, disposal, as well as improved use of non-opioid pain medications.

Future steps should be taken to develop more patient education videos. Through available technology videos can be viewed while in the hospital and again at home allowing for continued education of caregivers after discharge. Large academic health care institutions have a vast amount of resources available for video development. Efforts should be made to streamline processes for patient education video productions. Further collaborations with informatics could allow for more access and portability of videos through personal handheld devices. Ultimately, with the use of educational videos there can be increased quality of care and safety with better pain control for patients after spinal surgery.

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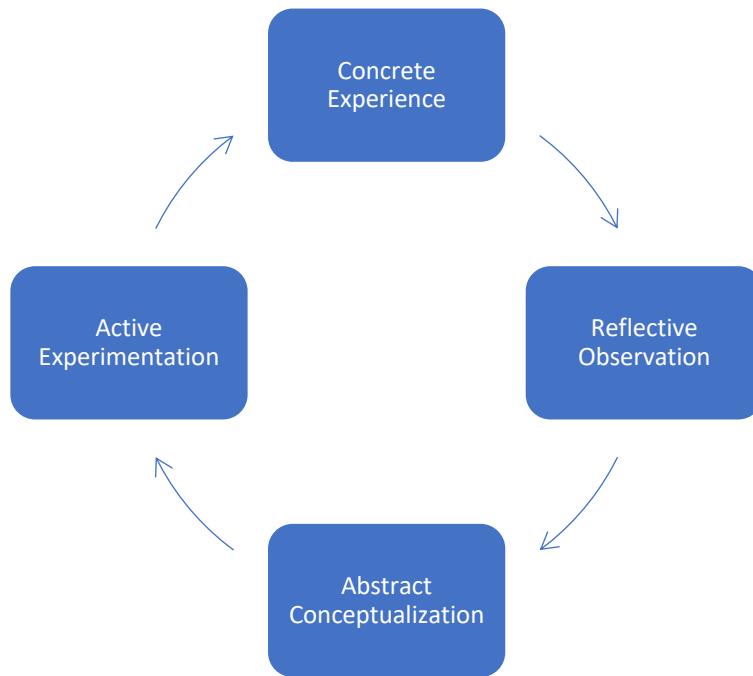
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Appendix A
Experiential Learning Cycle



Note. The Experiential Learning Cycle. From Kolb, D., 2015 “Experiential Learning Experience as the Source of Learning and Development”

Appendix B

REDCap Survey

Discharge Education for Pediatric Post-Operative Pain after Spinal Surgery

Demographic Questions

1. How many years have you worked as a nurse? _____ (years)

If less than one year, how many months have you worked as a nurse? _____ (months)

2. How many years have you worked as a nurse on 10NW? _____ (years)

If less than one year, how many months have you worked as a nurse on 10NW _____ (months)

Video Content Questions

Rate questions from poor to exceptional

1. Content: Was the content of the video accurate and up-to-date?
2. Was the content of the video useful to caregivers of children whom have had spinal surgery?
3. Was the content of the video bias-free, including stereotyping with regard to age, sex, ethnicity, race, physical impairment, values, dress, language, or social class?
4. Did the video begin with a motivating introduction to stimulate interest?
5. Were the objectives or key elements made clear in the introduction?
6. Did the video simplify complex tasks and avoid introducing extraneous information?
7. Did it try to cover too much material or introduce too much detail?
8. Did the video suggest methods for the learner to apply the newly acquired knowledge?
9. Were suggestions for practice of what's being discussed considered?
10. Did the video meet the learning objectives and needs of the learner?
11. Did what was being visually depicted fit the learning objectives?

12. Can the video be easily integrated into the learning environment by adding emphasis to or supplementing more traditional methods during the discharge process?
13. Was the video well planned, organized, and structured?
14. Did the video avoid content not related to the subject matter stated in the introduction?
15. Were drawings representative of content that was being delivered?
16. Was the vocabulary of the narration appropriate for the intended audience?
17. Was the speed of the narration slow enough to be understood?
18. Was the music fitting for the visual effects or audio narration?
19. Was the audio-visual combined well?
20. Do you feel more confident in your ability to teach caregivers about pain management after spinal surgery when utilizing the video in your discharge teaching? yes or no
21. Do you feel that the video was easy to incorporate into the current discharge process? yes or no

If no, please explain why it is not easy _____

22. Do you feel the video was too long? Yes or no

23. Please provide us with any additional comments about the content of the video or the implementation of the video: _____

Note. Video evaluation instrument adapted from “Instructional Video Evaluation Instrument” by Beaudin, B.P., & Quick, D, 1996, *Journal of Extension, 34(3)*, Retrieved from <https://www.joe.org/joe/1996june/a1.php>

Appendix C

Cost-Benefit Analysis Table

Resource	Cost	Total
10 minutes staff nurse time to complete survey	\$7.08 (10 minutes=\$42.85 hour/6) X 84 nurses	\$594.72
40 hours of pediatric nurse practitioner time to entirely create video	40 hours X \$59.38	\$2,375.20
8 hours for graphic designer to draw pictures for video	8 hours X \$22.47	\$179.76
		Grand total: \$3,149.68

Appendix D

DNP Project Timeline Table

Appendix E



Boston Children's Hospital

Nursing Scientific Review

August 22, 2019

Title: Discharge Education for Pediatric Post-Operative Pain after Spinal Surgery
Project Lead: Elise Buckley, CPNP

Dear Elise,

Members of the Nursing Scientific Review subcommittee of the Nursing Research Council reviewed your protocol titled: *Discharge Education for Pediatric Post-Operative Pain after Spinal Surgery*. The protocol met the criteria for quality improvement and therefore does not require additional nursing scientific review or Institutional Review Board (IRB) approval from Boston Children's Hospital.

Please be advised that if there is future dissemination of the activity (poster, abstract, didactic presentation), the authors/presentors must state that the information reported was obtained as part of a quality improvement project.

The Nursing Research Council scientific review subcommittee wishes you all the best with this quality improvement project and appreciates your dedication to clinical inquiry. Please contact us with any questions.

Respectfully,

A handwritten signature in cursive script that reads "Michele DeGrazia".

Michele DeGrazia PhD, RN, NNP-BC, FAAN
Chair, Nursing Research Council

A handwritten signature in cursive script that reads "Patricia A. Dwyer".

Patricia A. Dwyer PhD, RN
Co-Chair Nursing Scientific Review subcommittee

Appendix F



Mass Venture Center
100 Venture Way, Suite 116
Hadley, MA 01035
Telephone: 413-545-3428

Memorandum – Not Human Subjects Research Determination

Date: September 23, 2019

To: Elise Buckley, College of Nursing

Project Title: Discharge Education for Pediatric Post-Operative Pain after Spinal Surgery

IRB Determination Number: 19-158

The Human Research Protection Office (HRPO) has evaluated the above named project and has made the following determination based on the information provided to our office:

- The proposed project does not involve research that obtains information about living individuals [45 CFR 46.102(f)].
- The proposed project does not involve intervention or interaction with individuals OR does not use identifiable private information [45 CFR 46.102(f)(1), (2)].
- The proposed project does not meet the definition of human subject research under federal regulations [45 CFR 46.102(d)].

Submission of an Application to UMass Amherst IRB is not required.

Note: This determination applies only to the activities described in the submission. If there are changes to the activities described in this submission, please submit a new determination form to the HRPO prior to initiating any changes.

A project determined as “Not Human Subjects Research,” must still be conducted in accordance with the ethical principles outlined in the Belmont Report: respect for persons, beneficence, and justice. Researchers must also comply with all applicable federal, state and local regulations as well as UMass Amherst Policies and procedures which may include obtaining approval of your activities from other institutions or entities.

Please do not hesitate to call us at 413-545-3428 or email humansubjects@ora.umass.edu if you have any questions.

A handwritten signature in black ink that reads "Iris L. Jenkins".

Iris L. Jenkins, Assistant Director
Human Research Protection Office

