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A Policy Guide to Decrease the Use of Continuous Passive Motion Machines

Rosa M. Cooper
Walden University

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Walden University

College of Health Sciences

This is to certify that the doctoral study by

Rosa Cooper

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee

Dr. Allison Terry, Committee Chairperson, Health Services Faculty
Dr. Ruth Politi, Committee Member, Health Services Faculty
Dr. Oscar Lee, University Reviewer, Health Services Faculty

Chief Academic Officer
Eric Riedel, Ph.D.

Walden University
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Abstract

A Policy Guide to Decrease the Use of Continuous Passive Motion Machines

by

Rosa M. Cooper

MSN, Walden University, 2009

BSN, Immaculata University, 2007

Project Submitted in Partial Fulfillment
of the Requirements for the Degree of
Doctor of Nursing Practice

Walden University

August 2015

Abstract

This project was conducted at a post-acute rehabilitation hospital that served post-acute orthopedic, stroke, brain injury, cardiac, and skilled nursing patients. On the orthopedic unit, there were 5 practicing physicians, 3 of whom consistently used continuous passive motion (CPM) therapy on total knee arthroplasty (TKA) and 2 of whom did not. As a result of discussions with physicians who did and did not utilize CPM therapy, a practice problem was identified that CPM use may not be consistent with current literature and practice evidence. Scholarly literary reviews were done on current CPM evidence-based research. Observational data were collected on patients' ambulatory function, knee range of motion, and pain duration. This information was then presented by the interdisciplinary team (IDT), which consisted of the physical therapist, occupational therapist, and nurses. The physicians' input along with the observational data obtained by the IDT all supported the hypothesis that CPM usage did not promote faster healing nor added a benefit to patient outcomes. A project to revise the existing CPM policy and develop a guide decreasing CPM usage was implemented and guided by the theories of organization change and a total quality management model. The purpose of this quality assurance project is to promote a cost-effective practice change that would be beneficial to the TKA population as it relates to care and treatment. As the increase in TKA continues to rise in the United States due to such co-morbidities as obesity causing an increase in disabilities, implementing the best practice as it relates to patient outcomes brings about a positive social change.

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Section 1: Nature of the Project

I am employed at a post-acute rehabilitation hospital which serves orthopedic, stroke, brain injury, cardiac, and skilled nursing patients. On the orthopedic unit, five physicians practice, three of whom consistently use continuous passive motion (CPM) machines on total knee arthroplasty (TKA) and two of whom do not utilize the machines on a consistent basis. The CPM machine is defined as a motorized device that enables the knee joint to move throughout an arc of range of motion (ROM) (Lenssen, Koke, DeBie, & Geesink, 2003). When describing why the CPM machine was used for some patients and not for others, a physician explained that the more seasoned physicians believed the patients had a better and more complete recovery from the TKA, [May 2012]. Other physicians believed the CPM machine did not promote a better or faster recovery, and one physician also believed the CPM machine put stress on the incision, increased pain duration, and ROM did not meet expectations.

The facility's own evidence-based project team conducted a survey to determine if there was a decrease in the length of stay (LOS), as well as a faster and more complete recovery for patients, as believed by some physicians, when compared to those patients who has not use CPM therapy after surgery. The results indicated there was no significant difference in LOS or recovery time for those patients who used CPM therapy. The small study sample of 20 participants revealed that the patients who used CPM therapy average LOS days were 7.4 and those who did not use CPM therapy average LOS days were 7.3 days. Those results, which were supported by the literature (Denis et al., 2006; Lenssen,

Koke, et al., 2003; Tabor, 2013), suggested there is a need to develop a facility policy to eliminate the use of CPM machines.

Problem Statement

The CPM machine is not an effective tool to produce a rapid recovery from a total knee arthroscopy.

Purpose Statement

The purpose of the project was to revise the existing facility policy on the use of CPM machines and develop a guide to eventually eliminate the use of the CPM machine. Evidence-based literature and a hospital-conducted survey showed there was no significant benefit to patient outcomes (Denis et al., 2006). As health care facilities continue to find ways to decrease the cost but maintain positive outcomes, leaders are encouraged to review practices to achieve these goals. This area of practice is being studied because both rentals and purchased CPM machines are costly, challenge the nursing staff with time effectiveness in their daily tasks, and cause increased pain in some patients (Tabor, 2013). Authors of the current literature also stated there are possibilities for adverse effects due to application errors, which can lead to a longer hospital stay (O'Driscoll & Giori, 2000).

Project Objectives

The objective of this project is to create a cost effective practice change that will be a benefit and may increase patient satisfaction as well as nurse satisfaction. Today's complex, multi-tiered health care environment depends on the contributions of highly skilled and knowledgeable individuals from multiple professions. In order to accomplish

the Institute of Medicine (IOM) mandate for safe, timely, effective, efficient, equitable, patient-centered care in a complex environment, health care professionals must function as highly collaborative teams and the DNP members of these teams have advanced preparation that enables them to facilitate collaborative team functioning (American Association of Colleges of Nursing, 2006)

Significance of the Project

This project was of significance and relevance to the rehabilitation practice because decreasing the use of CPM machines creates a source of patient satisfaction as it relates to decrease in pain (Tabor.2013), reducing the need for pain medication prior to physical therapy that may reduce falls. The policy revision will also create a source of satisfaction for the nurses, allowing better time management; this would acknowledge recent satisfaction surveys that indicated the CPM machine was difficult to maneuver and a poor fit for some patients with larger limbs. Many practitioners have grown comfortable with the use of the CPM machine despite the increasing evidence that questions the practice. Some of the notable disadvantages include an increase in extensor lag and flexor tightness around the knee, increased length of time spent in bed limiting activity, purchase and maintenance costs, and poor fit of the CPM due to different leg lengths and sizes (Tabor, 2013). Further consideration is the time and effort it takes for nurses to place the patient repeatedly in and out of the machine (Tabor, 2013). A cost analysis was also done to show the challenges to the rehabilitation budget. It was determined an annual savings of approximately \$5,050 would have a positive effect on the budget. A strengths, weaknesses, opportunity and threat (SWOT) analysis was done and it indicated a need for

this policy change. DNP graduates can evaluate the cost effectiveness of care and use principles of economics and finance to redesign effective and realistic care delivery strategies (American Association of Colleges of Nurses, 2006).

Evidence-Based Significance of the Project

The evidence-based supported practice change could promote change among other rehabilitation facilities with eliminating the use of the CPM machines, saving other rehabilitation facilities the cost of the CPM machines. The evidence has shown there was no difference with decreasing the LOS days and increased recovery time with the use of the CPM machine (Alkire, & Swank, 2010). This evidence was presented to the physicians who use the CPM to encourage them to decrease the usage and eventually eliminate the use altogether. Whenever a patient's LOS rehabilitation days extend beyond the approved days, the rehabilitation facility must absorb those health care costs. There are congressional mandated financial limitations on outpatient occupational, physical, and speech therapy on an outpatient basis known as the Budget Balance Act of 1997 and implemented in 1999. This was done as a measure to control health care cost (Centers for Medicare, Medicaid Services.gov n.d.). For this reason, it is essential for patients to receive the most effective inpatient therapy.

Definition of Terms

Continuous passive motion (CPM): A motorized device that enables the knee joint to move throughout an arc of ROM (Lenssen, Koke, et al., 2003).

Length of stay (LOS): The period a patient remains in a hospital or other health care facility as an inpatient (Mosby's Medical Dictionary, 2009).

Total knee arthroplasty (TKA): A surgery to relieve pain and restore ROM by realigning or reconstructing a joint (Mosby's Medical Dictionary, 2009).

Range of motion (ROM): The amount of excursion through which a joint can move, measured in degrees of a circle (Taber's Cyclopedic Medical Dictionary, 2001).

Assumptions, Limitations, and Delimitations

The assumption of the project was that developing a policy to decrease the use of CPM machines would improve quality outcomes for patient care and possible postoperative difficulties from a prolonged period spent in bed as well as nurse efficacy related to time management. Encouraging the patient to be actively involved in postoperative recovery is ideal, and too much time spent in bed is contrary to many postoperative protocols. The CPM machine also requires that multiple staff tend to the patient several times per day; an added cost and care and maintenance of the machine can be time consuming, costly, and burdensome (Tabor, 2013).

The limitation or issues that could arise with the project policy change include resistance to the change by some physicians. Physicians' resistance could prolong the policy implementation process.

Summary

I implemented a project based on the area of practice at a post-acute rehabilitation hospital. A revision to the existing CPM policy as well as newly developed guide was created to reduce the use of CPM machines that will eventually lead to the discontinuation of CPM's at this facility. A hospital-conducted study showed there was no significant difference in patient outcomes for those who used CPM therapy. However,

physicians have continued to use this costly process without benefits to the patients.

Health care leaders are encouraged to review practices and seek ways to reduce the cost while maintaining a positive outcome. As health care reform is blooming into full effect, more insurance companies are decreasing the approved amount of rehabilitation LOS days for certain surgeries. As post-acute hospitals struggle to stay within those parameters, sometimes they meet with challenges and the patient exceeds the approved days, causing the facility to absorb the remaining days cost of care. A cost effective strategy is being offered to this policy change.

Section 2: Review of Literature and Theoretical and Conceptual Framework

Specific Literature

Several scholarly research articles were reviewed. In one study, Lenssen, Koke, et al. (2003) looked at the short- and long-term use of the CPM machine on ROM. This study was done with randomized trials involving patients who had undergone primary TKA using CPM machines. In this research, Lenssen, Koke, et al. performed two studies and compared different forms of CPM use. Of the two studies, one only used patients with bilateral knee arthroplasty, leaving it unclear whether a random assignment had been performed on patients with a unilateral arthroplasty. The other study used CPM machines as a baseline treatment for all treatment groups, not as experimental interventions. Conclusion of the research revealed there was moderate, yet conflicting evidence of the short-term efficacy of CPM machine use and there was no long-term benefit of CPM use (Lenssen, Koke, et al., 2003).

In a randomized clinical trial, Denis et al. (2006) compared the effectiveness of three in-hospital rehabilitation programs with and without CPM for ROM in knee flexion and extension, functional ability, and LOS after primary TKA. Eighty-one subjects who underwent TKA for a diagnosis of osteoarthritis were participants. The participants were divided into three groups immediately after surgery (Denis et al., 2006). The controlled group received conventional physical therapy intervention only; a second group received conventional physical therapy and 35 minutes of CPM application daily, and the experimental group received conventional physical therapy and 2 hours of CPM daily. The primary outcome measure was active ROM in knee flexion at discharge. The results

showed the outcome measurements for the subjects in the three groups were similar at baseline (Denis et al., 2006). No significant difference among the three groups was demonstrated in primary or secondary outcomes at discharge. The results of this study did not support the addition of CPM applications to conventional physical therapy in rehabilitation programs after primary TKA because the use did not further reduce knee impairments or disability or lessen the length of the hospital stay. Data showed analysis was based on the intention-to-treat principle. Demographic and clinical characteristics of the subjects and baseline measurements were compared between groups by use of analysis of variance (ANOVA) for continuous variables and chi-square tests for categorical data. The Kruskal-Wallis test was used when data were not normally distributed. (Denis et al., 2006).

Lenssen, DeBie, Bulstra, and Van Steyn (2003) conducted a randomized controlled trial. The objective was to assess whether there was a benefit in CPM use during short hospitalization periods. Early mobilization, if possible, should start the day of surgery. Although CPM is widely used, the debate about its efficacy is still going on, mainly as a result of controversial findings reported in the literature (Lenssen, DeBie, et al., 2003). The primary effect measures were mobility and function, both of which were assessed at all three examinations. Secondary outcome measures included length of hospital stay, pain, muscle strength, medication, satisfaction with the treatment given by the physical therapist, and satisfaction with attention received from the physical therapist. The total amount of time spent on the CPM machine per day was measured to assess compliance (Lenssen, DeBie, et al., 2003). The results of the study showed 40 patients

were included in the study, 20 of whom received physical therapy twice a day during all 4 days of their hospital stay, while 20 patients received CPM in addition to the physical therapy. The baseline characteristics showed good balance between the two groups (Lenssen, DeBie, et al., 2003).

The conclusion of the study indicated that CPM delivered in the first 4 days following surgery seemed to lead to better short-term mobility. The increased mobility was present through the 17th day after surgery. Results on function should be interpreted with caution because pain and function seem closely related in the scoring system used. However, there was a considerable difference in favor of the CPM group in terms of this functional outcome measure. Finally, muscular strength in the CPM group was better than the control group, at Day 4 as well as Day 17 (Lenssen, DeBie, et al., 2003).

In the fourth and most compelling study, Tabor (2013) took a look at ROM and pain with the use of the CPM machine following TKA. The purpose of the study was to identify by using ROM and pain scores, which patients, if any, may have benefited from CPM use versus those who did not need the CPM machine. This was a quasi-experimental empirical study using two groups: patients who had CPM and physical therapy versus patients who received standard physical therapy alone. A self-reported 0-10 pain score for post-op day 1 (POD1) versus discharge day pain score was used (Tabor, 2013). CPM use POD1 was 6.3 and decreased to 3.2 on discharge day. Non-CPM group reported pain score on POD1, 3.6 and decreased to 2.6 on discharge day. The conclusion of the study showed patients who used CPM did not heal faster or attain larger gains in knee ROM, when comparing to those who did not use CPM. There were no differences in

adverse events; manipulations, LOS, and functional outcomes were all comparable (Tabor, 2013).

Doff (1999), an orthopedic physician, used randomized groups for a study that compared CPM with early passive flexion called the drop and dangle protocol. CPM did not improve flexion compared with the drop and dangle technique. Doff stated patients in the study who underwent CPM experienced significantly more flexion contractures at 6 months than patients who were treated without CPM. Therefore, contraction was one of the biggest drawbacks to CPM. Moreover, patients who underwent CPM were not discharged from the hospital any earlier than those who did not undergo CPM (Doff, 1999). Finally, CPM is more expensive because of the equipment investment. It certainly is a lot more expensive than sitting patients in a chair and letting them bend over their knees. Currently CPM is not routinely used and has not been used for approximately 3 1/2 years. Post knee surgery, the patients are instructed to sit in a chair and lean forward over their knees. Doff cited amazement at how many patients achieved 90 degree flexion in the first day. That is all patients are required to do when they go home (Doff, 1999).

Viswanathan& Kidd (2010) conducted a systematic review on the effect of CPM following TKA on knee ROM and function. The aim of the review was to determine the effect of CPM on knee ROM and function following TKA. Those authors searched databases (Medline, Pedro, Cochrane, CINAHL and Google Scholar) to locate randomized controlled trials published from 2000 onwards. Forty-two articles were extracted for the search. Inclusion criteria consisted of participants who had a primary TKA, CPM therapy, and outcome measures including knee ROM and/or function

(Viswanathan & Kidd 2010). Fifteen articles satisfied these criteria. Study methodology was rated using PEDro scoring system. Nine studies showed data on ROM found no significant difference between groups. Three of the studies showed short-term effects that disappeared during follow-up. Six of the nine studies investigated knee function and found no significant difference between the groups. The authors stated that although CPM seemed to be a commonly accepted and current rehabilitation technique after TKA, it was a contentious and potentially costly and time-consuming intervention post TKA based on the results of their review. The use of CPM did not seem as an adjunct to standard physiotherapy (Viswanathan & Kidd, 2010).

General Literature

O'Driscoll and Giori (2000) described the theory and principles of the clinical application of the CPM machine. Stiffness following surgery of injury to a joint develops as a progression of four stages: bleeding, edema, granulation tissue, and fibrosis. CPM properly applied during the first two stages of stiffness acts to pump blood and edema fluid away from the joint and peri-articular tissue (O'Driscoll & Giori, 2000). The CPM was developed with subsequent research was driven primarily by the theory that joint motion would promote the healing and regeneration of articular cartilage. Cartilage healing and regeneration continue to be an active area of research (O'Driscoll & Giori, 2000). However, the CPM continues to be the major clinical use to avoid arthro- fibrosis following trauma or surgery on joints that are prone to stiffness, such as the knee, elbow, and joints of the hand. Using the theory of the CPM for preventing joint stiffness can be demonstrated within the first few days following surgery (O'Driscoll & Giori, 2000). The

CPM primarily minimizes joint hemarthrosis and peri-articular edema. In the presence of a joint effusion, movement of the knee away from the position of maximum volume and compliance cause an increase in intra-articular pressure. The greater the effusion, the greater the pressure generated by a certain degree of joint flexion causes a sinusoidal oscillation in intra-articular pressure. The maximum benefit of the CPM is believed to be in the first few hours and days following surgery in the first and second stages of stiffness (O'Driscoll & Giori, 2000). The CPM is less effective in the third stage of stiffness. Complications do occur from the use of the CPM. Once CPM is started, it is necessary to utilize the full ROM. Essentially; the peri-articular tissues are being stretched and compressed alternately in flexion and extension. By this mechanism, CPM causes a sinusoidal oscillation in intra-articular pressure, which squeezes out excess blood and fluid and prevents further edema from accumulating (O'Driscoll & Giori, 2000).

CPM requires close supervision by someone skilled in its use, so it is mandatory that the patient and family are involved and educated from the beginning regarding the principles of use and how to monitor the limb. Most complications are not serious, or permanent. The most common may be increased bleeding, but rarely is this sufficient for transfusion due to the marginal increase in blood loss (O'Driscoll & Giori, 2000). Studies O'Driscoll and Giori (2000) reviewed found no difference in wound drainage or transfusion requirements with CPM use following TKA. Some patients may require a return to the operation room for evacuation of hematoma under such circumstances (O'Driscoll & Giori, 2000).

A therapist from the interdisciplinary team presented scholarly literature from Bible, Simpson, Biswas, Pelker & Grauer, 2009 of a study conducted by orthopedic and rehabilitation physicians on the effectiveness of CPM machines. Investigations of the usefulness of CPM therapy after TKA have yielded mixed results, with evidence suggesting its efficacy is contingent on the presence of larger motion arcs. Twenty asymptomatic subjects were recruited. The amount of flexion in both knees was determined by applying the electro goniometer to each joint. The CPM machine then was passed through a series of motion arcs starting at 0 to 10 degrees and progressed in 10-degree increments until a CPM motion arc of 0 to 90 degree was reached. Surprisingly, the ROM the knee experiences while in a CPM machine has not been elucidated. In this study, the ability of a CPM apparatus to bring about a desired knee ROM was assessed. The data showed ROM of the knee was less than would be expected relatively to the motion arc of the CPM. The ROM, the knee experience in a CPM machine, is considerably less than initially anticipated. The authors did go on to say that the study was not without limitations; the primary limitation was only one brand of CPM machine was evaluated and did not account for potential variability between CPM machines from different manufacturers. However, the majority of CPM machines in current clinical use are predicated on a similar design and concept (Bible, Simpson, Biswas, Pelker & Grauer, 2009).

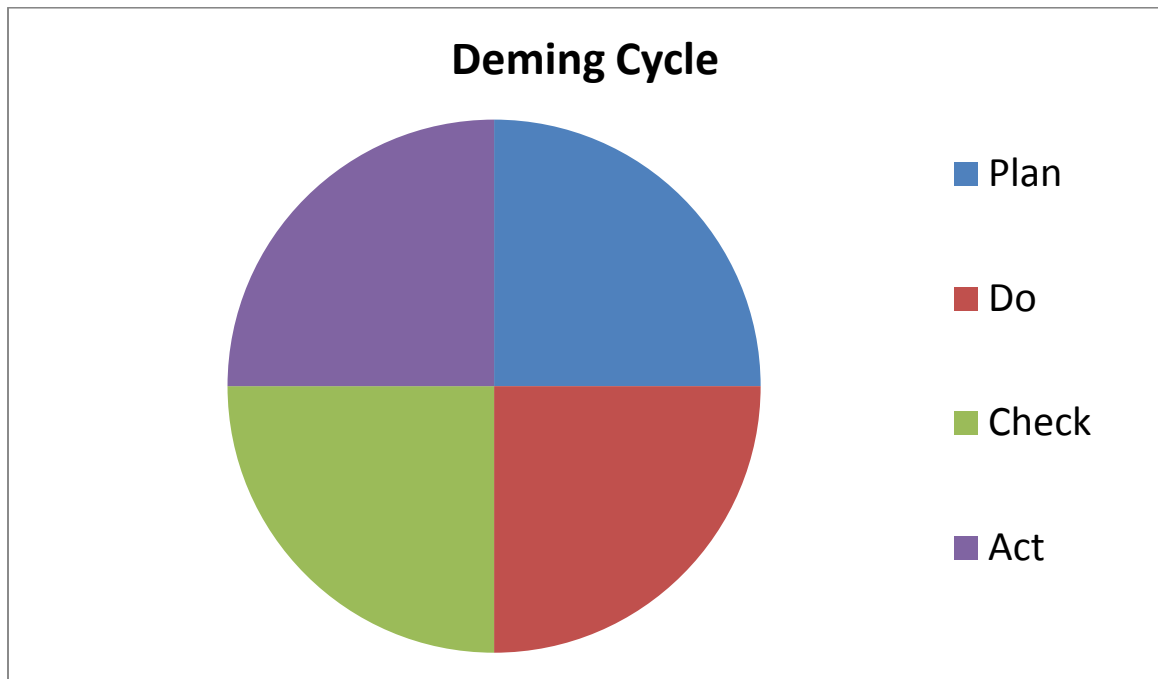
Frameworks

Theories of organizational change explains how organization's innovative new goals, programs, technologies, and ideas are presented. Organizational change theories

also offer strategies for getting a program accepted by those in charge of the approval process. These theories recognize that organizations such as schools, worksites, and health care facilities evolve through stages, and each stage may require a different strategy or activity before it is implemented (Hodges & Videto, 2011). For this project, the total quality management (TQM) model was used. The theoretical framework is based on Deming, who in 1950 proposed that business processes should be analyzed and measured to identify sources of variation that cause products to deviate from the customers' requirements (www.balancescorecardinc). The TQM model assumes that change is prevented because institutions are based on long-standing traditions, practices, and values. In order to challenge barriers to change, a set of principles has been developed for leaders who create a new quality culture. These principles include; develop and focus on vision, mission and outcomes of the institution, creative and supportive leadership, retrain individuals or implement systematic development of staff, make data-driven decisions based on facts, ensure collaboration, delegate decision making and proactively plan change. This model views change agents and leaders as the focus of the change process. The benefit of this model is it allows analyzing strategies and categorizing change processes, the emphasis is on the role of people and their attitude towards the change process is brought to the forefront. (Kezar, 2001).

The TQM model will be essential in this project, because when presenting the evidence that the use of CPM therapy shows there are no benefits and suggest that this practice be discontinued, the physician's that use it may create resistance. Though W. Edward Deming utilized this model to promote change in a business environment, the

principals could apply in health care setting as well. Using CPM therapy by some physicians has been a long standing tradition. Though the project results along with other EBP reports may prove contradictory to what the physicians believe their attitudes towards the change can become a barrier. The TQM model is design to use strategies for innovative new goals, programs, technologies and ideas to be presented to leaders who are the focus. One of the physicians that use CPM therapy is the medical director of the rehabilitation hospital. For this reason, good strategies to ensure collaboration among the physicians, administration, and the change agent to ensure the common goal of quality patient care remain the focus.



Plan: Design plan

Do: Implement the plan

Check: Assess the measurements and report the results

Act: Decide a change needed to improve the process

Figure 1. TQM: Deming wheel. Adapted from <http://www.balancedscorecard.org/resources>

Section 3: Methodology

Project Design/Methods

The project utilizes a quality assurance approach that is exemplified by a Deming cycle. The mission statement reveals the purpose of the proposed project to promote cost-effective practice change on the orthopedic post-acute rehabilitation unit. The goal for this project is to develop a policy that is based on best practice and current literature to eliminate the use of CPM machines. The objective is to have the physicians implement a cost-effective change to their practice based on the evidence-based results. According to the Deming cycle, it will allow designing a policy development (plan), implementing the plan, assessing the data and reporting the results, and then deciding the change that is needed to improve the practice process. (IRB approval #12-02-14-0066886)

Population

The population for this policy development will consist of the interdisciplinary team of physical therapist, occupational therapist, and nursing staff. The team collaborated and brought forth evidence-based information to support the development of the policy. Physical therapists presented feedback with their observations of physical therapy progress and outcomes and discharges as they relate to mobility of those who do not use the CPM machines with therapy. Nursing staff presented feedback with their observations of patients' progress and outcomes as it related to pain management, discharge, and nurse staff time management (see Figure 2).

Category	Item	Quantity	Price each	Total
Equipment	CPM Purchase	15	\$1575.00	\$23,625.00
	CPM Rental	5(varies)	\$375.00/7days	\$ 1875.00
Training	Basic nursing application skills	1 hour	\$ 25.00	\$ 25.00
Other	Avg nursing tasks hours(including monitoring)	8hrs/6nurses	\$ 25.00	\$ 1200.00
Total Cost:				
\$ 26,725.00				
Benefits (estimated) of discontinued use of CPM Machines				
Purchase or replacement of CPM machine Savings				\$ 1575.00ea
Rental of CPM savings				\$ 1875.00
Repairs of CPM machine (estimate) savings				\$ 400.00
Improvement in nursing time management efficiency				\$ 1200 00
				Total
				\$5050.00

Figure 2. Costs benefit analysis for discontinuation of CPM therapy machine usage.

The above cost benefit analysis shows the purchase and rental of CPM machines as well as the time to train each nurse hired and the average nursing task hours used daily per patient in applying and monitoring the device. This time also includes monitoring pain while the machine is in use and medicating the patient according to orders, which can be time consuming if the nurse has three to four patients on CPM in conjunction with other patients.

The estimated benefits of the discontinued use of the CPM machine will save the operational budget an average of \$4,000 in maintenance, rental, and nursing hours as well

as the elimination of purchasing new CPM machines at \$1,575 each. The discontinuation will improve patient outcomes by decreasing pain and the need for additional pain medications that can increase the patients' fall risk while at physical therapy.

The CPM machine is applied most often by the rehabilitation nurse. Frequent checking and slight adjustments of position prevent pressure-related problems are necessary. Nurses do not always have sufficient time, or sometimes the experience, to look after these needs (O'Driscoll & Giori, 2000).

Project Evaluation Plan

An evaluation report and project assessment tool will be utilized to establish the effectiveness of this project. The report will consist of an executive summary, program description, evaluation methodology, final findings, interpretation, and reflection and recommendations.

This report will align with the program goal to provide the most cost effective rehabilitation therapy treatment for a positive recovery outcome. This report also aligns with the objectives to have the physiatrist modify their practice in coordination with the project findings. In evaluating this program, the five guiding principles for evaluating the program (Hodges & Videto, 2011) will be utilized. Systematic inquiry will be done to evaluate the design and do a systematic data-based evaluation. Competence will be demonstrated to the stakeholders by presentations of evidence and show cost benefit analysis and current data from the literature. The evaluation process will ensure integrity and honesty. Respect for people will be demonstrated by the security, dignity, and self-worth of the respondents, program participants, clients, and other stakeholders with

whom they interact. Responsibility for the general public welfare will be demonstrated by taking into account the diversity of interest and values that may be related to the general and public welfare.

Summary

In summary, the project design/method was displayed through utilizing the Deming cycle. This model is derived from the theory of organizational change and TQM (Kezar, 2001). The population and sampling will be the interdisciplinary team of the physical therapist, occupational therapist, and nursing staff. Data collection will be done by first reviewing evidence-based literature and observational feedback from therapy and nursing staff on patients' progress and outcome without the use of CPM therapy. A benefit-cost analysis was created to show the economic benefit to discontinuing the use of CPM machines. This analysis provides for the operational budget expense visual to answer project questions. The project evaluation plan that was used was the formative evaluation design. The program study was done over a 30-day period, which allowed for the collaboration, observation, feedback, and presentation of the policy change to the stakeholders. The result of the project was reported to the health network administration team at the organization, with the hopes of encouraging a practice change throughout the health network and not just the rehabilitation hospital.

A SWOT analysis needs for a policy change to decrease the use of CPM machines was conducted and presented to the stakeholders to implement the gradual discontinued use of CPM machines. If this policy is accepted and approved, it will create a cultural

change among those rehabilitation physicians who have used CPM in their practice for years. The policy will also initiate a cost-effective benefit to the operational budget.

Strengths: Evidence-based literature available that supports the discontinued use of CPM therapy. The institutional findings show no benefit with the use of CPMs but no harm when not used on patients.

Weaknesses: While there are many rehabilitation facilities that have discontinued use, there are still a good number of facilities that still do use CPM therapy.

Opportunities: Opportunity to educate physicians and therapy staff in current literature and project findings by policy change and dissemination of information.

Threats: Push back from physicians that have used this practice for years and resistant to change.

Section 4: Findings, Discussion, and Implications

Summary of Findings

Physical and occupational therapist reported that there were no noted unusual ambulatory dysfunctions with patients who did not use CPM therapy; a decrease in complaints of knee pain when attending therapy was noted for those patients compared to those who did use CPM therapy prior to therapy. Nursing staff reported no noted changes or increased needs for ambulatory assistance. Nurses reported their daily time management was improved without the task of applying, monitoring, and removing the CPM machine. I have concluded that the CPM policy revision and the development of the policy guide will be an effective tool to help this facility decrease the usage of CPM machines with the long-term goal of eliminating its use. This project was of significance and relevance to the rehabilitation practice because eliminating the use of CPM machines creates a source of patient satisfaction as it relates to decreased pain, which may lead to reducing the need for pain medication prior to physical therapy and that may reduce therapy falls. The development of the policy was agreed upon by the interdisciplinary team best practice and current literature. The policy change may improve nurse satisfaction by freeing nurses' time schedule up by no longer having to go to the patient several times during their shift to monitor the CPM machine.

Discussion of Finding in the Context of Literature and Frameworks

The DNP project findings correlated with conclusions in the literature, though the project results were on a much smaller scale. The conclusion in one randomized clinical trial revealed there was moderate yet conflicting evidence of the short-term efficacy of

CPM machine use and there was no long-term benefit of CPM use (Lenssen, Koke, et al., 2003). Another randomized clinical trial concluded, after comparing the effectiveness of three-in-hospital rehabilitation programs with and without CPM for ROM in knee flexion and extension functional ability and LOS after primary TKA, no significant difference among the three groups was demonstrated in primary or secondary outcomes at discharge (Denis et al., 2006). The results of that study did not support the addition of CPM applications to conventional physical therapy in rehabilitation programs after primary TKA because the use did not further reduce knee impairments or disability or lessen the length of hospital stay. Lenssen, DeBie, et al. (2003) conducted a randomized controlled trial with the objective to assess whether there was a benefit in CPM use during short hospitalization periods. The conclusion of that study indicated that CPM delivered in the first 4 days following surgery seemed to lead to better short-term mobility. However, results on function should be interpreted with caution because pain and function seemed closely related in the scoring system used. This study also added that muscular strength in the CPM group was better than the control group (Lenssen, DeBie, et al., 2003). In the fourth and most compelling study, Tabor (2013) looked at ROM and pain with the use of the CPM machine following TKA. In conclusion, the study showed patients who used CPM did not heal faster or attain larger gains in knee ROM, when compared to those who did not use CPM. There were no differences in adverse events; manipulations, LOS, and functional outcomes were all comparable (Tabor, 2013).

Implications

Implications for Practice/Action

I would like to see a decrease in the use of CPM machine therapy. If the physicians, with the supporting literature and evidence, would start to reduce the orders for the CPM usage slowly while monitoring the outcomes of those patients, it would be a positive step towards my goals. If the policy is implemented, physicians will begin to decrease the order of CPM therapy starting with the less complicated surgeries.

Implications for Future Research

I suggest a retest at this rehabilitation hospital secondary to the short timeline used in this project. Though the consensus is the results will be the same, with a longer timeline, and more feedback used, it is felt it would add more validity to the results.

Implications for Social Change

If this project and supporting literature are accepted by physicians not only at this facility, but other rehabilitation facilities that continue to use CPM machine therapy, it may change long-standing cultural practices. As a result of these changes, it may have a significant impact on a way to help contain health care cost in the rehabilitation arena.

Project Strengths and Limitations

Strengths: The noted strengths of the project were the support of the stakeholders, also the rehabilitation hospital's interdisciplinary team and the availability of that team.

Limitations: the noted limitations were the timeline chosen, and the possible disapproval of the physicians.

Recommendations for a remediation of limitations: Extend the timeline.

Analysis of Self

As a scholar: I feel competent. I have experienced growth through this DNP journey, and knowledge does not stop here. With health care constant changes and demands to improve the quality, Evidence Based Practice will keep the doors open for new knowledge.

As a practitioner: I feel I am proficient. This skill has been built on the experiences through this DNP journey, and I have combined it with previous experiences.

As a project developer: I feel I demonstrate the skills to be an advanced beginner. I have engaged in small unit projects previously, but not to the extent that this DNP project has allowed. This project has given me the confidence to identify issues, become creative by developing a research question, and pursue the steps to answer that question.

What does this project mean for future professional development? As stated earlier, it has provided the confidence needed to identify issues and the courage to develop a research question and present it to the stakeholders to get buy-in and the ability to follow through on future projects.

The advanced beginner nurses are ones who can demonstrate marginally acceptable performance, the competent nurse develops when the nurse begins to see his or her actions in terms of long-range goals or plans of which he or she is consciously aware, and the proficient nurse perceives situations as wholes rather than in terms of aspects, and performance is guided by maxims (Benner, 2001).

Summary and Conclusions

My goals for the DNP project have been met. It has provided the opportunity for me to grow as a research scholar by investigating the efficiency of the use of CPM therapy. The desired long-term outcome of this project is that physicians at the rehabilitation hospital will follow through and try to change their practice by slowly decreasing the orders of CPM usage. It is also the desire that administration will maintain interest, support and report if there is a substantial impact on the operational budget.

Section 5: Scholarly Product

Project Evaluation Report and Project Assessment

Project description; A policy revision to a rehabilitation hospital existing CPM policy and the development of a policy guide to eliminate the use of CPM machines was done to create a cost effective practice change that will be a benefit and may increase patient satisfaction as well as nurse satisfaction.

Evaluation Methodology; the project was completed within the given timeline. The interdisciplinary team that consisted of physical therapy, occupational therapy, and nursing staff observed patients during their shifts and presented feedback as it related to those patients who did not use CPM machines mobility progress. The team met once a week for four weeks presenting evidence-based scholarly nursing and therapy literature as well as presenting feedback from each discipline. Feedback questions for therapy were; was there anything you had to do more extensively with patient's who did not use CPM therapy? Were there any notable unusual ambulatory dysfunctions or complaints out of the ordinary from those patients who did not use CPM therapy? Feedback questions for nursing were; any notable changes or concerns with patients who do not use CPM therapy with ambulatory assistance? How was the nurse's time management when having assignments with primarily patients who do not use CPM therapy? The Deming cycle was used as a tool to help guide this project. The plan, do, check and act of the Deming cycle was demonstrated as follows; plan: a plan to develop a policy change was decided, do: the plan was implemented, check: assessed and reviewed the feedback and scholarly literature, and act: decided a change was needed to improve the process.

Findings; all the feedback overwhelmingly showed there was no difference in ambulatory functionality and positive feedback on nurse's time management was received which conforms to the literature. The stakeholders in the organization were very supportive of this project, which included the program director, rehabilitation nurse manager, skilled rehabilitation administrator and two physicians (one physiatrist and one hospitalist). The project ran from December 5, 2014 through December 31, 2014. As the IDT met weekly and gathered information, we began to develop a policy that would gradually eliminate the use of CPM machines. Dissemination of the project was presented on January 2, 2015.

A power point presentation of the project and its findings were disseminated to the stakeholders at the rehabilitation hospital. The project was evaluated and determined it has met its objective. The rehabilitation program director stated the proposed project is something to think about, and believes that the automatic orders come about from surgeons who rely on traditions. The hospitalist interjected and stated the project has proven to have merit and agrees that we could implement a policy that will gradually decrease the use of CPM machines utilizing it first with less complex TKAs. The hospitalist also stated that they will introduce this proposed concept at their next physician's meeting and then offer to have this writer, a nurse and therapist from our project group to present the project and disseminate its findings. Upon all committee and council approval, the current CPM policy will be revised.

Assessment of Project; Policy Guide to decrease the use of CPM Machine

Objective	Results
Create a cost effective practice change that will be a benefit and may increase patient satisfaction as well as nurse satisfaction.	Reported by therapy and nursing project committee that there was a decrease in complaint of pain by patients, and nurses reported improved daily task management without the task of applying, monitoring or removing CPM machines.
Scope	Results
To revise the existing rehabilitation facility's policy on the use of CPM machines and develop a guide to eventually eliminate the use of the CPM machine	Completed and showed in Appendix A and Appendix B
Timeline	Results
The project committee interdisciplinary team met once a week for four weeks.	Committee was able to obtain the needed information for this project within the given timeline.
Resources	Results
Physical therapist, occupational therapist, and nursing staff	Interdisciplinary team collaboration at weekly meetings

Stakeholders Expectation	Results
Enlightening on CPM usage in today's rehabilitation setting, it's cost and actual patient benefit	Met expectations, stakeholders in agreement with proposed policy revision and policy guide.
Impact of Change	Results
It will be a practice culture change for those physicians who are accustomed to ordering CPM machines.	A gradual practice change that will have a positive impact on this rehabilitation facility.
Project Success	Results
	The project met its goals, objectives and outcomes.

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Appendix A: Proposed Policy Revision

Manual: Nursing Manual	Folder: Equipment Medical Plan for
TITLE: Continuous Passive Motion (CPM)	POLICY OWNER: Senior Director of Clinical Operations
POLICY ADMINISTRATOR: Chief Nursing Officer	COMPLIANCE REVIEW:
ORIGINAL DATE:	REVISION DATE(S) 5/00, 6,08,9/08,9/13,6/14, (01/15 in review)

SCOPE: Patients with a physician order for Continuous Passive Motion (CPM)

PURPOSE:

To provide the reference necessary to assure equipment is available to provide for the individualized plan of care for the orthopedic/trauma patient.

POLICY:

1. Equipment
 - a. Continuous Passive Motion (CPM) machine
 - b. Sheepskin slings
2. Policy
 - a. CPM units are stored and available to the trauma and orthopedic units
 - b. CPM is initiated in PACU or on the nursing unit and may be placed on patient by nursing per physician order.

- c. Physicians will gradually decrease orders for the use of CPM usage on patients with routine elective surgeries but continue to order on trauma or complex surgeries per the physician's discretion.
- d. Annual Preventive Maintenance is performed by the bio-med department.

EDUCATION AND TRAINING: Physical therapy and nursing staff will attend in-service and training as it relates to application of the CPM machine.

COMMITTEE/COUNCIL APPROVALS:

CANCELLATION:

Appendix B: A Policy Guide for Eliminating the Use of CPMs

The gradual elimination of the CPM machine will be based on the following;

1. Complexity of the arthroplasty and acute medical stability of the patient
2. Physician's assessment of the patient
3. Physician's order for physical and occupational therapy
4. Weight bearing status

Upon admission of the status-post total knee arthroplasty patient to the rehabilitation hospital, the physician will assess the patient and determine that the patient is a non CPM candidate based on the complexity of the surgery and medical stability. The physician will then write an order for physical therapy and occupational therapy to evaluate and treat. The non-CPM candidate will then be evaluated by physical therapy for a full weight bearing or partial weight bearing status and a treatment program will be developed not utilizing the CPM machines.

Nursing staff will be made aware that the patient is a non-CPM candidate and nursing staff will monitor and report any abnormal joint stiffness, ROM deficits, wound drainage and pain levels to the physician.

This policy will continue until the majority or all non-complex TKA's no longer utilize CPM machines.