Nonpharmacologic Pain Management for Patients in Ambulatory Extended Recovery After Minimally Invasive Gynecologic and Urologic Surgery

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PURPOSE: To determine the effectiveness of an evidence-based postoperation nonpharmacologic pain management bundle for patients recovering from minimally invasive gynecologic and urologic surgeries.

PARTICIPANTS & SETTING: This study focused on patients recovering from minimally invasive gynecologic and urologic surgery at a comprehensive cancer center. The first cohort consisted of patients three months preimplementation (n = 96) and the second consisted of those three months postimplementation (n = 86).

METHODOLOGIC APPROACH: The project used a pre- and postintervention design and deployed the bundle as a nursing order. Nurses and patients were educated about the bundle and comprehensive postoperation pain management strategies.

FINDINGS: Postimplementation, the documented use of nonpharmacologic pain management interventions significantly increased and postoperation opioid use significantly decreased without negatively affecting pain scores or lengths of stay.

IMPLICATIONS FOR NURSING: Nonpharmacologic pain interventions can decrease the need for postoperation opioids, and ordering a bundle of interventions alongside analgesia is an effective way patients can manage pain.

KEYWORDS pain management; alternative therapies; laparoscopy; robotic surgical procedures
***ONF, 50*(1), 47–57.**
DOI 10.1188/23.ONF.47-57

The use of minimally invasive surgical techniques is increasing worldwide (Blencowe et al., 2018). Robotic surgery increased from 1.8% of all surgeries in 2012 to 15.1% of all surgeries in 2018 and has become commonplace in many surgeries for which the laparoscopic technique has been considered safe and effective, including surgeries for urologic and gynecologic malignancies (Sheetz et al., 2020). Although there is reportedly less postoperation pain after laparoscopic surgery compared to open surgery, early postoperation pain after laparoscopy is still thought to be similar or even more severe (Sjövall et al., 2015). The etiology of laparoscopic surgical pain is multifactorial. As with open surgery, laparoscopic surgery includes superficial and deep somatic pain related to tissue trauma near the incision sites or drains, and pain can be worsened by sociocultural and individual factors (Blencowe et al., 2018; Sjövall et al., 2015). Because of the insufflation of the abdomen with carbon dioxide, postlaparoscopic surgery pain can also include visceral pain, which is attributed to peritoneal irritation caused by the dissolved gas, as well as neuropathic pain related to distension-induced neuropraxia of the phrenic nerves (Blencowe et al., 2018; Koraş & Karabulut, 2019; Sjövall et al., 2015). Visceral and neuropathic pain present as cramps, bloating, and shoulder tip pain, generally in the first 24 hours postoperation (Blencowe et al., 2018). Previous studies report the presence of postlaparoscopic surgery visceral pain and shoulder pain in 31%–83% of patients (Çankaya & Saritaş, 2018). Given that postoperation pain in these patients arises from different mechanisms, an appropriate pain management protocol should also be mechanism

FIGURE 1. PARIHS Framework High Subelements: Guiding Translation

Evidence

Research

- High-level, quality research showing the benefit of nonpharmacologic interventions
- Judged as relevant: research on patients recovering from abdominal laparoscopic surgery

Clinical and patient experience

- Reflected upon clinical experience with beneficial nonpharmacologic interventions
- Consensus within similar groups (e.g., online blogs, patient–provider conversations)
- Multiple patient biographies used and valued as evidence

Local data

- Evaluated and reflected upon data collected from organizational providers, and systematically analyzed patients

Context

Culture

- Define culture and unit climates (e.g., values, beliefs).
- Ensure consistency with nurses' role.
- Ensure resources for the bundle are available.
- Pain management aligns with strategic goals and is a key practice and patient issue.

Leadership

- Transformational nurse leaders, surgeons, and advanced practice providers support the project.
- Effective teamwork
- All stakeholders involved in decision-making
- Use an enabling, empowering approach to teaching nurses.

Evaluation

- Collect feedback from individuals, the team, and multiple sources on system performance.
- Use multiple methods for feedback (e.g., clinical, performance, economic, experience evaluations).

Facilitation

Purpose and role

- Holistic approach to enabling others—understand how the bundle fits into the workflow and consider all documentation and patient education.
- Develop a sustained partnership with stakeholders—check in with nurses regularly because the intervention is a nursing order and relies on their care delivery.
- Adult learning approach to teaching
- Work with high intensity.

Skills and attributes

- Convey the project's meaning and significance.
- Be flexible and authentic.
- Critically reflect.

PARIHS—Promoting Action on Research Implementation in Health Services
Note. Based on information from Rycroft-Malone, 2004.

based. Pain management often includes acetaminophen, nonsteroidal anti-inflammatory drugs, and opioids, but should also include nonpharmacologic interventions.

Nonpharmacologic interventions are noninvasive, associated with minimal to no risk, and preferred by patients when possible (D'Arcy, 2011). The overall use of alternative, complementary, or nonpharmacologic therapies has been increasing worldwide (Frass et al., 2012). In the United States, about 38% of adults reported using some form of complementary and alternative medicine (National Center for Complementary and Integrative Health, 2017). Postoperation, complementary and alternative medicine can reduce the use of analgesic and antiemetic drugs, minimize symptom burden, enhance quality of life, and reduce financial effects on individuals and hospitals (Çankaya & Saritaş, 2018).

Postoperation pain management is inadequate when the healthcare team does not use the full spectrum of evidence-based pain management interventions and the treatment pathways include only medications. The purpose of this quality improvement project was to develop and deploy a nonpharmacologic pain management bundle for patients admitted for minimally invasive gynecologic or urologic surgery recovering on the ambulatory extended recovery (AXR) unit at Memorial Sloan Kettering Cancer Center in New York, New York.

Review of Literature

There are no guidelines for using complementary and alternative medicine, particularly after minimally invasive surgery, because of the scarcity of published research. In performing the literature review, interventions that would not be feasible to implement on the AXR units were disregarded. Although limited in number, high-quality studies exist to support the following interventions for improving acute postoperation pain outcomes in

patients undergoing abdominal laparoscopic surgery: practicing relaxation therapy with guided imagery, listening to music or simply decreasing noise, employing massage and touch therapy, ambulating, and using hot packs for shoulder tip pain (Broadbent et al., 2012; Çankaya & Saritaş, 2018; Ikonomidou et al., 2004; Koraş & Karabulut, 2019; Lasaponari et al., 2013; Laurion & Fetzer, 2003; Mohamed & Abd Elhady, 2019; Rafer et al., 2015). To determine best practices for nonpharmacologic pain management in this AXR population, the following three prongs of evidence-based practice were considered: (a) literature review, (b) patient and caregiver experience and values, and (c) clinician expertise. In addition to the literature review, patients were invited to share experiences with the clinical team during the project's development and, separately, to explore online forums and patient blogs related to pain after laparoscopic prostatectomies, nephrectomies, and hysterectomies. The project team met with surgical nurses, advanced practice providers, physicians, and integrative medicine and pain specialists to ensure a comprehensive search for beneficial interventions. From this, the authors identified additional low-risk interventions that would be feasible to implement in clinical practice. These included the applications of hot packs to the abdomen, in-bed exercises, ginger and mint tea, and acupressure. These interventions were supported by literature unrelated to abdominal laparoscopic surgery pain management.

For years, nurses at the project team's cancer center had already been providing hot packs for patients' abdomens after gynecologic surgery to treat complaints of cramping, because lower abdominal heat has been shown to be as effective as ibuprofen in dysmenorrhea (Akin et al., 2001). In patients undergoing robotic-assisted laparoscopic prostatectomy, abdominal hot packs significantly decreased the mean time to the first passage of flatus after surgery, likely related to increased blood flow, without increasing adverse events (Park et al., 2018). One can assume that early passage of flatus coincides with earlier relief of gas pain. When not ambulating, physiotherapists recommend patients bend their knees in bed or rock their legs side to side with their knees bent (Kenway, 2019); patients reported these in-bed exercises as beneficial.

Ginger and mint tea are two interventions that repeatedly appeared in patient and physician blogs, and in communications with patients, nurses, clinicians, and integrative medicine and pain specialists (Angstetra, n.d.; Dumas, 2018; Johnson, 2011).

FIGURE 2. Nursing Order

Nonpharmacologic Pain Management

- Demonstrate the use of interactive videos.
  - Acupressure for pain and headaches
  - Touch therapy for caregivers (massage)
  - Guided imagery meditation
  - Mindful breathing meditation and managing pain with meditation
- Decrease lighting and noise.
- Encourage listening to music via headphones.
- Exercise as tolerated every 1–2 hours day and night.
  - While in bed, bend and straighten legs or rock knees side to side with legs bent.
  - Begin ambulation by 4 hours postoperation, as long as clinically stable.
- Order mint or ginger tea from food and nutrition for gas pain when tolerating by mouth.
- Apply hot packs to the abdomen or shoulders as needed. Do not apply directly on skin.

Although human data are lacking, ginger is known to stimulate saliva flow and secretion of digestive enzymes, increase gastric emptying, reduce nausea and vomiting, and have anti-inflammatory effects (Memorial Sloan Kettering Cancer Center, 2019). Dietary ginger seems to be without the anticoagulant or antiplatelet effects for which healthcare professionals typically ask patients to hold their supplements during the perioperative period, so safety is not a concern (Memorial Sloan Kettering Cancer Center, 2019). Clinical studies have shown the effectiveness of peppermint in reducing colonic or gastric spasms, dyspepsia, and general gastrointestinal discomfort, as well as anti-inflammatory effects (Memorial Sloan Kettering Cancer Center, 2019). Acupressure was recommended by the integrative medicine service as a simple patient-directed intervention that may help in acute pain scenarios after laparoscopic cholecystectomy and minor trauma (Kober et al., 2002; Yeh et al., 2008).

Translation Framework

The Promoting Action on Research Implementation in Health Services (PARIHS) framework served as the framework for this quality improvement project. Kitson et al. (1998) developed PARIHS based on the interplay of the following three essential elements for successful research translation into practice: (a) clarity about the nature of the evidence being used,

TABLE 1. Demographic and Surgical Characteristics of the Pre and Post Groups

	Pre (N = 96)		Post (N = 86)	
Characteristic	**$\bar{X}$**	**SD**	**$\bar{X}$**	**SD**
Age (years)	58.7	9.51	59.9	10.23
Surgery duration (minutes)	169.7	74.9	169.9	76.3
Length of stay (minutes)	1,253.6	272.4	1,235	259.5
Characteristic		**n**		**n**
Pain close care alert		3		1
Sex				
Female		63		62
Male		33		24
ASA Physical Status Classification				
2		38		34
3		57		49
4		1		3
Postoperation AXR unit				
M19		77		70
M5		14		11
M17		5		5
Surgery type[a]				
LAP GYN debulking		1		–
LAP oophorectomy or ovarian cystectomy[b]		2		2
LAP partial nephrectomy		2		–
LAP prostatectomy		–		3
LAP total laparoscopic hysterectomy[a]		8		9
RA adrenalectomy		1		–
RA GYN debulking		–		1
RA oophorectomy or ovarian cystectomy		1		4
RA partial nephrectomy		5		3
RA partial nephrectomy		5		3
RA prostatectomy		26		17
RA radical nephrectomy		–		3

Continued in the next column

TABLE 1. Demographic and Surgical Characteristics of the Pre and Post Groups *(Continued)*

	Pre (N = 96)	Post (N = 86)
Characteristic	**n**	**n**
Surgery type *(continued)*		
RA total laparoscopic hysterectomy[c]	50	44
PLND	64	61
Additional ancillary procedure	3	5

[a] Participants could undergo more than 1 type of surgery.
[b] Right or left, with or without salpingectomy
[c] With or without bilateral salpingo-oophorectomy
ASA—American Society of Anesthesiologists; AXR—ambulatory extended recovery unit; GYN—gynecologic; LAP—laparoscopic (no robot); PLND—pelvic lymph node dissection; post—postimplementation; pre—preimplementation; RA—robotic assisted
Note. A pain close care alert is an alert in the health information system that denotes a patient with an increased risk of adverse effects from opioids such as opioid use disorder, diversion, overdose, and respiratory depression.

(b) the context in which the proposed change is being implemented, and (c) the type of facilitation needed to ensure a successful change process (White et al., 2016). Within these elements (evidence, context, and facilitation), the framework provides a checklist of subelements that can be judged as either low or high. There is a greater chance of success and sustainability if the project is supported by high subelements (Rycroft-Malone, 2004). This checklist helped ensure that the evidence used to develop the bundle was considered high, the context in which the project was rolled out engaged the strengths of the cancer center and was in line with its priorities, and the change was facilitated in a holistic manner that enabled the clinical staff (Rycroft-Malone, 2004).

The framework uses a comprehensive definition of evidence that includes published research; clinical expertise and professional knowledge; evidence based on patient preferences or experiences, including those of caregivers and family; and routine information derived from the collective practice environment (White et al., 2016). This inclusive definition aligned with the project given the limited published research on nonpharmacologic interventions and the collaborative effort in determining the best strategies to include in the bundle. Context is defined as the organization's culture, leadership,

and evaluation environment in which the proposed change is implemented (White et al., 2016). The project was implemented on the three hospital units that care for patients in AXR programs, and it was crucial to ensure that the nursing staff on each unit was able and willing to deliver the interventions suggested in the bundle. Facilitation is the essential function described as helping others achieve goals and understanding the processes to achieve those goals (White et al., 2016). Facilitators in this quality improvement project included nursing leadership, nurse champions, AXR nurse practitioners, surgeons, surgical fellows, nursing informatics, pain and anesthesia personnel, integrative medicine units, dietary services, and the unit supply technicians. The authors consulted with these interprofessional teams and sought their support. Figure 1 presents the subelements of evidence, context, and facilitation applied to this project. In the PARIHS framework, strong evidence with strong contextual support and facilitation make an ideal situation for implementing evidence into practice (White et al., 2016). The PARIHS framework did not provide clear steps to inform translation, yet it was the supporting translational framework that guided implementation of the project.

Methods

Design and Setting

This quality improvement project employed a pre- and postimplementation design and took place on three designated AXR units at Memorial Sloan Kettering Cancer Center. The objectives were as follows:

- Increase the use of nonpharmacologic pain management interventions documented by nurses in the medical record.
- Reduce the use of opioids postoperation, measured in morphine milligram equivalents (MEQs), taken from four hours postoperation until discharge.
- Reduce pain scores on the numeric rating scale (NRS) ranging from 0 (no pain) to 10 (the worst pain imaginable) documented at the time of the first follow-up nursing assessment on the AXR unit (four to six hours after arrival to the unit) and at discharge.
- Reduce the number of patients on the AXR unit for minimally invasive gynecologic and urologic procedures who require inpatient admission for pain control issues.

Sample

Leading up to implementation, the hospital's capacity was frequently at more than 100%. Therefore, the preimplementation comparison group was identified by selecting a 12-week time period with a similarly high census. The preimplementation sample consisted of 96 patients who underwent surgery between March 3, 2019, and May 25, 2019. The postimplementation group consisted of 86 patients who underwent surgery during the 12-week time period from October 4, 2019, to December 27, 2019. All surgeries were minimally invasive gynecologic or urologic surgery on the AXR program. The AXR program consists of surgery-specific enhanced recovery after surgery pathways and a one-night hospital stay.

Inclusion and Exclusion Criteria

Patients who recovered from any minimally invasive gynecologic or urologic surgery on the AXR program during the designated pre- and postimplementation time frames were included. This included the following robot-assisted or laparoscopic surgeries with or without lymph node dissections: total hysterectomy with or without bilateral salpingectomy-oophorectomy, unilateral or bilateral oophorectomy or ovarian cystectomy with or without salpingectomy, radical prostatectomy, partial or radical nephrectomy, adrenalectomy (robotic assisted only), nephroureterectomy, and gynecologic debulking surgery. Individuals were still included if minor ancillary procedures were performed, as long as they remained on the AXR program. These procedures included the excision of a mesenteric mass, ureteral stent placement, appendectomy, and umbilical hernia repair. Participants included all men and women aged 18 years or older who underwent one of the qualifying surgeries on the AXR service and recovered in an AXR-designated room. Individuals were excluded if they spent the night on the postanesthesia care unit, were not discharged home from one of the three designated AXR units, or were transferred to inpatient for reasons other than postoperation pain control issues. The individuals who became inpatients for pain control issues were simply counted and not included in the analysis of nonpharmacologic intervention use, opioid use, or pain scores.

Ethical Considerations

An institutional review board (IRB) member at Johns Hopkins Medicine and Memorial Sloan Kettering Cancer Center's department of nursing quality deemed this project a quality improvement project. Subsequently, the quality improvement project did not require formal IRB submission and was approved

by nursing leadership at the project site, nursing informatics, and the director of nursing quality. A letter of support from the cancer center's IRB was also obtained prior to submission for publication. Because it was deemed a quality improvement project with the intention of improving evidence-based care for all patients in the postimplementation group, no informed consent was required.

Evidence-Based Intervention

There are many ways to deliver each pain management strategy collected from the literature review. The team evaluated the available resources at the cancer center and worked with stakeholders to determine how to best incorporate each strategy into the nurses' workflow as similarly as shown in the evidence. After many iterations, the evidence-based nonpharmacologic interventions were compiled into a bundle that was structured as a nursing order and incorporated into the standard AXR unit order sets for each applicable surgery. The final versions of the bundle and the project proposal were vetted by the nurse leaders on the recovery units and the applicable surgeon groups (see Figure 2).

Measures

The following data points were collected from the clinical information system and used to measure the effects of the intervention: (a) the free text and selection of nonpharmacologic interventions documented in the "relieving factors" section of the pain assessments in all nursing follow-up notes when the patient was on the AXR unit; (b) the opioid administration record from four hours postoperation until discharge, later converted into MEQs; (c) the pain scores in the first nursing follow-up assessment note documented on the AXR unit and in the last nursing note before discharge; and (d) the presence of an AXR-to-inpatient order released. Four hours postoperation was the selected time to start collecting opioid use data because this is when the patients are likely on the AXR unit and are no longer receiving IV opioids. The descriptive variables requested can be seen in Table 1.

Procedures

An education program describing the purpose of the project and the evidence supporting the use of the nonpharmacologic interventions was delivered to the inpatient and outpatient nurses by the principal investigator. This occurred during the course of two weeks, almost daily. A patient education handout titled "Managing Pain After Robotic or Laparoscopic Abdominal Surgery," which explained the interventions included in the bundle, was created, approved, and uploaded to the patient education portal. The outpatient nurses were instructed to include the new handout in their preoperative teaching.

Six inpatient unit nurses, comprised of a day-shift nurse and a night-shift nurse from each of the three AXR units, were enlisted as project champions. Two additional project nurse champions were identified from outpatient urology and gynecology. These nurses assisted by educating colleagues who missed the new order's in-service education, frequently reminding nurses to use and document the interventions, ensuring sufficient stock of warm packs and tea, and reaching out to the project team with any issues impeding use of the bundle. With the nurses, nurse leaders, attending surgeons, nurse practitioners, and fellows on board, the bundle was deployed in the order sets.

For the three months following bundle implementation, the principal investigator and the nurse champions reinforced the use of the nonpharmacologic interventions as well as the appropriate documentation during unit huddles and when noticing these patients on the AXR unit. The principal investigator and nurse champions also communicated monthly to discuss how the nurses were responding to the new order sets. Because the bundle was included in the order sets and standard nursing practice is to review the orders at the beginning of and throughout each shift, little to no continued nurse education was needed. The documentation of nonpharmacologic strategies is also standard. Therefore, there was limited concern that float nurses may not have received the initial education program. The principal investigator reviewed nursing documentation for patients under their care as a nurse practitioner and worked with the nurses to review any issues.

Once the data were collected, the principal investigator manually sorted through the data to ensure that only individuals who met the inclusion criteria were included in the analysis. The opioid dosages were converted to MEQs by an algorithm created by the cancer center's pain service and totaled for each patient. The number of nonpharmacologic interventions documented for each patient was totaled.

Data Analysis

The first three aims of the project were to (a) increase the mean number of documented nonpharmacologic interventions, (b) decrease mean opioid use from four hours postoperation until discharge,

TABLE 2. Analysis of Aims

	Pre (N = 96)		Post (N = 86)			
Outcome	**M**	**IQR**	**M**	**IQR**	**Difference**	**Significance**
Opioid use of morphine or equivalent (mg)	4	8	–	5	–4	0.01
Pain score floor	4	3	3	4	–1	0.039
Pain score discharge	3	5	3	4	–	0.321
Documented nonpharmacologic interventions	–	2	3	6	3	–
Outcome		**n**		**n**	**Difference**	**Significance**
Patients converted to inpatient for pain		2		3	1	0.67

IQR—interquartile range; M—median; post—postimplementation; pre—preimplementation
Note. Pain scores were measured using the numeric rating scale ranging from 0 (no pain) to 10 (worst pain imaginable).

and (c) decrease mean pain scores at the time of the first follow-up assessment and discharge during a 12-week period postimplementation. These aims were analyzed using the Mann–Whitney U test. The fourth aim of the project was to decrease the prevalence of individuals being transferred from AXR to inpatient because of pain control issues. This aim was analyzed using Fisher's exact test. All data were analyzed using IBM SPSS Statistics, version 26.0.

Results

Demographic information and surgical information were extremely similar across the pre- and postimplementation groups. The majority of patients in both groups were middle-aged women and were classified as American Society of Anesthesiologists category 3; patients recovered on the primary AXR unit after gynecologic surgery. The mean surgical duration was around 2 hours and 50 minutes in both groups. The mean length of stay (from admission to discharge) was 18.6 minutes less in the postimplementation group compared to the preimplementation group, although this was not significant ($p = 0.663$).

The intervention led to an increase in the use of nonpharmacologic pain management interventions documented by nurses in the medical record ($p = 0.0$) (see Table 2). The median number of nonpharmacologic pain interventions used per patient increased by three. The median use of opioids postoperation decreased significantly from 4 to 0 MEQs ($p = 0.01$). Pain scores (0–10) on the NRS documented at the time of the first follow-up nursing assessment on the AXR unit significantly decreased ($p = 0.039$, median difference of 1), but there was no change in pain scores at discharge ($p = 0.321$, median difference of 0). The fourth aim, to reduce by 30% the number of patients who undergo abdominal laparoscopic procedures on the AXR unit and then require inpatient admission for pain control issues, was not achieved. An increase from two to three patients in the postimplementation group was not statistically significant ($p = 0.67$).

Discussion

This quality improvement project sought to improve pain management by guiding the AXR nurses in the delivery of nonpharmacologic interventions alongside multimodal analgesia. Prior to the project, most patients on the AXR unit did not use nonpharmacologic interventions for pain management. This was evident in the preimplementation documentation and conversations with nurses. The nurses occasionally used repositioning, encouragement of deep breathing, and warm packs for pain management, but denied frequent use of any other nonpharmacologic methods and relied mainly on the administration of medications (S. Fellhauer, personal communication, July 23, 2018). To provide comprehensive, patient-centered, and culturally relevant pain management, nurses need to offer their patients complementary, nonpharmacologic interventions. In addition, documented use of nonpharmacologic interventions was required by the Joint Commission (2018) with the intention of decreasing opioid use and its associated negative sequelae.

After incorporating the bundle of interventions into the nursing orders for patients who underwent minimally invasive gynecologic and urologic AXR, the documented use of nonpharmacologic pain

management significantly increased and opioid use significantly decreased, without negatively affecting pain scores. There was a slight increase in patients who were transferred from AXR to inpatient because of pain issues from preimplementation (two patients) to postimplementation (three patients), but the numbers are so small that it is not clinically meaningful. This incremental increase is worth monitoring to see whether inpatient conversions continue to increase, but it is likely unrelated to the increase in nonpharmacologic pain management.

The increase in the median number of documented interventions is clinically meaningful because it shows a change in practice. Nurses provided more comprehensive, culturally relevant pain management by going beyond pharmaceuticals. The robust decrease in postoperation opioid use was also clinically meaningful because many patients were able to avoid opioids from four hours postoperation until discharge, and it is reasonable to speculate that this continued postdischarge. These data suggest that most patients should be able to go home without opioid prescriptions. Given the current opioid epidemic, increasing nonpharmacologic interventions and avoiding medications is what many patients and providers want. Opioids should be avoided when not needed because of the increased risks associated with long-term opioid use and its associated side effects (Chou et al., 2016). Constipation is a major concern in this population because any surgery that manipulates the bowel predisposes patients to altered peristalsis, which is amplified by opioids. Preimplementation, the most commonly reported symptom to the urology surgeons' offices postdischarge was constipation (B. Ehdaie, personal communication, February 19, 2019). Although not formally analyzed, outpatient nurses in gynecology and urology have reported a decrease in this issue postimplementation (C. Estes, personal communication, March 27, 2020; C. Wan, personal communication, March 27, 2020). This may be caused by the reduction in opioid use. The bundle could have also contributed to improved bowel motility by encouraging early and frequent postoperation exercise, hot packs to improve blood flow to the mesenteric artery, or ginger or mint tea. It has been shown that postoperation mobilization, abdominal massage, hot pack therapy, and gum chewing promote bowel recovery after robotic-assisted laparoscopic prostatectomy surgery (Park et al., 2018).

The minimal change in pain scores at the first nursing follow-up assessment, which is performed four to six hours after admission to the AXR unit, was statistically significant but likely not clinically meaningful when analyzed alone. Whether pain relief is clinically meaningful can differ from patient to patient based on how much improvement they are looking for and the level of pain. One study found a percentage change to provide the most realistic goal, with more than a 90% reduction in pain score on the NRS considered as "complete," at least 70% reduction considered as "much improvement," and less than 30% reduction perceived as "minimal" (Sloman et al., 2006). Another study on older adults in the emergency department found that the minimum clinically significant difference in mean pain scores was 1.5 NRS units or 25% (Bijur et al., 2009). In this project, the median pain scores from pre- to postimplementation decreased 25% at the first follow-up assessment and 0% at discharge, but the mean pain scores at the first follow-up decreased by only 0.6 NRS units (18%) and 0.3 NRS units (10%) at discharge. An aim of this project was to decrease pain scores by 20%. In fact, part of the education plan for nurses was to educate patients that they would likely have pain for a week or two after surgery. Nurses were advised to promote realistic, functional goals, such as walking and similar daily activities. Although the pain score results are not clinically meaningful alone, this is a promising result when realized alongside a decrease in opioid use. The patients reached their functional goals, as evidenced by a statistically similar, although mildly decreased (18.6 minutes), length of stay, with minimal or no opioid use and stable or decreased pain scores.

Although it was not one of the project's aims, it is important to note that the mean length of stay minimally decreased. The mean postoperation length of stay decreased from 20.89 hours in the preimplementation group to 20.58 hours in the postimplementation group, a difference of 18.6 minutes. The Mann–Whitney U test was used to confirm that this difference was not statistically significant ($p = 0.663$). Although the decreased mean length of stay is likely related to a multitude of factors—including a hospitalwide initiative for earlier discharge—it is important because it shows that providing nonpharmacologic pain management does not take a meaningfully longer time to deliver compared to analgesia alone and does not delay recovery time. This finding is also consistent with a study showing that enhanced recovery after surgery pathways, which use opioid-sparing multimodal analgesia, are associated with shortened hospital stay after laparoscopic abdominal surgery (Li et al., 2018).

Limitations

These changes in postoperation pain management may have been influenced by the presence of project champions actively reminding nurses to use the bundle. It may be worth reviewing the data at a time further from project completion. Another limitation of this project is that no postdischarge outcomes were measured. It is unclear whether patients continued to have good pain control at home and whether there were effects on constipation. In addition, the data were analyzed as one group, without separating surgery types or other variables that may be of interest. Disaggregating data may show significant differences among groups. Finally, interventions that were supported by high-quality studies in the literature review, such as transcutaneous electrical nerve stimulation and gum chewing, could have led to more profound improvements in pain management. These were deemed unfeasible for implementation at the project site and were therefore not included. Chewing gum stimulates bowel motility and leads to accelerated passage of flatus, which decreases bloating and distension and may be the reason for decreased pain (Husslein et al., 2013; Turkay et al., 2019). Transcutaneous electrical nerve stimulation has been successful in decreasing postoperation pain scores after abdominal laparoscopic surgery for benign conditions (DeSantana et al., 2009; Platon et al., 2018; Silva et al., 2012; Tokuda et al., 2014). Future projects should consider including these interventions.

Implications for Nursing

The project's findings suggest that using a nurse-driven nonpharmacologic pain management intervention bundle is worthwhile in the minimally invasive gynecologic and urologic surgery population. It is relatively inexpensive and without barriers. Additional research should be performed on the individual strategies listed in this bundle, as well as other feasible interventions in the short-stay surgery population. Population-based bundles can enhance patient-centered care. The evidence-based bundle used in this project is likely transferable to all patients undergoing abdominal laparoscopic surgery, but other bundles should be created for other types of surgeries and for nonsurgical patients. Bundles should be structured in clear formats and included in standard order sets in the electronic health record to avoid being overlooked by nurses or viewed as inferior to opioid and nonopioid analgesics. Comprehensive pain management includes multimodal analgesia and nonpharmacologic interventions, so all components must be ordered by providers to guide quality care.

KNOWLEDGE TRANSLATION

- Nonpharmacologic interventions such as acupressure, touch therapy, guided imagery, mindful breathing meditation, decreased lighting and noise, music, in-bed exercises, early ambulation, ginger or mint tea, and hot packs may improve pain management after minimally invasive gynecologic and urologic surgery.
- Incorporating evidence-based nonpharmacologic pain management strategies into the nursing orders for patients recovering from minimally invasive gynecologic and urologic surgery significantly decreased opioid use without negatively affecting pain scores or lengths of stay.
- Additional research is needed on the specific nonpharmacologic interventions in this population and whether these results are transferable to all patients undergoing abdominal laparoscopic surgery.

Conclusion

This quality improvement project highlights significant postimplementation improvements in pain management for patients recovering from minimally invasive gynecologic and urologic surgery. The evidence-based bundle of nonpharmacologic interventions in the nursing orders significantly increased the documented use of these interventions and significantly decreased postoperation opioid use without negatively affecting pain scores. Therefore, orders endorsing the use of nurse-driven complementary therapies for pain are recommended.

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The authors gratefully acknowledge Vivek T. Malhotra, MD, Kathleen Trotta, MSN, ANP-BC, Aida Milcetic, DNP, FNP-BC, James Eastham, MD, Mario Leitao, MD, Mary Eagan, MSN, RN, Eleni Kalandranis, MSN, RN, NE-BC, OCN®, CMSRN, Patricia McTague, MSN, FNP-BC, Jane Sallustro, RN, MPA, CNML, Kristen Fessele, PhD, RN, ANP-BC, AOCN®, Karen Collum, DNP, RN, OCN®, Carrie Wan, BSN, RN, OCN®, Beau Amaya, MS, RN, OCN®, Connie Estes, BSN, RN, Wen Wen

Cheung, MSN, FNP-BC, Elena Chersky, BSN, RN, Christine Wengler, BSN, RN, Alessandro Pernoca, BSN, RN, Ashley Ruiz, BSN, RN, Yenon Saiag, BSN, RN, Tatanisha Peets, DrPH, MPH, RD, Deepali Pallegar, MPH, Allison Reichel, BPH, CHES, and all AXR unit nurses for their collaboration and project support.

This research was funded, in part, by the Memorial Sloan Kettering Cancer Center Support Grant/Core Grant (P30 CA008748) through funding from the National Cancer Institute.

Ehinger completed the data collection. Ehinger and Kozachik provided statistical support. Ehinger and Marte provided the analysis. All authors contributed to the conceptualization and design and the manuscript preparation.

REFERENCES

Akin, M.D., Weingand, K.W., Hengehold, D.A., Goodale, M.B., Hinkle, R.T., & Smith, R.P. (2001). Continuous low-level topical heat in the treatment of dysmenorrhea. *Obstetrics and Gynecology, 97*(3), 343–349. https://doi.org/10.1016/S0029-7844(00)01163-7

Angstetra, D. (n.d.). *Recovery from laparoscopic surgery.* Gold Coast Private Hospital. https://goldcoastprivatehospital.com.au/blogs/tips-and-tricks-laparoscopic-surgery

Bijur, P.E., Chang, A.K., Esses, D., & Gallagher, E.J. (2009). Identifying the minimum clinically significant difference in acute pain in the elderly. *Annals of Emergency Medicine, 56*(5), 517–521. https://doi.org/10.1016/j.annemergmed.2010.02.007

Blencowe, N.S, Waldon, R., & Vipond, M.N. (2018). Management of patients after laparoscopic procedures. *BMJ, 360,* k120. http://doi.org/10.1136/bmj.k120

Broadbent, E., Kahokehr, A., Booth, R.J., Thomas, J., Windsor, J.A., Buchanan, C.M., . . . Hill, A.G. (2012). A brief relaxation intervention reduces stress and improves surgical wound healing response: A randomized trial. *Brain, Behavior, and Immunity, 26*(2), 212–217. https://doi.org/10.1016/j.bbi.2011.06.014

Çankaya, A., & Saritaş, S. (2018). Effect of classic foot massage on vital signs, pain, and nausea/vomiting symptoms after laparoscopic cholecystectomy. *Surgical Laparoscopy Endoscopy and Percutaneous Techniques, 28*(6), 359–365. https://doi.org/10.1097/SLE.0000000000000586

Chou, R., Gordon, D.B., de Leon-Casasola, O.A., Rosenberg, J.M., Bickler, S., Brennan, T., . . . Wu, C.L. (2016). Management of postoperative pain: A clinical practice guideline from the American Pain Society, the American Society of Regional Anesthesia and Pain Medicine, and the American Society of Anesthesiologists' Committee on Regional Anesthesia, Executive Committee, and Administrative Council. *Journal of Pain, 17*(2), 131–157. https://doi.org/10.1016/j.jpain.2015.12.008

D'Arcy, Y. (2011). New thinking about postoperation pain management. *OR Nurse, 5*(6), 29–36. https://doi.org/10.1097/01.ORN.0000406638.19178.07

DeSantana, J.M., Sluka, K.A., & Lauretti, G.R. (2009). High and low frequency TENS reduce postoperation pain intensity after laparoscopic tubal ligation: A randomized controlled trial. *Clinical Journal of Pain, 25*(1), 12–19. https://doi.org/10.1097/AJP.0b013e31817d1070

Dumas, F. (2018, January 27). After surgery in Germany, I wanted Vicodin, not herbal tea. *The New York Times*. https://www.nytimes.com/2018/01/27/opinion/sunday/surgery-germany-vicodin.html

Frass, M., Strassl, R.P., Friehs, H., Müllner, M., Kundi, M., & Kaye, A.D. (2012). Use and acceptance of complementary and alternative medicine among the general population and medical personnel: A systematic review. *Ochsner Journal, 12*(1), 45–56.

Husslein, H., Franz, M., Gutschi, M., Worda, C., Polterauer, S., & Leipold, H. (2013). Postoperation gum chewing after gynecologic laparoscopic surgery: A randomized controlled trial. *Obstetrics and Gynecology, 122*(1), 85–90. https://doi.org/10.1097/AOG.0b013e3182983e92

Ikonomidou, E., Rehnstrom, A., & Naesh, O. (2004). Effect of music on vital signs and postoperation pain. *AORN Journal, 80*(2), 269–278. https://doi.org/10.1016/S0001-2092(06)60564-4

Johnson, E.T. (2011, February 28). *Post surgery ailments.* Endometriosis.org. https://endometriosis.org/resources/articles/post-surgery-ailments

Joint Commission. (2018). *R3 report issue 21: Pain assessment and management standards for nursing care centers*. https://www.jointcommission.org/r3_report_issue_21_pain_assessment_and_management_standards_for_nursing_care_centers

Kenway, M. (2019). *Physiotherapy exercises for relieving gas pain after hysterectomy*. Pelvic Exercises Physiotherapy. https://www.pelvicexercises.com.au/gas-pain-after-hysterectomy

Kitson, A., Harvey, G., & McCormack, B. (1998). Enabling the implementation of evidence based practice: A conceptual framework. *Quality in Health Care, 7*(3), 149–158. https://doi.org/10.1136/qshc.7.3.149

Kober, A., Scheck, T., Greher, M., Lieba, F., Fleischhackl, R., Fleischhackl, S., & Hoerauf, K. (2002). Prehospital analgesia with acupressure in victims of minor trauma: A prospective, randomized, double-blinded trial. *Anesthesia and Analgesia, 95*(3), 723–727. https://doi.org/10.1097/00000539-200209000-00035

Koraş, K., & Karabulut, N. (2019). The effect of foot massage on postoperation pain and anxiety levels in laparoscopic cholecystectomy surgery: A randomized controlled experimental study. *Journal of Perianesthesia Nursing, 34*(3), 551–558. https://doi.org/10.1097/00000539-200209000-00035

Lasaponari, E.F., Peniche, A.C.G., Turrini, R.N.T., & Grazziano, E.D.S. (2013). Efficiency of Calatonia on clinical parameters in the immediate post-surgery period: A clinical study. *Revista Latino-Americana De Enfermagem, 21*(5), 1055–1061. https://doi.org/10.1590/S0104-11692013000500007

Laurion, S., & Fetzer, H.J. (2003). The effect of two nursing interventions on the postoperation outcomes of gynecologic laparoscopic patients. *Journal of Perianesthesia Nursing, 18*(4), 254–261. https://doi.org/10.1016/S1089-9472(03)00131-X

Li, Z., Zhao, Q., Bai, B., Ji, G., & Liu, Y. (2018). Enhanced recovery after surgery programs for laparoscopic abdominal surgery: A systematic review and meta-analysis. *World Journal of Surgery, 42*(11), 3463–3473. https://doi.org/10.1007/s00268-018-4656-0

Memorial Sloan Kettering Cancer Center. (2018, October 30). *Ginger*. https://www.mskcc.org/cancer-care/integrative-medicine/herbs/ginger

Memorial Sloan Kettering Cancer Center. (2019). *Peppermint.* https://www.mskcc.org/cancer-care/integrative-medicine/herbs/peppermint

Mohamed, A.I., & Abd Elhady, R.M. (2019). Heating pads and early mobilization for reducing postoperation shoulder pain and enhancing recovery of women undergoing gynecological laparoscopic surgery. *IOSR Journal of Nursing and Health Science, 5*(1), 10–16.

National Center for Complementary and Integrative Health. (2017). *Statistics on complementary and integrative health approaches.* https://nccih.nih.gov/research/statistics/2007/camsurvey_fs1.htm

Park, J.S., Kim, J.K., Jang, W.S., Heo, J.E., Elghiaty, A., Rha, K.H., . . . Ham, W.S. (2018). Management of postoperation ileus after robot-assisted laparoscopic prostatectomy. *Medicine, 97*(44), e13036. https://doi.org/10.1097/MD.0000000000013036

Platon, B., Mannheimer, C., & Andrell, P. (2018). Effects of high-frequency, high-intensity transcutaneous electrical nerve stimulation versus intravenous opioids for pain relief after gynecologic laparoscopic surgery: A randomized controlled study. *Korean Journal of Anesthesiology, 71*(2), 149–156. https://doi.org/10.4097/kjae.2018.71.2.149

Rafer, L., Austin, F., Frey, J., Mulvey, C., Vaida, S., & Prozesky, J. (2015). Effects of jazz on postoperation pain and stress in patients undergoing elective hysterectomy. *Advances in Mind–Body Medicine, 29*(1), 6–11.

Rycroft-Malone, J. (2004). The PARIHS framework—A framework for guiding the implementation of evidence-based practice. *Journal of Nursing Care Quality, 19*(4), 297–304. https://doi.org/10.1097/00001786-200410000-00002

Sheetz, K.H., Claflin, J., & Dimick, J.B. (2020). Trends in the adoption of robotic surgery for common surgical procedures. *JAMA Network Open, 3*(1), e1918911. https://doi.org/10.1001/jamanetworkopen.2019.18911

Silva, M.B., de Melo, P.R., de Oliveira, N.M., Crema, E., & Fernandes, L.F. (2012). Analgesic effect of transcutaneous electrical nerve stimulation after laparoscopic cholecystectomy. American Journal of Physical Medicine *and Rehabilitation, 91*(8), 652–657. https://doi.org/10.1097/PHM.0b013e318246638f

Sjövall, S., Kokki, M., & Kokki, H. (2015). Laparoscopic surgery: A narrative review of pharmacotherapy in pain management. *Drugs, 75*(16), 1867–1889. https://doi.org/10.1007/s40265-015-0482-y

Sloman, R., Wruble, A.W., Rosen, G., & Rom, M. (2006). Determination of clinically meaningful levels of pain reduction in patients experiencing acute postoperation pain. *Pain Management Nursing, 7*(4), 153–158. https://doi.org/10.1016/j.pmn.2006.09.001

Tokuda, M., Tabira, K., Masuda, T., Nishiwada, T., & Shomoto, K. (2014). Effect of modulated frequency and modulated-intensity transcutaneous electrical nerve stimulation after abdominal surgery: A randomized controlled trial. *Clinical Journal of Pain, 30*(7), 565–570. https://doi.org/10.1097/AJP.0b013e31829ea151

Turkay, U., Yavuz, A., Hortu, I., Terzi, H., & Kale, A. (2019). The impact of chewing gum on postoperation bowel activity and postoperation pain after total laparoscopic hysterectomy. *Journal of Obstetrics and Gynaecology, 40*(5), 705–709. https://doi.org/10.1080/01443615.2019.1652891

White, K.M., Dudley-Brown, S., & Terhaar, M.F. (2016). *Translation of evidence into nursing and health care* (2nd ed.). Springer.

Yeh, C.-C., Ko, S.-C., Huh, B.K., Kuo, C.-P., Wu, C.-T., Cherng, C.-H., & Wong, C.-S. (2008). Shoulder tip pain after laparoscopic surgery analgesia by collateral meridian acupressure (shiatsu) therapy: A report of 2 cases. *Journal of Manipulative and Physiological Therapeutics, 31*(6), 484–488. https://doi.org/10.1016/j.jmpt.2008.06.005