Chapter 37. Pain Management

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Approximately 23 million people undergo surgery each year in the United States.[1] Despite pharmacologic interventions, at least 40-50% of postoperative patients report inadequate pain relief.[2] In addition, the practice of withholding analgesics due to fear of masking symptomatology and delaying diagnosis is still widespread in many emergency rooms and acute care settings. The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) and the Agency for Health Care Policy and Research (AHCPR) have established guidelines for the appropriate assessment and management of pain in general and postoperatively. Yet efforts to educate clinicians as to appropriate pain management, particularly in emergency departments (ED) and following surgery, have lagged behind the available evidence.

We have taken the point of view that untreated pain represents a patient safety problem. This chapter reviews pain management techniques and interventions in 4 domains: use of analgesics in patients with acute abdominal pain, the use of acute pain services, prophylactic antiemetics during patient-controlled analgesia therapy, and non-pharmacologic interventions for postoperative pain.

Subchapter 37.1. Use of Analgesics in the Acute Abdomen

Background

The use of analgesics in patients with acute abdominal pain has traditionally been condemned. The 1987 edition of Cope's *Early Diagnosis of the Acute Abdomen* states "though it may appear crude, it is really prudent to withhold morphine until a reasonable diagnosis has been made and a plan of action formulated."[1] The most recent edition of Cope's *Early Diagnosis of the Acute Abdomen* (1996) begins to question this long-accepted dogma, but still states that analgesia medication should be given only after a "responsible surgeon" takes a thorough history and performs a thorough physical examination.[3] As patients with acute abdominal pain are rarely evaluated by a surgeon within the first few hours of presentation, it seems inappropriate and inhumane to withhold pain medication if this practice is not supported by evidence.

Practice Description

Prescribing analgesics to patients with acute abdominal pain is infrequently done. When prescribed, dosages and routes vary, from intramuscular to intravenous morphine in 5 to 10 mg increments, or 0.1 mg/kg of body weight. Although JCAHO and AHCPR have established guidelines for the appropriate assessment and management of pain in general and postoperatively, neither addresses pain management in patients with acute abdomens. Therefore, the traditional practice of withholding analgesia in this setting has not been seriously challenged.

Prevalence and Severity of the Target Safety Problem

According to the National Center of Health Statistics, there were 100,385,000 total visits to US emergency departments in 1998. The most frequent principal reason for visits was stomach or abdominal pain (5.9 million).[4] Despite studies suggesting that the early administration of pain medication is safe and does not interfere with, and may actually facilitate, the ability to make a correct diagnosis, recent surveys of emergency room physicians and

surgeons indicate that the majority withhold analgesics in patients presenting with an acute abdomen. Wolfe et al[2] surveyed 443 emergency medicine physicians and found that although 85% believe that the conservative administration of pain medication did not change important physical findings, 76% choose not to give an opiate analgesic until after the examination by a surgeon. Graber et al[5] surveyed 131 practicing surgeons in Iowa and found 67% agreed that pain medications interfere with diagnostic accuracy, and 82% cited their concerns about diagnostic accuracy when deciding to withhold pain medication.

Opportunities for Impact

Limited data suggest that the number of patients with acute abdominal pain who actually receive pain relief before surgical evaluation is small. Therefore, by educating providers in appropriate pain management for these patients, the potential impact in emergency departments across the country is large.

Study Designs

Five prospective randomized controlled trials (Level 1) were evaluated. Four of the 5 used a double-blind design. In each study, patients were randomly assigned to receive opiate analgesia or placebo, and evaluated pre- and post-intervention for pain using variations of visual analog scales (Table 37.1.1).

Study Outcomes

All 5 studies evaluated the effects of analgesia on pain relief (Level 1), and diagnoses and treatment decisions (Level 2) in patients with acute abdominal pain. Two studies evaluated the effects of analgesia on physical examination findings and one evaluated the effects of analgesia on the diagnostic performance of ultrasonography in patients with acute abdominal pain (Level 3).

Evidence for Effectiveness of the Practice

All 5 studies showed that provision of analgesia decreased pain more than it decreased localization of tenderness. None of the 5 studies indicate that the practice of providing early analgesia is harmful. Specifically, no study found compromises in diagnosis or treatment of the acute abdomen after increasing the use of analgesia.

Potential for Harm

The traditional belief that analgesic use in patients with acute abdominal pain may mask signs and symptoms, delay diagnosis, and lead to increased morbidity and mortality was not supported in these studies. All 5 studies analyzed diagnostic or management errors that occurred in each group.

Attard et al[6] found no difference in localization of physical signs, and no difference in the surgeon's diagnostic confidence or management decision (to operate or to observe) between the 2 groups (opioids vs. placebo). The decision to operate or to observe was incorrect in 2 patients in the opioid group (4%) and in 9 patients in the placebo group (18%). The surgeon's initial diagnosis one hour after the injection was incorrect in all of these patients. These same 2 patients in the opioid group were incorrectly diagnosed as having non-specific abdominal pain when first assessed, but the diagnosis was subsequently changed and both patients had an inflamed appendix removed within 24 hours of admission. Neither appendix was perforated. There were no deaths or side effects from the injection for either group.

LoVecchio et al[7] documented changes in localization of physical examination findings and differences in diagnosis between patients receiving opioid analgesia and placebo. The use of opioids was associated with some change in tenderness and localization in half the patients but led to no delays in care or eventual morbidity. The emergency department diagnosis differed from the final discharge diagnosis in 4 of the 49 total patients. One such patient had received placebo and 3 had received high-dose morphine (no significant difference). There was no delay in outcome or time to treatment in any patient.

Zoltie[8] demonstrated that 17/134 (12%) of those receiving opioids had altered physical signs. Of the 50 patients (out of 288 in the total opiate and placebo groups) whose signs changed during the evaluation, the most common change (n=32) was alteration in bowel sounds. The remaining 18 had altered sites of tenderness, in most cases a migration of a large region to a smaller, more precise area. In no case was the diagnosis altered by a change in physical signs. To the contrary, the correct diagnosis was facilitated in several cases, particularly in the 18 cases where the site of pain changed.

Vermeulen et al[9] also found that the use of opioids did not change the appropriateness of the surgeons' decision making. Among female patients, the decision to operate was appropriate more often in the opioid group, but the difference between this group and the placebo group was not statistically significant. In male patients and overall, opiate analgesia did not influence the appropriateness of the decision. The appropriateness to discharge patients without surgery was 100% in both groups. No patient who had left the hospital after 24 hours of observation without surgery was readmitted or operated on at another local hospital. The study also assessed the impact of analgesia on the accuracy of abdominal sonography. For diagnosis of appendicitis, ultrasound had lower sensitivity (71.1%) and higher specificity (65.2%) in the opioid group than in the placebo group, 80.6% and 53.8%, respectively.

Similarly, Pace et al[10] found 3 diagnostic or management errors in each group (out of 35 morphine and 36 control patients). The use of opioids did not alter the physicians' ability to evaluate accurately and treat patients appropriately.

Costs and Implementation

The costs associated with implementing appropriate analgesic practice for patients with acute abdominal pain are limited to physician education programs and the cost of the analgesia and associated monitoring. There were no cost outcomes reported in any of the 5 studies.

Comment

From the available evidence, we conclude that appropriate use of analgesics in patients with acute abdominal pain effectively decreases pain and does not interfere with diagnosis or treatment. Recent surveys suggest many physicians believe conservative administration of pain medication does not interfere with diagnosis and treatment of patients with acute abdominal pain. Despite this recognition, the gap between understanding and practice remains large, and abdominal pain is often undertreated.

Table 37.1.1. Randomized controlled trials of analgesia in patients with acute abdominal pain*

Study	Study Participants; Intervention	Outcomes	Results†
Zoltie, 1986[8]	268 adults with acute abdominal pain admitted to a hospital in the UK; sublingual buprenorphine vs. placebo	Level 1	Pain better after 1 hour: 64/134 vs. 59/122 (p=NS). Only 6/32 (19%) patients who received no tablet reported pain was better after 1 hour Change in physical signs after 1 hour: 22/134 (16%) vs. 24/122 (20%); when site of tenderness changed, it usually was resolution of a large region to a smaller, precise area In no case was the diagnosis altered by a change in physical signs
Attard, 1992[6]	100 selected adults admitted with clinically significant abdominal pain; intramuscular papaveretum vs. placebo	Level 1	Pain score: 3.1 vs. 8.3 (p<0.0001) Tenderness score: 5.1 vs. 8.3 (p<0.0001) Diagnostic or management errors: 2/50 vs. 9/50 (p=0.05)
Pace, 1996[10]	75 patients with acute abdominal pain at a US military emergency department; morphine	Level 1	Improvement in pain‡: 3.9±2.8 vs. 0.8±1.5 (p<0.01) Accuracy of provisional diagnosis: no difference between groups Diagnostic or management errors: 3/35 vs. 3/26 (p=NS)
LoVecchio, 1997[7]	49 adults with acute abdominal pain and peritoneal signs ("acute abdomen") admitted to the emergency department of a tertiary care hospital in NY; intravenous morphine vs. placebo	Level 1	Pain after 15 minutes: subjective and objective improvement with morphine (p<0.005) but not with placebo (p• 0.05) Significant change in physical exam with regard to tenderness and localization: 16/32 vs. 1/16 (p<0.005)§ Initial and final diagnosis differed in 4 patients (morphine 3, placebo 1) but there was no delay in outcome or time to treatment (by retrospective chart review)
Vermeulen, 1999[9]	340 adults with pain in the right lower part of the abdomen at a university hospital emergency department; intravenous morphine vs. placebo	Level 1	Pain after approx. 45 minutes: significantly reduced with placebo and, to a greater extent, with morphine (p<0.001) Ultrasound had lower sensitivity (71.1% vs. 80.6%, p<0.05) and higher specificity (65.2% vs. 53.8%, p<0.05) in patients who received morphine. The negative predictive value of US was significantly lower in female patients who received morphine rather than placebo. Other changes in predictive value did not achieve statistical significance. Opiate analgesia did not significantly influence the appropriateness of the decision to operate

* NS indicates not statistically significant.
† Results are reported as intervention group vs. control group.
‡ Pain was measured on visual analog scale; larger values represented greater pain relief.
§ Change in tenderness from 2 or more quadrants to one and the loss of rebound tenderness or vice versa were considered significant

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Subchapter 37.2. Acute Pain Services

Background

The concept of an acute pain service (APS) was first reported in 1988. Its genesis was the recognition of the problems wrought by inadequate postoperative pain management and appreciation that acute pain may prolong recovery or precipitate complications. Over the past 15 years, in the United States and worldwide, hospitals have created multidisciplinary acute pain services, with specially trained staff and resources geared toward providing up-to-date techniques and education. The APS creates a framework in which postoperative pain can be managed more effectively, hopefully leading to less discomfort and fewer postoperative complications.

Practice Description

An APS attempts to bridge the gap between physicians, nurses and patients to coordinate pain management. The roles of the APS are 1) educating patients, 2) educating nurses and physicians, 3) selecting appropriate analgesic techniques for different situations, 4) preparing guidelines for different analgesic regimens, 5) helping to manage acute pain problems, and 6) performing quality control activities.

Most acute pain services in the United States are anesthesiology-based. The comprehensive pain management teams usually consist of staff anesthesiologists, resident

anesthesiologists, specially trained nurses, pharmacists and physiotherapists. Some services are nurse-based rather than anesthesia-based.

Prevalence and Severity of the Target Safety Problem

Approximately 50% of patients undergoing surgery do not receive adequate pain relief.[1] Failure to appropriately treat pain stems from lack of knowledge and skills on the part of health care providers and those responsible for health care system management, and insufficient patient education. The "safety" problem targeted by the practice of implementing an APS is postoperative pain and morbidity.

Opportunities for Impact

Approximately 34-44% of hospitals in Europe[2,3] and most major institutions in the United States[4] have organized APSs. In general, few smaller hospitals have an APS. Therefore, there are many opportunities to institute acute pain services in hospitals.

Study Designs

Six articles were reviewed for this chapter. All are observational studies; one with a control, 5 without controls. All 6 studies looked at the intervention of an acute pain service in patients undergoing surgery (Table 37.2.1).

Study Outcomes

Three of the 6 studies assessed postoperative pain (Level 1). Two of the 6 studies assessed adverse effects and safety (Level 2) and one assessed knowledge and attitudes, perceived adequacy of patients' pain relief and the effect on staff workload and relationships.

Evidence for Effectiveness of the Practice

All 3 studies that assessed postoperative pain scores found improvements. Bardiau et al[2] showed that differences in pain score were most pronounced (around 50%) in patients undergoing vascular, maxillofacial, gynecologic, oral and urologic surgeries. Gould et al[5] showed a reduction in median visual analog scores for pain during relaxation, movement and deep inspiration. Tighe et al[6] showed a significant improvement in patient perception of pain relief after introduction of an APS.

Schug and Torrie[7] found no complications resulting in sustained morbidity or mortality when anesthesiology-based APS provided postoperative pain relief. Potentially severe complications (without sequelae) occurred in 0.53% of patients. In one study by Tsui et al,[8] 1.8% of patients developed respiratory complications (bradypnea, hypercapnia, oxygen desaturation), 1.2% developed hypotension, and 28.8% and 15.1%, respectively, developed nausea and vomiting. None suffered long-term sequelae.

Although the postoperative setting is a logical place for acute pain services, they may also be useful in patients who experience pain as part of a disease process. Although used more for managing chronic conditions such as cancer and low back pain, acute pain services are also gaining popularity in treating hospitalized patients with pain due to a medical condition. There are no rigorous trials of APSs as they are used for medical patients.

Potential for Harm

Fragmentation of care (ie, lack of continuity between the anesthesiologist performing preoperative evaluation and anesthesiologist providing postoperative pain control, or

fragmentation of care among multiple physicians) and decreased attention by the physician-of-record may result in problems from the intervention. However, no studies have examined these concerns.

Costs and Implementation

Although none of the studies directly examined costs of implementing an acute pain service, one study estimated that an APS might be cost-effective.[6] Some data suggest that a nurse-based APS may be more cost-effective than an anesthesiologist-based APS, although there are no formal analyses of this supposition.[9]

Principal obstacles to implementing such acute pain services include financial constraints, the challenges of educating newly qualified doctors regarding pain management, and the complexity of published guidelines.[9]

Comment

Studies of APSs are mostly observational, measuring postoperative pain, adverse outcomes and staff knowledge and attitudes regarding its implementation. Although these studies indicate that acute pain services can improve postoperative pain without endangering patient safety, no formal recommendation can be made in the absence of high quality, systematic reviews of the benefits, costs and feasibility of implementing these services.

Table 37.2.1. Studies of acute pain services in postoperative pain management*

Study Setting	Study Design, Outcomes	Results
1304 patients in the pre-APS inception phase and 671 patients after its implementation undergoing various surgeries in a university teaching hospital[2]	Level 3, Level 1	Significant reduction of all pain indicators after APS inception ($p<0.0001$); major improvement (>50%) in patients undergoing vascular, maxillofacial, gynecologic, urologic and oral surgeries
2035 patients undergoing various surgical operations at a university hospital[5]	Level 3, Level 1	Reduction in mean pain from 45 (95% CI: 34-53) to 16 (95% CI: 10-20) after APS
1518 patients undergoing various surgeries at a district general hospital[6]	Level 3, Level 1	Significant reduction of pain ($p<0.0001$) after APS
2509 patients under APS care at a tertiary referral teaching hospital; 1759 received systemic analgesia, 590 epidural; 160 other techniques[8]	Level 3, Level 2	Side effects were unusual (1.8% respiratory, 1.2% hypotension, 28.8% nausea, 15.1% vomiting)
3016 patients treated by an APS for postoperative pain[7]	Level 3, Level 2	0.53% potentially severe adverse reactions and no severe complications
48 staff members (36 nurses, 12 house officers) working in two surgical units[10]	Level 3, Level 3	Two-thirds of staff thought APS decreased their workload; perception of patient pain relief significantly better in APS unit

* APS indicates acute pain service; CI, confidence interval.

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Subchapter 37.3. Prophylactic Antiemetics During Patient-controlled Analgesia Therapy

Background

Nausea and vomiting are common side effects of patient-controlled analgesia (PCA) with opioids. When severe, nausea and vomiting may limit a patient's tolerance of PCA. Giving antiemetics prophylactically has been suggested as a way to prevent PCA-associated nausea and vomiting.

Practice Description

No study has definitively determined the best prophylactic antiemetic in patient-controlled analgesia. Prophylactic treatments that have been used include droperidol, 5-HT_3 receptor antagonists (ondansetron, tropisetron), clonidine, promethazine, hyoscine, propofol and metoclopramide. Prophylactic antiemetics have been given both at the induction of anesthesia and at the end of surgery. A relatively new approach to minimizing nausea and vomiting associated with PCA involves the addition of an antiemetic to PCA, so that the patient receives both analgesic and antiemetic with each PCA demand dose.

Prevalence and Severity of the Target Safety Problem

The incidence of postoperative nausea and vomiting has varied widely (from 8 to 92%) among studies.[1] There is no evidence that the incidence of nausea and vomiting with PCA is any different than that with intramuscular opioids. In patients receiving PCA, 57-90% report nausea and 27-40% report vomiting. There appears to be no clear advantage to using one opioid over any others in PCA in terms of postoperative emesis.

Opportunities for Impact

The degree to which prophylactic antiemetics are used in routine practice with PCA is unknown.

Study Designs

Tramer and Walder[2] conducted a systematic search for randomized trials (MEDLINE, Embase, Cochrane library, reference lists, hand-searching, no language restriction) that compared prophylactic antiemetics with placebo or no treatment in patients receiving postoperative PCA with opioids. Their review identified 14 placebo-controlled trials with different regimens of droperidol, ondansetron, hyoscine transdermal therapeutic system, tropisetron, metoclopramide, propofol and promethazine. One PCA delivered tramadol; all others delivered morphine.

Both relative risk and number needed to treat were calculated. To estimate the frequency of drug-related adverse effects, the relative risk and the number needed to harm were calculated.

Study Outcomes

The main end point for efficacy was prevention of emetic events (Level 1). The incidence of emetic events with active treatments (experimental event rate) and with placebo or no treatment (control event rate) was extracted. Nausea, vomiting, and "any emetic event" (nausea, vomiting, or nausea and vomiting) were extracted from each trial. Data on drug-related adverse effects (Level 2) were extracted as well.

Evidence for Effectiveness of the Practice

Without antiemetic drugs, the incidence of nausea averaged 43% (range 22-80%), vomiting 55% (45-71%), and any emetic event 67% (54-87%). At 24 hours postoperatively, the cumulative incidence of nausea and vomiting in patients not receiving any antiemetic treatment added to their PCA-morphine was approximately 50%.

The best-studied antiemetic was droperidol. It was added to morphine-PCA in 6 placebo-controlled trials involving 642 patients. Droperidol 0.017-0.17 mg/mg of morphine (0.5-11 mg/d droperidol) was significantly more effective ($p=0.04$) in preventing nausea than placebo, without evidence of dose-responsiveness. Compared with placebo, the number needed to treat with droperidol to prevent nausea was 2.7 (95% CI: 1.8-5.2) and to prevent vomiting was 3.2 (95% CI: 2.3-4.8).

The second most frequently reported drugs were 5-HT_3 receptor antagonists (ondansetron, tropisetron). Their effect on vomiting was satisfactory, with numbers needed to treat of approximately 5 compared with placebo. There was no evidence of any antinausea effect.

Promising results were shown with some of the other interventions (clonidine, promethazine). However, the limited numbers of patients studied did not generate sufficient evidence to make a recommendation.

Potential for Harm

With placebo, the absolute risk of minor adverse events (sedation, drowsiness and dizziness or anxiety, restlessness and agitation) was 0-20%. In those trials that reported adverse events with droperidol, doses of the antiemetic ranged from 1.2 mg to cumulative doses of 7.4 mg. There were no obvious differences in the incidence of minor adverse effects compared with placebo with droperidol doses $\leq$4 mg. In all droperidol trials, 2 adverse effect-related study withdrawals were documented. No extrapyramidal symptoms were documented in any trial.

Costs and Implementation

Costs of prophylactic antiemetics during patient-controlled analgesia have not been evaluated. However, 1-4 doses of droperidol per day (0.25-0.5 mL q 4 h) costs $2.83-$11.32 while 1-3 doses of ondansetron per day costs $22.50-$67.50. Implementing prophylactic antiemetics during PCA seems neither difficult nor time-consuming.

Comment

Postoperative nausea and vomiting is a common event and patients may refuse to continue PCA because of these side effects. Prophylactic droperidol appears to decrease such side effects. Of 100 patients who have droperidol added to their PCA pump with morphine, 30 who would have vomited or been nauseated had they not received droperidol will not suffer these effects.

The results of this systematic review should be confirmed, as a pooled effect size estimated by meta-analysis must be considered provisional. Additional randomized, placebo-controlled trials assessing droperidol's prophylactic efficacy in the morphine-PCA setting can establish its optimal use in this clinical setting.

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Subchapter 37.4. Non-pharmacologic Interventions for Postoperative Plan

Background

Over the past decade, increased attention has been paid to non-pharmacologic interventions in conjunction with pharmacologic interventions to treat postoperative pain. The Agency for Health Care Policy and Research's (AHCPR) 1992 Clinical Practice Guideline on Acute Pain Management recommends that preoperative preparation includes educating patients concerning pain control. The Guidelines specifically state that management of postoperative pain may include cognitive-behavioral interventions, such as relaxation, distraction, and imagery.[1] Nonetheless, non-pharmacologic interventions can only be considered beneficial if postoperative pain is effectively decreased.

Practice Description

Non-pharmacologic interventions typically fall into 3 categories: health care information, skills teaching and psychosocial support.[2] Health care information includes information on preparation for surgery, timing of procedures, functions and roles of health care providers, self-care responsibilities, and pain/discomfort information. Skills teaching includes coughing, breathing and bed exercises, hypnosis, cognitive reappraisal and relaxation exercises. Relaxation strategies include such techniques as the modified Jacobson method, Flaherty and Fitzpatrick jaw relaxation, relaxation tapes, tapes with structured breathing, muscle relaxation and pleasant imagery, and cognitive relaxation. Psychosocial support includes identifying and alleviating concerns, providing reassurance, problem solving with the patient, encouraging questions and increasing frequency of support.

Prevalence and Severity of the Target Safety Problem

The safety problem targeted by the practice of non-pharmacologic interventions is postoperative pain. At least 40-50% of postoperative patients report inadequate pain relief, despite pharmacologic interventions.[3] Postoperative pain can have deleterious psychological and physiologic consequences that contribute to patient discomfort and longer recovery periods, and may compromise outcomes.[1] It also consumes greater health care resources.

Opportunities for Impact

Non-pharmacologic interventions are increasingly used in management of postoperative pain, although the exact proportion of patients receiving such interventions is unknown.

Study Designs

We identified 7 meta-analyses of studies evaluating the effectiveness of non-pharmacologic interventions on postoperative pain. Two of these meta-analyses evaluated various non-pharmacologic interventions for the management of acute pain. Devine[2] conducted a meta-analysis of 191 studies looking at psychoeducational care (including all 3 intervention categories above) for adult surgical patients. Sindhu[3] conducted a meta-analysis including 49 randomized controlled trials looking at non-pharmacologic nursing interventions (preoperative education/information, relaxation, music, imagery, biofeedback, multidisciplinary approaches and others) for the management of acute pain. AHCPR[1] conducted a systematic search of non-drug intervention studies on postoperative pain management. One hundred forty studies were included and formal meta-analysis of 3 was performed. The American Society of Anesthesiologists Task Force on Pain Management, Acute Pain Section[4] performed a systematic search for acute pain management in the perioperative setting. Two hundred thirty-three articles were used in the formal meta-analysis; the number of articles regarding education of patients was not reported. Good[5] performed a systematic search of trials evaluating the effects of relaxation and music on postoperative pain. Suls and Wan[6] performed a systematic search of trials evaluating the effects of sensory and procedural information on coping with stressful medical procedures and pain. Seers and Carroll[7] performed a systematic review of various relaxation techniques for postoperative pain relief. Table 37.4.1 lists the 7 articles and briefly describes their salient features.

Study Outcomes

All studies reported postoperative pain (Level 1) as a primary outcome measure. Other outcomes, such as recovery time, psychological distress, and opioid intake were reported in some cases (Level 1).

Evidence for Effectiveness of the Practice

The extensive literature covered by the meta-analyses suggested beneficial effects of psychoeducational care, education and instruction of patients, music and relaxation techniques (Table 39.5.1). The 2 meta-analyses that examined opioid intake failed to show an effect of non-pharmacologic interventions in reducing postoperative opioid consumption.

Potential for Harm

One study[7] reported no adverse events in any of the trials for any of the treatment or control groups. Otherwise, adverse consequences of non-pharmacologic interventions on postoperative pain management were not addressed.

Costs and Implementation

Direct information on costs of non-pharmacologic interventions was not reported in these 7 studies. Devine and Cook[8] found that the beneficial impact on length of stay and medical complications rendered non-pharmacologic interventions cost-beneficial. Another review[2] hypothesized that costs could potentially be decreased by non-pharmacologic interventions, since the length of hospital stay was shortened by an average of 1.5 days (11.5%).

The most obvious direct cost of psychoeducational care is the increased staff time to provide these services. Based on average treatment duration of 42 minutes, a comprehensive version of the intervention would probably not take more than 1 hour per patient.[8] Less obvious direct costs might result from staff time to plan the protocol for psychoeducational care and/or to develop patient education materials, in-service programs or staff meetings to teach or review the protocol, printing or purchasing patient education materials, transporting patients to group teaching sessions, and staff time to document the level of care provided.

Comment

Effective treatment of postoperative pain continues to be a challenge. In addition to analgesia, non-pharmacologic interventions may provide some benefit in reducing postoperative pain. Clinicians have a wide range of options to consider when developing a comprehensive version of non-pharmacologic care appropriate for their patients. As such interventions are low risk and appeal to many patients, they should be explored in practice and further research.

Table 37.4.1. Studies of non-pharmacologic interventions for postoperative pain

Study setting; Practice Examined	Study Design, Outcomes	Results*
Adult surgical patients (# not stated), 92% in American hospitals (45% teaching, 43% general hospitals); health care information, skills teaching, psychosocial support[2]	Level 1-3 A, Level 1	79-84% of studies found beneficial effects; Average effect size values were 0.43 for recovery, 0.38 for pain, 0.36 for psychological distress; Length of stay decreased 11.5%
Not reported; transcutaneous nerve stimulation, education/instruction, relaxation[1]	Level 1-3 A, Level 1	Simple/complex relaxation techniques, education/ instruction effective in reducing mild-moderate pain
Not reported; education and participation of patients and families in pain control[4]	Level 1-3 A, Level 1	Education improves pain control, reduces adverse outcomes
Adult pts who have undergone torso surgery (# not stated); relaxation techniques, music[5]	Level 1-3 A, Level 1	Total pain decreased in 10 of 13 studies; Sensory pain† reduction was reported in 6 of 12 studies; Affective pain‡ decreased in 10 of 13 studies; Unidimensional pain decreased in 4 of 7 studies; Observed pain decreased in 4 of 4 studies
Not reported; sensory and procedural information (explanations of what will be happening and how patients can expect to feel) [6]	Level 1-3 A, Level 1	Combination of procedural and sensory preparation significantly better than control on all measures; effect sizes with combination larger than with either type of information alone
362 patients undergoing fractured hip repair, removal of malignant skin lesions, major elective abdominal surgery, elective cholecystectomy, abdominal hysterectomy, femoral angiography; jaw relaxation, imagery, music, breathing, relaxation tapes[7]	Level 1-3 A, Level 1	3 of 7 studies showed significant decrease in pain sensation/pain distress in those who had relaxation; 1 out of 5 trials showed significant improvement in psychological outcomes; less anxiety in relaxation group
3387 adult patients; education, relaxation, music, imagery, biofeedback, multidisciplinary approach[3]	Level 1-3 A, Level 1	Effect sizes ranged from 2.25 to 1.78; strong heterogeneity

* Effect size is the standardized difference between the control and experimental groups regarding the measure of interest in each study. Positive values indicate benefit with the intervention.

† Sensory pain refers to ability to discriminate where pain is occurring and respond appropriately.

‡ Affective pain is the sensation of pain as something unpleasant and to be avoided.

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