RESEARCH PAPERS


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ABSTRACT

Background. Little is known about physician attitudes, goals, or satisfaction regarding acute postoperative and cancer pain management.

Objectives. To provide quantitative data regarding the status of acute postoperative and cancer pain management by Michigan physicians. To measure physician confidence, preference, and satisfaction as well as identify their pain care goals for acute postoperative and cancer pain management. To evaluate variability in acute postoperative and cancer pain decision making based upon physician demographic characteristics, knowledge, and attitudes.

Research Design. A cross-sectional survey, which included two cancer and three acute postoperative pain vignettes.

Subjects. A randomly-selected sample of three hundred sixty-eight licensed Michigan physicians who provide clinical care for acute postoperative and cancer pain patients.

Results. The majority of respondents (>50%) reported providing acute postoperative pain care frequently, while a minority (<20%) reported doing so for cancer pain. The majority of the physicians (>75%) reported goals of at least adequate pain relief without distress for both acute postoperative and cancer pain. Physicians more frequently chose the optimal pain management response for men following prostatectomy (56.2%) than for women following myomectomy (42%). They also chose the optimal response for metastatic prostate cancer more frequently (16.3%) than for metastatic breast cancer pain management (10.7%).

Conclusion. These data highlight physician variability in acute postoperative and cancer pain management decision making. Further study of the physician variable is necessary to improve the management of acute postoperative and cancer pain.

Key Words. Physician Variability; Physician Attitudes, Knowledge, and Goals; Acute Postoperative Pain Management; Cancer Pain Management; Physician Confidence and Satisfaction; Quality of Care

Introduction

Multiple modalities are currently available to treat acute postoperative and cancer pain [1–12]. In fact, the Agency for Health Care Policy and Research (now the Agency for Health Care Research and Quality) convened an interdisciplinary panel to develop guidelines for their management [13,14]. These guidelines have provided an impetus to advance and optimize the appropriate management of all types of pain [2]. The guidelines were based upon literature that revealed that unrelied or inadequately controlled pain has many detrimental effects, and that optimizing pain man-
Acute Postoperative and Cancer Pain Management Variability

Management improves patient outcome by decreasing morbidity and mortality as well as by enhancing quality of life [13,15,16]. The implementation of these guidelines has served as the foundation for both pharmacologic and nonpharmacologic options for the control of acute postoperative and cancer pain [3,17]. However, despite these innovations, patients continue to report that one of their greatest fears is unrelieved pain, and the literature reveals that adequate pain control for the postoperative patient is often not achieved [18,19]. Although we might wish it were otherwise, the picture is not brighter for the management of cancer pain, where it is estimated that 70% of patients die with unrelieved cancer pain [13].

The achievement of optimal health is complicated by variability in the way physicians treat patients with similar conditions [20,21]. Practice variability has been related to race, ethnicity, age, and gender of both the physician and patient [20–23]. Attention has also been directed at the knowledge and attitudes of health care providers toward pain assessment, management, and education [24]. However, barriers to pain management are not merely limited to inadequate assessment of pain and knowledge deficits. Physician variability could also contribute to misconceptions about the importance of pain management [25]. Attitudinal differences regarding the role of nonpharmacologic and pharmacologic therapies (especially opioid analgesics) have also contributed to the inadequate treatment of pain [24,26–28]. Nonetheless, quantitative analyses of physician characteristics associated with best practices of acute postoperative or cancer pain management are lacking.

We hypothesized that variability in physician treatment of acute postoperative and cancer pain patients contributes to their undertreatment, and that the degree of undertreatment might differ by patient characteristics. A questionnaire was developed for physicians to better understand their attitudes and knowledge regarding acute postoperative and cancer pain management. Specifically, we aimed to evaluate: 1) The quality of acute postoperative pain management; 2) The quality of cancer pain management; 3) Physician attitudes, knowledge, and satisfaction for both acute postoperative and cancer pain management; and 4) Physician acute postoperative and cancer pain management decision making.

Methods

The University of Michigan Health System (UMHS) granted Institutional Review Board approval for this study. A four-page study-specific questionnaire was developed by the investigators to find out the status of acute postoperative and cancer pain management among physicians licensed in the state of Michigan. The survey was pretested on two occasions for validity and reliability by UMHS physicians in the Department of Anesthesiology as well as by pain management faculty. The distribution of surveys to the randomly selected Michigan physicians included three mailings of the survey with return U.S. postage-paid envelopes and reminder postcards within a 2-month time frame. Physicians were not offered incentives for participation. An abbreviated nonresponse questionnaire was sent to physicians who did not respond to any of our mailings in order to elicit their reasons for nonparticipation. Details of questionnaire development and the survey collection process have been described previously [25].

Physician Demographics

The survey collected information on physician demographics. The questions included the physician’s age, gender, race, ethnicity, medical practice specialty, practice location (via zip codes), and the years of college and medical school graduation.

Pain Management Practice, Goals, and Satisfaction of Pain Management

Using a four-point Likert scale (never, sometimes, often, very often), physicians were asked to describe the frequency of treating patients with pain (i.e., assessment of complaints) and prescribing pain medication with three different types of pain (i.e., acute postoperative pain, cancer pain, and pain due to terminal illness). Physicians were asked to describe their goals for acute postoperative and cancer pain relief, which were recorded as: 1) Absolute and complete pain relief; 2) Adequate pain relief; 3) Moderate pain relief; 4) Pain relief only during painful periods; 5) No pain relief; and 6) Not applicable. Using the same Likert scale, the physicians who reported a personal pain experience rated the perceived quality of pain relief that they received. For those physicians who reported that a close relative had experienced pain, they rated the perceived quality of care for that relative via this scale. In addition, physicians’ satisfaction with pain care, their confidence level in the knowledge of pain treatments and modalities, as well as their level of agreement with different statements on the quality of pain management were assessed. A five-point Likert
scale measured satisfaction with pain care (1 = dissatisfied, 5 = very satisfied). Physicians were asked to rate their confidence or knowledge of several pain treatment modalities (1 = not confident, 5 = extremely confident). Opioid analgesic treatments were divided into triplicate (e.g., morphine, hydromorphone, fentanyl, methadone, codeine, and oxycodone) and nontriplicate (e.g., hydrocodone, propoxyphene) based upon whether a special prescription form is required. Meperidine was considered as a separate category. Physicians also provided opinions for their level of agreement with a number of statements regarding pain and pain management on a five-point scale (1 = strongly disagree, 5 = strongly agree).

**Acute and Cancer Pain Vignettes**

To evaluate physician decision making, five different pain vignettes were developed to examine the physician's management of these problems (see Appendix). The vignettes included three acute postoperative pain vignettes: Myomectomy (MYO), Prostatectomy (PRO), and Cesarean section (CS). Two cancer pain vignettes were included: Metastatic prostate cancer (MP); and Metastatic breast cancer (MB). Table 1 summarizes the vignettes by patient demographic characteristics and the etiology of the pain complaint. Both MYO and PRO as well as the MP and MB vignettes were considered to be gender-equivalent matches and were paired by age. The treatment options available for the matched vignettes were presented in a multiple choice best answer format in the same order. Treatment options were ranked from optimal to worst (1 = optimal, 5 = worst) by the principal investigator and pain management fellows, as previously described [25]. The choice of referral to a pain management specialist was ranked as the second optimal treatment choice in the cancer pain vignettes, whereas in the acute postoperative pain vignette, it was ranked as a neutral treatment choice.

**Statistical Analyses**

Physician demographics were analyzed using descriptive statistics. The frequency distribution of the respondents’ demographic characteristics was compared with the annual statistics of Michigan physicians published by the American Medical Association [29]. Ranked vignettes were compared using Wilcoxon Signed Ranks Test. Comparisons were made between MP and MB, MYO and PRO, MYO and CS, and PRO and CS. Spearman correlation coefficients were obtained between physician characteristics (age, education practice category) and the appropriateness of their responses to the acute and cancer pain vignettes separately. Their attitudes, knowledge, frequency of pain treatment, and frequency of writing prescription for pain were compared with the optimal responses to the clinical vignettes using Spearman’s correlation coefficient as well. The association between the physician’s practice category and several independent factors were measured via a one-way analysis of variance (ANOVA). The independent factors included frequency of pain treatment, frequency of pain prescription, satisfaction with pain care, confidence in knowledge, and attitudes and goals for pain management. In cases involving multiple comparisons, Bonferroni corrections were computed. All analyses were performed using SPSS version 10.0 statistical package [30]. For all analyses, a P value less than 0.05 was considered to be statistically significant.

### Table 1

**Summary of acute postoperative and cancer pain vignettes, distribution of responses, and summary statistics**

<table>
<thead>
<tr>
<th>Type of pain</th>
<th>Vignette response N (%)</th>
<th>Summary statistics mean score ± SD*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute postoperative</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Myomectomy* (44/F) N = 339</td>
<td>28 (8.3) 128 (37.8) 10 (3.0) 30 (8.9) 143 (42.2)</td>
<td>2.61 ± 1.52</td>
</tr>
<tr>
<td>Prostatectomy* (44/M) N = 333</td>
<td>9 (2.7) 60 (18.0) 16 (4.8) 61 (18.3) 187 (56.2)</td>
<td>1.92 ± 1.0</td>
</tr>
<tr>
<td>Cesarean section (24/F) N = 255</td>
<td>37 (11.0) 13 (27.8) 7 (2.1) 49 (14.6) 149 (44.5)</td>
<td>2.46 ± 1.53</td>
</tr>
<tr>
<td>Cancer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metastatic prostate cancer* (54/M) N = 344</td>
<td>1 (0.3) 5 (1.5) 224 (65.1) 58 (16.9) 56 (16.3)</td>
<td>2.04 ± 0.64</td>
</tr>
<tr>
<td>Metastatic breast cancer* (57/F) N = 336</td>
<td>17 (5.1) 9 (2.7) 163 (48.5) 111(33.0) 36 (10.7)</td>
<td>2.42 ± 0.9</td>
</tr>
</tbody>
</table>

Gender equivalent pain problems: *acute, cancer.

* 1 = optimal response, 5 = worst response.
Results

The overall response rate for completion of the entire survey was 26% (368/1,415). Respondents' demographics were similar to those of the Michigan Physicians' population published by the American Medical Association [30]. The respondents' distribution of age, race, ethnicity, and gender have been described previously [25,31,32].

Of the respondents, 228 (63%) were primary care physicians (i.e., those providing basic medical care) and 133 (36%) were specialty physicians (i.e., those providing medical care for which a referral is required). While the most common primary care group respondent was internal medicine (N = 100), the most common specialty care group respondent was surgery (N = 71). No demographic differences were noted between primary care and specialty physicians. Also, no demographic differences were noted between respondents and nonrespondents upon analysis of the nonresponse questionnaire (N = 122). Approximately 30% of the physician population did not receive any pain management education during their medical training, i.e., medical school, residency training, or via Continuing Medical Education (CME).

Overall, the majority of specialty physicians (52%) reported providing treatment for acute postoperative pain often to very often. Although their responses were comparable, a minority of primary care or specialty physicians reported frequently treating pain due to cancer (16.5% vs 12%) or terminal illness (19.7% vs 12.4%). Tables 2A and 2B provide further details regarding the frequency with which the physicians reported treating or prescribing medications for acute postoperative pain, cancer pain, or pain due to terminal illness, by physician specialty.

Acute Postoperative Pain Care

For specialty physician respondents, the frequency of treating acute postoperative pain, i.e., often to very often (52%), was similar to the frequency of prescribing for acute postoperative pain (51.8%). Primary care physicians reported a higher frequency of prescribing for acute postoperative pain than treating acute postoperative pain (34% and 22%, respectively; P < 0.001). These results are displayed in Tables 2A and 2B. Overall, both primary and specialty physicians were satisfied with the acute postoperative pain care they pro-

Table 2A  Frequency of pain treatment by type of pain and practice category

<table>
<thead>
<tr>
<th>Type of pain</th>
<th>Practice category</th>
<th>Frequency of treatment</th>
<th>Number of physicians (% within practice category)</th>
<th>Total</th>
<th>Mean ± SD</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute postoperative</td>
<td>Primary</td>
<td>Never = 1</td>
<td>75 (32.4)</td>
<td>105 (45.4)</td>
<td>31 (13.4)</td>
<td>20 (8.6)</td>
</tr>
<tr>
<td></td>
<td>Specialist</td>
<td></td>
<td>32 (24.6)</td>
<td>30 (23)</td>
<td>17 (13)</td>
<td>51 (39.2)</td>
</tr>
<tr>
<td>Cancer</td>
<td>Primary</td>
<td>Never = 1</td>
<td>76 (33.1)</td>
<td>115 (50.2)</td>
<td>23 (10)</td>
<td>15 (6.5)</td>
</tr>
<tr>
<td></td>
<td>Specialist</td>
<td></td>
<td>48 (36.9)</td>
<td>66 (50.7)</td>
<td>12 (9.2)</td>
<td>4 (3)</td>
</tr>
<tr>
<td>Terminal illness</td>
<td>Primary</td>
<td>Never = 1</td>
<td>75 (33)</td>
<td>107 (42.1)</td>
<td>26 (11.4)</td>
<td>19 (8.3)</td>
</tr>
<tr>
<td></td>
<td>Specialist</td>
<td></td>
<td>51 (39.5)</td>
<td>62 (48)</td>
<td>12 (9.3)</td>
<td>4 (3.1)</td>
</tr>
</tbody>
</table>

* Statistically significant.

Table 2B  Frequency of prescription by type of pain and practice category

<table>
<thead>
<tr>
<th>Type of pain</th>
<th>Practice category</th>
<th>Frequency of treatment</th>
<th>Number of physicians (% within practice category)</th>
<th>Total</th>
<th>Mean ± SD</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute postoperative</td>
<td>Primary</td>
<td>Never = 1</td>
<td>83 (36.7)</td>
<td>66 (29.2)</td>
<td>46 (20.3)</td>
<td>31 (13.7)</td>
</tr>
<tr>
<td></td>
<td>Specialist</td>
<td></td>
<td>41 (31.2)</td>
<td>22 (16.7)</td>
<td>15 (11.4)</td>
<td>53 (40.4)</td>
</tr>
<tr>
<td>Cancer</td>
<td>Primary</td>
<td>Never = 1</td>
<td>76 (33.7)</td>
<td>63 (28)</td>
<td>49 (21.7)</td>
<td>36 (16)</td>
</tr>
<tr>
<td></td>
<td>Specialist</td>
<td></td>
<td>56 (43.0)</td>
<td>51 (39.2)</td>
<td>13 (10)</td>
<td>10 (7.6)</td>
</tr>
<tr>
<td>Terminal illness</td>
<td>Primary</td>
<td>Never = 1</td>
<td>78 (34.6)</td>
<td>64 (28.4)</td>
<td>41 (18.2)</td>
<td>41 (18.2)</td>
</tr>
<tr>
<td></td>
<td>Specialist</td>
<td></td>
<td>61 (47.2)</td>
<td>47 (36.4)</td>
<td>9 (6.9)</td>
<td>11 (8.5)</td>
</tr>
</tbody>
</table>

* Statistically significant.
vided (mean ± standard deviation (SD): 4.2 ± 0.6 vs 4.4 ± 0.8, respectively, \( P = 0.014 \)). More than 90% of the physicians reported either absolute and complete (17.4%) or adequate pain relief without distress (80%) as goals for acute postoperative pain management (Table 1).

Physicians' ratings of their experience with the quality of pain relief for themselves (mean ± SD: 2.3 ± 0.7) and/or for a close relative (mean ± SD: 2.4 ± 0.7) were significantly lower than their reported goals for pain relief (mean ± SD: 1.9 ± 0.5; \( P < 0.05 \)). More details of the physicians goals for pain relief and the adequacy of their own or a relative's pain management are summarized in Table 3.

Physicians more frequently chose the optimal treatment option for acute postoperative pain for men following prostatectomy (56.2%) than for women following either myomectomy (42.2%) or cesarean section (44.5%, results not shown). The Wilcoxon Signed Ranks Test revealed a significant difference in the ranking of prostatectomy compared with myomectomy (\( P < 0.001 \)) and prostatectomy compared with cesarean section (\( P < 0.001 \)). There was no significant difference in the ranking of treatment choices between myomectomy and cesarean section (\( P = 0.078 \)). The mean response for the treatment of pain following myomectomy was mean ± SD: 2.61 ± 0.17, whereas it was mean ± SD: 2.46 ± 0.17 for pain following cesarean section. Figure 1 shows the physician responses for the acute postoperative pain vignettes.

**Cancer and Terminal Illness Pain Care**

Despite a lower rate of treating, the prescribing frequencies were similar, i.e., often to very often, for both cancer and terminal illness for primary care physicians (37.7% and 36.4%, respectively) and specialty physicians (17.6% and 15.4%, respectively). Both groups of physicians were satisfied with the cancer pain care they provided, although primary care physicians were more satisfied than specialty physicians (mean ± SD: 3.8 ±

**Table 3** Pain relief goals and experiences according to the type of pain

<table>
<thead>
<tr>
<th>Type of pain</th>
<th>Physician belief</th>
<th>N</th>
<th>Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Goals</td>
<td>340</td>
<td>1.9 ± 0.5</td>
</tr>
<tr>
<td></td>
<td>Own pain</td>
<td>205</td>
<td>2.3 ± 0.7</td>
</tr>
<tr>
<td></td>
<td>Relative’s pain</td>
<td>244</td>
<td>2.4 ± 0.7</td>
</tr>
<tr>
<td>Acute postoperative</td>
<td>Goals</td>
<td>254</td>
<td>1.8 ± 0.5</td>
</tr>
<tr>
<td></td>
<td>Own pain</td>
<td>26</td>
<td>2.3 ± 0.8</td>
</tr>
<tr>
<td></td>
<td>Relative’s pain</td>
<td>112</td>
<td>2.6 ± 1.0</td>
</tr>
<tr>
<td>Cancer</td>
<td>Goals</td>
<td>246</td>
<td>1.7 ± 0.6</td>
</tr>
<tr>
<td></td>
<td>Relative’s pain</td>
<td>111</td>
<td>2.5 ± 1.0</td>
</tr>
<tr>
<td>Terminal illness</td>
<td>Goals</td>
<td>26</td>
<td>2.3 ± 0.8</td>
</tr>
<tr>
<td></td>
<td>Relative’s pain</td>
<td>112</td>
<td>2.6 ± 1.0</td>
</tr>
</tbody>
</table>

* 1 = absolute and complete pain relief, 5 = no pain relief.
0.9 and 3.5 ± 1.0, respectively, *P < 0.001*). When considering the management of terminal illness, both primary care and specialty physicians were satisfied with their care (mean ± SD: 3.9 ± 0.9 and 3.4 ± 1.1, respectively, *P = 0.001*), with primary care physicians expressing significantly greater satisfaction.

The majority of physicians (>80%) reported their goals to be either absolute and complete or adequate pain relief for both cancer pain (24.8%) and pain due to terminal illness (38.2%). Mean (±SD) responses were 2.6 (±1.0) and 2.5 (1.0), respectively. For those physicians who reported a goal of adequate pain relief without distress, 68.5% chose this option for cancer pain and 55.7% chose the same option for pain due to terminal illness. When physicians personally experienced cancer pain, their response was consistent with adequate pain relief without distress, which was less relief than their goals but better than the relief received by their relatives (Table 3).

Physicians reported similar pain relief goals for cancer pain and the pain of terminal illness (mean ± SD: 1.8 ± 0.5 and 1.7 ± 0.6, respectively), which is consistent with absolute and complete-to-adequate pain relief.

Regarding the physicians’ ranking of responses to the prostate cancer and breast cancer vignettes, the Wilcoxon Signed Rank Test did not reveal any significant difference in their choice of cancer pain treatments between metastatic prostate cancer and metastatic breast cancer (*P = 0.304*). However, a comparison of their answers to these vignettes showed that more physicians chose the referral option for the male cancer patient (MP) than for the female cancer patient (MB) (60.9% vs 44.3%, respectively). Figure 2 graphically displays the physician’s responses to the cancer pain vignettes. Physicians reported their relative’s pain relief as adequate to moderate for cancer pain and the pain of terminal illness.

**Confidence and Attitudes in Pharmacologic Treatment**

Both specialty and primary care physicians reported a high confidence in their knowledge of meperidine (mean ± SD: 4.1 ± 1.0 and 3.9 ± 0.9, respectively) and triplicate drugs (mean ± SD: 3.6 ± 0.8 and 3.5 ± 0.7, respectively). They reported less confidence in their knowledge of nerve blocks (mean ± SD: 2.9 ± 1.4 and 2.2 ± 1.1, respectively) and transcutaneous electrical nerve stimulation (TENS) unit (mean ± SD: 2.5 ± 1.4 and 2.5 ± 1.1, respectively). A one-way ANOVA revealed differences between the frequency of prescription by practice categories (specialty vs primary care). The frequency distributions show that specialty physicians were more confident of their knowledge of triplicate drugs (mean ± SD: 2.7 ± 1.0 vs 2.2 ± 0.8),
nerve blocks (mean ± SD: 1.9 ± 1.1 vs 1.5 ± 0.7), and meperidine (mean ± SD: 2.2 ± 0.5 and 2.0 ± 0.5; \( P = 0.003 \)).

The physicians agreed that it was appropriate to refer cancer pain (mean ± SD: 4.1 ± 0.9) and the pain of terminal illness (mean ± SD: 4.1 ± 1.0), but they provided a significantly different and neutral response regarding the appropriateness of referring acute postoperative pain (mean ± SD: 2.7 ± 1.1). In general, the physicians disagreed that regulatory scrutiny limited their prescription of strong opioid analgesics for patients, with the strongest level of disagreement for pain in terminal illness (mean ± SD: 2.6 ± 1.3). Table 4 provides physician opinions about pain management by type of pain.

**Who Provides the Best Acute Postoperative and Cancer Pain Care?**

Table 1 shows the distribution of the physician responses to the different acute postoperative and cancer pain scenarios by the appropriateness of their choices. The physicians who provided better treatment of both acute postoperative and cancer pain were categorized by their demographic characteristics, attitudes, knowledge, frequency of treating patients, and goals for treatment. Spearman correlation coefficients were obtained between physician characteristics and the appropriateness of their responses to vignettes for acute and cancer pain separately (Table 5). Physicians who had more pain education, overall, provided better treatment. Neither physician age nor education characteristics were found to be associated with how well they responded to the acute postoperative or cancer pain scenarios. Physicians who tended to agree that they should prescribe strong opioids for acute postoperative pain chose better treatment options and were satisfied with their acute postoperative pain care.

For both acute postoperative and cancer pain, physician confidence in their knowledge of pain management modalities did not improve their response, although a greater frequency of treating acute postoperative pain improved their response. Physicians who prescribed meperidine (mean ± SD: 2.47 ± 0.94, \( P = 0.011 \)) or triplicate drugs (mean ± SD: 2.24 ± 0.54, \( P = 0.009 \)) responded significantly better. Further analysis of the physicians who provided the better responses for both acute postoperative and cancer pain is provided in Table 5.

**Table 4** Physician opinions by type of pain

<table>
<thead>
<tr>
<th>Physician opinions</th>
<th>Type of pain</th>
<th>Agreement scores*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Mean ± SD</td>
</tr>
<tr>
<td>Appropriate to refer to pain specialists</td>
<td>Acute postoperative</td>
<td>357</td>
</tr>
<tr>
<td></td>
<td>Cancer</td>
<td>358</td>
</tr>
<tr>
<td></td>
<td>Terminal illness</td>
<td>360</td>
</tr>
<tr>
<td>Appropriate for patients to ask for additional pain medications</td>
<td>Acute postoperative</td>
<td>365</td>
</tr>
<tr>
<td></td>
<td>Cancer illness</td>
<td>364</td>
</tr>
<tr>
<td></td>
<td>Terminal illness</td>
<td>362</td>
</tr>
<tr>
<td>Physician should prescribe strong opioids</td>
<td>Acute postoperative</td>
<td>361</td>
</tr>
<tr>
<td></td>
<td>Cancer</td>
<td>357</td>
</tr>
<tr>
<td></td>
<td>Terminal illness</td>
<td>356</td>
</tr>
<tr>
<td>Majority of patients are undertreated</td>
<td>Acute postoperative</td>
<td>362</td>
</tr>
<tr>
<td></td>
<td>Cancer</td>
<td>359</td>
</tr>
<tr>
<td></td>
<td>Terminal illness</td>
<td>357</td>
</tr>
<tr>
<td>Majority of patients should have more control (decisions regarding treatment)</td>
<td>Acute postoperative</td>
<td>366</td>
</tr>
<tr>
<td></td>
<td>Cancer</td>
<td>363</td>
</tr>
<tr>
<td></td>
<td>Terminal illness</td>
<td>362</td>
</tr>
<tr>
<td>Regulatory scrutiny limits my use of strong opioids</td>
<td>Acute postoperative</td>
<td>365</td>
</tr>
<tr>
<td></td>
<td>Cancer</td>
<td>358</td>
</tr>
<tr>
<td></td>
<td>Terminal illness</td>
<td>357</td>
</tr>
</tbody>
</table>

* 1 = strongly disagree to 5 = strongly agree.

**Discussion**

Considering the number of surgical procedures performed in the United States annually and the significant implications of untreated pain, optimizing pain management is of critical importance [33]. However, there is little known regarding factors that promote successful acute and cancer pain management outcomes by physicians. In general, most studies directed at physician pain management have focused on a single specialty [34–36]. The major assumption in these studies is a presumed familiarity with and knowledge of pain management [18]. Few studies, however, have attempted to understand the care of a general sample of physicians of multiple specialties who see and treat most patients with acute postoperative or cancer pain [29,36]. Furthermore, these studies did not look at physician characteristics or the type of pain complaint [21]. Our study examines the physician variable as a potential barrier to the management of acute postoperative and cancer pain.
The identification of physician variables that contribute to better management of acute postoperative and cancer pain allows for the development of strategies specifically designed to enhance pain management. Many have documented a lack of pain education for health care providers [18,28,34,37,38]. Our data support the idea that there is minimal pain management education directed at physicians. In this survey, younger physicians and those reporting greater pain education provided the best responses for pain management overall. This suggests an anticipated trend toward improved pain management as more educational efforts are pursued.

Variability in physician decision making has contributed to differences in primary, cardiovascular, and cancer care outcomes [39–42]. We surmised that physician attitudes, age, personal experiences with pain, and education could impact their goals and management of acute postoperative and cancer pain. The physicians reported higher confidence in their knowledge and prescribing of meperidine than the other modalities. This finding suggests that their confidence may be misplaced [43]. In general, we have demonstrated that physicians in this study expressed lower goals for acute postoperative pain than for cancer pain relief. Furthermore, when asked to rate the quality of pain relief when they personally experienced pain (acute postoperative or terminal illness), they reported their pain relief as adequate to moderate regardless of the type of pain, which is significantly less relief than their reported goals. Although the physicians reported treating cancer pain and pain due to terminal illness, our findings seem to suggest that physicians advocate for better pain control for their patients (especially when dealing with cancer pain management and the pain of terminal illness) than what they personally have experienced.

Schulman et al. utilized actors in a series of vignettes on chest pain. They found that both the race and gender of a patient independently influenced physician management [40,44]. Clinical vignettes were also utilized in this study to determine the physician’s management of different types of acute postoperative and cancer pain [38]. The correct response for this and other vignette studies was determined by expert opinion, which may vary institutionally, regionally, or by specialty.

Table 5  Physician characteristics and attitudes correlated with better responses to clinical vignettes

<table>
<thead>
<tr>
<th>Variable category</th>
<th>Variable for pain management</th>
<th>Cancer pain Spearman correlation coefficient</th>
<th>P value</th>
<th>Acute pain Spearman correlation coefficient</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physician characteristics</td>
<td>Age of physician</td>
<td>0.111</td>
<td>0.149</td>
<td>−0.010</td>
<td>0.090</td>
</tr>
<tr>
<td></td>
<td>Education*</td>
<td>−0.020</td>
<td>0.791</td>
<td>0.115</td>
<td>0.050</td>
</tr>
<tr>
<td>Satisfaction‡</td>
<td>Satisfaction of care for cancer/acute postoperative pain patients</td>
<td>0.068</td>
<td>0.44</td>
<td>0.153</td>
<td>0.012</td>
</tr>
<tr>
<td></td>
<td>Complaints of pain could distract a physician from treating an illness</td>
<td>0.120</td>
<td>0.117</td>
<td>0.010</td>
<td>0.863</td>
</tr>
<tr>
<td></td>
<td>Appropriate for cancer/acute patients to ask for additional pain drugs</td>
<td>0.103</td>
<td>0.178</td>
<td>0.107</td>
<td>0.068</td>
</tr>
<tr>
<td></td>
<td>Physicians should prescribe strong opioids for cancer/acute pain</td>
<td>0.095</td>
<td>0.217</td>
<td>0.255</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td></td>
<td>Patients should have control over decisions regarding cancer/acute treatment</td>
<td>0.132</td>
<td>0.084</td>
<td>0.080</td>
<td>0.175</td>
</tr>
<tr>
<td>Knowledge*</td>
<td>Confidence of knowledge of meperidine</td>
<td>0.004</td>
<td>0.956</td>
<td>0.097</td>
<td>0.10</td>
</tr>
<tr>
<td></td>
<td>Confidence of knowledge of nerve blocks</td>
<td>0.015</td>
<td>0.845</td>
<td>0.080</td>
<td>0.18</td>
</tr>
<tr>
<td></td>
<td>Confidence of knowledge of triplicate drugs</td>
<td>0.055</td>
<td>0.473</td>
<td>0.060</td>
<td>0.31</td>
</tr>
<tr>
<td>Frequency*</td>
<td>Treating patients with cancer/acute pain</td>
<td>0.060</td>
<td>0.433</td>
<td>0.171</td>
<td>0.0034</td>
</tr>
<tr>
<td></td>
<td>Prescribing meperidine</td>
<td>−0.074</td>
<td>0.336</td>
<td>0.149</td>
<td>0.011</td>
</tr>
<tr>
<td></td>
<td>Prescribing nerve blocks</td>
<td>−0.044</td>
<td>0.567</td>
<td>0.070</td>
<td>0.235</td>
</tr>
<tr>
<td></td>
<td>Prescribing triplicate drugs</td>
<td>0.013</td>
<td>0.860</td>
<td>0.153</td>
<td>0.009</td>
</tr>
<tr>
<td></td>
<td>Prescribing frequency of nontriplicate drugs</td>
<td>0.014</td>
<td>0.880</td>
<td>0.013</td>
<td>0.834</td>
</tr>
<tr>
<td>Goals°</td>
<td>Goal for cancer/acute pain</td>
<td>−0.043</td>
<td>0.582</td>
<td>−0.0001</td>
<td>0.988</td>
</tr>
</tbody>
</table>

* number of pain management educational programs attended.
‡ 1 = very dissatisfied to 5 = very satisfied; † 1 = strongly disagree to 5 = strongly agree; * 1 = not confident to 5 = very confident; ° 1 = never to 4 = very often; 0 = 1 = complete pain relief to 5 = no pain relief.
Although we believe that our vignettes did not have a presentation bias, they may have their limitations. For instance, the format of the vignettes required only recognition of the correct response, which may lead to an overestimation of physician behavior. Vignettes may not provide key patient information that may influence patient presentation (e.g., insurance status, past medical history, social history, and socioeconomic status). All in all, real-world case management is much more challenging, and real patients are much more complex than any vignette. However, vignettes do provide valuable insights into physician decision making, but other approaches to validating physician behavior may also need to be studied.

When developing the survey instrument, we felt that our physician respondents would be fairly sophisticated. Thus, the use of the same acute and cancer pain problem in a male and female patient could be easily identified and would possibly skew our findings. Our goal was not to be obvious in our intent. Similarly, we attempted to use gender-equivalent surgical procedures for the acute postoperative pain scenarios, while similar problems were also chosen for the cancer pain vignettes. The cesarean section vignette was a separate and different entity altogether. Overall, the purpose of this study was to evaluate variability. Future studies are needed to address these limitations. Furthermore, the patient's perspective of the adequacy of their pain management or their response to treatment also was not addressed in this study.

A survey by Warfield and Kahn suggested that 40% of patients suffered with unrelied postoperative pain [45]. Our study revealed that physicians often evaluate and prescribe for acute pain problems. Upon evaluation of their acute postoperative pain decision making using the vignettes, the physicians more frequently chose the optimal treatment choice for men following prostatectomy than for women after myomectomy. In evaluating all of the acute postoperative pain vignettes using the worst choice option, physicians more frequently chose the worst analgesic regimen for cesarean section (11% and 8.3%) than for prostatectomy (2.7%). We have shown significant differences in physician treatment of acute pain based upon gender. A limitation of this study is the choice of similar, but not identical, acute postoperative pain clinical vignettes. Nonetheless, this study supports physician variability in acute postoperative pain management while emphasizing the importance of further study to elucidate the causes for differences in referral patterns and management of pain.

Both primary care and specialty physicians reported some familiarity with treating and prescribing for cancer pain and pain due to terminal illness. The physicians provided a higher percentage of optimal responses for the male with metastatic prostate cancer than for the female with breast cancer (16.3% vs 10.7%). They also chose referral of the male with metastatic prostate cancer more frequently than the female with metastatic breast cancer (65.1% vs 48.5%), while also choosing the worst or a poor response for the female more frequently than the male (7.8% vs 1.8%). Again, evaluation of the confidence intervals revealed significant differences in decision making based upon gender. These preliminary findings suggest that the gender of the patient may make a difference in how physicians manage pain. Refinement of our tool and more study are required to evaluate whether the gender of the patient truly has an influence on how physicians manage acute postoperative and cancer pain.

The good news is that over 75% of the physician respondents reported goals of at least adequate pain relief without distress for acute postoperative pain, cancer pain, and pain due to terminal illness. For pain in the terminally ill, almost 40% of the physicians reported a goal of absolute and complete pain relief. The physicians reported less agreement in the appropriateness of referring acute postoperative pain to a specialist than in the referral of cancer pain and the pain of terminal illness. Physician respondents who concurred with patients asking for additional pain medications for acute postoperative pain were better responders. In general, our results highlight that greater confidence in their knowledge of pain management modalities did not lead to better management of our clinical pain vignettes. Surprisingly, greater pain education only correlated with their management of acute postoperative pain. A potential limitation of this study is that the pain management regimens focused on opioid analgesics. We chose to focus on opioid analgesics since the literature has identified the lack of use of opioid analgesics as a barrier to pain management [46–50]. Furthermore, the literature also supports that regulatory oversight of opioid analgesics may contribute to the undertreatment of pain [51–53]. The physicians in this survey did not feel that regulatory scrutiny limited their prescription of strong opioid analgesics for pain due to terminal illness.

Self-report bias, representativeness, and non-response are important considerations of survey
research [54,55]. Our survey was fairly detailed and touched upon a sensitive subject matter. In order to reduce a potential selection bias, monetary incentives were not used in this study. These factors may have reduced the response rate. The total number of respondents to this survey was substantial for a group of busy clinical physicians from different disciplines who did not receive an incentive for participation [56]. We used three mail follow-ups of a survey to enhance our response. The questionnaire was completed confidentially in order to reduce the potential to report untrue behaviors. A nonresponder questionnaire was utilized to determine the reasons why some of the physicians did not respond to the survey. Analysis of the nonresponder questionnaire revealed that the respondents were not significantly different. Despite obtaining a representative sample of physicians, the small numbers of women as well as racial and ethnic minority physicians prevent the analysis of potential acute postoperative and cancer pain treatment differences that could be attributed to physician demographics. However, if a nonresponse bias was present, we believe that it did not affect our conclusions in a meaningful manner. It is possible, however, that our findings could be biased by the overrepresentation of physician respondents who were more knowledgeable about pain management. This possibility would reinforce our conclusions about the inadequacy of effective pain management in some quarters. In order to provide worthwhile answers regarding the impact of physician demographic variables on pain management, future studies may require oversampling of women as well as racial and ethnic minority physicians.

In conclusion, this study serves as a platform for future outcome studies on physician characteristics that contribute to adequate pain management. New expectations from the Joint Commission of the Accreditation of Healthcare Organizations (JCAHO) have been developed to ensure the regular and consistent assessment as well as appropriate efforts to manage pain [57,58]. We have shown the potential for the undertreatment of women with both acute postoperative and cancer pain. Physician variability was seen in cancer pain management, where women patients were referred less frequently to pain specialists than men. The importance of the physician’s age and educational experiences in pain cannot be overlooked. Our data suggest that early educational efforts could lead to a paradigm shift toward optimizing pain management. Disparities in the stated goals of physicians and their management of acute postoperative and cancer pain suggest the need for continuing study of physician variability as an important factor that may influence the adequacy of acute postoperative and cancer pain management. This serves as a platform to highlight that improvements in the assessment and management of acute postoperative and cancer pain may be achievable when efforts are directed at influencing and understanding those physician variables that may be associated with best practices.

Acknowledgments

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References

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Acute Postoperative and Cancer Pain Management Variability


Appendix: Acute Postoperative and Cancer Pain Vignettes

*Best answer choice is in bold font
( ) = Response scores

1. A 44-year-old male complains of incisional pain immediately following radical retropubic prostatectomy. The most appropriate regimen for his acute postoperative pain would be:
(4) a. Acetaminophen hydrocodone
(1) b. Start intravenous PCA
(5) c. Ibuprofen
d. Management with an epidural for postoperative pain
(3) e. Refer to pain management specialist

2. A 44-year-old female complains of incisional pain following a myomectomy. The most appropriate management for her acute postoperative pain would be:
(4) a. Acetaminophen hydrocodone
(1) b. Start intravenous PCA
c. Ibuprofen
d. Management with an epidural for postoperative pain
(3) e. Refer to pain management specialist
3. A 24-year-old female complains of incisional pain immediately following a cesarean section. She
denies a prior history of pain. The most appropriate management would be:
(4) a. Acetaminophen with codeine
(2) b. Hydrocodone
(5) c. Ibuprofen
(1) d. Start an IV PCA
(3) e. Refer to a pain management specialist

4. A 54-year-old male with metastatic prostate cancer complains of bone and generalized pain. His life
expectancy is no more than 6 months. No new surgical procedures are planned. He reports severe
pain despite a morphine PCA at 20 mg/hour with a bolus of 5 mg available every 6 minutes. He obtains
some additional relief with 75 mg IV meperidine q 6 hours prn. On physical examination he is drowsy,
but awakens easily. He appears uncomfortable and is in moderate acute distress. Prior to his admis-
sion, he reported extreme pain despite oxycodone at 120 mg p.o. b.i.d. with hydromorphone 6 mg p.o.
q 4–6 hours prn for breakthrough pain. The most appropriate management of his pain would be:
(5) a. Discharge him home on his previous home regimen
(4) b. Add oxycodone and acetaminophen to his home regimen
(3) c. Consider an IV home PCA
(1) d. **Consider a trial of intrathecal opioids**
(2) e. Refer to pain management specialist

5. A 57-year-old female with breast cancer with metastases to the bone is currently on a hydromorphone
PCA. She complains of generalized and back pain. Her life expectancy is 3–6 months. She receives
2 mg of hydromorphone an hour continuously and has the ability to bolus herself with 0.5 mg of
hydromorphone every 6 minutes. She occasionally requires 10-mg IV boluses of morphine q 4–6
hours prn. Physical examination reveals an alert female in acute distress. Prior to her hospitalization
for intractable pain, she utilized a fentanyl patch at 150 mcg/hour and hydromorphone 6 mg p.o. q
4–6 hours prn for breakthrough pain. It is her desire to return home with a visiting nurse. An appro-
priate home regimen would be:
(5) a. Discharge her home on her previous home regimen
(4) b. Add oxycodone and acetaminophen to her home regimen
(2) c. Consider an IV home PCA
(1) d. **Consider a trial of intrathecal opioids**
(3) e. Refer to pain management specialist