ORIGINAL ARTICLE

The influence of chief complaint on opioid use in the emergency department

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ABSTRACT

The aim of this study was to explore factors influencing emergency department (ED) clinicians' use of opioids in treating selected patients. Patients who either received or did not receive opioids in the ED, as well as their nurses and physicians, were interviewed before patient discharge. We found that the decrease in patients' mean (SD) pain intensity from the time of admission to the ED (7.3 ± 2.4 on a 0 to 10 numeric rating scale) to discharge (5.0 ± 2.9) was statistically significant (t_{93} = 8.4, $p < 0.001$, 95 percent CI = 1.7, 2.8) for all groups except those with trauma-related pain. The factor that most frequently led physicians of patients with abdominal pain and nurses in general to administer no opioids was that the patient was "not in that much pain." However, the patients in question had self-reported pain scores that indicated moderate pain. Our findings lead us to conclude that clinicians inaccurately infer severity of patient pain. This in turn can influence the prescription of opioids and the patient's decrease in pain.

Key words: pain, pain assessment, pain treatment, emergency department, decision making, opioids

INTRODUCTION

Certain patients are at particular risk of not receiving aggressive or adequate pain management in hospital emergency departments (EDs). Opioids have been withheld from ED patients because of the following clinical concerns: 1) that the patient will become too sedated and unable to safely leave the ED,[1] 2) that physicians will not be able to make an accurate diagnosis in patients with abdominal pain because symptoms or physical findings might be "masked" by analgesics,[2] 3) hesitancy to provide opioids to patients with chronic painful conditions and/or drug dependencies,[3-5] and 4) that trauma patients will suffer hemodynamic instability or a decrease in respiratory drive following administration of opioids.[6] We hypothesized that the ED patient's pain experience and clinicians' utilization of opioids in the management of patient pain would be influenced by the patient's chief complaint (abdominal, chronic, abscess, or trauma pain). Understanding how pain in various patient groups is treated and what factors lead clinicians to be concerned about treating patient pain with opioids could provide guidance for future interventions for ED patients in pain.

METHODS

Study design

This prospective, descriptive, comparative study was conducted in the EDs of two Level I trauma centers in teaching hospitals in Northern California, Stanford University Medical Center and San Francisco General Hospital. Study approval was obtained from the institutional review boards at both sites, as well as from the Committee on Human Research at the University of California, San Francisco.

Study setting and population

The study population was selected from patients who presented to the ED with a chief complaint of abdominal, chronic, abscess, or trauma pain. Abdominal pain was categorized as any pain in the abdominal area that began less than 10 days prior to ED admission. For the purpose of this study, chronic pain was defined as pain lasting longer than 10 days, to differentiate it from the many other acute, painful conditions that lead patients to seek ED care. Chronic pain has traditionally been defined as pain lasting for longer than three months.[7] However, ED researchers have defined chronic pain as having a duration of longer than 48 hours[8] or longer than one month.[9]

Table 1. Sample demographics							
	All patients (N = 94)	**Patients with abdominal pain (n = 31)**	**Patients with chronic pain (n = 18)**	**Patients with abscesses (n = 25)**	**Patients with trauma pain (n = 20)**	**Physicians (N = 78)**	**Nurses (N = 43)**
Age (mean/SD)	41.2/12.6	38.8/12.2	45.1/15.2	43.5/5.90	36.6/10.6	31.6/6.4	38.2/8.4
Gender							
Male (percent)	53 (56.4)	22 (46)	19 (68)	24 (73)	23 (66)	46 (59)	11 (26)
Female (percent)	41 (43.6)	26 (54)	9 (32)	9 (27)	12 (34)	32 (41)	32 (74)
Ethnicity							
Caucasian (percent)	49 (52)	18 (38)	15 (54)	19 (58)	24 (69)	48 (63)	34 (79)
African American (percent)	26 (28)	15 (32)	9 (32)	12 (37)	5 (14)	4 (5)	2 (5)
Hispanic (percent)	12 (13)	10 (21)	2 (7)	1 (3)	5 (14)	3 (4)	1 (2)
Asian Pacific (percent)	5 (5)	4 (8)	1 (4)	0 (0)	1 (3)	16 (21)	5 (12)
Other (percent)	2 (2)	1 (2)	1 (4)	1 (3)	0 (0)	5 (7)	1(2)

We included patients presenting with abscesses because, in our EDs, they are often injection drug users and, as such, may be subjected to a conservative approach by clinicians regarding opioids. Patients with trauma pain were included if they were categorized as second-tier trauma activations (i.e., without life-threatening injuries). Patients were excluded if they didn't speak English, were younger than 18 years of age, or had life-threatening or unstable conditions or altered mental status.

Measurements

The research instruments were separate questionnaires for patients, nurses, and physicians. The questionnaires were developed by research team members who were experts in pain, emergency nursing, and/or emergency medicine. Nurses received the same questionnaire for all patients, and physicians received questionnaires specific to each patient's chief complaint (abdominal pain, chronic pain, abscess pain, or trauma pain). Content validity of the instruments was determined through pilot testing of three ED nurses and five ED physicians. In one question on the questionnaire, clinicians were offered a variety of reasons for why they might decide not to administer an opioid to a particular patient or, if an opioid was selected, to use only a low dose. They checked all reasons that they felt were relevant to the particular patients for whom they were providing care. We intentionally did not define "low-dose opioids," believing that there is considerable variation in clinicians' beliefs about what would constitute a low dose. In this study, a provider's own interpretation of a low opioid dose was what we considered to be important. The questionnaires also contained numeric rating scales (NRSs) where 0 = no pain and 10 = worst pain imaginable.[10,11] (Questionnaires available upon request.) Upon discharge from the ED, patients rated their degree of pain intensity at admission and at discharge using separate 0 to 10 NRSs for each rating. Information about patient demographics and whether patients received opioids or other analgesics during their ED stays was obtained through chart abstraction.

Study protocol

If a patient met study criteria, the patient and the patient's primary nurse and physician were asked to participate in the study, and informed consent was obtained.

Table 2. Changes in pain intensity from admission to discharge (NRS)*					
Type of pain	**Pain at admission (M/SD)†**	**Pain at discharge (M/SD)†**	**t**	**p**	**95 percent CI‡**
All types (N = 94)	7.3/2.4	5.0/2.4	8.4	< 0.001	1.7, 2.8
Abdominal pain (n = 31)	7.5/2.0	4.2/3.0	7.3	< 0.001	2.3, 4.2
Chronic pain (n = 18)	7.4/2.5	5.5/3.0	4.5	< 0.001	0.98, 2.7
Abscess pain (n = 25)	7.6/2.5	5.6/2.8	4.1	< 0.001	0.97, 3.0
Trauma pain (n = 20)	6.4/2.8	4.8/2.8	2.1	< 0.053	-0.03, 3.2
* NRS = Numeric Rating Scale; † M/SD = mean/standard deviation; ‡ confidence intervals					

Research assistants were nurses who participated in training sessions and regularly scheduled review sessions to ensure standardization of enrollment and administration of the questionnaires. Each patient's nurse and physician completed their surveys soon after assessing and treating the patient. When patients were being prepared for ED discharge or hospital admission, they were given the option to complete their questionnaires themselves or have research assistants read the questions to them. All questionnaire responses were blinded from other respondents. Time required for completion of the questionnaires did not exceed five minutes.

Data analysis

Data were analyzed using Statistical Program for the Social Sciences (SPSS) 12.0 for Windows. Descriptive statistics (e.g., frequencies, means, and standard deviations) were used for analysis of demographic data. Fisher's Exact tests were used for analyses of categorical data, and

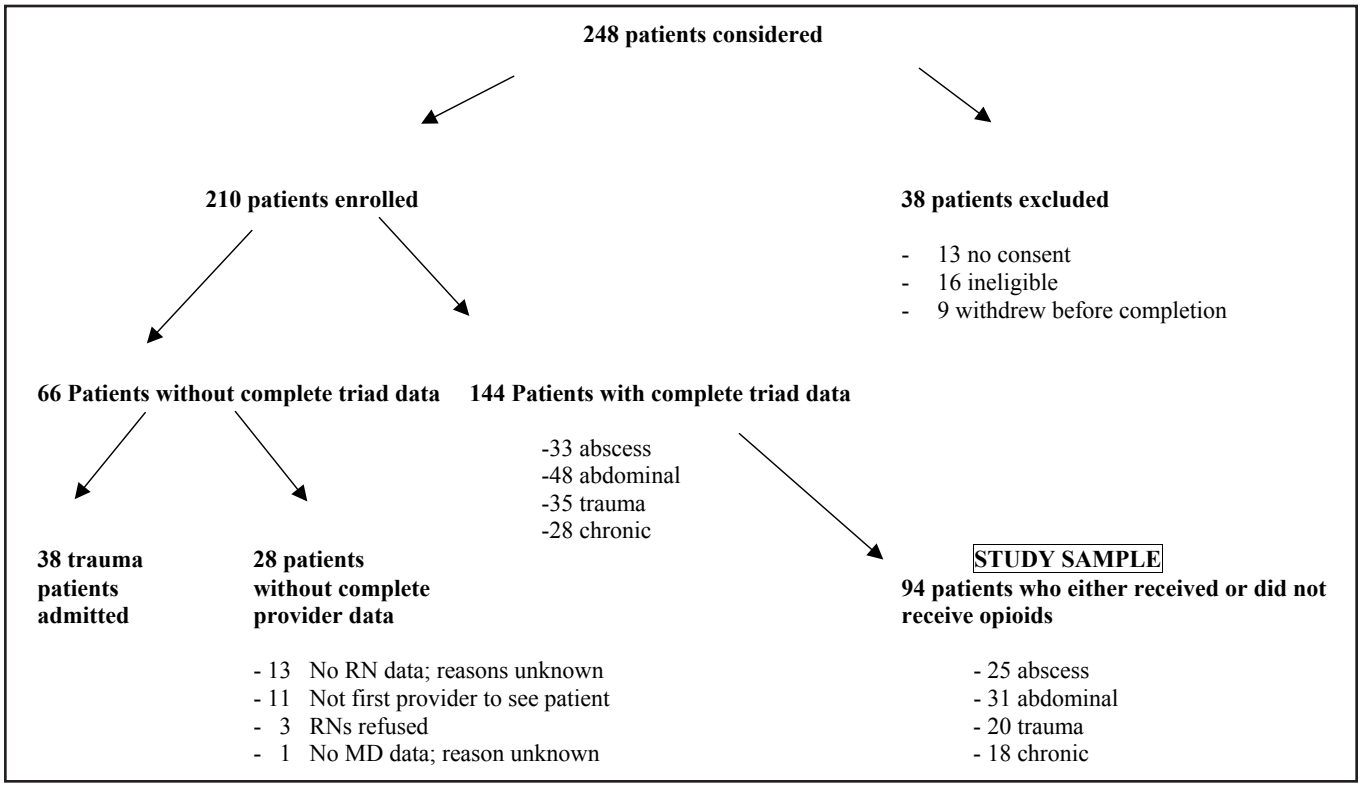

Figure 1. The process of patient enrollment into the study.

Table 3. Specific factors influencing nurses' decision to administer opioids			
Factor (number of nurses who selected factor)	**Number (percent) of patients who received opioids (n = 59)**	**Number (percent) of patients who did not receive opioids (n = 35)**	**Level of significance**
Patient's vital signs (12)	9 (15.3)	3 (8.6)	ns
Patient's chief complaint (7)	4 (6.8)	3 (8.6)	ns
Patient has chronic pain (6)	3 (5.1)	3 (8.6)	ns
Opioids interfere with diagnosis (4)	3 (5.1)	1 (2.9)	ns
Patient not in that much pain (32)*	11 (18.6)	21 (60)	< 0.001
Opioids not appropriate (11)	4 (6.8)	7 (20.6)	< 0.05
* Ten (56 percent) were patients with chronic pain			

t-tests and analysis of variance (ANOVA) were used for analyses of continuous data. An α level of significance of < 0.05 was considered statistically significant.

RESULTS

We identified 248 patients presenting with a chief complaint of abdominal pain, chronic pain, abscess pain, or trauma-related pain. Of those, 144 had complete triad data (patient, nurse, physician) for analysis. Of the 144, 94 either received only opioids for pain or did not receive any analgesics. It is this sample of 94 that we report on here. (See Figure 1 for the patient enrollment process and Table 1 for sample demographics.)

Pain intensity at ED admission

Our 94 patients reported moderate to severe pain upon arrival at the ED, with an overall mean NRS score of 7.3 ± 2.4. Patients with abscess pain reported the highest pain intensity (7.6 ± 2.5), while the patients with trauma pain reported the lowest pain intensity (6.4 ± 2.8) (Table 2). A one-way ANOVA determined that the difference among the four groups in pain intensity at admission was not statistically significant.

Opioid administration

During their stay in the ED, 59 patients received only opioids for pain, and 35 patients received no analgesics. Among the four pain groups, the difference in the number of patients who received opioids versus no analgesics was not significant. For those who received opioids, the average opioid dose (in morphine equivalents) differed considerably between those whose chief complaint was of abdominal pain and those with chronic pain. Doses ranged from 8.9 ± 7.5 mg (administered to patients with abdominal pain [n = 19]) to 19.8 ± 19.8 mg (administered to those with chronic pain [n = 10]). Trauma pain (n = 11) and abscess pain (n = 19) patients received an average of 14 ± 11.4 mg and 14.4 ± 14.3 mg, respectively. A one-way ANOVA determined that the differences in opioid doses among groups were nonsignificant. This may have been an artifact resulting from the small number of patients in each group who received opioids.

Factors that could influence clinicians' use of opioids

The physicians and nurses were asked to choose a reason or reasons that would lead them to administer low doses of opioids or no opioids at all to their patients. We provided them with an extensive list of possible factors that could influence opioid administration decisions, derived from research and our own clinical practices. (Complete list of factors available on request.) We used Fisher's Exact tests to examine the relationships between selected factors and whether patients did or didn't receive an opioid. Only six factors, from the entire list of 12 potential factors, were selected by more than 5 percent of the nurses as being important to them when determining whether an opioid should be administered to a particular patient. Table 3 presents the factors selected by the nurses. A choice against opioid administration was significantly related to a nurse's determination that the "patient was not in that much pain" ($p < 0.001$) and that "opioids were not appropriate" ($p < 0.05$).

Table 4. Specific factors influencing physicians' decision to administer opioids				
Chief complaint	**Selected factor (number of physicians selecting factor)**	**Number (percent) of patients who received opioids**	**Number (percent) of patients who did not receive opioids**	**Level of significance**
Abdominal pain		n = 18	n = 12	
	Pending consult (2)	2 (11)	0 (0)	NS
	Opioids may interfere with diagnosis (3)	3 (17)	0 (0)	NS
	Patient not in that much pain (14)	4 (22)	10 (83)	$p < 0.001$
	Opioids not appropriate (7)	2 (11)	5 (42)	$p = 0.053$
	Patient going to CT (1)	0 (0)	1 (8)	NS
	Medications will interfere with timely discharge (1)	1 (5.6)	0 (0)	NS
Abscess pain		n = 19	n = 6	
	Abscess best treated by incision and drainage (3)	2 (11)	1 (17)	NS
	Abnormal vital signs (3)	2 (11)	1 (17)	NS
	Altered mental status (2)	2 (11)	0 (0)	NS
Chronic pain		n = 11	n = 8	
	Patient should be treated by primary provider (1)	0 (0)	1 (17)	NS
	Patient given other pain medications (3)	2 (18)	1 (13)	NS
Trauma pain		n = 11	n = 9	
	Suspected abdominal injury in trauma patient (1)	1 (9)	0 (0)	NS
	Not a high priority (3)	2 (18)	1 (11)	NS

Only 13 factors, from the entire list of 59 potential factors on the four physician questionnaires, were selected by more than 5 percent of the physicians as important when determining whether an opioid should be administered to a particular patient. Table 4 presents the factors selected by the physicians. Opioid administration was significantly related to the determination that a "patient was not in that much pain" ($p < 0.001$) by physicians of patients with abdominal pain. Significantly fewer abdominal pain patients received opioids if their physicians thought this factor was an important influence on the decision to administer an opioid. The idea that "opioids were not appropriate" for abdominal pain patients almost reached statistical significance ($p = 0.053$).

Physicians and nurses frequently noted that there were "other" factors (besides those on the questionnaire) that influenced their decisions concerning opioids. However, the following "other" factors were the only ones written in: a) "other medications would be better selections" (n = 1), b) "patient refusal of pain medication" (n = 3), c) patient did not want "mind-altering drugs" (n = 1), d) patient was taking heroin/methadone (n = 2), and e) patient had no IV access (n = 1).

Patients "not in that much pain"

Fourteen physicians of patients with abdominal pain

Table 5. Patient- and nurse-reported pain intensity scores for patients (N = 94) and resultant opioid doses

	Patient-reported score	Nurse-reported score	Number of patients who received opioids	Opioid dose* administered
Nurse chose "not in that much pain" (n = 32)	5.8 ± 2.3[a]	3.5 ± 2.3[a]	11	8.0 ± 5.7 mg[c]
Nurse did not choose "not in that much pain" (n = 62)	8.1 ± 2.2[b]	6.0 ± 2.5[b]	48	14.7 ± 12.6 mg[c]

* As morphine equivalent; a = $p < 0.001$; b = $p = 0.003$; c = $p < 0.02$.

and 32 nurses (over half of them nurses of chronic pain patients) noted that their patients were not in enough pain to warrant an opioid. Because of this finding, we examined the self-reported pain intensity of these particular patients at admission. Patients determined by their nurses to not be in much pain reported an average pain intensity of 5.8 ± 2.3 at admission (their nurses rated their average pain intensity as being 3.53 ± 2.3) (Table 5). The 14 abdominal pain patients whose physicians believed they were not in much pain reported an average pain intensity of 6.7 ± 2.2 at admission; their physicians rated their pain as being 2.7 ± 1.3. These differences in pain intensity scores between nurses and patients and between physicians and abdominal pain patients were significant ($p < 0.05$ and $p < 0.001$, respectively). Patients who were considered to not be in much pain received significantly lower doses of opioids than the other patients (nurses' patients = 8.0 ± 5.7 mg vs. 14.7 ± 12.6 mg, respectively; abdominal pain patients = 4.0 ± 1.6 mg vs. 10.2 ± 2.2 mg, respectively). (See Tables 5 and 6.)

Change in pain intensity from admission to discharge

Overall, our 94 patients' pain at discharge had decreased significantly, from an admission pain intensity of 7.3 ± 2.4 to a discharge pain intensity of 5.0 ± 2.9 (t^{93} = 8.4, $p < 0.001$, 95 percent CI = 1.7, 2.8). (Table 2.) The decrease in pain intensity was statistically significant in all of the groups except the trauma patients. In spite of the significant decrease in pain, 54 percent of our patients reported pain scores of 5 or greater upon discharge, and only 5.3 percent reported no pain at discharge. An NRS pain score of 5 or greater is considered to reflect moderate pain.[12]

DISCUSSION

We studied four different groups of ED patients who we believe are at particular risk for undertreatment of pain: patients with abdominal pain, chronic pain, abscess pain, or trauma-related pain. Our goal was to elucidate possible reasons for their undertreatment. Unlike previous studies in the ED setting, we questioned not only the patients but also the patients' nurses and physicians to determine the basis of clinicians' decisions regarding opioid administration.

Forty-one percent (n = 59) of the 144 patients in our sample received opioids alone for pain, a frequency different from those seen in previous studies.[6,13,14] The 94 patients we isolated for this report rated their pain as severe upon arrival at the ED. Pain decreased significantly over time when considering the group as a whole and three of the four chief complaint groups. While the amount of opioids administered to these patients was not statistically different, patients with abdominal pain received a substantially lower average opioid dose (8.9 mg) than did patients with chronic pain (19.8 mg). That abdominal pain patients received the lowest doses of opioids may not be too surprising, given the traditional surgical dogma dictating that analgesics be withheld from such patients until a diagnosis is established, so they don't affect the physical examination. It is also sometimes believed that opioids can mask symptom progression or prevent the accurate and timely diagnosis of serious disease. In our study, physicians caring for patients with abdominal pain believed that they "weren't in that much pain" and an opioid was unwarranted. The lower dose of opioids received by abdominal pain patients did not seem to prevent a change in pain intensity over time, since their pain intensity scores at discharge were significantly lower than at admission. Factors other than opioid administration that influence or decrease abdominal pain were not explored in this study.

While trauma patients had the lowest pain intensity scores (NRS = 6.4) at admission, those scores were close to what is considered to be severe pain (NRS = 7 to 10).[12] Although 11 out of 20 of our patients with trauma pain received opioids, trauma pain did not decrease significantly over the patients' time in the ED. There was no documented concern on the part of clinicians that these trauma patients had unstable vital signs or altered mental status. There was, however, a documented concern from

Table 6. Patient- and physician-reported pain intensity scores for abdominal pain patients (n = 30) and opioid doses

	Patient-reported score	Physician-reported score	Number of patients who received opioids	Opioid dose* administered
Physician chose "not in that much pain" (n = 14)	6.7 + 2.2[a]	2.7 + 1.3[a]	4	4.0 + 1.6 mg[c]
Physician did not choose "not in that much pain" (n = 16)	8.1 + 1.7[b]	6.1 + 2.2[b]	14	10.2 + 2.2 mg[c]

* As morphine equivalent; a = $p < 0.001$; b = $p = 0.003$; c = $p < 0.02$.

a few physicians that treatment of the trauma patients' pain was not a priority. The patients that we studied were second-tier trauma activation, and thus of lower urgency than first-tier trauma patients. Perhaps this accounted for some of the physicians' decision that treatment of pain was not a priority. Careful consideration should be given regarding administering opioids in a timely manner to trauma patients (unless specifically contraindicated).

While many nurses of chronic pain patients felt that opioids were "not appropriate," 10 chronic pain patients received the highest doses of opioids provided to patients in any group. These may have been situations where a physician's prescription for opioids was carried out by the nurse in spite of the nurse's own belief that the patient wasn't in much pain. Patients with chronic pain often adapt behaviorally and therefore may not exhibit common pain behaviors when seeking care in an ED.[15] It may have been a lack of outward signs of pain that led nurses in this study to believe that opioid administration was not appropriate. Future research could explore the influence of pain-exhibiting behavior on nurses' judgments about chronic pain patients' level of pain and appropriate analgesic interventions.

The reason most often given by clinicians for administering low-dose opioids or no opioids at all was that the patient was "not in that much pain." Yet those patients who were deemed by their clinicians to be "not in that much pain" were, by self-report, experiencing moderate pain at admission. For emergency clinicians, current challenges in pain management may be to believe the patient's report of pain and its intensity, to use treatments and medications appropriate for the level of pain reported, to reassess the efficacy of these interventions, and to provide additional treatment as needed. Other investigators have noted that only patients who reported severe pain received frequent pain assessments.[16] Whether those frequent assessments resulted in greater analgesic administration or pain relief was not reported, but Tcherny-Lessenat and colleagues[9] found that patients who reported mild to moderate pain received fewer analgesics and obtained less relief than did patients reporting higher pain intensity. It may be that those patients with higher pain scores were more demonstrative and therefore received more attention.

Like others,[8,17,18] we found a significant discrepancy between the patients' self-reports of pain and clinicians' assessments of their pain, with patients reporting they were in significantly more pain than assessed by their nurses or physicians. The reasons for this underestimation are unclear. It has been theorized that true underestimation may occur because a patient's pain is evaluated by proxy, and since pain is a subjective experience it cannot be fully appreciated by the clinician. Some postulate that the daily observation of pain by clinicians may blunt their ability to appreciate pain.[19] This issue is indeed complex and may need to be studied through the use of clinicians' narratives concerning their decision-making processes and patients' narratives concerning factors influencing their pain reports.

In summary, we initially hypothesized that an ED patient's pain experience and clinicians' opioid management of the patient's pain would be influenced by the patient's chief complaint. Contrary to that hypothesis, we found that admission pain intensity scores and amount of opioids received did not differ significantly among the patient groups. Still, there were important differences in treatment and outcome. Nurses and physicians of patients with abdominal pain were influenced by their (inaccurate) belief that their patients weren't in much pain, and they made decisions regarding opioids according to this belief. In addition, the pain experienced by trauma patients did not decrease across their time in the ED, while other patients saw significant decreases in their pain. These findings highlight the complexity of pain assessment and treatment and should prompt further investigation of opioid management practices in EDs.

Limitations

Although we limited patients in our study to four categories of chief complaint, there still could have been several other factors that influenced their clinicians' decisions

about opioid use. However, since we used actual patient encounters and reported on actual opioid use, in terms of both frequency and amount, we had a greater chance of identifying factors that influenced unique patient-provider situations. Despite presenting clinicians in our study with a detailed list of potential factors (based on prior research and clinical experience) that could have influenced their treatment decisions, many clinicians noted that other factors influenced them. We agree with Tamayo-Sarver[20] that "the decision to prescribe opioids is complicated." Finally, the decision-making process of nurses regarding the administration of a prescribed "pro re nata" opioid has not been fully explored in this study.

CONCLUSION

Our patients with abdominal, chronic, abscess, or trauma pain arrived in the ED with moderate to severe pain. The amount of opioids they received was greater than reported in some studies, yet improvement of pain intensity depended more on the patient's chief complaint. Clinicians often think that opioids are not an appropriate treatment because they believe the patient's pain severity level does not warrant opioids. Identification of factors that may influence patients' reporting and clinicians' pain assessment and clinical decisions may provide a basis for focused research on appropriate pain management techniques aimed at decreasing pain in ED patient populations who are at risk for inadequate pain control.

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