

Pain and Satisfaction With Pain Control in Hospitalized Medical Patients

No Such Thing as Low Risk

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Background: Pain is common in many populations of hospitalized patients. It is unknown if any populations of hospitalized patients are at low risk for pain. We studied the prevalence of pain and satisfaction with pain control in a general medicine inpatient service to determine if this population was at low risk for pain.

Methods: We performed a prospective cohort study of 5584 hospitalized patients. Pain and pain control were assessed in a follow-up telephone survey. Predictors of pain were determined through administrative databases and patient survey.

Results: Of the study patients, 59% had pain (28% reported severe, 19% moderate, and 12% mild pain). Among patients with common diagnoses, those with sickle cell crisis were the most likely and those with syncope were the least likely to report significant pain (90% and 34%, respectively). Patient characteristics significantly associated with increased pain included DRG (diagnosis re-

lated group) weight (odds ratio [OR], 1.19), Charlson Index score (OR, 1.03), age older than 65 years (OR, 0.65), female sex (OR, 1.17), and education level higher than high school (OR, 1.31). Pain was reported by 28% of patients without high-risk characteristics for pain; and 82.2% of patients were satisfied, 11.1% somewhat satisfied, and 6.7% dissatisfied with their pain treatment.

Conclusions: Pain was common in the study population and more patients rated their pain as severe than as moderate or mild. Pain was dispersed among diagnoses. Although most patients thought that their pain was adequately controlled, 18% of patients with pain (10% of all patients) reported that their pain was inadequately controlled. Although patient characteristics were associated with pain or dissatisfaction with pain control, they were weak predictors and significant pain was common even in populations at the lowest-risk for pain.

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THE RECOGNITION AND TREATMENT of pain in hospitalized patients has recently received increased attention. Several studies have demonstrated that pain is common and pain treatment inadequate.¹⁻⁴ In response to these findings, many major health care organizations have made concerted efforts to improve pain management strategies.⁵⁻⁸ The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) has developed a pain management program that must be implemented by all health care organizations to maintain complete accreditation. Moreover, JCAHO requires that all patients admitted to a health care facility be covered by the facility's pain management program.⁸ Organizations such as JCAHO have based these nonselective regulations on data from studies in hospitalized populations at high risk for pain. Most hospitalized patients with cancer as well as postsurgical and critically ill patients ex-

perience pain, which justifies a broad systematic approach to pain management.^{1,2,4,9-11} While these studies support a universal approach to pain management in populations at high risk for pain, no adequate data justify a nonselective approach. Obtaining data supporting a nonselective approach to pain management is important, however, because a widely applied systematic approach risks missing certain populations at high risk, and, therefore, the worsening of pain management practices for those who are the most in need. Thus, by risk-stratifying patients from a sufficiently large group at low risk for pain, it may be possible to improve the overall effectiveness of pain management programs and focus on patients who are the most at risk. We attempted to identify a population of hospitalized patients of sufficiently large size and low risk to cause JCAHO and other similar organizations to reconsider their use of a nonselective approach to pain management.

Hospitalized general medicine patients, specifically excluding those who have cancer, are postsurgical, or under critical care, may be the optimal population to answer this question for several reasons. As a group, they account for a large portion of hospitalized patients; and as they do not fall into any of the categories known to be at high risk for pain, they may be overall at a significantly lower risk. Finally, the breadth of characteristics, both demographic and diagnostic, may reveal significant differences among subpopulations within this group. If a selective approach is not justifiable for these patients, it is unlikely to be useful in other hospitalized populations. However, the pain burden in hospitalized general medicine patients has not been adequately studied. Prior studies have been small and/or included a large percentage of study patients among populations at high risk for pain.^{2,12-15}

In this study, we used a large cohort of hospitalized general medicine patients to identify the level and severity of the pain that they experienced and to determine if this population was at significantly lower risk for pain than previously studied populations. We also measured the level of satisfaction with pain control as reported by patients who experienced pain. Finally, we looked for predictors that could identify significant numbers of patients within this group who might be at low risk for pain. We chose to examine specific patient characteristics that have been found to be associated with pain and/or satisfaction with pain control in previous studies.^{1,2,16-18}

METHODS

DATA COLLECTION

Data were collected over a 3-year period, from July 1, 1997, to June 30, 2000, for patients who were admitted to the general medicine inpatient service of a single urban academic medical center. Characteristics obtained from hospital administrative databases and patient surveys included age, sex, race, educational levels, DRG (diagnosis related group) weight, and Charlson Index score.¹⁹ The enrolled patients were contacted 30 days after discharge and a telephone questionnaire was administered. Patients who left the hospital without being approached were also contacted 30 days after discharge and interviewed over the telephone if they consented. Three questions about pain and pain control taken from the Picker/Commonwealth Survey of Quality²⁰ were included in the questionnaire. The patients were first asked if they experienced any pain during their hospital stay. If they did not experience any pain, no further responses were needed. If they experienced pain, they were asked if the pain was mild, moderate, or severe. They were also asked how they rated their satisfaction with their providers' pain management.

The study was approved by the University of Chicago's institutional review board.

STATISTICAL ANALYSIS

We used 1-way analysis of variance and χ^2 tests to compare baseline characteristics between study patients and patients who were eligible but not included (they were not enrolled in the study, or were interviewed in the hospital but did not have a follow-up interview 30 days after discharge). We used logistic

regression to test the bivariate correlation between having significant pain (moderate or severe)¹ and being satisfied with pain control during hospital stay, and patient characteristics. Multivariate logistic regressions were used to discern independent associations between the probability of experiencing significant pain and patient characteristics. We also used multivariate logistic regressions to model the effects of patient characteristics and the levels of pain experienced on the probability of achieving a certain level of satisfaction with pain control. In all the multivariate regressions, we included as dummy indicator the month of admission.

RESULTS

STUDY PARTICIPANTS

Of the 11 191 patients admitted to the general medicine inpatient service, 6596 were interviewed in the hospital and 5605 agreed to participate in the study and completed the 30-day follow up interview process. The participants were predominantly African American (80%), and a majority were women (63%). There were no dominant diagnoses among the 20 most frequent diagnoses, which accounted for 1.2% to 7.1% of all admissions. The enrolled patients differed significantly in several baseline characteristics from those who were eligible but not enrolled. The study population included more women and fewer African Americans, and had lower DRG weights and lower Charlson Index scores (**Table 1**).

PREVALENCE OF PAIN AND SATISFACTION WITH PAIN CONTROL

Pain was common among the study patients. Of the 59% who experienced pain during their hospitalization in the general medicine service, 12% reported mild pain, 19% moderate pain, and 28% severe pain; and 6.7% thought that their physicians definitely did not do everything they could to relieve their pain, while 17.8% thought that their physicians did less than everything they could (**Figure 1**).

BIVARIATE ANALYSIS WITH PATIENT CHARACTERISTICS

Diagnosis

Among the 25 most common primary diagnoses, which account for 60% of the total population, sickle cell crisis had the highest percentage (90%) of patients reporting moderate or severe pain while syncope had the lowest percentage (34%). Primary diagnosis was significantly associated with the presence of pain ($P=.02$) (**Figure 2**).

Disease Severity and Comorbidity

A higher Charlson Index score was positively associated with experiencing significant pain (moderate or severe) (odds ratio [OR], 1.03; $P=.03$), as was logged DRG weight (OR, 1.19; $P=.004$). Although the Charlson Index score was not associated with patients' rating of satisfaction with pain management (**Table 2**), a higher logged DRG weight was (OR, 1.28; $P=.02$).

Table 1. Hospital Admission Characteristics of Patients

| Baseline Characteristics | Not Enrolled in Inpatient Interview (n = 3619, 32.3%) | Not Enrolled in Follow-up Interview n = 1967, 17.6% | Interviewed (n = 5605, 50.1%) | P Value for Difference |
|-----------------------------------|---|---|-------------------------------|------------------------|
| Age, y | 58 | 59 | 59 | .35 |
| Female sex, % | 60 | 59 | 63 | <.001 |
| African American, % | 84 | 84 | 80 | <.001 |
| DRG weight | 1.19 | 1.35 | 1.13 | <.001 |
| Charlson Index score | 3.09 | 2.31 | 2.14 | <.001 |
| Admitted on weekend, % | 23 | 24 | 22 | .08 |
| Primary diagnosis (ICD-9 code), % | | | | |
| Asthma (493.20, 493.90-493.91) | 6.13 | 6.25 | 7.3 | <.001* |
| Pneumonia (486) | 5 | 5.08 | 6.16 | |
| Congestive heart failure (428.0) | 4.45 | 4.47 | 4.5 | |
| Urinary tract infection (599.0) | 2.87 | 2.75 | 2.64 | |
| Sickle cell disease (282.62) | 4.39 | 2.49 | 1.61 | |
| Hypovolemia (276.5) | 2.63 | 1.93 | 1.77 | |
| COPD (491.21) | 1.69 | 1.78 | 1.89 | |
| Cellulitis of leg (682.6) | 1.13 | 1.88 | 2.07 | |
| Venous thrombosis (453.8) | 1.13 | 1.63 | 1.77 | |
| HRD with renal failure (403.91) | 1.41 | 1.63 | 1.11 | |
| All other | 69.1 | 70.12 | 68.2 | |

Abbreviations: COPD, chronic obstructive pulmonary disease; DRG, diagnosis related group; HRD, hypertensive renal disease; ICD-9, International Classification of Diseases, Ninth Revision.

*Pearson χ^2_{30} test = 28.8.

Patient Demographics

We examined several demographic characteristics as predictors of the presence of pain, the severity of pain, and reported satisfaction with pain control. Subjects 65 years or older were less likely to report significant pain (OR, 0.65; $P < .001$). However, there was no association between age and satisfaction with pain management. Female patients were more likely to report significant pain (OR, 1.17; $P = .006$). There was also no association between sex and satisfaction with pain management among patients with pain. African Americans were less likely to report significant pain (OR, 0.83; $P = .006$) and were also more likely to report being satisfied with their pain management (OR, 1.45; $P = .001$). Patients with higher levels of education reported more significant pain (OR, 1.14; $P < .001$) and were less satisfied with their pain management (OR, 0.88; $P = .02$).

MULTIVARIATE ANALYSIS

We performed logistic regressions to identify the independent effect of each predictor on the patients' pain severity and satisfaction with pain control. Each of the following predictors was independently associated with patients being less likely to have moderate or severe pain: age ($P < .001$), male sex ($P < .001$), a lower log DRG weight ($P = .001$), high school or lower educational level ($P < .001$), a lower Charlson Index score ($P = .008$), and being African American ($P = .04$). Among patients who reported having pain, only the following predictors were independently associated with greater satisfaction with pain control: being African American ($P = .002$) and a higher logged DRG weight ($P = .02$).

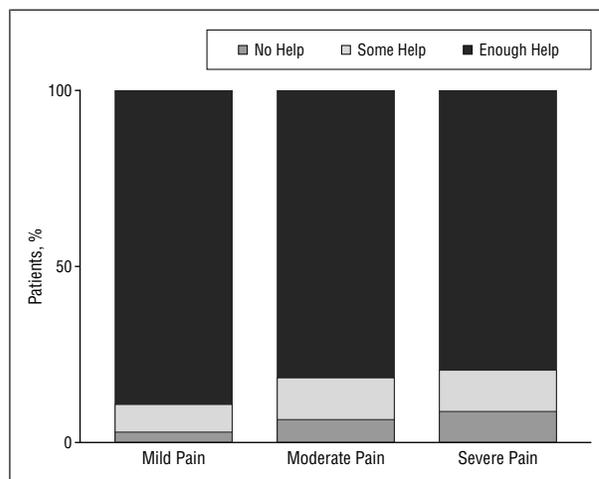


Figure 1. Patients' report of satisfaction with pain management.

PERCENTAGE OF PATIENTS FROM SUBGROUPS AT RISK FOR MODERATE/SEVERE PAIN

Among the 25 most common diagnoses, the cumulative pain burden for the 5 diagnoses with the highest percentage of patients with pain accounted for 7.1% of the population and for 10% of the total pain burden in the population. All 25 of the common diagnoses accounted for approximately 60% of the patients and 60% of the total moderate/severe pain burden (**Figure 3**).

Significant percentages of patients in the statistically significant low-risk predictor groups (age >65 years, male sex, educational level of high school or less, lower Charlson Index score, lower log DRG weight, and being African American) still reported having moderate or se-

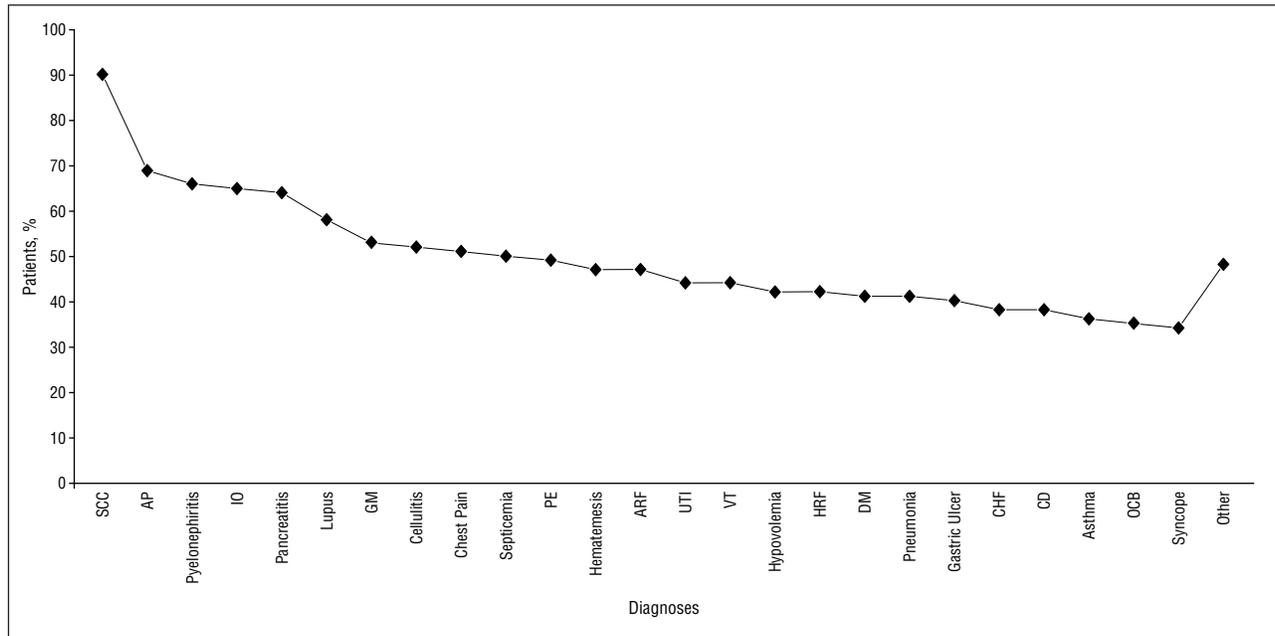


Figure 2. Percentage of patients with the 25 most frequent diagnoses who reported having experienced moderate or severe pain. AP indicates abdominal pain; ARF, acute renal failure; CD, colon diverticulosis; CHF, congestive heart failure; DM, diabetes melitus; GM, graft malfunction; HRF, hypertensive renal failure; IO, intestinal obstruction; OCB, obstructive chronic bronchitis; PE, pulmonary embolism; SCC, squamous cell carcinoma; UTI, urinary tract infection; VT, venous thrombosis.

Table 2. Results From Bivariate and Multivariate Analyses With Logistic Regressions*

| Patient Characteristics | Bivariate Analyses, OR (P Value) | | Multivariate Analyses, OR (P Value) | |
|-------------------------|----------------------------------|--------------------------------|-------------------------------------|--------------------------------|
| | Moderate/Severe Pain | Satisfied With Pain Management | Moderate/Severe Pain | Satisfied With Pain Management |
| Age >65 y | 0.65 (<.000) | 1.00 (.98) | 0.65 (<.001) | 0.99 (.91) |
| Female sex | 1.17 (.006) | 0.93 (.46) | 1.24 (<.001) | 0.92 (.43) |
| African American | 0.83 (.006) | 1.45 (.001) | 0.86 (.04) | 1.44 (.002) |
| > High school education | 1.31 (<.000) | 0.79 (.02) | 1.25 (<.001) | 0.86 (.15) |
| Charlson Index score | 1.03 (.03) | 1.00 (.83) | 1.03 (.008) | 1.00 (.96) |
| DRG weight | 1.19 (.004) | 1.28 (.02) | 1.23 (.001) | 1.29 (.02) |

*Bivariate analyses are logistic regression models in which each patient characteristic is the only predictor. All patient characteristics are entered into regression models in multivariate analyses. Multivariate analysis with Satisfied With Pain Management values also controls for severity of pain.

vere pain. Among patients 65 years or older, 39.3% reported having experienced moderate or severe pain; 43.4% of male patients reported moderate or severe pain; 44.6% of African Americans reported moderate or severe pain; 44% of patients with no more than a high school education reported moderate or severe pain; and 28% of patients in the lowest risk predictor profile (elderly African American men with no more than a high school education and who were in the 50th percentile or lower for Charlson Index scores and DRG weight) reported moderate or severe pain and accounted for only 97 patients, or 1.9% of the total population.

COMMENT

We found that patients hospitalized in a general medicine service carry a heavy pain burden. A large percentage of our study patients had experienced pain, and a significant percentage was dissatisfied with the pain management that they had received. Our data for pain

prevalence and severity closely resembled those reported for populations thought to be at high risk for pain. While we identified several predictors of pain, we were unable to identify a population truly at a low risk using these predictors. Therefore, it may be important to think of all patients hospitalized in general medicine services as being at high risk for pain, just as we do for patients with cancer and for critically ill and postoperative patients.

Patients' satisfaction with pain control is the key measure of the success of a pain management system. We found that almost 20% of the patients who had experienced pain (representing about 10% of the total of the hospitalized population) were less than satisfied with pain management. While 10% may seem to be a small target for a systematic approach to improve quality, it represents a significantly larger group than patients with the most common primary diagnosis (asthma, 6.7%) in this population.

This population appears to have a significant pain burden and prevalence of dissatisfaction with pain man-

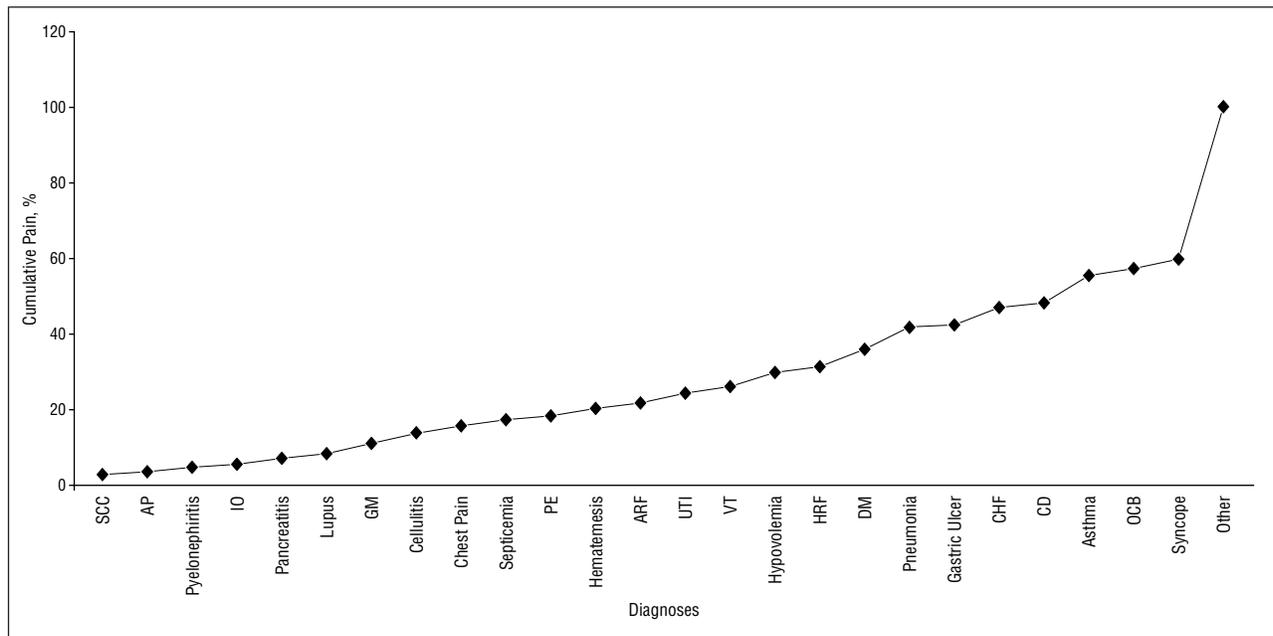


Figure 3. Cumulative percentage of pain by diagnosis. AP indicates abdominal pain; ARF, acute renal failure; CD, colon diverticulosis; CHF, congestive heart failure; DM, diabetes mellitus; GM, graft malfunction; HRF, hypertensive renal failure; IO, intestinal obstruction; OCB, obstructive chronic bronchitis; PE, pulmonary embolism; SCC, squamous cell carcinoma; UTI, urinary tract infection; VT, venous thrombosis.

agement, which supports the need for improved methods of pain recognition and management. We were interested in determining if there were subpopulations who could be identified as being at low risk for pain. We chose to use single predictor models as primary measures because any practical predictor, as a rule, must be explicit and straightforward. Several characteristics were predictive of a decreased risk of significant pain, ie, male sex, age 65 years or older, lower DRG weight, lower Charlson Index score, primary diagnosis, and being African American. However, no characteristic by itself was able to adequately predict that a group of patients was truly at low risk for pain. Likewise, primary diagnosis is also not an adequate predictor of low risk despite large differences in pain prevalence for each diagnosis (32%-90%). If a small number of diagnoses (5-10) accounted for a larger percentage of the total population's pain burden, then targeting patients with these diagnoses may be an efficient method of treating pain. However, the wide spectrum of diseases on a general medicine service and the broad distribution of pain across diagnoses renders this approach impractical. Even when using multivariate prediction models, we were unable to identify a group at low risk for pain. Using the multivariate model, we found that more than one quarter of the patients in the lowest predictor group had experienced significant pain. These analyses suggest that while patient characteristics may be predictors of pain, as all patients are at significant risk for pain, JCAHO is correct to advocate for a universal systems approach to pain management.

Although patient-specific predictors were not helpful in identifying populations at particularly low risk, they may provide a better understanding of pain and satisfaction with pain management. Independent predictors for pain or dissatisfaction with pain control identified in multivariate analyses included age 65 years or older, male

sex, educational level no higher than high school, lower log DRG weight, lower Charlson Index score, and being African American. While it may be clear why disease severity is positively associated with pain levels, why the demographic predictors have the associations we reported may be less intuitive. The only demographic predictors independently associated with higher satisfaction with pain management are higher DRG weight and being African American. It is interesting to consider why sicker patients who experience more pain are more satisfied with their pain control. It is possible that the more acutely ill patients receive more medical attention during their hospitalization than those less ill, and therefore feel more satisfied with their pain management. While this study does not answer any specific questions about how race, age, educational level, and sex affect pain and pain management, it continues to suggest that these characteristics are important to consider when thinking about measuring, treating, and studying pain.

There are several strengths to this study. It is a large prospective cohort study of a previously understudied population. The patients had a wide variety of medical conditions but very few disease-specific attributes previously thought to be predictors of high risk for pain. Most patients were African American, a population that is traditionally understudied. There are some limitations that are worth noting as well. While our measurement tools for pain and satisfaction with pain control were from the well-described Picker/Commonwealth Survey on Quality, they are significantly more limited in scope and less traditionally used in the pain literature than other validated pain instruments.²¹⁻²⁴ For the purpose of measuring prevalence, however, this tool is adequate. The surveys were also given 30 days after discharge, which could have influenced patient reports. However, recent studies suggest that patients' recall of experienced pain may

be reliable up to at least 3 months.^{25,26} Moreover, our enrolled patients differed from those not enrolled, and some of the differences pertained to the characteristics that affect pain or satisfaction with pain control. However, the direction of predicted effects on our results was variable (more women and fewer African Americans were enrolled, for example), which, we believe, would reduce any effect on our results. One additional limitation of our study is that we did not have exact pain locations or etiologies. Collecting these data in future studies might provide added insights for predicting and managing pain. Finally, although this is a large study, it was based in 1 urban academic medical center, which may limit its generalizability to other settings.

Despite these limitations, it is clear that pain and dissatisfaction with pain management are common in patients hospitalized in general medical services. The JCAHO recommendations for a universal systematic approach to pain management are supported by this study. Future studies on pain and pain control in hospitalized patients are needed to address the best practice approach to managing pain, and intervention trials will ultimately be required. This study may prove useful for future studies. Specifically, we used a brief postdischarge survey that could easily be used in large-scale studies. Our data support findings obtained from other populations, that patient characteristics can influence the level of the pain experienced, which suggests that approaches to patients' pain may benefit from tailoring. Finally, our results emphasize that pain is common even in hospitalized patients at the lowest risk, and that each person must be considered high risk.

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