

ORIGINAL RESEARCH

FACTORS INFLUENCING ANALGESIC USE FOR SKATEPARK-RELATED MUSCULOSKELETAL INJURIES

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ABSTRACT

Objective: This study was designed to determine the proportion of patients with skatepark-related musculoskeletal injuries who were administered analgesics in the emergency department (ED) or at discharge, and to determine if differences in use of pain medication varied by injury type, anatomic location, or patient age. **Methods:** This is a retrospective review of a cohort of consecutive patients with musculoskeletal injuries presenting to a large urban ED from a local skatepark over a 1-year period (1999-2000). Patients with non-musculoskeletal injuries were excluded. The outcome measure was analgesic use either in the ED or at discharge. Data included demographics, activity during injury, disposition, injury type (fracture or non-fracture), and injury location (upper or lower body). Analgesic data was abstracted from the medical records. Multivariable logistic regression was used to identify independent predictors of receipt of analgesic medications.

Results: 85 injured patients were enrolled. No differences in age, sex, activity, or disposition were found comparing those who received analgesics (n=68) to those who did not (n=17). Overall, analgesia was administered to 80% (95% CI = 70 to 88%) of patients; 67% (95% CI = 56 to 77%) in the ED and 64% (95% CI = 52 to 74%) at discharge. Fractures were more likely to receive analgesia (adjusted OR = 18.5; 95% CI = 4.0 to 86.1) than non-fracture injuries. Lower body injuries were more likely to receive analgesics compared to upper body injuries (adjusted OR = 9.2; 95% CI = 1.5 to 55.8). Age was not independently associated with analgesic use. **Conclusions:** A high proportion of skatepark-related musculoskeletal injuries were treated with pain medications either in the ED or at discharge. In this study analgesic medication use was influenced by injury type and location of the injury, but not age.

Key Words: Pain, analgesics, skatepark, fractures, pain management, emergency department.

INTRODUCTION

Pain is a central reason for many emergency department (ED) visits. Attention to pain has been mandated by federal guidelines for years.¹ Despite this, a reluctance to adequately manage pain related to extremity fractures or other painful conditions in the ED has been reported, with only 30-77% of patients receiving ED analgesics.²⁻¹² Even fewer patients receive prescriptions for pain medications at the time of discharge from the ED.²⁻¹² Undertreating pain has been termed oligoanalgesia.³

Skateboarding and in-line skating (rollerblading) are popular recreational activities that attract millions of child, adolescent and adult participants each year.¹³ There are over 1000 public and private skateparks across the United States and many more internationally, with annual revenue exceeding well over \$600 million (personal communication; Skatepark Association USA). Thus, in light of the expanding extreme-sports market and construction of new skateparks in virtually every nation, it is anticipated that skatepark-related musculoskeletal injuries will become more common in the ED. In this study we sought to examine analgesic use in a university ED for patients presenting from a local skatepark with isolated musculoskeletal injuries. The primary objectives were: 1) to determine the proportion of patients administered analgesics in the

ED and given analgesics at discharge for fracture and non-fracture skatepark injuries, and 2) to determine if there were differences in pain medication use according to patients' injury type, age, or anatomic injury location.

METHODS AND RESULTS

Study Design. This was a retrospective review of a cohort of consecutive patients previously enrolled in an injury surveillance study.¹⁵ The outcome was a composite measure of analgesic use either in the ED or at discharge. Opioids, nonsteroidal anti-inflammatory drugs, and acetaminophen medications administered in the ED or given as a prescription at discharge were considered analgesics. Hematoma blocks were not considered a form of analgesia in this study, consistent with methodology in Jones et al.⁷

Study Setting and Population. Patients presented to a busy university-based level one trauma center ED from a local commercial skatepark in southern California. The enrollment period was from July 1, 1999 through June 30, 2000. The ED was located within half a mile of the skatepark. Trauma transports and a majority of the paramedic calls to the skatepark were brought to the study ED because of its proximity to the skatepark. No attempt was made to catalogue injuries or analgesic use for patients taken to other EDs.

Study Protocol. All criteria were established before the start of chart review. The inclusion criterion was any injury sustained at a local commercial skatepark that presented to the study ED. Exclusion criteria were non-musculoskeletal injuries, blunt head injuries, age less than seven years, pregnancy, or any condition precluding the ability to provide consent. Written informed consent was obtained from all enrolled subjects. The University of California, Irvine institutional review board approved the study protocol. Data collected included demographic variables, type of skatepark activity, injury type, dictated radiology reports of all imaging studies, and disposition. Injuries were classified either as fractures, when radiographic

evidence of acute fracture injury was noted, or as non-fracture injuries. Anatomic location was classified into upper and lower body using the thoracic-lumbar spine transition.

The authors retrospectively abstracted the data from medical records of enrolled subjects to determine if analgesics were administered in the ED or at the time of discharge home as a prescription. All patient care, including pain management, was solely at the discretion of the treating attending emergency physician (EP) and resident team in order to assess the current practice patterns. EPs were all board-certified in emergency medicine.

Statistical Analysis. Abstracted data were compared on a random sample of charts to ensure capture and accuracy of data and reported as a kappa statistic. Proportions with 95% confidence intervals (CI) were calculated. Univariate statistics were performed using two-sided Student's t-test for continuous variables and Fisher's exact test for categorical variables. A p-value of 0.05 was set for significance. Multivariable logistic regression analysis was used to examine the relationship between analgesic use and age, injury type, and injury location. CIs for the logistic regression model were calculated at the 95% level for all estimates. All analyses were performed using STATA 7.0 (Stata Corporation, College Station, TX).

Results. The study cohort initially consisted of 100 patients. Fifteen patients were excluded for the following reasons: twelve blunt head injuries, one splenic injury, one opioid ingestion, one medical record could not be located. Both authors reviewed a subset of ten medical records. There was 100% agreement on all data fields (kappa statistic= 1.0).

Patient demographics and characteristics are summarized in Table 1. A total of 68 patients received analgesia in the ED or at discharge and 17 did not. No significant differences in disposition, activity, age, or sex were found between the groups. Overall, 80% (95% CI = 70 to 88%) of patients received analgesia in the ED or at discharge. Analgesics were used in the ED in 67% (95% CI = 56 to 77%) of patients.

	Analgesics Given (n=68)	No Analgesics (n=17)	p-value*
Age, years (SD)	20 (8.5)	16 (8.2)	0.12
Male sex, (%)	68 (100)	16 (94)	0.20
Discharged from ED, n (%)	62 (91)	17 (100)	0.34
Activity, n (%)			
Skateboard	55 (81)	12 (71)	0.35 ^a
Rollerblade	8 (12)	5 (29)	0.07 ^a
Bike (BMX)	5 (7)	0 (0)	0.25 ^a
Type of Injury, n (%)			
Fracture	51 (75)	5 (29)	
Non-fracture	17 (25)	12 (71)	<0.001
Injury Location, n (%)			
Upper body	42 (62)	15 (88)	
Lower body	26 (38)	2 (12)	0.045
Injury Type by Location, n (%)			
Fracture:			
Upper body	35 (69)	5 (100)	
Lower body	16 (31)	0 (0)	0.31
Non-Fracture:			
Upper body	7 (41)	10 (83)	
Lower body	10 (59)	2 (17)	0.054

* p-values by Fisher's exact test (categorical variables) or t-test (continuous variables).
^ap-value for each pairwise comparison. Overall, there was no significant relationship between type of activity and analgesia (p = 0.15). ED = emergency department; SD = standard deviation

TABLE 1. Summary of Study Group Characteristics

Analgesics were prescribed to 64% (95% CI = 52 to 74%) of patients at discharge. Proportionate analgesic use for fracture injuries was 91% (95% CI = 80 to 97%) and 59% (95% CI = 39 to 76%) for non-fracture injuries. Twenty percent (95% CI = 12 to 30%) of all patients received no analgesics at any time.

After adjusting for age, injury type, and injury location, both fracture and lower body injuries were independently associated with increased likelihood of receiving analgesia (Table 2). Age was not independently associated with analgesic use after adjusting for injury type and location.

DISCUSSION

Overall 80% of patients with acute musculoskeletal injuries received analgesics in the ED or as a prescription for home use. This study demonstrates that fracture injuries and lower body injuries were significantly associated with receiving analgesics. Previous studies of acute musculoskeletal injuries

documented varying prevalence of pain medication use, ranging from 30-77% either in the ED or at discharge.²⁻¹²

Age was not found to be a significant determinant for receiving analgesics. This differs from previous studies that found younger patients received pain medications less often for fracture injuries^{4,9}, more often^{5,8}, or equally⁷ compared to older patients. The source population for our study had a narrower age range compared to these studies, which may partially explain the disparate results. Also, aggressiveness and risk-taking behaviors associated with skatepark activities may influence the willingness to ask for pain medications or to exhibit signs of pain, possibilities that we did not attempt to address.

The type and location of injuries were found to be associated with pain medication utilization. Fractures were associated with receiving analgesics, which was not surprising; most physicians find it logical and reasonable to address pain from obviously painful sources. Less clear is why non-fracture

Independent variables	Crude OR	95% CI	p-value	Adjusted OR*	95% CI	p-value
Age	1.05	0.98-1.13	0.129	1.08	0.99-1.18	0.06
Fracture injury	7.20	2.20-23.40	0.001	18.50	3.98-86.13	<0.001
Lower body	4.64	0.98-21.97	0.053	9.23	1.53-55.78	0.02

2. Multivariable Logistic Regression Results for Analgesic Use

*Odds ratio (OR) adjusted for all other variables in the model. CI = confidence interval

musculoskeletal injuries are not approached with a similar mentality. Physicians rely on a number of factors that determine the likelihood and severity of true injury. An example of one of these elements is the mechanism of injury in trauma patients. Indeed, the mechanism of injury is at the core of trauma protocols and management. Notable in this study was that all of the patients had a similar mechanism of injury. It is unclear why a disparity of approaches to pain management for similar mechanisms was detected.

Beel et al.¹⁰ examined patient preferences for pain management. When patients with acute fractures were asked if they wanted pain medications in the ED, 88% responded affirmatively. Although their results were based on a limited sample size in an older population, no prior studies to our knowledge have reported patient-based “target levels” that EPs could use to gauge overall pain medication use. In our study, 91% of patients with fracture injuries received ED analgesics.

Upper body injuries were less likely to receive analgesics compared to lower body injuries. We cannot explain this association and it differs from Lewis et al.⁵, who examined acute fracture injuries and found no difference by anatomic location. We speculate that physicians observing patients with the inability to ambulate may infer that the injury is more serious and therefore more painful.

The definition of analgesia we used did not include hematoma blocks as a form of analgesia. The intent was to provide consistency with previous published work.⁷ In clinical practice, hematoma blocks are an effective and useful method of directed analgesia.¹⁶ Hematoma blocks were in fact performed in 8 patients

for closed fracture reductions (all discharged home, seven in the upper extremity). All of these patients also received narcotic medications and were correctly classified as having received analgesia, thereby avoiding a potential misclassification bias. Furthermore, among patients who did not receive any analgesics in the ED or at discharge, none had undergone hematoma blocks.

Our results must be interpreted in the context of several limitations. First, the retrospective approach for studying painful conditions did not permit an assessment of the degree of pain. In fact, measurements of patient pain were rarely noted in the medical records. Therefore it is difficult to determine if all patients truly had any pain at all. Second, it is possible that some patients may have received analgesics that were not documented, thus causing us to underestimate analgesic use in this study. Also, some patients may have self-medicated prior to arrival in the ED. Of note, one of the excluded patients ingested an illicit opioid medication he reportedly acquired near the skatepark after a blunt musculoskeletal injury. The small size of the cohort also makes it possible that additional differences may exist but were not detected. Finally, these results represent the clinical practices of emergency physicians in a single ED. Analgesic practices vary and the extent of that variation is not well described in the literature. Therefore, analgesic use represented in this study may not be reflective of pain management practices elsewhere.

CONCLUSION

Analgesic administration for skatepark-related musculoskeletal injuries, including acute fractures and

non-fracture conditions, is common. A high proportion of musculoskeletal injuries were treated with pain medications either in the ED or at discharge. Fracture injuries and lower body injuries were found to be independently associated with receipt of analgesia for acute skatepark-related musculoskeletal injuries. Future prospective multicenter studies are needed to assess optimal approaches to pain management issues, with an emphasis on establishing reasonable "target levels" of analgesic rates of administration for mechanism-based musculoskeletal injuries.

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