Gender Disparity in Analgesic Treatment of Emergency Department Patients with Acute Abdominal Pain

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Abstract

Objectives: Oligoanalgesia for acute abdominal pain historically has been attributed to the provider's fear of masking serious underlying pathology. The authors assessed whether a gender disparity exists in the administration of analgesia for acute abdominal pain.

Methods: This was a prospective cohort study of consecutive nonpregnant adults with acute nontraumatic abdominal pain of less than 72 hours' duration who presented to an urban emergency department (ED) from April 5, 2004, to January 4, 2005. The main outcome measures were analgesia administration and time to analgesic treatment. Standard comparative statistics were used.

Results: Of the 981 patients enrolled (mean age ± standard deviation [SD] 41 ± 17 years; 65% female), 62% received any analgesic treatment. Men and women had similar mean pain scores, but women were less likely to receive any analgesia (60% vs. 67%, difference 7%, 95% confidence interval [CI] = 1.1% to 13.6%) and less likely to receive opiates (45% vs. 56%, difference 11%, 95% CI = 4.1% to 17.1%). These differences persisted when gender-specific diagnoses were excluded (47% vs. 56%, difference 9%, 95% CI = 2.5% to 16.2%). After controlling for age, race, triage class, and pain score, women were still 13% to 25% less likely than men to receive opioid analgesia. There was no gender difference in the receipt of nonopioid analgesia. Women waited longer to receive their analgesia (median time 65 minutes vs. 49 minutes, difference 16 minutes, 95% CI = 3.5 to 33 minutes).

Conclusions: Gender bias is a possible explanation for oligoanalgesia in women who present to the ED with acute abdominal pain. Standardized protocols for analgesic administration may ameliorate this discrepancy.

ACADEMIC EMERGENCY MEDICINE 2008; 15:414–418 © 2008 by the Society for Academic Emergency Medicine

Keywords: analgesia, gender disparity, abdominal pain

Oligoanalgesia in emergency department (ED) patients presenting with pain is well documented.[1–4] Disparities in pain management have been attributed to patient characteristics (e.g., age,[2,5–7] gender,[8] and ethnicity[9–13]), physician characteristics (e.g., level of training, clinical experience, perception of patient's pain),[4,10,14] triage acuity,[15] diagnosis (e.g., traumatic vs. nontraumatic),[15,16] and ED crowding.[17]

According to the 2004 National Hospital Ambulatory Medical Care Survey, acute abdominal pain is the most frequent specific reason for ED visits.[18] The treatment of abdominal pain has historically been influenced by the fear of masking peritonitis and a reluctance to base treatment entirely on the patient's subjective self-assessment.[19,20] Studies to investigate this issue have shown that early analgesia does not hinder the recognition of surgical conditions[21–26] and that there is good agreement between physicians and patients on pain severity and need for analgesia.[27] To date, there are few studies evaluating factors that affect pain management in patients with undifferentiated abdominal pain.

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Received November 30, 2007; revision received January 18, 2008; accepted January 30, 2008.

Presented at The Society for Academic Emergency Medicine Annual Meeting, Chicago, IL, May 16–19, 2007.

This study is a secondary analysis of a prospective study funded by Biosite Inc. for the investigation and development of abdominal pain biomarkers. Biosite played no role in the design or conduct of the study, data collection, management, analysis, or interpretation of the data and manuscript preparation, review, or approval.

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ISSN 1069-6563
PII ISSN 1069-6563583
© 2008 by the Society for Academic Emergency Medicine
doi: 10.1111/j.1553-2712.2008.00100.x

One study, limited by small sample size, showed that women wait longer for their medications.[14] We conducted the current prospective study involving almost 1,000 patients to assess whether there is gender disparity in the management of ED patients with acute abdominal pain.

METHODS

Study Design

A secondary analysis of a prospective cohort study of ED patients with acute abdominal pain was performed to compare analgesic treatment by patient gender. The original study was conducted for the detection of new biomarkers for abdominal pain. The Institutional Committee on Research Involving Human Subjects at the University of Pennsylvania approved the study. Written informed consent was obtained from all participants.

Study Setting and Population

This study was conducted at an urban academic ED with an annual census of approximately 55,000 patient visits. Patients aged 18 years or older with nontraumatic abdominal pain of 72 hours' duration or less were enrolled from April 5, 2004, to January 4, 2005. Exclusion criteria were pregnancy, abdominal trauma, or abdominal surgery within the prior 7 days or inability to provide informed consent.

Study Protocol

Trained research assistants (RAs) identified and enrolled patients from 8 AM to midnight, 7 days a week. Triage pain score (1–10), patient demographics, provider gender, and final ED disposition were recorded by RAs on a standardized collection form. The type and time of medications administered were obtained directly from the medical record as documented electronically by the nurse or physician administering the medication. Historical features, physical exam findings, and final ED diagnoses were recorded by the treating physician. All clinical decisions were made by the treating physicians, independent of the study. Furthermore, although the physicians were aware that we were collecting data on patients with abdominal pain, they were unaware of the specific purpose of this study. Final diagnoses were grouped by organ system into broader categories independently by the principal investigators, and any discrepancies were resolved by consensus review.

Measurements

Initial pain score was documented using a 10-point scale (1–10), from ''no pain'' (1) to ''worst pain of my life'' (10). Time to analgesia was defined as time from patient placement into the treatment area, either an ED hallway or a room, to time of analgesia administration as documented in the medical record by the nurse or physician. Opioid analgesia was defined as any intravenous, intramuscular, or oral opioid medication (e.g., morphine, hydromorphone, acetaminophen with oxycodone, fentanyl) given in the ED. Nonopioid analgesia was defined as any intravenous, intramuscular, or oral nonnarcotic medication (e.g., ibuprofen, acetaminophen, ketorolac). Triage class was subjectively determined by the triage nurse on a 4-point scale (1–4), from emergent (1) to nonurgent (4). The main outcomes were analgesic administration (opioid and nonopioid) and time to analgesia.

Data Analysis

Descriptive data are presented as means (±standard deviation [SD]), frequencies, and percentages. To test for differences between gender and analgesia administration, the Fisher's exact test was used. Median times to analgesia were compared using the Wilcoxon rank sum test. Data for these analyses are presented with 95% confidence intervals (CIs) around the differences. To assess the independent contribution of each confounder and to adjust for clustering of physicians, logistic regression was performed. To adjust for potential confounders, stratified analyses were conducted using Mantel-Haenszel summary relative risk ratios with 95% CI. All data were analyzed using SAS statistical software (Version 9.1, SAS Institute, Cary, NC). A probability of <0.05 was considered statistically significant.

RESULTS

Of the 1,000 patients with acute abdominal pain who were enrolled, 19 patients without a documented pain score were excluded. This left 981 (98%) patients for analysis, of which 65% were women. The gender differences in patient characteristics are shown in Table 1. Compared to men, women were slightly younger, with lower triage acuity, but reported similar mean pain scores.

Analgesia was administered to 62% of the study group. Compared to men, women had a similar mean pain score (6.7 vs. 6.5; $p = 0.3$), but were less likely to receive any analgesia (60% vs. 67%, difference 7%, 95% CI = 1.1% to 13.6%) and less likely to receive opiates (45% vs. 56%, difference 11%, 95% CI = 4.1% to 17.1%). Women were just as likely to receive nonopioid analgesia. The gender disparity in receipt of opioid analgesia persisted when gender-specific diagnoses were excluded and when stratified by age (Table 2). Specifically, in patients younger than 50 years, women were less likely to receive opiates than men, but this difference was not observed in patients older than 50 years. In addition, the gender of the treating physician failed to show any difference from the gender disparity identified for the entire cohort (Figure 1). Finally, 80 (8%) patients underwent surgical treatment of their abdominal pain, of which 50% were women. Of the 40 female surgical patients, 25 (62%) received opioid analgesia, compared to 31 (78%) male surgical patients ($p = 0.22$).

A comparison of the characteristics of female and male patients elucidated several potential confounders, specifically age, race, pain score, and triage class. Logistic regression with clustering on physicians demonstrated that men, older patients, patients of non–African American race, and patients with higher pain scores and triage acuity were more likely to receive opioid analgesia (Table 3). However, only higher pain score and triage acuity were associated with an increased likelihood of receiving any analgesic treatment (Table 3). After stratifying on these variables

Table 1
Gender Differences in Patient Characteristics

Characteristics	Women, n = 639 (%)	Men, n = 342 (%)	p-Value
Age (yr), mean ± SD	39 ± 16	45 ± 17	<0.0001
Race			
African American	427 (67)	180 (53)	<0.0001
White	182 (29)	144 (42)	
Other	28 (4)	18 (5)	
Triage class			
1	30 (5)	16 (5)	<0.0001
2	273 (43)	209 (62)	
3	328 (52)	111 (33)	
4	3 (0.5)	4 (1)	
Pain score, mean ± SD	6.7 ± 3.0	6.5 ± 3.1	0.36
Admission	206 (59)	146 (41)	0.001
Final diagnoses			
Abdominal pain, NOS	118 (19)	46 (14)	0.003
Appendicitis	13 (2)	14 (4)	
Gastrointestinal disease	159 (25)	116 (34)	
Gastritis/GERD	36 (6)	19 (6)	
Gastroenteritis	48 (8)	41 (12)	
Male genitourinary disease	0 (0)	8 (2)	
Gynecologic disease	118 (19)	0 (0)	
Liver/biliary/pancreatic disease	65 (10)	47 (14)	
Other	85 (13)	44 (13)	
Urinary disease	81 (13)	67 (20)	
Urolithiasis	26 (5)	45 (13)	

GERD = gastroesophageal reflux disease; NOS = not otherwise specified; SD = standard deviation.

Table 2
Gender Difference in Opioid Treatment

	Analgesia	Women (%)	Men (%)	Difference (95% CI)
All	None	257 (40)	112 (33)	7 (1.1, 13.6)
	Opioid	288 (45)	191 (56)	11 (4.1, 17.1)
	Nonopioid	94 (15)	39 (11)	–4 (–8.5, 1.3)
Age <50 yr	None	203 (42)	70 (33)	9 (1.4, 16.7)
	Opioid	203 (42)	118 (55)	13 (4.7, 20.6)
	Nonopioid	80 (16)	27 (12)	–4 (–10.1, 2.2)
No gender-specific diagnoses	None	207 (40)	110 (33)	7 (0.2, 13.4)
	Opioid	243 (47)	188 (56)	9 (2.5, 16.2)
	Nonopioid	70 (13)	36 (11)	–2 (–8.3, 1.8)

using the summary Mantel-Haenszel risk ratios, women were still 13%–25% less likely than men to receive opioid analgesia (Table 4).

Analysis of time to analgesia showed that women waited longer for their pain medications than men (median time 65 minutes vs. 49 minutes, difference 16 minutes, 95% CI = 3.5 to 33 minutes), particularly for opiates (63 minutes vs. 48 minutes, difference 15 minutes, 95% CI = 3 to 33 minutes).

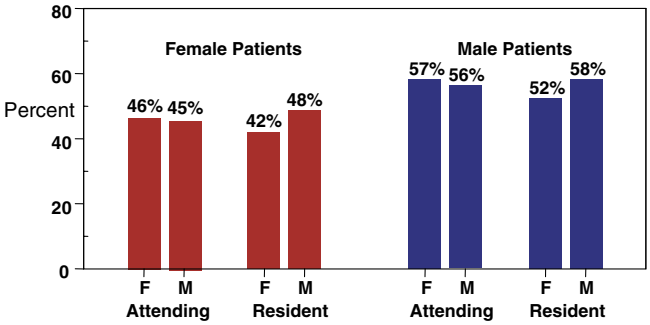

Figure 1. Opioid administration by provider gender.

Table 3
Logistic Regression of Variables Associated with Analgesic Treatment with Clustering on Physicians

Analgesia	Characteristics	Odds Ratio	95% CI	p-Value
Opioid	Male	1.38	1.01, 1.89	0.04
	Triage class	0.56	0.40, 0.77	<0.0001
	Pain score	1.24	1.17, 1.30	<0.0001
	African American	0.69	0.53, 0.90	0.007
	Age >50 yr	1.48	1.11, 1.98	0.008
Any	Male	1.26	0.83, 1.91	0.2
	Triage class	0.51	0.39, 0.68	<0.0001
	Pain score	1.21	1.15, 1.27	<0.0001
	African American	0.93	0.68, 1.26	0.6
	Age >50 yr	1.17	0.90, 1.51	0.2

CI = confidence interval.

DISCUSSION

Previous studies of the management for abdominal pain have suggested that clinicians may withhold analgesia out of concern that it may vitiate the diagnostic accuracy of the physical exam.[19,20] There is a paucity of research into other contributing factors such as gender or race that have been previously shown to influence analgesic treatment for musculoskeletal pain.[8,10,12,13] This study was conducted to assess whether gender disparity exists in the management of acute undifferentiated abdominal pain by measuring the probability of receiving analgesia and time to analgesia. We hypothesize that there may be an unconscious gender bias in the treatment of abdominal pain.

Gender disparity has been observed in the treatment of pain. Raftery et al.[8] showed that women with musculoskeletal pain were more likely to receive analgesia than men, primarily because they reported higher pain levels. The provider's perception of the severity of the patient's pain appeared to influence the decision to provide pain relief. This association between pain severity and analgesic administration was corroborated by Shabbir et al.[14] for patients with abdominal pain. In the current study, however, men were more likely to receive opioid analgesia than women despite similar self-reported pain intensity. This difference was observed regardless of provider (resident or attending) gender, suggesting that an unconscious bias may exist.

Potential confounders for this observed gender disparity may be age, race, triage classification, and final

Table 4
Mantel-Haenszel Analyses of Confounding Variables

	Opiate (%)				
	Men	Total	Women	Total	RR
Age (yr)*					
All	191 (56)	342	288 (45)	639	1.24
<30	34 (45)	75	90 (36)	251	1.26
31–50	89 (59)	150	119 (49)	244	1.22
>50	68 (58)	117	79 (55)	144	1.06
Race†					
All	191 (56)	342	288 (45)	639	1.24
African American	91 (51)	180	180 (42)	427	1.20
Non–African American	100 (62)	162	107 (51)	210	1.21
Pain score‡					
All	191 (56)	342	288 (45)	639	1.24
0–4	31 (36)	86	31 (24)	131	1.52
5–7	51 (55)	92	84 (39)	217	1.43
8–10	109 (67)	164	173 (60)	291	1.12
Triage class§					
All	191 (56)	342	288 (45)	639	1.24
1	11 (69)	16	18 (60)	30	1.15
2	135 (65)	209	157 (58)	273	1.12
3–4	45 (39)	115	113 (34)	331	1.15

RR = risk ratio.
*Mantel-Haenszel adjusted RR 1.17, 95% CI = 1.03 to 1.33 (p = 0.02).
†Mantel-Haenszel adjusted RR 1.21, 95% CI = 1.06 to 1.37 (p = 0.005).
‡Mantel-Haenszel adjusted RR 1.25, 95% CI = 1.10 to 1.41 (p = 0.0006).
§Mantel-Haenszel adjusted RR 1.13, 95% CI = 1.00 to 1.28 (p = 0.06).

diagnosis. A significantly higher proportion of the women than the men in our cohort were African American and in the lower acuity triage classes. However, when differences in both race and triage class were adjusted for, women were still less likely to receive opiates than men. This discrepancy persisted in patients less than 50 years old, but not in those older than 50 years. A possible explanation for the age-related difference may be a bias among providers against treating women for pain associated with gynecologic disease, which are more common in younger women. When gender-specific diagnoses were controlled for, women were still 9% less likely than men to receive opioid analgesia.

Women who did receive analgesia waited, on average, 16 minutes longer for their medication than men, an observation that was previously reported for patients with abdominal pain.[14] The delivery of analgesia to women might be delayed by the need for pregnancy testing and pelvic examination among women of reproductive age. While these tests should theoretically not delay analgesia, patients who require more diagnostic evaluation have been shown to wait longer for their analgesia.[28] Similarly, there was no assessment made of the basis for the lower triage scores given to the women or whether these were born out by differences of severity in the final diagnosis. Arguing against this hypothesis in the current study is the fact that while the triage class is the basis for the urgency with which patients are brought back to the treatment area, the ED physician who determines the need for analgesia may not have this information. In our ED, all but the sickest patients tend to be seen in chronological order, not based on triage score, once they are brought back from the waiting room. For this reason, the triage score was also unlikely to affect the time to analgesia, since it was measured from the time the patient was moved into the ED, not from the time of triage. We did not analyze whether severity of disease correlated with the patients' subjective pain assessment. Future studies of this topic might explore the correlation between administration of analgesics and severity of final diagnosis.

A final contributing factor may be ED crowding. During busy periods, patients, particularly those with lower acuity, are often evaluated in hallway stretchers. If women with acute abdominal pain are brought back into an ED hallway to be evaluated, their pelvic and abdominal exams are usually deferred until room placement occurs. This may further exacerbate delays in the administration of analgesia due to previously noted concerns about clouding the clinical exam. A small study of acute abdominal pain in the ED showed that patients received analgesia more quickly during times of less crowding.[14]

Policy Implications

To improve prompt and adequate analgesia treatment in the ED, several protocols have been proposed and, in some cases, implemented. The introduction of pain scales at triage has been shown to increase analgesic administration for undifferentiated pain by 11% and expedite the mean time to analgesia by 39 minutes.[29] Similarly, nurse-initiated analgesia for specific painful conditions has been shown to decrease time to analgesia by 50% compared to physician-initiated analgesia.[28]

Although not specifically studied in our study, it is likely that determination of pregnancy status at triage and the placement of female patients in rooms, not hallways, in the treatment area would decrease patients' wait times before receiving analgesia. Similarly, triage-driven analgesic administration for patients with moderate pain (e.g., for pain scores >5) may further decrease treatment delays and also ensure that all patients receive analgesia. Finally, making timely analgesic administration an ED quality indicator is likely to lead to greater awareness and compliance with this goal.

LIMITATIONS

The patients participating in this study were part of an investigation that included consent for phlebotomy, a potential selection bias. Bias was also introduced by triage, a subjective process dependent on the triage nurse's clinical judgment. No attempt was made to gauge interobserver reliability of the triage nurse's perception of acuity. Further studies correlating analgesia with both subjective and objective criteria would be useful. In addition, since follow-up pain scores were not recorded, we did not assess whether pain evolution during the ED stay, or the clinician's impression of the patient's pain, influenced analgesic treatment. The experimental design of measuring the time to analgesia from the time of arrival in the treatment area may be

acceptable due to the fact that nonurgent patients are likely to spend the longest time in the waiting room. However, this hypothesis was not confirmed. We also did not measure the use of nonanalgesic medications to treat abdominal pain (e.g., H_2 receptor antagonists, proton pump inhibitors, gastrointestinal ''cocktails''). Finally, as this study was conducted at a single academic urban center, our results may not be generalizable to other practice settings and individual practice patterns.

CONCLUSIONS

Gender bias may be a component of oligoanalgesia in the treatment of acute abdominal pain. Despite having similar pain scores, women are less likely to receive analgesic treatment than men, particularly opiates, and wait longer for their medications. Standardized protocols for analgesic administration may ameliorate this discrepancy.

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