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Appropriateness of intravenous acetaminophen use in the emergency departments across a multi-hospital community health system

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OBJECTIVE

- The objective of this study was to evaluate adherence to institutional restriction criteria for intravenous acetaminophen use in the emergency departments within a community hospital system.

BACKGROUND

- Intravenous (IV) acetaminophen is an analgesic frequently used instead of opioids in the emergency departments (ED) across Parkview Health.
- Current literature demonstrates comparable efficacy for pain relief with IV acetaminophen when compared to other intravenous pain medications, while other data suggesting little additional benefit with IV acetaminophen.
- Casey et al. found that the use of oral acetaminophen in patients with geriatric hip fractures was associated with better pain control and patients in the oral acetaminophen group used less opioids.¹
- Barnaby et al. compared 1 gram of IV acetaminophen with 1 mg of IV hydromorphone in adults with acute pain in the ED. The hydromorphone group had statistically greater analgesia effects.²
- Biok et al. evaluated the addition of IV acetaminophen did not decrease opioid requirement in adult patients with acute pain during their ED stay.³
- IV acetaminophen is significantly more expensive than other oral, rectal, and intravenous alternatives which leads to restricted use criteria at Parkview Health.

METHODS

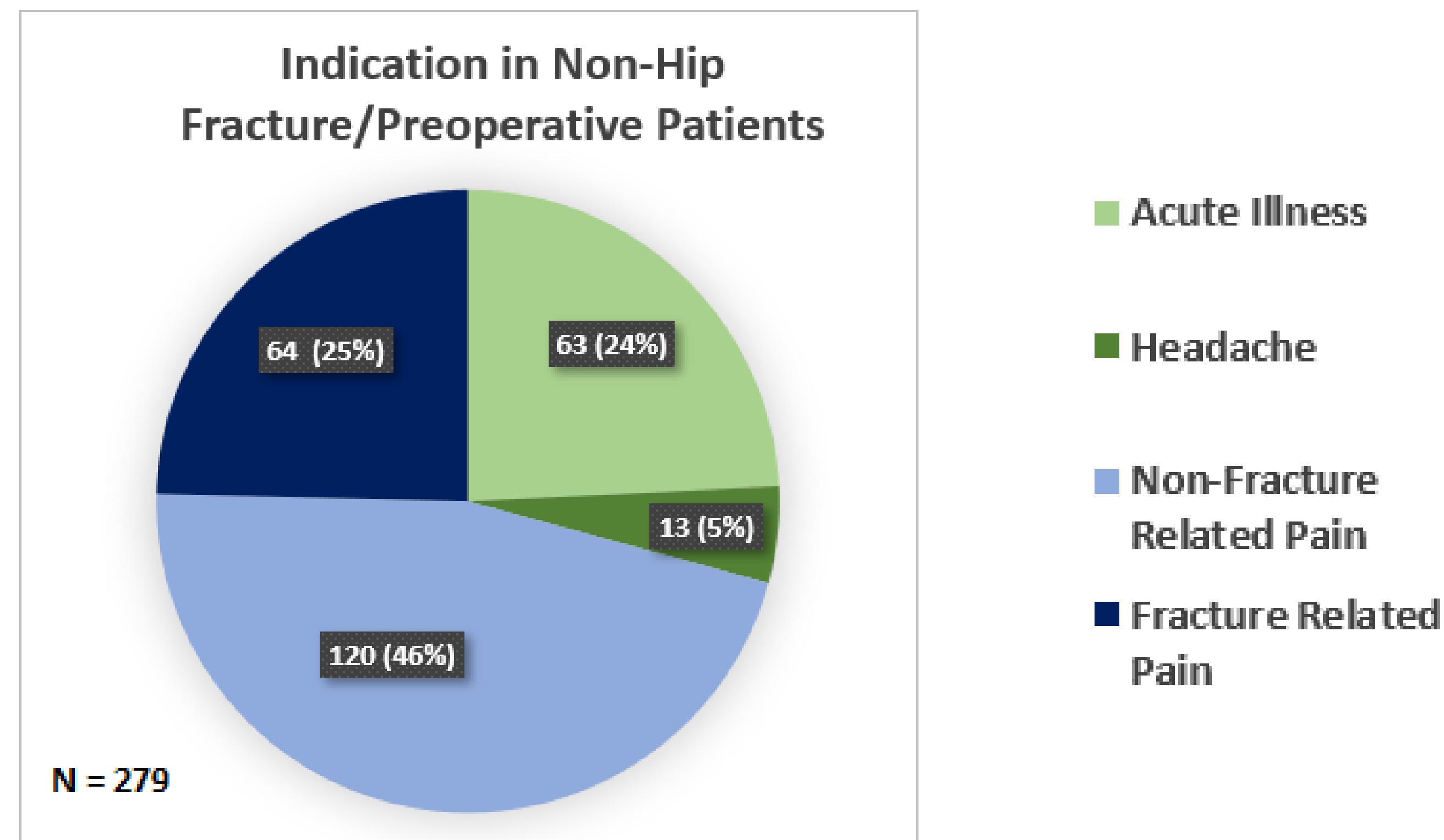
- Institutional Review Board (IRB) approved retrospective chart review of patients treated in the Parkview Health ED between March 1, 2019 and March 30, 2020.
- Inclusions: > 18 years old, in the ED, and received at least 1 dose of IV acetaminophen.
- Exclusions: did not have at least one recorded pain score after IV acetaminophen administration.
- Primary endpoint: number of inappropriate IV acetaminophen doses given in the ED as defined by the current restriction criteria within the health system.
- ED restriction criteria: patients greater than 65 years of age with hip fracture or for surgical patients in the peri-operative period.

RESULTS

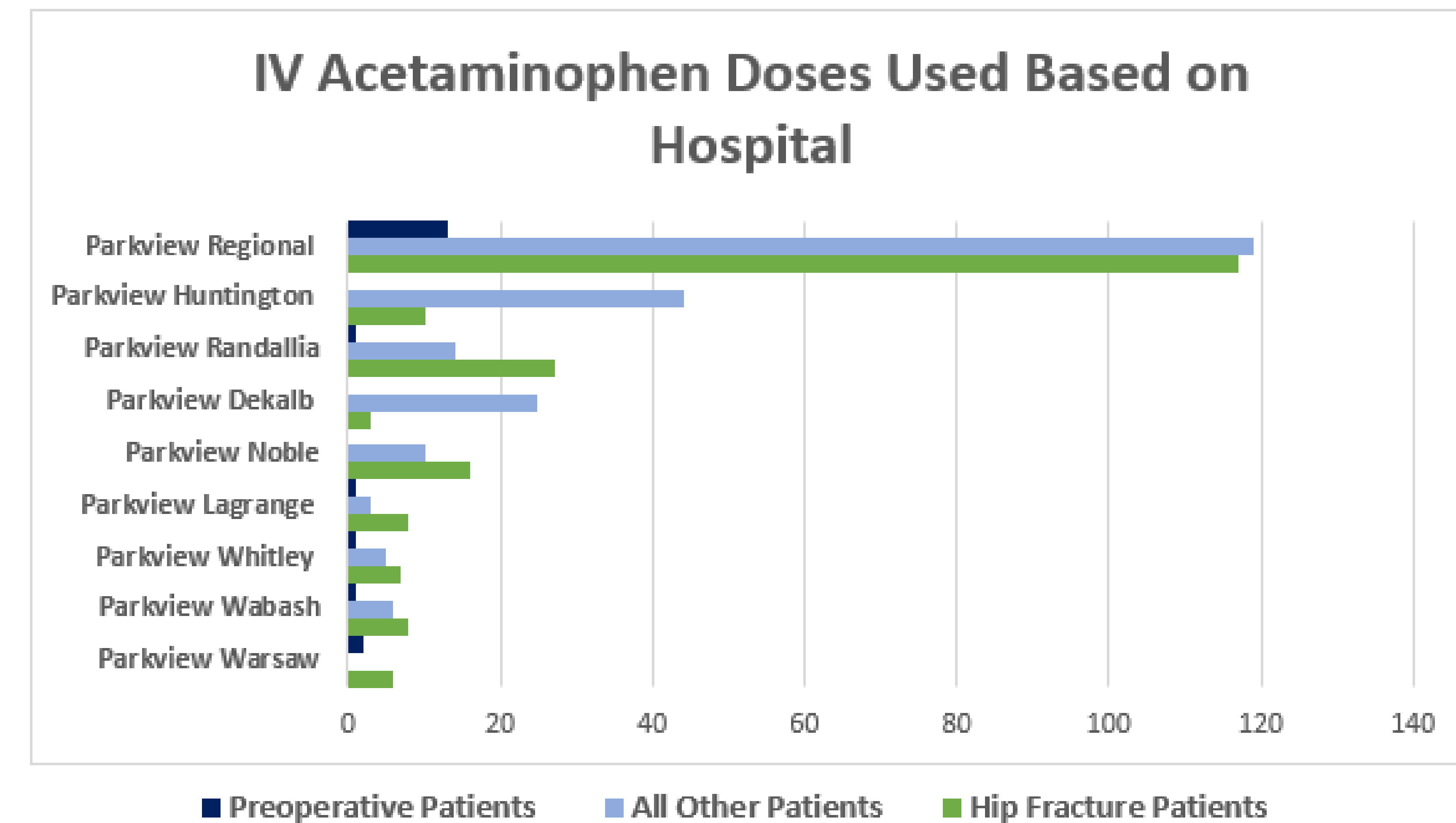
Demographics			
	Hip Fracture Patients (n= 168)	Preoperative Patients (n= 19)	All Other Patients (n=260)
Females, N (%)	125 (74.4%)	12 (63.2%)	176 (67.7%)
Age, mean ± SD	80.5 ± 10.8	62.8 ± 20.5	65.8 ± 23.0
Patients > 65 yo, N (%)	158 (94.0%)	8 (42.1%)	156 (60.0%)
Outpatient Opioids, N (%)	20 (11.9%)	1 (5.2%)	57 (21.9%)

RESULTS

Characteristics	Hip Fracture Patients (n= 168)	Preoperative Patients (n= 19)	All Other Patients (n=260)
Pain Score Upon Arrival, mean ± SD	6.87 ± 3.06	7.37 ± 2.61	6.54 ± 3.24
Fever Upon Arrival, N (%)	0 (0%)	1 (5.2%)	16 (6.2%)
Emesis During Visit, N (%)	3 (1.8%)	1 (5.2%)	3 (1.2%)
Length of ED Stay, mean ± SD; hours	9.0 ± 6.4	4.8 ± 1.8	7.9 ± 7.1
Auto-Verified IV Acetaminophen Dose, N (%)	108 (64.3%)	14 (73.7%)	179 (68.9%)



Outcomes	Hip Fracture Patients (n= 168)	Preoperative Patients (n= 19)	All Other Patients (n=260)
Inappropriate IV Acetaminophen Doses Given Based on Restriction Criteria	27 (16.1%)	0 (0%)	260 (100%)
Change in Pain Scores after IV Acetaminophen Given	-1.2 ± 3.2	-1.9 ± 3.0	-1.9 ± 3.3
Patients that Received Other Analgesics	125 (74.4%)	11 (57.9%)	140 (53.8%)
Patients that Received Oral Medications	9 (5.4%)	0 (0%)	19 (7.3%)
Patients that Received More than One IV Acetaminophen Dose	17 (10.1%)	0 (0%)	9 (3.5%)



RESULTS

IV Acetaminophen Doses Ordered by Provider Specialty			
	Inappropriately Prescribed Doses	Appropriately Prescribed Doses	Grand Total
Emergency Medicine	257 (63.6%)	147 (36.4%)	404
Family Medicine	2 (100%)	0 (0%)	2
Internal Medicine	19 (55.9%)	15 (44.1%)	34
Orthopedics	0 (0%)	2 (100%)	2
Trama Surgery	3 (%)	2 (%)	5
Grand Total	281 (62.9%)	166 (37.1%)	447

DISCUSSION & CONCLUSIONS

- Data analysis from this retrospective medication use evaluation shows that 62.4% of IV acetaminophen doses are ordered for patients that do not meet criteria for use.
- Auto-verification was used on 66.7% of all IV acetaminophen doses, with 39.6% of those orders being inappropriate based on restriction criteria. Removing acetaminophen from the auto-varication list would allow more pharmacist intervention.
- The total study population experienced a mean decrease in pain scores of 1.6 ± 3.3 after the administration of intravenous acetaminophen. Since 61.7% of patients required additional analgesic medications, this may indicate that IV acetaminophen may not be adequate alone for pain control.
- Future Directions
 - Education for providers on non-oral analgesics, multi-modal pain control, and review of restriction criteria is needed to limit inappropriate ordering of intravenous acetaminophen for patients in the ED.
 - Take off the auto verify list.
 - Further limitations can be put on providers by not supplying IV acetaminophen in the ED Pyxis. Having the medication come from main pharmacy allows for pharmacy intervention in doses that do not meet the institution's restriction criteria.
 - Increase awareness of the atraumatic headache pain panel and non-opioid pain panels to give providers other tools to help with pain control.

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Disclosure
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