



Original Contribution

A comparison of analgesic prescribing among ED back and neck pain visits receiving physical therapy versus usual care☆



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ABSTRACT

Objective: Physical therapy (PT) is commonly cited as a non-opioid pain strategy, and previous studies indicate PT reduces opioid utilization in outpatients with back pain. No study has yet examined whether PT is associated with lower analgesic prescribing in the ED setting.

Methods: This was a retrospective cohort study of discharged ED visits with a primary ICD-10 diagnosis relating to back or neck pain from 10/1/15 to 2/21/17 at an urban academic ED. Visits receiving a PT evaluation were matched with same-date visits receiving usual care. We compared the primary outcomes of opioid and benzodiazepine prescribing between the two cohorts using chi-squared test and multivariable logistic regression.

Results: 74 ED visits received PT during the study period; these visits were matched with 390 same-date visits receiving usual care. Opioid prescribing among ED-PT visits was not significantly higher compared to usual care visits on both unadjusted analysis (50% vs 42%, $p = 0.19$) and adjusted analysis (adjOR 1.05, 95% CI 0.48–2.28). However, benzodiazepine prescribing among ED-PT visits was significantly higher than usual care visits on both unadjusted (45% vs 23%, $p < 0.001$) and adjusted analysis (adjOR 3.65, 95% CI 1.50–8.83).

Conclusions: In this single center study, ED back and neck pain visits receiving PT were no less likely to receive an opioid prescription and were more likely to receive a benzodiazepine than visits receiving usual care. Although prior studies demonstrate that PT may reduce opioid utilization in the subsequent year, these results indicate that analgesic prescribing is not reduced at the initial ED encounter.

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1. Introduction

Physical therapy (PT) initiated in the emergency department (ED) is increasingly utilized in the United States (U.S.) for the evaluation and treatment of acute musculoskeletal impairments. Although PT has been widely integrated into “accident & emergency departments” in the United Kingdom and Australia for several decades, ED-based physical therapy (ED-PT) is a relatively new resource in the U.S. with only 23 hospitals reporting programs in 2014, although this number is growing [1,2]. In a typical ED-PT evaluation, a physical therapist is consulted by the treating physician to assess the patient at the bedside. This involves conducting an independent history and physical examination,

providing diagnosis-specific education, implementing therapeutic exercise and biomechanical education and placing a referral to outpatient PT as appropriate.

Recently, PT has been suggested as an alternative to opioid prescribing, with a number of U.S. insurance-claims based studies finding that patients with low back pain engaging in PT had lower rates of opioid utilization in the year following injury compared to patients not engaging in PT [3–5]. Although these studies are limited to outpatient populations, a qualitative study of ED physicians indicates that PT is viewed as a viable alternative to prescribing opioids [6], and several international studies found that ED patients receiving PT for low back pain demonstrated high satisfaction and adequate pain relief [7–9]. These initial data encourage further investigation of whether ED-PT may actually result in lower rates of opioid prescribing, especially given the recent emphasis on appropriate opioid prescribing and non-opioid alternatives [10,11].

Back pain is a particularly compelling area in which to investigate non-opioid therapies. Acute and chronic back pain accounts for nearly

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4 million ED visits annually and is the most common reason for which opioids are prescribed [12,13] and benzodiazepines are co-prescribed [14]. Almost two thirds of all ED patients with back pain will receive an opioid, despite low quality evidence that opioids are effective for acute or chronic pain [15–17]. Although the majority of opioid prescriptions do not result in adverse outcomes, an increasing body of evidence points to a small but measurable risk associated with initiating opioid therapy [18–21] which must be carefully evaluated in the context of increasing rates of opioid dependence and overdose [11,22,23].

1.1. Objective

The goal of this investigation was to compare analgesic prescribing among ED visits for back or neck pain receiving PT versus usual care. Following the results of insurance claims-based studies [3–5], we intended to test the hypothesis that PT initiated in the ED setting would reduce the rate of opioid and benzodiazepine prescribing at the point of the ED encounter.

2. Methods

2.1. Study design and setting

This was a retrospective study of discharged ED visits with a primary diagnosis related to back or neck pain at an urban academic ED (>88,000 annual visits) in Chicago, IL. ED visits receiving PT were matched with same-date visits receiving usual care in order to compare visit and prescribing characteristics. This study was approved by the Northwestern University, Institutional Review Board.

The Northwestern Memorial Hospital, ED obtained dedicated PT coverage in August 2015. Historically, 16% of discharged visits for all diagnoses at our ED receive an opioid prescription, similar to national rates of opioid prescribing [13].

2.2. Selection of participants

Discharged visits involving adult patients with a primary International Classification of Disease version 10 diagnosis relating to back or neck pain (see Appendix) from 10/1/15 to 2/21/17 were identified in the electronic medical record. Only visits arriving to the ED triage desk during normal business hours (0600–1600) on weekdays (Monday–Friday) were included, due to limited availability of ED-PT services outside of these times. Repeat visits by the same patient were excluded. Visits receiving a PT consultation were identified by the presence of a consult order and confirmed by manual review of the PT note. In order to obtain a comparable sample of back and neck pain visits not receiving PT, we included usual care visits occurring on the same calendar dates as visits receiving PT and during normal business hours, as determined by ED triage check-in.

2.3. Description of intervention

At our institution, the treating ED physician consults PT at his or her own discretion; there are no formal criteria required to qualify for consultation. The physical therapist performs an independent assessment of the patient, gives guidance on activity progression and proper body mechanics, provides bedside instruction of several prescribed home exercises, counsels the patient on expected symptom trajectory and return precautions, and works with the treating physician to provide a signed referral to outpatient PT. At this time, ED PT services do not include the use of therapeutic ultrasound, mechanical traction, or electrical nerve stimulation; however joint mobilizations may be utilized as deemed appropriate. The decision to prescribe an analgesic medication is at the sole discretion of the treating ED physician.

2.4. Measurements and outcomes

All data were abstracted from the electronic medical record by a contracted data analyst. We collected clinical and demographic background variables including sex, race, insurance type, initial pain score, and ED length of stay. These variables were selected a priori due to their high fidelity in the electronic medical record and previously demonstrated association with receipt of analgesia. Insurance type refers to the patient's primary form of insurance. Initial pain score (range 0–10) was collected at ED check-in by the triage nurse. Length of stay was calculated by subtracting the discharge time from the roomed time; therefore it does not include time spent in the waiting room.

The main outcomes of interest were the prescription of an **opioid** or **benzodiazepine** at discharge. We included benzodiazepines due to their common use for relief of back pain [14,24–26]. Prescribed medications were identified in the electronic record by their Multum classification, drug therapeutic category level 3 code: narcotic analgesics (060), narcotic analgesic combinations (191), and benzodiazepines (069). We collected medication name, dosage, and number of pills prescribed in order to standardize opioid prescriptions by morphine milligram equivalents for descriptive purposes.

2.5. Analysis

We compared clinical and demographic variables between the two cohorts using *t*-test or chi-squared test, as appropriate with $\alpha < 0.05$. For the main outcomes of opioid and benzodiazepine prescribing, we measured effect size using Cohen's *h* with cutoffs of 0.2, 0.5, and 0.8 for small, medium, and large effect sizes, respectively [27]. We then conducted a multivariable logistic regression analysis to determine the adjusted odds of receiving an opioid prescription (or benzodiazepine prescription, as a separate analysis) in patients receiving and not receiving PT, with all available variables included in the model. All statistical analyses were conducted using Stata v14.1 (StataCorp, College Station, TX).

3. Results

3.1. Characteristics of study subjects

During the 16 month study period, a total of 464 ED visits qualified for study inclusion; 74 visits received ED-PT and 390 visits received usual care (Fig. 1). Most ED patients were white (41.9%) and female (58.1%), with a mean age of 48.2 years. Univariate comparisons of patients receiving ED-PT and usual care are presented in Table 1.

3.2. Main results

A total of 200 ED visits (43.1%, 95% confidence interval [CI]: 38.5%–47.7%) were prescribed an opioid. On univariate analysis, ED-PT visits had a higher, but non-significant, rate of opioid prescribing than usual care visits (50.0% vs 41.8%, $p = 0.19$) and the effect size was negligible ($h = 0.16$). This association remained non-significant on multivariable logistic regression (Table 2, Adjusted Odds Ratio [adjOR] 1.05, 95% confidence interval [95% CI] 0.48–2.28, $p = 0.90$). Among all variables included in the adjusted model, only initial pain score was associated with increased odds of receiving an opioid prescription (adjOR 1.22, 95% CI 1.07 to 1.39, $p = 0.004$).

Among the total study sample, 122 ED visits (26.3%, 95% CI: 22.3%–30.5%) were prescribed a benzodiazepine. On univariate analysis, visits receiving PT had significantly higher rates of benzodiazepine prescribing compared to visits receiving usual care (44.6% vs 22.8%, $p < 0.001$), with a small to medium effect size ($h = 0.47$). This difference remained significant on multivariable analysis (Table 3, adjOR 3.65, 95% CI 1.50–8.83, $p = 0.004$).

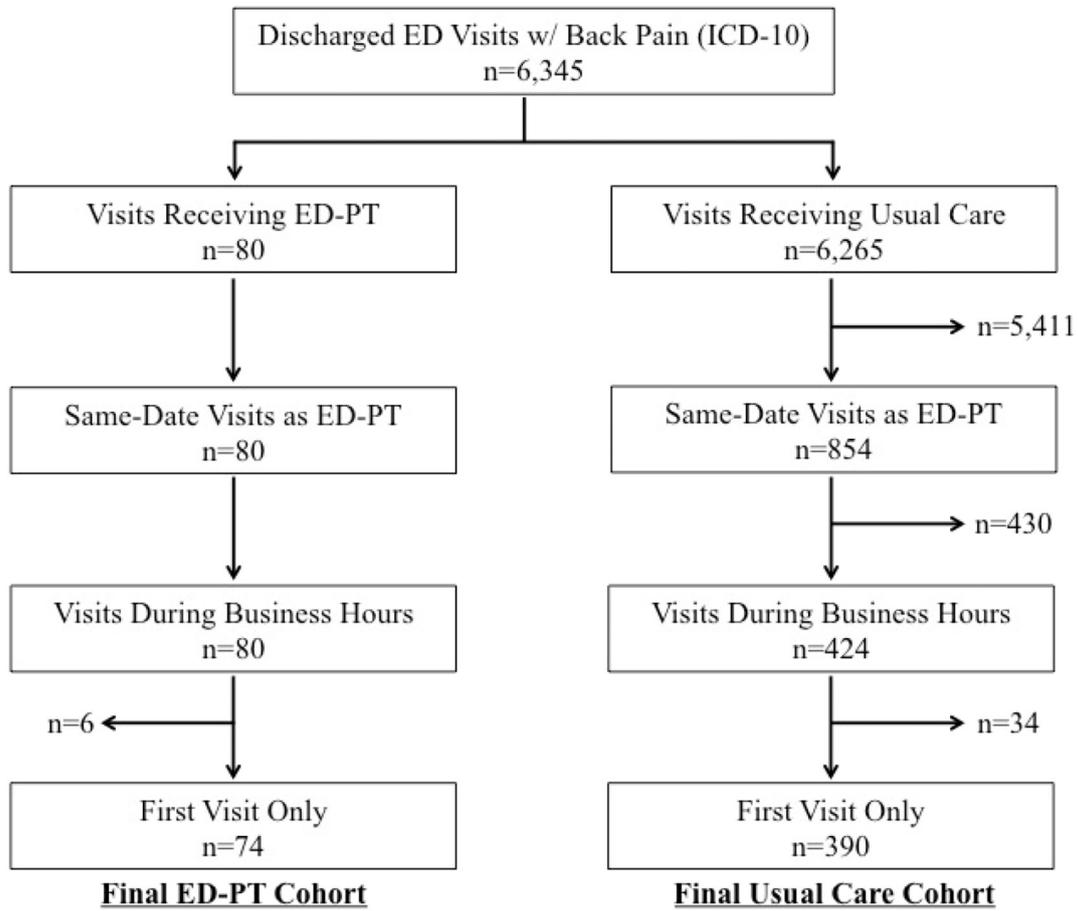


Fig. 1. Flow diagram for study inclusion.

4. Discussion

In this retrospective study of discharged ED visits for back or neck pain, receipt of physical therapy was not associated with lower opioid prescribing compared to usual care. In fact, the observed rate of opioid prescribing among ED-PT visits exceeded that of usual care, however this difference was not statistically significant and the effect size was negligible. It is likely that the observed higher rate of opioid prescribing among ED-PT visits in the unadjusted analysis was confounded by

higher initial pain scores in this cohort, as initial pain score was the only variable associated with increased odds of opioid prescribing on adjusted analysis. This reasoning is consistent with the existing body of knowledge that patients with a higher severity of pain are more likely to receive an opioid prescription [28,29].

Our findings contrast with a number of insurance claims-based studies indicating lower rates of opioid utilization among patients engaging in PT [3–5]. Notably, these prior studies focused strictly on outpatients – from which a sample of ED visits may reasonably differ due to higher pain acuity and greater urgency of encounter – and a longer follow-up period of one year. It may be the case, for example, that PT is less effective as an opioid-substituting therapy in the acute phase of injury, and that the opioid-sparing effects of PT are observed in the year following ED discharge. Therefore, these results are not incompatible with those of prior studies but rather bring new focus to the context of the acute

Table 1 Univariate comparison by treatment group.

	Usual care (n = 390)	Physical therapy (n = 74)	p value
Age, years ^a	46.9	55.0	<0.001
Female sex ^b	229 (59%)	43 (58%)	0.92
Race ^b			0.49
White	166 (43%)	26 (35%)	
Black	88 (23%)	19 (26%)	
Other	136 (35%)	29 (39%)	
Insurance type ^b			<0.01
Commercial	111 (58%)	19 (46%)	
Medicaid	22 (11%)	4 (10%)	
Medicare	31 (16%)	17 (42%)	
Self-pay	28 (15%)	1 (2%)	
Initial pain score, 0–10 scale ^a	7.1	8.0	<0.01
Length of stay, minutes ^a	177.5	222.6	<0.01
Opioid prescribed ^b	163 (42%)	37 (50%)	0.19
Total MME ^a (n = 200)	101.7	102.2	0.97
Benzodiazepine prescribed ^b	89 (23%)	33 (45%)	<0.001

MME: morphine milligram equivalents (per prescription).

^a t-Test, means.

^b Chi-squared, proportions.

Table 2 Multivariable logistic regression for outcome of opioid prescribed.

	Adjusted odds ratio	95% confidence	p
Physical therapy	1.05	0.48–2.28	0.90
Age, years	1.02	0.99–1.04	0.15
Female sex	1.33	0.73–2.43	0.36
Race			
White	Ref	Ref	Ref
Black	0.75	0.36–1.58	0.45
Other	0.76	0.38–1.53	0.45
Insurance type			
Commercial	Ref	Ref	Ref
Medicaid	0.53	0.21–1.36	0.19
Medicare	0.59	0.23–1.56	0.29
Initial pain score, 0–10 scale	1.22	1.07–1.39	<0.01
Length of stay, minutes	1.00	1.00–1.00	0.43

Table 3
Multivariable logistic regression for outcome of benzodiazepine prescribed.

	Odds ratio	95% confidence	p
Physical therapy	3.65	1.50–8.83	<0.01
Age (years)	0.97	0.94–1.00	0.025
Female sex	1.07	0.52–2.21	0.85
Race			
White	Ref	Ref	Ref
Black	1.07	0.43–2.64	0.88
Other	1.51	0.65–3.48	0.34
Insurance type			
Commercial	Ref	Ref	Ref
Medicaid	0.38	0.12–1.19	0.10
Medicare	0.41	0.11–1.58	0.20
Initial pain score, 0–10 scale	1.18	1.00–1.39	0.06
Length of stay, minutes	1.00	1.00–1.00	0.83

phase of injury where we find that opioid prescribing is not lower. It is also worth noting that the decision to prescribe an analgesic is at the sole discretion of the treating ED physician; thus these results should not be interpreted as supporting a causal link between the ED-PT intervention itself and analgesic prescribing.

We hypothesize that ED physicians view PT as a secondary therapy for the treatment of back pain: to supplement, rather than substitute for, the use of opioids in patients presenting with severe pain. Thus, ED-PT visits had higher rates of opioid prescribing due to higher pain severity, which also led physicians to prescribe an additional therapy beyond opioids. This hypothesis is supported by the study's finding that ED-PT visits received significantly higher rates of benzodiazepine prescriptions compared to usual care. In our prior work, we found that ED physicians prescribe benzodiazepines for back pain as an escalating therapy, i.e. when pain was not sufficiently controlled by an initial medication [24]. The strong association between benzodiazepine prescribing and PT consultation in this study may therefore indicate that physicians view these therapies similarly, i.e. as adjunctive to opioids rather than substitutive.

It is not possible to gain insight into physician decision-making based on electronic medical record data. Therefore, this study should be followed by a prospective investigation of analgesic prescribing patterns in patients receiving ED-PT, ideally with qualitative data generated from conversations with prescribers and patient-reported data on opioid utilization in the months following ED discharge. Understanding physician motivations for prescribing in the context of ED-PT may reveal specific knowledge gaps or attitudinal barriers that could be addressed in order to increase the potential for ED-PT to serve as a substitutive therapy for opioids.

4.1. Limitations

Due to the retrospective nature of this study, ED visits received either PT or usual care based on the discretion of the treating physician. It may be the case that patients receiving ED-PT fundamentally differed from those receiving usual care due to unmeasured confounders, although we did attempt to control for possible differences through multivariable regression and by limiting study inclusion to similar timeframes.

Typically, PT services are provided over an extended period of time, including follow-up visits with an outpatient physical therapist. This study is therefore limited by its focus on ED-PT as a single discrete intervention. As this was a retrospective study of a single institution we did not have access to outpatient follow-up data and did not evaluate patterns of continued opioid prescribing after discharge from the ED. The retrospective nature of this investigation also limited our ability to differentiate between acute and chronic back pain; for example, the ICD-10 code M54.5 for "low back pain" includes both acute and chronic pain but does not assign a distinct code to each subtype.

Finally, the total number of ED-PT visits was relatively small. It is possible that a larger sample size would have increased the study's power to detect a statistically significant difference in opioid prescribing. However, the direction of the observed effect is consistent with the null hypothesis that there was no difference in opioid prescribing between visits receiving ED-PT or usual care, at least in the absence of additional educational efforts targeted towards prescribers. Additionally, benzodiazepine prescribing was strongly associated with PT, indicating that PT during this period of care is likely not viewed as a substitute for opioids. To the extent that this exploratory analysis informs future study design, this study's sample size would have allowed for detection of a 12.7% change in opioid prescribing from the 41.5% prescribing rate in usual care, assuming usual parameters $\beta = 0.80$ and a two-tailed $\alpha < 0.05$.

4.2. Conclusion

This study found that ED back and neck pain visits receiving PT were no less likely to receive an opioid prescription, and slightly more likely to receive a benzodiazepine prescription, than visits receiving usual care. Although prior studies have demonstrated lower opioid utilization in the subsequent year following PT referral, this study uniquely focused on the discrete point of the ED visit and found no difference in opioid prescribing. These results suggest that PT cannot be hastily applied to the ED clinical context as a quick solution to opioid over-prescribing. Rather, the integration of PT services into ED care must be carefully nuanced with specific attention to clinician preferences and practice patterns.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ajem.2018.10.009>.

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