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Mini Review

The Effectiveness of Opioid Therapy for Breakthrough Pain Management in the Acute Rehabilitation Setting

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ABSTRACT

This retrospective review of patients at the MedStar National Rehabilitation Hospital analyzed patient health records to determine if immediate release opioid pain medications were being administered effectively for breakthrough pain management with this patient population. The Cerner PowerChart system was utilized to identify 77 patients that had received immediate release opioid medication to treat breakthrough pain. Orthopedic rehabilitation patients were identified as the primary users of opioid breakthrough pain medication doses at the facility (47%). When all breakthrough pain patients were examined, it was determined that the immediate release opioids being administered were significantly effective in treating patient pain with 88.8% of the doses achieving at least a 27.3% reduction in perceived patient pain on an 11-point numeric rating scale. Additionally, it was determined that 71.4% of the orthopedic rehabilitation patients were dose tapered by at least 50% during the inpatient stay. These results indicate that the treatment of acute pain at the hospital demonstrates a clinically significant analgesic response while doses are tapered appropriately to minimize opioid exposure.

Keywords: Rehabilitation; Numeric rating scale (NRS); Breakthrough pain; Opioid; Minimal Clinically important difference (MCID)

INTRODUCTION

This report describes the results of a retrospective analysis of the use of immediate release opioids for the treatment of breakthrough pain management at the MedStar National Rehabilitation Hospital in Washington, DC. Clinically significant (defined as a minimum of a 3 pt reduction on an 11 pt pain scale) differences in patient pain perception, dose tapering, and medication discontinuation are all important considerations to help evaluate medication effectiveness in this rehabilitation setting.

Pain management in the rehabilitation setting can be complex. Patients are stabilized in an acute care facility and then are transitioned to the rehabilitation hospital with a range of injuries that are associated with varying types and intensities of pain [1-4].

The incidents of breakthrough pain are more frequent in this setting due to the regular physical therapy sessions necessitating more frequent intervals of breakthrough opioid therapy. Although distinct injury types have been studied for rehabilitation pain management, there has been little data examining the overall effectiveness of opioid therapy for breakthrough pain management in the acute rehabilitation setting. Based on the need to limit unnecessary opioid use in the hospital and during discharge, and the use of these medications for the management of post-operative and post traumatic pain associated with the recovery process, an evaluation of the clinical efficacy of the opioid doses administered for breakthrough pain in the rehabilitation hospital can provide helpful guidance for opioid pain management in this patient care setting.

Literature Review

Eligible patients for this study were treated at the MedStar National Rehabilitation Hospital (NRH) in Washington, DC from September 1, 2018 to October 1, 2018 and who had their medications recorded in the Cerner PowerChart system. Inclusion criteria included non-pregnant patients over 18 years old who were treated for breakthrough pain with immediate release opioid therapy during their hospital stay. Patients who received breakthrough opioid analgesics were selected by a 'Pain Score by Medication' Report in PowerChart. Patient MAR data was then analyzed to determine the medication names, doses, and durations administered. A numeric rating scale (NRS) of 0 through 10 was employed in which each patient would self-rate and report

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the perceived pain level pre-administration and then one-hour post medication administration. These self-reported pain scores pre and one-hour post were available and analyzed from each patient's MAR. In order to prevent a dose sampling bias created by varying patient length of stays and chronic pain patients, three breakthrough pain medication dose data points were selected per patient: first dose, mid-stay dose, and final dose. To determine dose tapering and duration of therapy, MAR medication administration data was compared with each patient's length of stay and final medication strength. A power analysis was performed to achieve a power of 80% and a two-sided significance of 5% for detecting a 20% pain reduction and resulted in a sample size of 42 patients. This power was met with a sample size of 77 patients analyzed. These 77 patients who received breakthrough pain medication during the study period were divided into categories according to the admission injury type listed in the patient MAR (Table 1). The breakthrough pain medications that were utilized by NRH to treat these patients were varying strengths of tramadol, oxycodone, Percocet, and hydromorphone (Table 2). IRB approval for this study was obtained through the MedStar Health Research Institute.

Results and Discussion

The primary outcome for this study was the reduction in patient self-reported pain by at least 20% recorded one hour after the breakthrough medication administration in at least 50% of the patient population studied. The NRS used accepts self-reported scores from 0-10 (11-point scale). In order to meet significance for this endpoint, a patient needed to self-report a 2.2-point reduction in pain for the 1-hour post pain score. In order to keep a standard scale, patients were asked their NRS post scores in whole numbers and a score of 3 was determined to be significant for this study. The results indicated that 88.8% of the patients included in the study self-reported an NRS point reduction of at least 3, which is equivalent to a 27.3% reduction in pain (Table 3).

The two secondary outcomes both looked at the appropriate reduction of breakthrough pain medication therapy during the inpatient rehabilitation hospital stay. The first of these examined whether the breakthrough medication was dose tapered by the time of discharge. Specifically, appropriate dose reduction was defined as a reduction of at least 50% when compared to the initial dose. The strength of the first breakthrough pain medication dose was compared with the strength of the last dose administered. A dose reduction of 50% was considered significant. A total of 26% of all patients studied were dose tapered at least 50% by the last breakthrough pain medication administered at NRH. When the patients were broken down into specific injury categories, it was determined that none of the patients with stroke or head trauma received a significant dose tapering of their breakthrough pain medications. Conversely, 71.4% of the orthopedic patients were significantly dose tapered by the last administration of their breakthrough pain medication (Table 4).

The other secondary outcome looked at incidence of discontinuation of breakthrough pain medication treatment at least 2 days prior to patient discharge. At NRH patients are generally discharged in the morning of the last day of stay, so this criterion examined the breakthrough pain therapy on the last full inpatient day in the hospital. It was determined that 36.4% of all patients discontinued all breakthrough pain medication 2 days before discharge (Table 5).

In order to determine the effectiveness of the breakthrough pain medication therapy at NRH, it was first necessary to define what constitutes a minimal clinically important difference (MCID) in pain one hour after a dose administration. According to Farrar et al. a reduction of 2 points from baseline, represents MCID from the patient perspective for several chronic pain conditions [5]. This

Table 1: Patient demographics.

Average age (years)	57.96
Gender (%)	
Female	53.3
Average Length of Stay (days)	17.34
Type of Injury (%)	
Spinal Cord Injury	25
Stroke	5
Cardiac Rehabilitation	6
Orthopedic	47
Head Trauma	12
Others*	5
Baseline Characteristics (n=77) *other includes MS, burn, and Guillain-Barre patients	

Table 2: Breakthrough pain medications.

Medication	Dose	Number of Patients*
Tramadol	25 mg	3
Tramadol	50 mg	14
Tramadol	100 mg	2
Oxycodone	2.5 mg	1
Oxycodone	5 mg	34
Oxycodone	10 mg	37
Oxycodone	15 mg	4
Oxycodone-Acetaminophen	5/ 325 mg	2
Hydromorphone	4 mg	2
*Several patients received more than 1 medication for breakthrough pain therapy		

Table 3: Pain reduction (per dose).

NRS Point Reduction in Pain	Percent Reduction in Pain*	Percent Patients Self-Reported NRS Score
2	18.2	95
3	27.3	88.8
4	36.4	80.6
5	45.5	62.8
6	54.5	44.6
*Based on an 11-point NRS		

Table 4: Significant dose tapering during inpatient stay.

Type of Injury	Percent of Patients Dose Tapered per Injury Type
Spinal Cord Injury	18.8
Stroke	0
Cardiac Rehabilitation	25
Orthopedic	71.4
Head Trauma	0
Other	33.3
Total patients tapered	26

Table 5: Discontinuation of breakthrough medication prior to discharge.

Type of Injury	Percent of Patients Discontinued per injury type
Spinal Cord Injury	12
Stroke	25
Cardiac Rehabilitation	20
Orthopedic	8
Head Trauma	18
Other	17
Total patients discontinued	36.4

point reduction range around 2 points is also verified by Cepeda et al. in acute pain conditions, in which a 1.3 point to 2.4 point reduction gave the patients the perception that they were 'much improved' [6]. In terms of further determining a MCID range, Salaffi et al. demonstrated that a 1 point reduction represented the bottom of the MCID range while a 2 point reduction indicated the top MCID threshold for patients with orthopedic pain [7]. In the post-surgery orthopedic rehabilitation patient, De Luca et al. demonstrated a tighter MCID range of 1.3 points to 1.8 points [8]. This current study chose a conservative 20% pain NRS reduction which practically translated into a 3 point NRS reduction from baseline.

Of interest was the examination of injury types associated with breakthrough pain treatment during the NRH inpatient stay. It was determined that orthopedic rehabilitation patients required breakthrough pain medication treatment with greater significance (47%) than all other injury types. The second largest injury group requiring breakthrough pain medications were patients who had sustained spinal cord injuries (25%). Patients who were admitted with strokes, cardiac rehabilitation, and other issues represented much smaller percentages of participation in this breakthrough pain study (Table 1). This data correlates with what is known about the effectiveness of opioid use for breakthrough pain management. Opioids tend to have greater efficacy in musculoskeletal pain treatment such as seen in the orthopedic rehabilitation patients, and much less effectiveness in the types of neuropathic pain found in strokes and head trauma patients.

The overall effectiveness of the breakthrough pain medication therapy at NRH was positively reported by the results of this study. 88.8% of all patients self-reported a MCID with the administered breakthrough pain medication treatment at the hospital. In addition, the physicians appeared to dose taper these medications during the inpatient stay. In particular, the orthopedic patients that made up roughly half of all breakthrough pain patients at the hospital had a 71.4% dose tapering rate. Although only 36.4% of the patients studied discontinued all breakthrough pain medication before leaving the hospital, this statistic does not account for the extended release opioids that are commonly discontinued first in these patients. The NRH patients are generally tapered off the long acting opioids first and the acute pain is then managed with immediate release formulations, which are then tapered over time. This study only addressed the discontinuation of the immediate release opioids.

Conclusion

Although there is a general sense of concern in the health care profession about the opioid crisis and the possible over use of these medications in patient pain management, this study highlights several positive findings related to opioid therapy for breakthrough pain management in the acute rehabilitation setting at NRH. The results of this retrospective study indicate that in this setting there is a positive management of immediate release opioids in two key areas: effective initiation and use for pain management when non-opioid therapies such as non-steroidal anti-inflammatory drugs or acetaminophen are not effective, and responsible tapering over the course of the patient hospital stay. Immediate release opioids are most effective for musculoskeletal pain management, and it was determined that immediate release opioids were most frequently prescribed for musculoskeletal pain management at NRH, with a much smaller percentage of neuropathic type injuries utilizing these medications during the inpatient stay. The patient NRS self-reported scores further demonstrate that the immediate release opioids provided MCID pain relief when administered, which also indicates appropriate therapeutic utilization. Finally, the determination that 71.4% of the orthopedic patients were dose reduced by at least 50% before discharge further indicates an awareness of the risks of prolonged opioid therapy and an active attempt to reduce the medication dose by the NRH physicians.

The rehabilitation setting can be challenging in terms of pain management. Patients still retain significant post traumatic and post-operative pain levels and generally begin aggressive rehabilitation which further amplifies this existing pain. Physicians must balance the serious risks of opioid therapy for pain management that facilitates participation in physical therapy and functional improvements with opioid monitoring for potential overdosing as the patient transitions into the outpatient setting. This retrospective snapshot of immediate release opioid use at NRH provides a type of guideline for balancing effective pain management and abuse deterring in this unique rehabilitation population.

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Conflict of Interest

The authors have no potential conflicts of interest to disclose.

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