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Opioid Prescribing In Orthopaedic and Neurosurgical Specialties in a Tertiary Hospital

A retrospective audit of hospital discharge data

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Running Head: Post-surgery opioid prescribing practices

ABSTRACT

OBJECTIVE: To understand patterns of opioid prescribing on discharge in the orthopaedic and neurosurgical wards of a tertiary metropolitan hospital.

METHODS: A retrospective audit of medical records and discharge summaries for all orthopaedic and neurosurgical patients admitted for at least two days on two surgical wards over a six-month period between 1st January and 30th June 2017.

RESULTS: A combined total of 355 patients (281 orthopaedic and 74 neurosurgical patients) were included in the audit. Approximately 82% were discharged on opioids. Of patients discharged on opioids, 71.4% of the orthopaedic group and 73.8% of the neurosurgical group were discharged on combinations of two or more opioids (immediate release together with slow release). Around 65% of the sample discharged on opioids was opioid naïve on admission. 32.5% of the orthopaedic patients and 68.9% of the neurosurgical patients were discharged on a combination of opioid and other pharmacotherapy that could potentiate the CNS depressant effect of the opioids. Only 6.9% of orthopaedic patients and 11.5% of the neurosurgical patients had discharge summaries that included any reference to opioid management after discharge.

CONCLUSIONS:

Orthopaedic and neurosurgical units had high opioid prescribing rates on discharge from hospital. This highlights the need for clear communication of the intended medication

management plan post-discharge in order to minimise inappropriate and ongoing use of opioids post-surgery.

INTRODUCTION

Opioid based analgesia is commonly prescribed for both acute post-surgical pain and for chronic pain. In Australia, evidence based guidelines support the use of opioids in the acute post-surgical setting[1] but not for chronic non-cancer pain[2]. Overprescribing and inappropriate prescribing of opioids in surgical units has however been identified as a growing problem, with the prescription of medications for acute pain management potentially leading to chronic use and dependence[3, 4]. Evidence suggests that patients who have had relatively low-pain surgery, patients that have been prescribed opioids for general pain, and opioid-naïve individuals (not using opioid analgesics prior to admission) are being prescribed strong opioid pain relief on discharge and are at risk of progressing to chronic use[3,5,6,7,8]. In addition, it has been suggested that as much as 70% of medication prescribed for the treatment of acute post-operative pain in general surgery patients is not taken[9]. Over-prescribing of this nature potentially increases the availability of these drugs for misuse and diversion in the community.

The problem is not limited to the United States. In Australia, in state of Victoria, opioid prescribing increased by 78% between 2006 and 2013 and has been accompanied by an increase in opioid poisoning related hospital admissions and death rates[10]. As in the US, hospital prescribing practices may be contributing to the problem of misuse and/or abuse of opioid medications in the community.

To explore post-surgical opioid prescribing on discharge and processes to reduce the potential progression to chronic utilisation, we report on the results of a retrospective audit of postoperative opioid prescribing patterns on orthopaedic and neurosurgical patients in an Australian tertiary public hospital setting.

METHODS

Opioid prescribing patterns were examined on discharge from tertiary metropolitan hospital. Inclusion criteria for the audit comprised all orthopaedic and neurosurgical patients admitted for at least two days onto two large surgical wards over a six-month period between 1st January and 30th June 2017. Exclusion criteria for the audit were length of inpatient stay less than 2 days or patient was not discharged directly to community (e.g. transfer to another hospital or facility such as a residential care facility). Additional data for patients discharged during audit period were manually extracted from Medical Records Online (MRO) including reason for admission, demographic data (including gender and ethnicity), co-existing medical conditions, procedure performed, opioids and other analgesics prescribed on discharge and whether opioids were mentioned on discharge summaries. Where there was missing data from current admission, previous admission MROs were interrogated for data. Medication management plans prepared by clinical pharmacists, were examined to identify those patients who were opioid naïve on admission. Patients were considered opioid naïve if they were not taking opioids prior to admission to hospital. Potential drug interactions with other prescribed analgesics, adjuvants and regular medications the patient was taking prior to discharge were also explored. Drug interactions were classified according to Lexicomp Online® software - an internet based platform designed for healthcare professionals to provide clinically useful pharmacological information[11]. Lexicomp® categories include: X-Avoid combination, D-consider therapy modification and C-monitor therapy. Discharge summaries were audited by a Senior Pharmacist according to several criteria including a)

direct mention about opioid medication and/or b) a regimen of opioid weaning post discharge, c) mention of analgesia review.

This project was approved as a Quality Assurance project by the Quality and Risk Unit of St Vincent's Hospital Melbourne (ref QA046/17).

RESULTS

There were a total of 355 patients (281 orthopaedic and 74 neurosurgical) included in the audit between 1 January 2017 and 30 June 2017. Of orthopaedic patient group, 82.2% (n=231) of patients were discharged with opioids. Of neurosurgical patient group, 82.4% (n=61) of patients were prescribed opioids on discharge.

Demographic data:

Of 231 patients that were prescribed opioids on discharge from orthopaedic unit 41.6% (n=96) were male. Most patients were born in Australia/New Zealand 68% (n=157), 19.9% (n=46) were born in Europe, and 3.5% (n=8) patients were born in Asia. Of 61 neurosurgical patients prescribed opioids, 59.0% (n=36) were male. There was a similar demographic profile with most patients, 60.7% (n=37) born in Australia/New Zealand, and 19.7% (n= 12) patients born in Europe.

Co-morbidities:

Of orthopaedic patient group discharged on opioids, 58.4% (n=135) had medical co-morbidities. The most common co-morbidities on orthopaedic unit were: cardiovascular disease 32.0% (n= 74), musculoskeletal 22.5% (n=52), gastrointestinal disorders 13.4% (n=31), previous surgery (any type) 13.4% (n=31). Respiratory conditions occurred in 10.4%

(n=24), 9.5% (n=22) had T2DM and, 9.1% (n=21) mental health disorders. Only 1.3% (n=3) reported illicit, or recreational, drug use.

Of neurosurgical patient group discharged with opioids, 49.2% (n=30) had co-morbid medical conditions recorded. The most common co-morbid medical condition was cardiovascular disease 21.3% (n=13), musculoskeletal 14.8% (n= 9), respiratory conditions 14.8% (n=9), and mental health disorders in 11.5% (n=7). No patients in this group reported illicit or recreational substance use; however this might reflect bias as data was collected via self-report.

Procedures:

Procedures performed in orthopaedic patient group included: excision/correction/ exploration in 54.1% (n=125), open reduction internal fixation (ORIF) 16.5% (n=38), total knee replacement (TKR) 12.6% (n=29), total hip replacement (THR) 7.4% (n=17), revision of previous orthopaedic surgeries 3.5% (n=8), arthroscopy 3.9% (n=9) (Table 1). In neurosurgical patient group, most commonly performed procedures were: fixation/spinal fusion 36.1% (n=22), laminectomy/decompression 23.0% (n=14), anterior cervical decompression and fusion (ACDF) 14.8% (n=9) and discectomy-lumbar 14.8% (n=9)(Table 1).

Patterns of opioid prescribing:

Opioid formulation: Characteristics of opioid prescribing in the two patient groups were examined (Table 2 and 3). Almost two thirds of patients discharged on opioids were opioid naïve on admission: 64.9% (n=150) of orthopaedic group and 63.9% (n=39) of neurosurgical

group. Majority of patients in both groups were discharged on a combination of immediate release (IR) and slow release (SR) opioids; 71.4% (n=165) of orthopaedic group; 73.8% (n=45) of neurosurgery group. Just over one fifth, 22.5% (n=52) of orthopaedic patient group compared to 14.8% (n=9) of neurosurgical patient group were discharged on IR preparations only (e.g. Oxycodone, Tapentadol). Fewer patients were discharged on a SR preparation only (e.g. Targin, Oxycontin, Tapentadol SR) comprising 6.1% (n=14) of orthopaedic and 11.5% (n=7) of neurosurgical patients.

Opioid quantity:

Most patients, 77.5% (n=179) in orthopaedic and 85.2% (n=52) in neurosurgical groups, were discharged with more than 3 days' supply of opioids (Table *2*).

In orthopaedic group, 29.4% (n=68) were discharged with maximum quantity available under the Australian Prescription Benefits Scheme (PBS) of twenty tablets of oxycodone IR and 28 tablets of oxycodone SR equating to 14 days supply. Approximately 13.0% (n=30) were prescribed 10 days supply, 10.8% (n=25) 7 days supply, and 20.8% (n=48) had 5 days supply on discharge. In the neurosurgical group, 36% (n=22) of patients were discharged with the maximum script quantity of oxycodone IR and of oxycodone SR. Almost one fifth, 19.7% (n=12) had 5 days' supply while 13.1% (n=8) had 10 days supply. Only 1.6% (n=1) had more than 2 weeks' supply of opioids.

Opioids combined with other analgesics:

In both groups, majority of patients 96.1% (n=222) and 86.9% (n=53) of orthopaedic and neurosurgical groups respectively were prescribed other analgesia in combination with

opioids on discharge (Table 2). The most commonly prescribed analgesia on discharge, in addition to opioids was Paracetamol 63.6% (n=147) on orthopaedics, followed by a combination of Paracetamol/Non-steroidal anti-inflammatory drugs (NSAIDS) 14.3% (n=33). Approximately 3.9% (n=9) of orthopaedic patients were discharged on opioids only. Of neurosurgical group the most commonly prescribed analgesics in addition to an opioid were: Paracetamol 32.8% (n=20), Paracetamol and a NSAID 13.1 %(n=8), Paracetamol and Pregabalin 13.1% (n=8), Paracetamol and Tramadol 8.2% (n=5), Paracetamol and NSAID and Pregabalin 8.2% (n=5) and other analgesic combinations. Only 13.1% (n=8) of patients were discharged on opioids only.

Non-opioid analgesics:

A minority of the patients were prescribed analgesia without any opioids 17.8% (n=50) in orthopaedic group and 17.6% (n=13) of neurosurgical group.

Discharge Planning:

More orthopaedic than neurosurgical patients had a discharge plan referring to post-surgical management sent to the general practitioner 86.1% (n=199) of orthopaedic and 59.0% (n=36) of neurosurgical group. A weaning plan for opioids was included in the discharge summary in only 6.9% (n=16) of orthopaedic group and 11.5% (n=7) of neurosurgical group (Table 2).

Potential Drug-Interactions:

Potential drug-interactions with opioids on discharge were detected in approximately one third of orthopaedic patient group, 32.5% (n=75) and over two thirds of neurosurgical group

68.9% (n=42) (Table 2). These included interactions with newly prescribed medications on discharge or patients' regular medication. In the 75 orthopaedic patients with drug-interactions, the drug-interactions classified according to Lexicomp, were: category X (Avoid combination) 5.3% (n=4) and involved co-prescribing of opioids with benzodiazepines, olanzapine, risperidone, sertraline and tramadol. Most of category X drug interactions involved a combination of at least 3 of the mentioned drugs Category D (consider therapy modification) 60.0% (n=45) involved opioids with one or more of: amisulpride, tricyclic antidepressants, carbamazepine, citalopram, benzodiazepines, quetiapine, paliperidone, pregabalin and sertraline and category C (monitor therapy), 20.0% (n=15), which involved paroxetine, citalopram, escitalopram and venlafaxine together with opioids; while 14.7% (n=11) were drug–disease interactions (respiratory conditions - asthma, sleep apnoea, COPD). Of the 42 patients in neurosurgical group, 83.3% (n=35) of interactions were category D and involved co-prescribing of an opioid with one or more of valproate, pregabalin, tramadol, diazepam and amitriptyline, 11.9% (n=5) category C involved opioids with duloxetine, sertraline and escitalopram and 4.8% (n=2) were drug-disease interactions (as above).

DISCUSSION

Opioids are commonly prescribed for post-operative analgesia. In this sample, just over 82% of patients in both surgical groups were discharged from hospital on opioid analgesia. Of these around 65% of patients were opioid naïve on admission and over 70% of them were discharged with both IR and SR opioids. Almost half (42.8%) orthopaedic patients and

50.7% of neurosurgical patients were given more than 10 days' supply of opioids on discharge. Of concern, on average,only 7.9% of these patients had a discharge plan outlining an opioid weaning plan or stating for how long opioids might be needed post-discharge. Our findings are consistent with studies both in Australia[12] and internationally[9,13] which suggest that opioids are over-prescribed in surgical contexts. There is, however, relatively little literature exploring the nature of discharge plans relating to opioids and their potential for reduction of harm. Factors that have been suggested to be considered before providing opioids for the management of acute pain post-discharge include the provision of written discharge plans with an estimate of the expected duration of therapy and including suggestions for opioid tapering if required[14].

It is interesting to contrast our current findings to those of a similar cross-sectional audit in 2006 of patients admitted to orthopaedic, acute geriatric medicine, and oncology wards at another tertiary referral university teaching hospital in Sydney, Australia[15], which concluded that opioids were under-prescribed. This is a distinct change in prescribing practice. The high frequency with which opioid analgesics are currently given as first line analgesia rather than first attempting pain control with non-opioid analgesia may be the result of widespread publication about the adverse effects of non-steroidal analgesics[16], strong marketing of opioid analgesics[17], as well as potentially unrealistic expectations of what can be achieved with pain relief. There are numerous adverse effects of opioids including: oversedation, which can lead to accidents and increased risk of falls[14], respiratory depression, sleep apnoea, nausea, vomiting, constipation, opioid-induced androgen deficiency and peripheral oedema. Other negative consequences of opioid use include unintentional overdose, development of opioid dependence and diversion of opioids to individuals for non-medical

purposes. Despite guidelines advising against the sole use of opioids for analgesia, and highlighting the evidence for multimodal analgesia in providing better post-operative pain management[18], opioids continue to be over-prescribed.

The patterns of opioid prescribing observed in this study reveal sub-optimal use of immediate release (IR) and slow release (SR) opioid formulations. The most common discharge medication plans included both IR and SR formulations; observed in over 70% of the patient group. Recent US[19] and Australian[20] guidelines recommend: multimodal pain management post discharge; opioids should only be prescribed if deemed necessary; IR opioids rather than SR should be prescribed on discharge for only 3-5 days. An opioid/pain management plan and follow up, should further analgesia be required is also recommended.. Use of slow or controlled release opioid preparations is only recommended in treatment of chronic cancer pain. IR and SR combination is indicated for complex surgery or surgery where ongoing pain is anticipated (e.g. cancer surgery), or for patients that are not opioid-naïve, The majority of this sample however, did not fall under these categories and according to best practice guidelines would not have been expected to require combination opioids.

Some authors have advocated multi-modal pain management approaches for post-operative analgesia[21]. However, caution is required to avoid potential drug-drug interactions, drug-disease interactions, adverse-drug effects such as serotonin syndrome, gastrointestinal ulceration and cardio-toxicity. In our sample, 32.5% of the orthopaedic patients and 68.9% of neurosurgery patients were co-prescribed multiple pharmaceutical agents capable of potentiating the CNS depressant effect of opioids. Opioids have many drug interactions,

especially in medically complicated patients and when used in conjunction with other central nervous system depressants. This risk is highlighted in recent findings by a recent Coronial Inquiry[22] in which prescription medications account for approximately 80% of overdose deaths each year in the State of Victoria.

To address overprescribing of opioids, some hospitals have introduced models of patient care in which the pharmacist is enabled to provide comprehensive support to prescriber and patient[12]. This approach allows development of an effective program to ensure safe use of opioids and ensures improved patient care[23]. The pharmacist can reinforce agreed medication plan, counsel the patient on correct use of medications and how to handle adverse events e.g. constipation, advise the prescriber of any side-effects and when titration should occur, set timelines for trials of medications and assist in the appropriate withdrawal of medications. These and other interventions such as improved education and review of hospital opioid prescribing guidelines are important to reduce the risks associated with post-operative analgesia.

Discharge planning in this sample was found to be inadequate in light of the potential serious risks to patients through excessive or inappropriate use of opioids. An opioid management plan was included in the discharge summaries of only 6.9% of orthopaedic group and 11.5% of neurosurgical group. Of note, majority of patients in this sample were given maximum script quantities of one or more than one opioid; usually translating to almost 50 tablets on discharge. If these quantities of medication were not entirely used for post-operative pain management they could potentially be the subject of misuse or diversion and their associated harms[24]. The quantity of opioid prescription can have a significant

impact on the risk of long-term use and abuse. In one study, 13.5% of patients who were prescribed opioids for 7 days or longer become long-term users (double the rate of patients who have only 1 day of use[25]). Leftover medications frequently are misused. Ultimately a relatively low risk operation can yield significant downstream problems and further health concerns[5].

Several limitations to this audit must be acknowledged. The focus of the audit was a group of patients who had been prescribed opioids on discharge from hospital, not all patients who underwent orthopaedic procedures or neurosurgery, and thus due acknowledgment must be made of those individuals who had operations and left hospital without any opioid medication. The inpatient analgesia requirements were not studied. The focus was to observe what was on discharge script and therefore, some adjuvant analgesia like paracetamol and NSAID's that are available over the counter, might have been omitted from the script. The audit was conducted manually, interrogating computer-based files and the possibility of human error is acknowledged potentially resulting in inaccurate data entry. In some cases, data was missing or incomplete, and was classified according to the auditor's interpretation, which introduces an element of subjectivity. In order to classify patients as opioid naïve medical staff relied on ward pharmacist records, or in some cases, patients' recollection and thus may have introduced recall bias. Notwithstanding these limitations, the audit provides a powerful snapshot of potential areas for improved opioid practice.

This study provides an important baseline for opioid prescribing trends that can be used to measure the impact of future planned interventions to improve opioid prescribing practice. Recent data suggests that increasing awareness of the dangers of overprescribing opioids is

having an impact on prescribing practices[26], and highlight the important role of surgeons in combatting the opioid epidemic[27]. Overall, our findings confirm the need for education of health professionals as well as patients, and the implementation of updates of policies and protocols in light of the current concerns about opioids, to improve practice and reduce the risk for both the individual and the public.

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