Opioid use among same-day surgery patients: Prevalence, management and outcomes

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OBJECTIVES: To determine whether the prevalence of opioid use among patients requiring elective same-day admission (SDA) surgery is greater than the 2.5% prevalence found in the general population. Secondary objectives were to assess compliance with expert recommendations on acute pain management in opioid-tolerant patients and to examine clinical outcomes.

METHODS: A retrospective review of 812 systematically sampled adult SDA surgical cases between April 1, 2008 and March 31, 2009 was conducted.

RESULTS: Among 798 eligible patients, 148 (18.5% [95% CI 15.9% to 21.2%]) were prescribed opioids, with 4.4% prescribed long-acting opioids (95% CI 3.0% to 5.8%). Use of opioids was most prevalent among orthopedic and neurosurgery patients. Among the 35 patients on long-acting opioids who had a high likelihood of being tolerant, anesthesiologists correctly identified 33, but only 13 (37%) took their usual opioid preoperatively while 22 (63%) had opioids continued postoperatively. Acetaminophen, nonsteroidal anti-inflammatory drugs and pregabalin were ordered preoperatively in 18 (51%), 15 (43%) and 18 (51%) cases, respectively. Acetaminophen, nonsteroidal anti-inflammatory drugs and pregabalin were ordered postoperatively in 31 (89%), 15 (43%) and 17 (49%) of the cases, respectively. No differences in length of stay, readmissions and emergency room visits were found between opioid-tolerant and opioid-naive patients.

CONCLUSION: Opioid use is more common in SDA surgical patients than in the general population and is most prevalent within orthopedic and neurosurgery patients. Uptake of expert opinion on the management of acute pain in the opioid tolerant patient population is lacking.

Key Words: Complications; Opioid tolerance; Opioid use; Pain management, Peri-operative
Opioid use in surgical patients

The primary objective of the present study was to determine the prevalence of opioid use among patients attending The Ottawa Hospital (TOH; Ottawa, Ontario) operating room for elective same-day admission (SDA) surgery. We expected that there would be greater opioid use in SDA patients compared with the general population. The secondary objectives were to examine the perioperative management of patients taking long-acting opioids and assess compliance with expert recommendations; and to examine clinical outcomes, including in-hospital complications, (LOS), emergency room (ER) visits post-discharge and readmissions for pain crises within 30 days of surgery.

METHODS

The research was conducted at TOH, a large academic tertiary care centre (1149 beds) affiliated with the University of Ottawa. Following research ethics board approval, a data analyst identified all elective SDA surgical patients at TOH during the 12-month period from April 1, 2008 to March 31, 2009. A complete list representing all 6525 patients having SDA surgery at TOH in the study period was obtained and arranged chronologically; using systematic sampling, every eighth case was selected for review to achieve a target sample size of 800 (see sample size analysis below).

The patients included in the present study were 218 years of age. All surgical SDA procedures performed were eligible for sampling. SDA surgeries at TOH include orthopedics, general surgery, urology, gynecology, neurosurgery, vascular, thoracic, otolaryngology, plastics, ophthalmology and oral surgery. Patients undergoing emergency surgery or day-care surgery were not included.

Patient demographics including age, sex, surgical type and procedure were extracted from the operating room database for 812 patients. Any chart missing necessary documentation for evaluation was excluded. There were 14 missing or incomplete charts, leaving 798 complete charts available for analysis. The selection process of eligible records is summarized in Figure 1.

Patients taking prescription opioids were identified and categorized through a manual review of the Medication Reconciliation Form (MRF) completed during the preoperative assessment. The MRF lists drug, dose and frequency of administration but does not quantify daily consumption of immediate-release opioids taken as needed. At the time of the present study, there was no standard definition of opioid tolerance. Given these limitations, patients taking opioids were divided into two groups based on whether they consumed short-acting opioids only or long-acting opioids at regular intervals with or without short-acting opioids. Morphine equivalence was calculated (18) for patients taking long-acting opioids at regular intervals. Morphine equivalence for short-acting opioids could not be calculated because the quantity of short-acting opioids was not recorded in the chart. Long-acting opioid users were considered to have had sufficient regular exposure to opioids to have developed dependence and tolerance requiring special management (19,20).

Detailed chart reviews were completed on all patients whose opioid medications were listed on the MRF. Investigators (RS and JW) manually extracted data from patient medical records to assess for compliance with expert recommendations on the perioperative management of the opioid-tolerant patient. The preoperative assessment records were examined to determine whether the patient's opioid use was identified as a consideration in their perioperative management. Compliance with expert recommendations was assessed by using a checklist (see Table 1 for list of items). This included a review of preoperative orders to identify which analgesics were ordered preoperatively (eg, continuation of usual opioid medications); the anesthetic record from the day of surgery to identify the type of anesthetic used, including the use of regional anesthesia and intraoperative infusions of lidocaine and ketamine; and postoperative analgesic orders to examine whether they included, for example, continuation of usual opioid medications and the use of coanalgesic agents.

Perioperative complications, including: unexpected intensive care admission; unexpected overnight stay in the recovery room; calls for rapid assessment of unstable patients by a pre-code blue team; cardiovascular events including acute coronary syndromes or rapid atrial fibrillation; chest infections requiring antibiotics; strokes; surgical site infections; and thromboembolic events were recorded from the hospital progress notes. For the two surgical groups where perioperative opioid use was most prevalent, LOS, readmissions and ER visits for pain-related complaints were also collected from electronic health records.

Sample size analysis

There were 6252 patients who underwent elective SDA surgery in the 2008/2009 fiscal year; the target sample size of 800 was determined based on a two-sided confidence interval around an anticipated prevalence of opioid use of 8%. This sample size would yield a margin of error no greater than 1.9% and would amply allow the lower bound of the confidence
Perioperative management of patients on long-acting opioids (n=35) preoperatively and compliance with expert recommendations on the perioperative management of opioid-tolerant patients

Table 1 describes the perioperative management of patients on long-acting opioids. In 33 of the 35 cases, the responsible anesthesiologist identified opioid use as a factor to take into account for perioperative management. Despite this, only 15 (37%) patients received their baseline opioids preoperatively, with the most frequently performed surgeries being joint replacements. In comparison, patients on long-acting opioids often had surgical procedures in the lumbar and cervical spine. Table 3 presents details of the specific procedure type for neurosurgical and orthopedic surgeries.

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TABLE 3
Distribution of anatomical surgery locations across non-opioid and opioid users in orthopedic and neurosurgery specialties

<table>
<thead>
<tr>
<th>Specialty</th>
<th>Non-opioid users</th>
<th>Short-acting</th>
<th>Long-acting</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orthopedic</td>
<td>n=216</td>
<td>n=69</td>
<td>n=28</td>
<td>n=53</td>
</tr>
<tr>
<td>Hip</td>
<td>43 (25.1)</td>
<td>15 (25.9)</td>
<td>4 (6.9)</td>
<td>62 (36.1)</td>
</tr>
<tr>
<td>Knee</td>
<td>78 (45.1)</td>
<td>30 (51.7)</td>
<td>5 (8.6)</td>
<td>113 (63.8)</td>
</tr>
<tr>
<td>Shoulder</td>
<td>10 (5.7)</td>
<td>2 (3.5)</td>
<td>5 (8.6)</td>
<td>17 (9.7)</td>
</tr>
<tr>
<td>Neck</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Lower back</td>
<td>10 (5.7)</td>
<td>4 (6.9)</td>
<td>1 (1.8)</td>
<td>15 (8.4)</td>
</tr>
<tr>
<td>Other</td>
<td>32 (18.3)</td>
<td>7 (12.1)</td>
<td>3 (16.7)</td>
<td>42 (23.8)</td>
</tr>
<tr>
<td>Neurosurgery</td>
<td>n=41</td>
<td>n=11</td>
<td>n=10</td>
<td>n=22</td>
</tr>
<tr>
<td>Neck</td>
<td>6 (14.6)</td>
<td>5 (45.5)</td>
<td>4 (40.0)</td>
<td>15 (64.3)</td>
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<tr>
<td>Lower back</td>
<td>8 (19.5)</td>
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<td>27 (65.9)</td>
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Data presented as n (%) or median (quartile range)

outcomes according to group for 313 patients having orthopedic or neurosurgery. Although the study was not powered to attempt to find differences among groups, exploratory analyses were conducted. Overall, the median LOS among opioid users was three days (inter-quartile range three to five days). No statistically significant differences were found in the median LOS among patients who were not taking opioids, those who were on short-acting and those who were on long-acting opioids (P=0.24). Rates of readmission within 30 days of discharge were low among opioid users and not statistically significantly different between groups, although a trend was observed indicating higher readmissions rates among non-opioid users (9.8% among non-users versus 2.1% among opioid users; P=0.0512 for the overall comparison among three groups). The rate of ER visits within 30 days of hospital discharge among opioid users was not significantly different between groups (P=0.63).

In-hospital complications postoperatively were examined in the long-acting opioid group; there was one unexpected intensive care admission, two calls for rapid assessment of an unstable patient by a pre-code blue team, one episode of atrial fibrillation, one chest infection requiring antibiotics and one surgical site infection.

DISCUSSION

The present study addresses an important question regarding the prevalence of opioid use in the surgical population and adherence to expert recommendations in the setting of long-acting opioid use suggestive of opioid tolerance.

At our institution, 18.5% of elective SDA adult surgical patients were using an opioid at the time of surgery, which is seven times that reported in the general Canadian population (2.2% as extracted from Modin et al [6]) and much higher than our anticipated prevalence of 8%. In 4.4% of cases at TOH, patients were on long-acting opioids; more than five times the prevalence of strong opioid use reported in the general population. These findings support our hypothesis that prescription opioid use is more prevalent in patients scheduled for surgery than in the general population. Use of long-acting opioids was more common in the orthopedic and neurological specialties relative to other surgical services, which is not surprising given the prevalence of painful conditions in these groups. These services are, therefore, excellent choices for evaluating interventions aimed at improving acute pain management in the setting of pre-existing opioid use and opioid tolerance.

Although use of opioids was recognized in the preadmission unit by the anesthesiologist, the usual dose of long-acting opioid was not taken preoperatively in most cases. Although the reasons for omission of the baseline opioid dose is likely multifactorial (e.g., preoperative fasting status), this information is concerning because the absence of the usual morning dose of opioids will put patients in an opioid debt situation, which may lead to larger doses of opioid analgesics postoperatively being required to offset this debt and manage acute pain. Adherence with expert guidelines regarding the use of multimodal analgesia perioperatively was less than anticipated but due to the retrospective nature of the study, the impact on pain scores and patient satisfaction with care is unknown. We also cannot rule out that this decision was motivated by legitimate medical reasons (e.g., allergy, previous intolerance). However, treatment recommendations may also not be well known. For example, the American Society of Anesthesiologists practice guidelines for acute pain management in the perioperative setting (21) does not reference opioid-tolerant patients as a unique subgroup warranting specialized treatment plans.

We were unable to demonstrate a relationship between use of long-acting opioids and in-hospital complications, LOS or post-discharge pain crisis requiring ER visitation or readmission, but we note that our study was not powered to address these questions and that it is possible that some of the patients in the long-acting opioid group may not have been opioid tolerant. However, the trend of higher readmission rates among non-opioid users is particularly surprising given the recently published observational study conducted by Gulur et al (14) regarding opioid-tolerant patients admitted for an acute episode of care. They found that among patients who were expected to be discharged within 10 days, those who were opiate tolerant required longer hospitalization and had greater 30-day readmissions than those who were not.

The main limitation of the present study was its retrospective nature. The use of retrospective data is dependent on the accuracy and completeness of the written record and prospective data collection is preferable. Furthermore, the research was conducted at a time when paper charts predominated and before the implementation of an electronic information system for the preoperative assessment, anesthetic record and acute pain service. Additionally, we excluded patients on short-acting opioid analgesics because it was not possible to accurately calculate the daily opioid dose, and we also relied on prescription data to calculate morphine equivalent daily dosage for patients using long-acting opioids; we cannot be certain that patients were taking their opioids to calculate the daily opioid dose, and we also relied on prescription data to calculate morphine equivalent daily dosage for patients using long-acting opioids; we cannot be certain that patients were taking their opioids on a regular and frequent basis may have been inadvertently excluded from the opioid-tolerant group. It is also possible that some patients in the long-acting opioid group may not have been opioid tolerant.

In summary, we found a high frequency of opioid use among surgical patients and this was especially concentrated in the orthopedic and neurological services. Uptake of expert opinion regarding the perioperative management of acute pain in the setting of pre-existing opioid use was lacking. Despite this, there was no difference in LOS and postoperative adverse events requiring ER visits among the groups, although we found an unexpected trend of higher readmissions among patients who were not using opioids before their surgery. A larger prospective study is needed to further assess pain control, functional outcomes, patient satisfaction, LOS and complications in opioid-tolerant patients relative to opioid-naive patients. The fact that

### TABLE 4
Length of stay (LOS), and readmissions and emergency room (ER) visits within 30 days of discharge in the patient group undergoing orthopedic surgery or neurosurgery

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discharge was not delayed in patients using opioids does not necessarily mean that their pain was well controlled postoperatively, and the present study was not designed to explore this. Other outcome measures that may be of relevance in future studies include documentation of opioid requirements one year postoperatively. Future clinical research trials should focus on back and major joint surgeries because these groups were found to have the highest proportion of long-acting opioid use.

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AUTHOR CONTRIBUTIONS: Catherine Smyth was the primary investigator. Jennifer LC Wilson was the primary author. Catherine Smyth and Howard Nathan designed the study. Robert Sikorski and Jennifer LC Wilson collected the data. Catherine Smyth, Patricia Poulin, Monica Taljaard and Howard Nathan helped write the manuscript. Monica Taljaard conducted the statistical analysis and Catherine Smyth, Jennifer LC Wilson, Howard J Nathan and Patricia Poulin reviewed the analysis of the data. Patricia Poulin, Jennifer Wilson and Catherine Smyth were responsible for response to reviewers and revisions.

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REFERENCES
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