

POST-SURGICAL PAIN MANAGEMENT AS A CONTRIBUTOR TO THE OPIOID EPIDEMIC

The surgical setting is a gateway for opioid addiction. What are the actual risks associated with post-surgical pain management and how best might they be addressed?

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Excessive use of prescription opioids in the United States has created an epidemic of drug-related injury, death, and cost. Although the origins of the problem can be attributed to many potential sources, the financial, personal, and public health costs are easily measured, and are reported widely in the scientific and lay press. This document describes one of the gateways of addiction, the surgical setting, and elaborates on the history of opioid prescriptions, touching on the short and long-term effects of prescription opioid misuse. Lastly, this manuscript provides a potential means of curbing the crisis through a focus on prevention.

Understanding the Current Opioid Epidemic: **How We Got Here**

The evolution of anesthesia and pain management allowed for a rapid progression of surgical discovery and advancement. Anesthetic gases were discovered in the 1840s, and allowed for invasive procedures in immobile patients. Early anesthetic gases alone, however, were associated with significant dangers including flammability, toxicity, respiratory depression, and nausea.¹ In the second half of the 20th century, doctors developed balanced anesthetic techniques, whereby intravenous medications, including opioids, were given in addition to the anesthetic gases in an attempt to minimize the aforementioned side effects. Despite the growing use of intraoperative and postoperative opioids, there was a lack of concern about the addictive nature of these medications. A brief letter-to-the-editor in the New England Journal of Medicine in 1980 was heavily and uncritically cited as evidence that addiction was

rare with long-term opioid therapy.^{2,3} Simultaneously, new synthetic opioids became more available and affordable, including oxycodone and hydrocodone. Healthcare credentialing agencies began to focus on pain as a negative outcome, with many calling pain the “fifth vital sign”.⁴

Surgical procedures represent a common way in which people are exposed to opioids. In order to help quantify the number of patients who may transition into addiction as the result of postoperative pain management, a robust literature review was undertaken. More than 50 million surgical procedures are performed each year in the United States, and approximately 80% of patients, or 40 million patients, receive opioids after surgery to manage their postoperative acute pain. As many as 6.5% of patients that take opioids to manage pain after surgery may become persistent opioid users, representing 2.6 million people. Surprisingly, there seems to be no difference in rates of persistent use between major and minor surgeries.⁵ Persistent, or chronic, users of opioids are far more likely to transition to opioid addiction, as defined as a physical dependence and illicit use. As many as 17% of chronic users may transition to addiction.⁶ Taken together, as many as 440,000 people may become new addicts as a result of surgery every year. Further highlighting the role that post-surgical care can play in the opioid epidemic, many people are first exposed to opioids at the time of surgery.⁷ Patients discharged from hospitals following surgery are twice as likely to receive an opioid prescription as compared to a medical discharge.⁸ Understanding the origins of the epidemic and focusing on the surgical setting as a gateway to opioid addiction, can lead to a clear path for healthcare improvement by taking a preventative approach.

How did we get here? Each year,



surgical procedures happen in the United States.



of patients undergoing a surgical procedure are prescribed opioids for pain management.



That means **MILLIONS** of people are first exposed to opioids as they recover from surgery.

Currently, there are approximately 2.5 million opioid addicts in the United States.⁹ Opioid misuse and addiction present both short term and long term negative health outcomes and can drive up the costs associated with care. Short terms costs are associated with opioid related adverse drug events (ORADEs) which can be a significant contributor to increased healthcare utilization and costs. Furthermore, long term negative health outcomes, such as addiction, also present a significant burden on the healthcare system. It is reasonable to expect that efforts to curb this pathways to addiction can result in significant healthcare cost savings.

Finally, a lack of communication between surgeons and patients exists, with many patients expecting zero pain after surgery, and many surgeons promising “pain-free” procedures. Americans have the highest rate of opioid consumption in the world.¹⁰ It is evident that the opioid epidemic has multiple contributing factors, and as such, solutions must be multifaceted, taking into account all the drivers of the current crisis.

Short Term Health Outcomes Associated with **Postoperative Opioid Use and Their Costs**

Every medication comes with side effects. Side effects that delay recovery or cause harm are referred to as adverse drug events. Opioid-related adverse drug events (ORADEs) frequently occur after surgery while patients are recovering and result in discomfort, morbidity and mortality. Side effects associated with opioids include nausea, vomiting, drowsiness, problems with urination, constipation, ileus and itching.¹¹ Opioid receptors line the gastrointestinal track; because of this, side effects can be localized there in patients. Ileus, a painful obstruction in the intestine, is the result of opioid treatments combined with other contributing factors such as surgical stress.¹² It is a complex condition to manage and can result in extended hospital stays. Although seemingly minor, other side effects can have a significant financial impact and can delay patient recovery. Postoperative nausea and vomiting (PONV) is a common post-surgical ailment and can be the result of opioid administration.¹³ Patients who have experienced nausea in a postsurgical setting have expressed a

willingness to spend on average \$73 for an antiemetic drug that would prevent PONV.¹⁴ Additionally, patients that are constipated after a surgical procedure can incur additional healthcare costs.¹⁵

Potentially fatal ORADEs, however, are also common and include slowed breathing and respiratory arrest (or complete cessation of breathing). Between 0.09%-0.2% of patients receiving opioids in a hospital setting have experienced severe respiratory depression,¹⁶ despite using the medications while supervised by nursing staff, as prescribed. It is clear that even when using opioids as prescribed, deaths can still occur. In fact 60% of deaths related to opioid overdose have been estimated to occur in patients who are using them in the manner in which they were prescribed.¹⁷

ORADEs have a measurable effect on national healthcare costs. The most significant cost drivers of ORADEs are the resulting increase in length of stay.^{18,19} A recent study indicated that 10.6% of patients undergoing hospital based surgical and endoscopic procedures experiences at least one ORADE. ORADEs were associated with an increase cost of \$8,225 for the index of hospitalization.²⁰ Extrapolating these findings to the 40 million annual surgical procedures receiving postoperative opioids, 10.6% (approximately 4.2 million people) will experience an ORADE. At an average cost of \$8,225, this represents an increase in healthcare spending by \$34.9 billion per year.

Long Term Health Outcomes Associated with **Postoperative Opioid Use and Their Costs**

In addition to ORADEs, opioid analgesics given during the postoperative period can lead to longer-term health outcomes, including tolerance and addiction. Opioids treat pain, create sedation and euphoria, and reduce anxiety and worry.²¹ The amount of opioid required to achieve these effects, however, increases rapidly. This effect is called tolerance.²² As patients become tolerant to opioids, they require more and more to achieve the same effect. Unfortunately, patients do not become tolerant to the respiratory effects of opioids. In other words, as patients take more opioids to feel euphoric, they become more likely to stop breathing. Short term use of opioid may lead to

As many as **6.5%** of patients that take opioids to manage pain after surgery may become persistent opioid users. That's **2.6 million** people.

Of these **2.6 million** persistent opioid users, approximately **440,000** will become addicted to opioids.



OPIOID DISCHARGE PRESCRIPTIONS FILLED BY RECOVERING SURGICAL PATIENTS RESULT IN UNUSED PILLS.

90%

of these pills remain inside the home in **unsecured** locations

32%

of all opioid addicts report their first opioid exposure was through **leftover pills**

addiction. The results of tolerance and addiction are that once patients run out of their prescribed pills, they become inclined to turn to more illicit forms, such as illegally obtained pills, heroin, or imported fentanyl, to achieve desired opioid effects.²³

Just as short-term ORADEs can be quantified and monetized, the effect of post-operative opioid addiction can also be studied. Chronic use of opioids is associated with an increased utilization of healthcare resources. When chronic opioid users were compared with matched nonusers, they incurred an extra \$18,074 in healthcare costs.²⁴ Extrapolating this number to the number of post-surgical patients who may transition to chronic use (2.6 million), this accounts for increased healthcare spending upwards of \$47 billion dollars annually. Furthermore, on average, opioid addicts incur roughly \$30,000 of healthcare costs per year.²⁵ When applying this information to the numbers of people who may transition to opioid addiction as a result of postoperative pain management (440,000), the healthcare costs are an estimated \$13 billion. These numbers may represent an underestimation, as surgical procedures may continue to funnel patients into addiction faster than people transition away from addiction.

Diverted Pills: A Secondary Contributor to the Opioid Epidemic

The vast majority of opioids prescribed across a variety of surgeries remain unconsumed, suggesting broad patterns of over-prescription.²⁶ Up to 90% of these unused opioid prescriptions remain in unsecured locations in the home.²⁷ Opioid prescriptions can make their way to people who are not the intended users; these are known as diverted medications. Diverted pills are a significant source of opioids feeding the opioid epidemic; 32% of addicts report that their first opioid experience was through diverted pills sourced from friends and family.²⁸ Furthermore, as many as 71% of opioid addicts report diversion as their source of opioids.¹⁷ Noting the significance of the role of diverted medications fueling the opioid epidemic, the FDA has stated that “until

clinicians stop prescribing opioids far in excess of clinical need, this crisis will continue unabated”.²⁹ By reducing, or eliminating, opioid prescriptions at postoperative discharge, it is possible to reduce the unused pills at risk for diversion. This can mitigate a known pathway of addiction that is currently a significant contributor to the opioid epidemic. It is estimated that diversion of opioid medications costs insurers up to \$72.5 billion per year.³⁰ Costs can be attributed to robbery, forgery, prescription fraud, doctor shopping and employee theft (2016 NDTA Assessment).³¹

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Combating the Opioid Epidemic: A Preventative PeriOperative Approach

As described, opioids prescribed after surgery are a significant contributor to the opioid epidemic. Any proposed solutions to this problem should address the preoperative, intraoperative, and postoperative periods of care. Preoperative preparation should focus on expectation management. A 2003 study found that healthcare professionals (including nurses, anesthesiologists, and surgeons) spoke to patients about pain only 63% of the time before surgery.³² Pain is a normal part of healing, and some pain after surgery is inevitable. Patients are understandably concerned about pain, and should be

given realistic expectations in order to prepare for the quality, quantity, location, and duration of pain that they will experience. If patients expect no pain after surgery, they will take medications until they achieve that endpoint, regardless of medication side effects. If, however, they understand that some pain is normal, and that ORADEs can adversely affect healing, they may be motivated to reduce the amount of opioids used.

Intraoperatively, non-opioid medications should be used as a foundation for pain control. Local anesthetics, anti-inflammatories, acetaminophen, and other medications that work at a variety of pain receptors have been shown in numerous of studies to reduce pain scores and reduce opioid consumption in the immediate postoperative period.^{33,34,35} In a robust analysis of studies comparing non-opioid postoperative pain management to traditional opioid analgesics, researchers found that opioid-sparing treatments consistently reduced resource use, such as inpatient hospital length of stay, and improved recovery outcomes. Additionally, opioid-sparing treatments demonstrated equal or superior management of pain and resulted in reduced adverse events.³⁶ It is reasonable to expect that a refocusing of pain management away from opioids can reduce the significant healthcare costs associated with both short-term and long-term health outcomes associated with opioid use and misuse. However, because opioids are significantly cheaper, many insurance companies do not cover non-opioid based pain medications, so access can be limited.³⁷ Global value of non-opioid pain medications must be balanced against cost in any pharmacoeconomic analysis of drugs benefits and risks.

Postoperatively, patients must understand that an around-the-clock regimen of non-opioid pain medications is vital to good pain control. Again, expectations must be set appropriately, and patients must know that opioids can affect outcomes. Opioids should be reserved for “break-through” pain, when other medications and techniques, including ice and rest, are insufficient to achieve preoperatively agreed upon pain goals. Patients should also be educated to not fill opioid prescriptions upon discharge unless absolutely needed. Furthermore, patients must understand that disposing of unused opioids is a vital part of improving healthcare in their own communities.³⁸ Physicians can also play a critical role by emphasizing a multimodal approach with a non-opioid foundation and to use opioids only when necessary.

Conclusions

Solving the current opioid epidemic will require a multi-faceted approach, and will require the education and participation of healthcare providers (including surgeons, anesthesiologists, pharmacists and nurses) and importantly, patients. Recognizing the significant role that postoperative pain management and the surgical setting can play in fueling the epidemic is crucial in the development of

strategies to prevent the development of drug tolerance and addiction. Investments in innovative non-opioid treatment options as the foundation for postoperative acute pain management represent a significant tool in battling the opioid epidemic by preventing and reducing exposure to opioids. Utilizing non-opioid as the foundation can have a positive effect in reducing the number of opioid prescriptions in the surgical setting and at discharge, having the potential to reduce both ORADEs and rates of addiction. Additionally, previous research has demonstrated that non-opioid postoperative acute pain management can have an impact on short term and long term healthcare costs.

A reprioritization of postoperative acute pain management towards a non-opioid foundation has significant potential to reduce costs to the healthcare system. If a percentage of the 40 million annual surgeries that result in an opioid prescription were to be treated with non-opioid therapies instead, then it is reasonable to expect significant cost savings. For example, if 30% of these surgeries (or 12 million) were treated without opioids, it is feasible to see a reduction of 30% in the number of addictions that result from postoperative care (132,000 fewer addicts). Opioid addiction costs the healthcare system approximate \$30,000 per patient, so a reduction of 132,000 opioid addicts could represent a savings of almost \$4 billion. Furthermore, it is reasonable to expect similar reductions in ORADEs as a result of opioid free surgery- if 30% of postoperative patients did not receive opioids, there could potentially be a 30% reduction in the number of ORADEs following postoperative care. Taking into the approximately \$1.1 billion of healthcare costs associated with postoperative ORADEs, this 30% reduction could amount to a savings of over \$300 million. By putting an emphasis on non-opioid postoperative pain management, it is possible to see significant reductions in healthcare costs associated with opioid use, such as ORADEs and addiction. Additionally, non-opioid postoperative pain management can result in better patient care and outcomes, providing adequate treatment without exposing patients to the risks associated with opioids. ●

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DESIGNED FOR  BY  CUSTOM MEDIA

HERON THERAPEUTICS RETAINS SOLE RESPONSIBILITY FOR THE CONTENT WITHIN.