PEER REVIEW HISTORY

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ARTICLE DETAILS

| TITLE (PROVISIONAL) | Time trends and patterns in opioid prescription use following orthopedic surgery in Ontario, Canada from 2004/05 to 2017/18: A population-based study. |
| AUTHOR(S) | Canizares, Mayilee; Power, J. Denise; Perruccio, Anthony V.; Veillette, Christian; Mahomed, Nizar; Rampersaud, Y. Raja |

VERSION 1 – REVIEW

| REVIEWER | Flanagan, Christopher D University of South Florida |
| REVIEW RETURNED | 02-May-2023 |

| GENERAL COMMENTS | Abstract, Results: The way that this is written is confusing. If 25.1% of patients were chronic users, what does it then mean that 80.9% of patients had one-year post-operative opioid use? The entire results section needs clarification.

Results: I understand the "one-year post-operative use" after it is explained in the paper, but I think you should reconsider your nomenclature for this use. To the casual reader, especially those only reading the abstract, this appears to mean that 75% of patients were using pain medication at one year. Perhaps a better way to say this may be "within 1 year of surgery, 80% of patients had used an opioid medication. This had increased by 8% from 2004, when only 75% of patient's had used an opioid medication within in 1 year of surgery". Or something along these lines.

Results: Can you comment on the meaning of the changes in mean days and MME amount/day seen in 2014. Is this showing that basically prescribers gave the same amount of medication, just changed the dosing instructions (e.g., take 1 tab every 6 hours instead of every 4 hours?). Did the number of patients receiving a refill change?

Overall the study is interesting and shows changes in prescribing. Ultimately, what should prescribers or readers of this paper take away from it, in terms of actionable items to reduce opioid use? It's not clear to me, based on this data, that the mandatory reporting system made a difference. |

| REVIEWER | Bhashyam, Abhiram Harvard Combined Orthopaedics Residency Program, Orthopaedic Surgery |
| REVIEW RETURNED | 25-Jun-2023 |
Thank you for the opportunity to review this paper. In this study, the authors investigated temporal trends and patterns in opioid prescribing to orthopaedic surgery patients between 2004/2005 and 2017/2018.

While I agree that this is an important topic and the authors included a large group of patients, this paper has several limitations which I think significantly affect the generalizability or novelty of its findings.
1. It is already well known through several specialty specific articles that prescribing guidelines led to significant differences in prescribing and use - this is not novel
2. The authors could not study use - only prescribing habits and this is also well documented
3. The choice of 2017/2018 is curious - this is just when many guidelines were being formulated or modified. A later time point would have provided more valuable information.
4. I don’t see how this study would change my practice or influence public policy.

For these reasons, I recommend reject.

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This is a well written, descriptive, retrospective study of opioid prescribing trends after elective orthopedic surgery in older adults in Ontario, in the background of nation-wide efforts aimed at reducing opioid related harms. Results and discussion are clear with acknowledgement of limitations.

Minor considerations
- Opioids of interest include methadone. Is there a way to differentiate use for pain vs opioid use disorder? Are tramadol and tapentadol covered in Ontario?
- For study population characteristics, is there information on comorbidity of substance use disorder?

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Thank you for the opportunity to review this manuscript. In their paper entitled “Time trends and patterns in opioid prescription use following orthopedic surgery in Ontario from 2004/5 to 2017/2018,” the authors present data describing the frequency, duration, and nature of opioid prescriptions for patients age 66+ after elective orthopaedic surgery. Overall, they find that 80% of patients filled an opioid prescription within 90 days of their index operation. The describe a trend of decreasing frequency of chronic of postoperative opioid prescribing. In addition to other findings, the authors also report decreasing intensity of prescriptions (in morphine milligram equivalents) but longer duration of initial prescriptions. Overall, this a well written manuscript that relies on robust data. The analysis is appropriate, and the conclusions are generally supported by the results. I have the following questions and comments for the authors:
1. The postoperative use of opioids in elective orthopaedic surgery patients has been well studied and documented in the literature. What sets your study apart or what is the unique contribution of this to the literature? This should be clearly stated in the introduction.

2. How do you define pre-operative opioid use? I see a definition in a footnote in table 1, but it needs to be explicitly stated in the methods section. It appears you categorize this as a binary variable. I would posit that someone who has a continuous opioid prescription preoperatively is very different from someone who has filled a single short-term prescription months before surgery (especially without data on the clinical indication). For example, prior work on this topic by MA Chaudhary and colleagues has used the categories of: no observed prior use, prior opioid exposed, and sustained prior use. I would suggest categorizing and describing prior opioid exposure in a more detailed way.

3. The first sentence of the results presents some confusion for me ("Considering one elective orthopedic surgery per patient/year, there were 464,460 surgeries performed …"). In the methods section, the authors specify that the first eligible surgery within a year was included. How were patients with multiple operations within the same year handled (and how many of these did you identify)? For example, if a patient has another surgery and fills another immediate postoperative prescription later in the year, would that potentially flag them as a chronic user? Please clarify this in the methods/results section.

4. For patients who underwent multiple operations within the study period, but in different years, could a subset analysis be done to see if there are trends over time in this group with repeat orthopaedic operations? How many of these patients did you identify?

5. Do the authors have a hypothesis as to why, despite the changes in public sentiment and policies around opioid prescribing, the overall rate of prescribing increased? Similarly, while evidence and guidelines recommend shorter initial prescription duration, the authors report longer initial prescription duration. Do they have a hypothesis as to potential causes of this finding?

6. The authors describe a shift in prescribing patterns around 2014/2015/2016, however they point to a program that had been fully implemented 2 years prior as the likely driver of this change. I am skeptical of this as the sole, or even a primary driver, based solely on this weak temporal association. Are there other forces you can identify? If there are other reasons this is the most likely driver, they should be more clearly explained.

7. What are the proposed/suggested next steps for this work? What specific policies from their review of the literature would they suggest as most likely to combat the root of the particular concerning trends they identify?
reading the abstract, this appears to mean that 75% of patients were using pain medication at one year. Perhaps a better way to say this may be "within 1 year of surgery, 80% of patients had used an opioid medication. This had increased by 8% from 2004, when only 75% of patient's had used an opioid medication within in 1 year of surgery". Or something along these lines.

Response: Thank you for the suggestion; we have changed "one-year post-operative use" with "within one year of surgery" throughout the manuscript.

Results: Can you comment on the meaning of the changes in mean days and MME amount/day seen in 2014. Is this showing that basically prescribers gave the same amount of medication, just changed the dosing instructions (e.g., take 1 tab every 6 hours instead of every 4 hours?). Did the number of patients receiving a refill change?

Response: Unfortunately, with this type of data, we cannot ascertain the dosing instructions, but we observed changes in the total amount (MMEs) per prescription and the duration of the prescription. For example using the initial prescription, the total amount was 328 MMEs in 2004 vs 451 in 2017. For the duration, the estimates were 9.1 days to 13.6 days. This was also true for the calculations using all prescriptions within one year post-surgery. The proportion of patients with refills increased slightly from 60.1% to 63.5% for the overall cohort.

Overall the study is interesting and shows changes in prescribing. Ultimately, what should prescribers or readers of this paper take away from it, in terms of actionable items to reduce opioid use? It's not clear to me, based on this data, that the mandatory reporting system made a difference.

Response: Thank you for the comment. We did not intent to imply that mandatory reporting system led to changes in prescribing practices. Our goals were broader, considering that orthopedic surgeons are among the most common opioid prescribers and that orthopedic surgeries are common, we wanted to document changes in prescribing patterns of orthopedic surgeons. Furthermore, in the absence of surgery-specific guidelines we also wanted to explore if changes in prescribing by orthopedic surgeons mapped somewhat changes in guidelines and recommendations (the mandatory reporting system among others) for opioid prescribing for chronic pain more generally. Our findings highlight, that even in the absence of specific guidelines for surgical prescribing, general policies and guidelines influence somewhat opioid prescription patterns in the surgical population. Our findings support the need for high-quality evidence and initiatives to optimize opioid use in the surgical population.

Reviewer: 2
Dr. Abhiram Bhashyam, Harvard Combined Orthopaedics Residency Program

Comments to the Author:
Thank you for the opportunity to review this paper. In this study, the authors investigated temporal trends and patterns in opioid prescribing to orthopaedic surgery patients between 2004/2005 and 2017/2018.

While I agree that this is an important topic and the authors included a large group of patients, this paper has several limitations which I think significantly affect the generalizability or novelty of its findings.

1. It is already well known through several specialty specific articles that prescribing guidelines led to significant differences in prescribing and use - this is not novel

Response:
To address the opioid crisis, various jurisdictions have developed initiatives and interventions for opioid prescribing for chronic pain but there remains a paucity in guidelines/recommendations for post-operative opioid therapy. Few US based studies have evaluated the impact of the CDC guidelines on prescribing opioids for chronic pain (see for example 1 and 2), but there is even less evidence on the impact of guidelines among the surgical population and on jurisdictions outside the US. By focusing on Canadian jurisdictions and surgical populations, our study is novel in accounting for factors immediate to Canadian reality rather than relying on US based studies and institutional practices as proxies. In Canada, there is a lack of surgery-specific guidelines and recommendations
for opioid prescribing, and it is not clear if broad initiatives focused on prescribing opioids for chronic pain influence orthopedic prescribing practices. Therefore, our study is timely and adds to the literature by giving more depth to the specifics of the Canadian context, which differs significantly, from US contexts. We have edited the introduction hoping that this context is clearer.


Response: We used routinely collected administrative data on healthcare and drug use, which limited the years we could study, as we had to rely on data availability. Nevertheless, the data source used had the advantage that we could examine patterns of opioid prescription at the population level in a large jurisdiction with universal access to care.

Although we agree that some studies have documented opioid prescriptions in this population (1), the influence of guidelines/recommendations on prescription practices in a surgical population is not well documented. As such, our goal was beyond the description of opioid prescription, but to examine the influence of guidelines/recommendations on prescription practices following elective orthopedic surgery. We feel that our study adds to the growing literature on opioid prescription guidelines following surgery.


4. I don't see how this study would change my practice or influence public policy.

The goals of this study were not to change individual surgeon practice. The main goal was to document the potential impact of broad policies and guidelines related to opioid prescribing in shaping opioid prescription patterns in the surgical population, even in the absence of specific guidelines for surgical prescribing. We believe that our findings highlight the importance of further research to understand opportunities to develop and implement surgery-specific prescribing guidelines, and additional research into the provider-related factors that may influence prescribing patterns. Another area that warrants further attention is investigating alternative pain management strategies while recognizing that opioids remain an important therapy for managing pain after surgery.

Reviewer: 3

Dr. Lisa Doan, NYU Langone Medical Center

Comments to the Author:

This is a well written, descriptive, retrospective study of opioid prescribing trends after elective orthopedic surgery in older adults in Ontario, in the background of nation-wide efforts aimed at reducing opioid related harms. Results and discussion are clear with acknowledgement of limitations.

Response: Thank you for the comment.

Minor considerations

-Opioids of interest include methadone. Is there a way to differentiate use for pain vs opioid use disorder? Are tramadol and tapentadol covered in Ontario?

Response: Thank you for the comment. Unfortunately, this database do not include the reasons for the opioid prescription. In the Methods, we included all monitored narcotics under the Ontario’s Narcotics Strategy (https://www.health.gov.on.ca/en/public/programs/drugs/ons/publicnotice/monitored_drugs.aspx);
however, there were no prescriptions in the study period for tramadol and tapentadol. We had 221 patients (0.05%) with a methadone prescription.

Response: Thank you for the question. We found that 0.09% (304) of opioid users had drug related disorders. We used the definition as in “Huỳnh C, Kisely S, Rochette L, et al. Measuring Substance-Related Disorders Using Canadian Administrative Health Databanks: Interprovincial Comparisons of Recorded Diagnostic Rates, Incidence Proportions and Mortality Rate Ratios. The Canadian Journal of Psychiatry. 2022;67(2):117-129.”

Reviewer: 4
Dr. Michael Dalton, Rutgers New Jersey Medical School

Comments to the Author:
Thank you for the opportunity to review this manuscript. In their paper entitled “Time trends and patterns in opioid prescription use following orthopedic surgery in Ontario from 2004/5 to 2017/2018,” the authors present data describing the frequency, duration, and nature of opioid prescriptions for patients age 66+ after elective orthopaedic surgery. Overall, they find that 80% of patients filled an opioid prescription within 90 days of their index operation. The describe a trend of decreasing frequency of chronic of postoperative opioid prescribing. In addition to other findings, the authors also report decreasing intensity of prescriptions (in morphine milligram equivalents) but longer duration of initial prescriptions. Overall, this a well written manuscript that relies on robust data. The analysis is appropriate, and the conclusions are generally supported by the results. I have the following questions and comments for the authors:

Response: Thank you for the comment.

1. The postoperative use of opioids in elective orthopaedic surgery patients has been well studied and documented in the literature. What sets your study apart or what is the unique contribution of this to the literature? This should be clearly stated in the introduction.

Response: Thank you for the suggestion. Although post-operative opioid use following TJR and spine surgery have been widely studied, one strength of our study is that we included elective orthopedic surgeries in all joints in a population with universal access to care. Additionally, in Canada, there is a lack of surgery-specific guidelines and recommendations for opioid prescribing, and it is not clear if broad initiatives focused on prescribing opioids for chronic pain influence orthopedic prescribing practices. Therefore, our goal was to explore whether temporal changes in prescribing practices were somewhat related to broad changes in guidelines and recommendations for opioid prescribing for chronic pain. We have edited the introduction hoping that the context of the study is clearer.

2. How do you define pre-operative opioid use? I see a definition in a footnote in table 1, but it needs to be explicitly stated in the methods section. It appears you categorize this as a binary variable. I would posit that someone who has a continuous opioid prescription preoperatively is very different from someone who has filled a single short-term prescription months before surgery (especially without data on the clinical indication). For example, prior work on this topic by MA Chaudhary and colleagues has used the categories of: no observed prior use, prior opioid exposed, and sustained prior use. I would suggest categorizing and describing prior opioid exposure in a more detailed way.

Response: We have added the definition of pre-operative opioid use to the Methods. We focused on pre-operative opioid use close to the index surgery (90 days). In the absence of a standardized definition of opioid use and given the wide variability of definitions of opioid use in the literature, we decided to use a less stringent criterion (1+ prescriptions filled within the 90 days pre-operative window). Likewise for the definition of post-operative use. Note, that the definitions used in this paper had been previously used in studies that used the same data source as in ours. Nevertheless, we acknowledge that this may be a limitation of our analysis and we have included this in the Limitations section in the Discussion.

3. The first sentence of the results presents some confusion for me (“Considering one elective orthopedic surgery per patient/year, there were 464,460 surgeries performed …”). In the methods
section, the authors specify that the first eligible surgery within a year was included. How were patients with multiple operations within the same year handled (and how many of these did you identify)? For example, if a patient has another surgery and fills another immediate postoperative prescription later in the year, would that potentially flag them as a chronic user? Please clarify this in the methods/results section.

Response: Thank you for the comment. In the analysis, we included patients with one eligible surgery within each year (within each year we have unique patients). However, patients with surgeries at subsequent years were included. The numbers for the whole period represent number of surgeries.

4. For patients who underwent multiple operations within the study period, but in different years, could a subset analysis be done to see if there are trends over time in this group with repeat orthopaedic operations? How many of these patients did you identify?

Response: Thank you for the suggestion. Over the study period (2004-2017) 75% of patients has only one surgery. As suggested, we calculated the proportion of opioid use for the subset of patients with multiple surgeries and found similar results as the whole sample. This is not surprising as the median time between 2 consecutive surgeries was 2 years and our opioid use definition was limited to one year after surgery.

5. Do the authors have a hypothesis as to why, despite the changes in public sentiment and policies around opioid prescribing, the overall rate of prescribing increased? Similarly, while evidence and guidelines recommend shorter initial prescription duration, the authors report longer initial prescription duration. Do they have a hypothesis as to potential causes of this finding?

Response: We think that one possibility is related to the restrictions for prescribing opioids. It is possible that patients needing refills for opioids would have to consult with the surgeon, and therefore some surgeons prescribe opioids for longer duration in the initial prescription hoping that patients will not need to come back to obtain a refill. Unfortunately, we cannot corroborate if this is the case with the available data.

6. The authors describe a shift in prescribing patterns around 2014/2015/2016, however they point to a program that had been fully implemented 2 years prior as the likely driver of this change. I am skeptical of this as the sole, or even a primary driver, based solely on this weak temporal association. Are there other forces you can identify? If there are other reasons this is the most likely driver, they should be more clearly explained.

7. What are the proposed/suggested next steps for this work? What specific policies from their review of the literature would they suggest as most likely to combat the root of the particular concerning trends they identify?

Response: We have addressed points 6 & 7 together. It was not our intention to attribute changes to any particular measure implemented during the study period. We think that surgeons have adapted their prescription practices somewhat based on the release of guidelines and recommendations by the government and medical associations and the general tenor of the public discourse around opioids. Our intention was to highlight the importance of further research to understand opportunities to develop and implement surgery-specific prescribing guidelines, and additional research into the provider-related factors that may influence prescribing patterns. Another area that warrants further attention is investigating alternative pain management strategies while recognizing that opioids remain an important therapy for managing pain after surgery.
changes affected overall opioid prescribing practices. I would consider being careful to clarify this further.

**REVIEWER**
Dalton, Michael
Rutgers New Jersey Medical School, Surgery

**REVIEW RETURNED**
04-Sep-2023

**GENERAL COMMENTS**
Thank you for the opportunity to review the revised and resubmitted manuscript. I thank the authors for their responses to my prior questions/comments. I do have some additional comments and suggestions for the authors:

1) I appreciate the authors’ response regarding where their study fits in the literature, however I feel that they do not adequately elaborate on this in the introduction of the actual manuscript. While they explain more clearly what they sought to describe in their work, it still remains unclear to me what the novelty of this study is or its new contributions to practice in the face of the existing body of literature on the topic.

2) Additionally, I question the usefulness of the reported data in crafting policy or informing practice as the newest data in this study is nearly 4-5 years old, which represents a potentially significant time lag in the rapidly evolving topic of opioid prescribing. Was this the most current data available? I feel this limitation should be further addressed in the manuscript.

3) In general, the authors provide robust responses to the majority of my questions/comments. However, these clarifications and additional context belong in the manuscript to assist the reader by providing further clarity to the reader of the manuscript, providing more of the authors’ analysis of the reported data, and describing the impact of this work or ways to implement policy related to their findings.

Minor comment:
4) In the measures section (p10, line 21) – I believe it should be “pre-operative” not “post-operative”

**VERSION 2 – AUTHOR RESPONSE**

Reviewer #2:

Unfortunately we did not provide sufficient clarity with the incorporation of our revised text. Reviewer’s point #1 was addressed in the Introduction, last paragraph page 6 and first paragraph page 7:

“Opioid therapy is commonly prescribed to treat moderate to severe pain after major elective surgery. However, opioids are associated with potential harms including risks of long-term use, negative surgical outcomes, and potentially diversion.[2, 20-23] US and Canadian studies have reported that about 10% of patients undergoing surgery are persistent opioid users within one year of surgery,[2, 3] and that surgical patients generally use less opioids than prescribed, with the potential of diversion for non-medical use.[4]”

“Recognizing these potential harms, initiatives and interventions to address the opioid crisis have mainly focused on regulatory changes for prescription opioids for chronic pain, with less clear
guidelines/recommendations for post-operative opioid therapy.[5,8,9,13,24] The use of opioids in surgical patients is challenging as physicians need to balance managing acute pain in the immediate post-operative period while curtailing the risks of persistent opioid use following the surgery. In the absence of guidelines/recommendations for post-operative opioid therapy, examining whether broad initiatives focused on opioid prescribing for chronic pain nevertheless influence opioid prescribing following major elective surgery can inform alternative approaches to treating post-surgical pain."

Points #2 and 3 were addressed in the limitations.

“Our study has limitations due to the nature of routinely collected administrative data, which limited the years we could study, as we had to rely on data availability. Nevertheless, the data source used had the advantage that we could examine patterns of opioid prescription at the population level in a large jurisdiction with universal access to care. Furthermore, we used data on dispensed drugs, but we are unable to determine whether patients used the medication. It is possible that some of the prescriptions captured may have been unused. Likewise, the datasets used lacks important details such as in-hospital drug use, reasons for opioid prescriptions, and prescriptions that were indicated but never dispensed.”

Point #4, as we explained to the reviewer, the goals of this study were not to change individual surgeon practice. The main goal was to document the potential impact of broad policies and guidelines related to opioid prescribing in shaping opioid prescription patterns in the surgical population, even in the absence of specific guidelines for surgical prescribing. This stated in the introduction (page 7, last paragraph) as follows:

“The examination of prescription opioid use following orthopedic surgery over time may help to elucidate if evidence-based recommendations and public attention to the opioid crisis have influenced orthopedic surgeons’ opioid prescription practices. Therefore, the goal of this study was to characterize time trends and patterns of post-operative prescription opioid use in a large cohort of patients undergoing elective orthopedic surgery in Ontario (Canada’s most populous province with a population of 14.5 million people) from 2004/05 to 2017/18. We also examined trends over time in the amount prescribed, type of opioid prescribed, and co-prescription of opioids and benzodiazepines.”

Reviewer #3:

Regarding the reviewer’s question about a way to differentiate use for pain vs opioid use disorder, we have addressed this as a limitation (page 16) in the study:

“Likewise, the datasets used lacks important details such as in-hospital drug use, reasons for opioid prescriptions, and prescriptions that were indicated but never dispensed. We are unable to determine the reasons (e.g., persistent post-surgical pain) for persistent and/or chronic post-operative opioid use.”

Reviewer: 1

Dr. Christopher D Flanagan, University of South Florida

I think that the manuscript is much improved. However, I am still not sure that the data supports the conclusion that specific policy changes affected overall opioid prescribing practices. I would consider being careful to clarify this further.

Response:

Thank you. We agree that perhaps our conclusions were too strong in this regard. We have revised the text to highlight that the findings suggest that policy changes may have played a role in overall prescribing practices but that our study cannot make a determination in this respect as findings are
based on administrative data from which a direct correlation cannot be made. Modified the conclusions (page 17). The text now states:

“Therefore, our study suggests that changes in both policies and guidelines may have play a role in shaping overall opioid prescription patterns in the orthopedic surgical population, even in the absence of specific guidelines for surgical prescribing. However, as our findings are based on administrative data from which a direct correlation cannot be made, we cannot make a determination in this respect. Nevertheless, our findings highlight the need for high-quality evidence and initiatives to optimize opioid use in the surgical population, as well as additional research into the provider-related factors that may influence prescribing patterns.”

We have also noted this in the limitations (page 16): “Given the number of initiatives and the timing of their implementation, it is difficult to attribute a particular initiative to the trends seen in our study.”

Reviewer: 4

Dr. Michael Dalton, Rutgers New Jersey Medical School

Thank you for the opportunity to review the revised and resubmitted manuscript. I thank the authors for their responses to my prior questions/comments. I do have some additional comments and suggestions for the authors:

1) I appreciate the authors’ response regarding where their study fits in the literature, however I feel that they do not adequately elaborate on this in the introduction of the actual manuscript. While they explain more clearly what they sought to describe in their work, it still remains unclear to me what the novelty of this study is or its new contributions to practice in the face of the existing body of literature on the topic.

Response:

Thank you. We have added additional information in the introduction page 7 with the hope of improving clarity: “In Canada, there is a lack of surgery-specific guidelines and recommendations for opioid prescribing, and it is not clear if broad initiatives focused on prescribing opioids for chronic pain possibly influence orthopedic surgeon’s prescribing practices. Therefore, in the absence of specific guidelines/recommendations for post-operative opioid therapy, examining whether broad initiatives focused on opioid prescribing for chronic pain nevertheless influence opioid prescribing following major elective surgery can inform alternative approaches to treating post-surgical pain.”

2) Additionally, I question the usefulness of the reported data in crafting policy or informing practice as the newest data in this study is nearly 4-5 years old, which represents a potentially significant time lag in the rapidly evolving topic of opioid prescribing. Was this the most current data available? I feel this limitation should be further addressed in the manuscript.

Response:

Thank you. The intent of our study was not to inform current clinical practice but rather to understand whether changes in general prescribing guidelines appear to be reflected in practice changes. We have included the following texts in the discussion to acknowledge the limitation (page 16):

“Our study has limitations due to the nature of routinely collected administrative data, which limited the years we could study, as we had to rely on data availability. Nevertheless, since our goal was to explore whether changes in general guidelines might correspond with changes in practice observed at a system (or population) level using administrative data, including the timing between the two, might point towards a direct influence and the potential benefits of crafting and implementing specific post-operative guidelines.”
We have also edited our concluding paragraph (pages 17-18) to further clarify this point:

“Therefore, our study suggests that changes in both policies and guidelines may have play a role in shaping overall opioid prescription patterns in the surgical population, even in the absence of specific guidelines for surgical prescribing. However, as our findings are based on administrative data from which a direct correlation cannot be made, we cannot make a determination in this respect. Nevertheless, our findings highlight the need for high-quality evidence and initiatives to optimize opioid use in the surgical population, as well as additional research into the provider-related factors that may influence prescribing patterns. Another area that warrants further attention is investigating alternative pain management strategies while recognizing that opioids remain an important therapy for managing pain after surgery.”

3) In general, the authors provide robust responses to the majority of my questions/comments. However, these clarifications and additional context belong in the manuscript to assist the reader by providing further clarity to the reader of the manuscript, providing more of the authors’ analysis of the reported data, and describing the impact of this work or ways to implement policy related to their findings.

Response:

We have added the information as requested (See points 1-2 above).

Minor comment:

4) In the measures section (p10, line 21) – I believe it should be “pre-operative” not “post-operative”

Response:

Thank you for noticing the error. We have corrected the text.