



## Recent Advances in Post-Operative Pediatric Opioid Guidelines

**Megan LoFaso, PharmD Candidate 2022<sup>1</sup>**

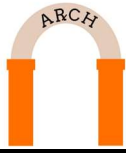
**Jace Swingle, PharmD Candidate 2022<sup>1</sup>**

<sup>1</sup>*University of Findlay College of Pharmacy*

### Abstract

Over the past few decades, the United States has been experiencing an opioid epidemic. Unfortunately, children and adolescents are not exempt from the effect this has had on our country. Lack of guidance in prescribing leading to improper or over prescribing can be associated with pediatric overuse and abuse. This article seeks to provide a review of *Guidelines for Opioid Prescribing in Children and Adolescents After Surgery*, a recently published guideline compiled using data from a multitude of published articles focused on pediatric opioid prescribing and the effects these agents have on children. These guidelines provide a gateway to continue research and development of specific guidelines to improve the practice of opioid prescribing after surgery.





### Introduction

Over the past few decades, the United States has experienced a dramatic increase in the prescribing of opioids leading to an increase in opioid related deaths.<sup>1</sup> Currently, the US remains at the forefront of this issue, surpassing Europe by four times in the amount of opioids prescribed in a year.<sup>2-5</sup> What is now famously known as the ‘opioid epidemic’ has affected individuals of all ages, killing 8,986 children and adolescents aging from 0 to 19 years old, which is an increase of 286.2% between the years of 1999 and 2016.<sup>1</sup>

In recent years many efforts have been made to raise awareness of this opioid epidemic, educate providers on safe prescribing practices, and make patients mindful of the potential risks that the overuse of opioids pose.<sup>6</sup> However, much of these efforts have been directed towards the adult population. There has been little research about appropriate opioid prescribing in pediatric patients, especially those requiring surgical procedures.<sup>7</sup> Recent studies have suggested that the adolescent use of opioids can lead to adult misuse.<sup>8-10</sup> With these findings it has become increasingly important to guide opioid prescribing for pediatric patients. The Journal of the American Medical Association is the first to tackle this by

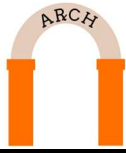
publishing *Guidelines for Opioid Prescribing in Children and Adolescents After Surgery*.<sup>7</sup>

### Review of Guideline

The study leading to the guideline development was completed by The American Pediatric Surgical Association Outcomes and Evidence-based Practice Committee as well as other professionals specializing in opioid stewardship. Guideline development was based on three prime questions related to opioid misuse, diversion, effective non-opioid regimens and patient/parent education. Kelly-Quon et al. conducted a search which surveyed a total of 14,574 articles for inclusion.<sup>7</sup> These were then narrowed down to 217 articles for analysis by searching topics such as opioid misuse in the pediatric population.<sup>7</sup> Articles that were excluded from the formulation of the guidelines included studies limited to neonatal intensive care, animal and experimental studies.<sup>7</sup>

The authors utilized the surveyed articles to come up with 20 guideline statements pertaining to safe opioid prescribing. These were broken down into 3 major categories: (1) Opioid Misuse, Heroin Use, Diversion, and Conversion to Long-term Use, (2) Perioperative Nonopioid Regimens, and (3) Patient and Family Education.<sup>7</sup>





The first category discusses the impact that the prescribing of opioids to adolescents has on their future behaviors. The trend begins with the prescribing of opioids as most adolescents who misuse opioids obtain them from a prescribing physician.<sup>11-14</sup> Of the adolescents that are prescribed opioids, 3.1% report opioid misuse.<sup>15</sup> While this is a decrease from recent years it is a drastic increase compared to pre-opioid epidemic levels. Additionally, of the adolescents who misuse opioids, a significant number of them will develop future opioid dependence which may include a heroin addiction.<sup>16-17</sup>

The National Survey on Drug Use and Health has reported that 39.2% of opioid misuse cases result from diversion.<sup>18</sup> In the *Guidelines for Safe Opioid Prescribing* by Nationwide Children's Hospital it is noted that the over prescribing of opioids in adolescents is a major contributor to the act of diversion.<sup>19</sup> According to McCabe et al, if approached, 94% of patients will divert medication.<sup>20</sup> Sources show that proper education on the effects of opioids and consequences of diversion can help slow this event.<sup>13</sup>

According to Kelly-Quon et al, pain regimens containing non-opioid alternatives such as acetaminophen, NSAIDs (ketorolac, etc), and steroids are reasonable options for specific postoperative periods.<sup>21,22</sup> This is most feasible in certain general,

otolaryngology, and urology surgeries due to their incision size, amount of dissection, and overall invasiveness.<sup>22-30</sup> If adequate pain management is not met with non-opioids, it is recommended that the non-opioid options be optimized followed by an addition of the lowest tolerable dose of an opioid agent.<sup>23,26</sup> It is preferred that these non-opioids be optimized enterally, however, the use of intravenous non-opioids can also be utilized to minimize opioid usage.<sup>7</sup>

It should be noted that if opioid use is required, the FDA states that the use of tramadol and codeine should be avoided in adolescents less than 18 years of age.<sup>31</sup> Tramadol and codeine can induce fatal respiratory depression in patients undergoing tonsillectomy and adenoidectomy, especially under the age of 12 years.<sup>32-33</sup> These agents should also be avoided in obese patients less than 18 years old with obstructive sleep apnea, severe lung disease, or at other risk for pulmonary obstruction.<sup>32-33</sup>

It is important to note that with the lack of formal guidelines in the major pediatric journals, many institutions have established their own protocols on pediatric opioid prescribing. Nationwide Children's Hospital in Columbus, Ohio, a nationally ranked pediatric institution, released their *Guidelines to Safe Opioid Prescribing* in December 2016.<sup>19</sup> This protocol recommends prescribing opioids only when





absolutely necessary at the lowest tolerable dose for the shortest duration possible similar to the recommendations of Kelly-Quon et al.<sup>7,19</sup> Also noted by both sources is the importance of patient/family education on the proper use and disposal of unused medications.<sup>7,19</sup>

Education should begin before the day of surgery in order to decrease the anxiety that the patient and family may be experiencing.<sup>34</sup> This education should continue often and through discharge, providing the family unit with adequate time for questions and information digestion.<sup>35-37</sup> Special consideration should be made for parents caring for young children as parental understanding of pain management regimens has been linked to reduced parental/patient anxiety leading to a decrease in the patient's preoperative and post-operative pain.<sup>38</sup> According to Kelly-Quon et al, the recommended counseling points in the patient and caregiver education include common side effects, how to properly take the medication, proper storage as well as appropriate disposal.<sup>10</sup> Follow-up is also recommended to assess the patient's well-being as well as proper medication disposal if needed. Follow-up on disposal is important because it is estimated that 30% of caregivers do not dispose of opioids properly due to forgetfulness or poor understanding of the importance of proper disposal.<sup>39</sup>

In conclusion, *Guidelines for Opioid Prescribing in Children and Adolescents After Surgery* by Kelly-Quon et al. provides recommendations consistent with the recommendations of the FDA and current providing practices as evidenced by the protocol from Nationwide Children's Hospital. While the authors provide some examples of medications that can be utilized in the decrease of opioid prescribing in certain surgeries, they do not provide any dosing recommendations for these medications. In addition, the authors provide guidance on the practices to prevent opioid use, overuse, and misuse. However, the authors do not provide readers with the appropriate dosing of opioids in the pediatric population or the algorithm used to arrive at the prescribing of such medications. Further studies must be conducted in order to fill in the literature gap for pediatric opioid prescribing. These guidelines set the stage for researchers to continue to evaluate and assess opioid prescribing practices in the pediatric population and continue to combat the opioid epidemic in the United States.

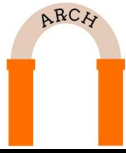




### References

- 1) Gaither JR, Shabanova V, Leventhal JM. US national trends in pediatric deaths from prescription and illicit opioids, 1999-2016. *JAMA Netw Open*. 2018;1(8):e186558.
- 2) Guy GP, Jr., Zhang K, Bohm MK, et al. Vital Signs: Changes in Opioid Prescribing in the United States, 2006–2015. *MMWR - Morbidity & Mortality Weekly Report*. 2017 7 07;66(26):697–704. PubMed PMID: 28683056; English. [PubMed: 28683056]
- 3) Washington DUDoVA, US Department of Defense, The Management of Opioid Therapy for Chronic Pain Working Group. The Management of Opioid Therapy for Chronic Pain Working Group. VA/DoD clinical practice guideline for management of opioid therapy for chronic pain. 2010.
- 4) Group UoWPPS. University of Wisconsin Pain & Policy Studies Group. Global Opioid Consumption, 2015. Madison, WI: University of Wisconsin Pain & Policy Studies Group; 2015.
- 5) Chou R 2009 Clinical Guidelines from the American Pain Society and the American Academy of Pain Medicine on the use of chronic opioid therapy in chronic noncancer pain: what are the key messages for clinical practice? [Review]. *Pol Arch Med Wewn*. 2009 7-8;119(7-8):469–77. PubMed PMID: 19776687; English. [PubMed: 19776687]
- 6) Overton HN, Hanna MN, Bruhn WE, Hutfless S, Bicket MC, Makary MA; Opioids After Surgery Workgroup. Opioid-prescribing guidelines for common surgical procedures: an expert panel consensus. *J Am Coll Surg*. 2018;227(4):411-418.
- 7) Kelley-Quon LI, Kirkpatrick MG, Ricca RL, Baird R, Harbaugh CM, Brady A, Garrett P, Wills H, Argo J, Diefenbach KA, Henry MCW, Sola JE, Mahdi EM, Goldin AB, St Peter SD, Downard CD, Azarow KS, Shields T, Kim E. Guidelines for Opioid Prescribing in Children and Adolescents After Surgery: An Expert Panel Opinion. *JAMA Surg*. 2021 Jan 1;156(1):76-90
- 8) Hu M-C, Griesler P, Wall M, Kandel DB. Age-related patterns in nonmedical prescription opioid use and disorder in the US population at ages 12-34 from 2002 to 2014. *Drug Alcohol Depend*. 2017;177:237-243.
- 9) Banerjee G, Edelman EJ, Barry DT, et al. Non-medical use of prescription opioids is associated with heroin initiation among US veterans: a prospective cohort study. *Addiction*. 2016;111(11):2021-2031
- 10) Kelley-Quon LI, Cho J, Strong DR, et al. Association of nonmedical prescription opioid use with subsequent heroin use initiation in adolescents. *JAMA Pediatr*. 2019;e191750.
- 11) US Department of Health and Human Services SAMHSA, Center for Behavioral Health Statistics and Quality. National Survey on Drug Use and Health 2017 (NSDUH-2017-DS0001). Published 2019. Accessed October 7, 2020.
- 12) Osborne V, Striley CW, Nixon SJ, Winterstein AG, Cottler LB. Sex differences in patterns of prescription opioid non-medical use among 10-18 year olds in the US. *Addict Behav*. 2019;89:163-171.
- 13) McCabe SE, West BT, Boyd CJ. Motives for medical misuse of prescription opioids among adolescents. *J Pain* 2013;14(10):1208-1216.
- 14) Brands B, Paglia-Boak A, Sproule BA, Leslie K, Adlaf EM. Nonmedical use of opioid analgesics among Ontario students. *Can Fam Physician*. 2010; 56(3):256-262.
- 15) Sung H-E, Richter L, Vaughan R, Johnson PB, Thom B. Nonmedical use of prescription opioids among teenagers in the United States: trends and correlates. *J Adolesc Health*. 2005;37(1):44-51.
- 16) Cerdá M, Santaella J, Marshall BDL, Kim JH, Martins SS. Nonmedical prescription opioid use in childhood and early adolescence predicts transitions to heroin use in young adulthood: a national study. *J Pediatr*. 2015;167(3):605-12.e1, 2.
- 17) Lankenau SE, Teti M, Silva K, Bloom JJ, Harocopos A, Treese M. Patterns of prescription drug misuse among young injection drug users. *J Urban Health*. 2012;89(6):1004-1016.
- 18) US Department of Health and Human Services SAMHSA, Center for Behavioral Health Statistics and Quality. National Survey on Drug Use and Health 2017 (NSDUH-2017-DS0001). Published 2019. Accessed October 7, 2020.
- 19) Nationwide Children's Hospital [Internet]. Columbus (OH): Nationwide Children's Hospital; Dec 2016. Guidelines for Safe Opioid Prescribing; [cited 21 Jan 2021]; [4 pages].
- 20) McCabe SE, West BT, Teter CJ, Ross-Durow P, Young A, Boyd CJ. Characteristics associated with the diversion of controlled medications





- among adolescents. *Drug Alcohol Depend.* 2011;118(2-3):452-458.
- 21) Kelly LE, Sommer DD, Ramakrishna J, et al. Morphine or Ibuprofen for post-tonsillectomy analgesia: a randomized trial. *Pediatrics.* 2015;135 (2):307-313.
- 22) Mattos JL, Robison JG, Greenberg J, Yellon RF. Acetaminophen plus ibuprofen versus opioids for treatment of post-tonsillectomy pain in children. *Int J Pediatr Otorhinolaryngol.* 2014;78(10):1671-1676.
- 23) Riad W, Moussa A. Pre-operative analgesia with rectal diclofenac and/or paracetamol in children undergoing inguinal hernia repair. *Anaesthesia.* 2007;62(12):1241-1245.
- 24) Kuzma J. Randomized clinical trial to compare the length of hospital stay and morbidity for early feeding with opioid-sparing analgesia versus traditional care after open appendectomy. *Clin Nutr.* 2008;27(5):694-699.
- 25) Kashefi P, Mirdamadi M. Preemptive analgesia with ibuprofen and acetaminophen in pediatric lower abdominal surgery. *J Res Med Sci.* 2005;10 (4):222-226.
- 26) Viitanen H, Tuominen N, Vääräniemi H, Nikanne E, Annala P. Analgesic efficacy of rectal acetaminophen and ibuprofen alone or in combination for paediatric day-case adenoidectomy. *Br J Anaesth.* 2003;91(3):363-367
- 27) Sutters KA, Miaskowski C, Holdridge-Zeuner D, et al. A randomized clinical trial of the effectiveness of a scheduled oral analgesic dosing regimen for the management of postoperative pain in children following tonsillectomy. *Pain.* 2004;110(1-2):49-55.
- 28) Bolton P, Bridge HS, Montgomery CJ, Merrick PM. The analgesic efficacy of preoperative high dose (40 mg x kg(-1)) oral acetaminophen after bilateral myringotomy and tube insertion in children. *Paediatr Anaesth.* 2002;12(1):29-35.
- 29) Moir MS, Bair E, Shinnick P, Messner A. Acetaminophen versus acetaminophen with codeine after pediatric tonsillectomy. *Laryngoscope.* 2000;110(11):1824-1827.
- 30) Dawson GS, Seidman P, Ramadan HH. Improved postoperative pain control in pediatric adenotonsillectomy with dextromethorphan. *Laryngoscope.* 2001;111(7):1223-1226.
- 31) United States Food and Drug Administration (FDA). FDA drug safety communication: FDA restricts use of prescription codeine pain and cough medicines and tramadol pain medicines in children; recommends against use in breastfeeding women. Published 2017. Accessed November 18, 2019.
- 32) Food and Drug Administration (FDA). FDA Drug Safety Communication: FDA restricts use of prescription codeine pain and cough medicines and tramadol pain medicines in children; recommends against use in breastfeeding women. 2017.
- 33) Food and Drug Administration (FDA). Tramadol: drug safety communication - FDA evaluating risks of using in children aged 17 and younger. 2015.
- 34) Wisselo TL, Stuart C, Muris P. Providing parents with information before anaesthesia: what do they really want to know? *Paediatr Anaesth.* 2004;14(4):299-307.
- 35) Kankkunen P, Vehviläinen-Julkunen K, Pietilä A-M, Halonen P. Is the sufficiency of discharge instructions related to children's postoperative pain at home after day surgery? *Scand J Caring Sci.* 2003;17(4):365-372.
- 36) Lim SH, Mackey S, Liam JLW, He H-G. An exploration of Singaporean parental experiences in managing school-aged children's postoperative pain: a descriptive qualitative approach. *J Clin Nurs.* 2012;21(5-6):860-869.
- 37) Sharek PJ, Wayman K, Lin E, et al. Improved pain management in pediatric postoperative liver transplant patients using parental education and non-pharmacologic interventions. *Pediatr Transplant.* 2006;10(2):172-177.
- 38) Fortier MA, Kain ZN. Treating perioperative anxiety and pain in children: a tailored and innovative approach. *Paediatr Anaesth.* 2015;25(1): 27-35.
- 39) Kain ZN, MacLaren JE, Hammell C, et al. Healthcare provider-child-parent communication in the preoperative surgical setting. *Paediatr Anaesth.* 2009;19(4):376-384.

