

# Standardized Opioid Counseling Is Underperformed Before and After Anterior Cruciate Ligament Reconstruction



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**Purpose:** To characterize contemporary pain management strategies after anterior cruciate ligament reconstruction (ACLR) within the US and international orthopaedic community. **Methods:** This was a cross-sectional survey-based study disseminated to a consortium of expert orthopaedic surgeons in the management of anterior cruciate ligament injuries. The survey was a 27-question, multiple choice—style questionnaire with question topics ranging from demographic characteristics and practice characteristics to surgeon-specific pain management strategies in the postoperative period after ACLR. Specific topics of interest included the use of preoperative opioid education and/or counseling sessions, implementation of standardized pain management regimens, use of pain tracking systems, and use of any adjunct non-narcotic analgesic modalities. **Results:** A total of 34 completed surveys were collected, representing a 73.9% response rate. Over 85% of respondents reported prescribing opioids as a standardized postoperative regimen after ACLR. Surgeons reported prescribing 5- to 10-mg doses, with the tablet count ranging anywhere from fewer than 10 tablets to more than 20 tablets, often instructing their patients to stop opioid use 2 to 4 days postoperatively. Prescribed dosages remained stable or decreased over the past 6 months with increased use of non-narcotic adjuncts. Only one-third of respondents reported using standardized preoperative opioid counseling, with even fewer discussing postoperative discontinuation protocols. **Conclusions:** Over 85% of respondents prescribe opioids as a standardized postoperative regimen after ACLR, with only 15% providing non-narcotic pain regimens. However, prescribed dosages have remained stable or decreased over the past 6 months with increased use of non-narcotic adjuncts. Only one-third of respondents use standardized preoperative opioid counseling, with even fewer discussing postoperative discontinuation protocols. **Clinical Relevance:** The ongoing opioid epidemic has created an urgent need to identify the most effective pain management strategies after orthopaedic procedures, especially ACLR. This study provides important information about current pain management practices for patients who have undergone ACLR.

Opioid abuse and overdose have fueled an epidemic that has claimed the lives of millions and placed an exorbitant burden on the global health care system.<sup>1,2</sup> Coronavirus disease 2019 (COVID-19) has further exacerbated the opioid epidemic, and although global studies regarding its effect are limited, reports within the United States have shown a more than 10%

increase in fatal overdoses and a nearly 20% increase in nonfatal overdoses since 2020.<sup>3</sup> Initiatives at the local, national, and global levels have sought to curb the opioid epidemic, and many of these have focused on regulating physician prescribing practices to minimize illicit diversion of narcotics to the public. Within the medical community, orthopaedic surgeons are often

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The authors report no conflicts of interest in the authorship and publication of this article. Full ICMJE author disclosure forms are available for this article online, as [supplementary material](#).

Received March 6, 2023; accepted May 25, 2023.

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<https://doi.org/10.1016/j.asmr.2023.100782>

scrutinized for their role in fueling the epidemic, partly because of their status as the greatest prescribers of narcotic medications of any health care profession.<sup>1,4,5</sup>

In response, the orthopaedic surgery community has been active in establishing guidelines for postoperative pain management. In 2021, the American Academy of Orthopaedic Surgeons (AAOS) released an evidence-based clinical practice guideline for pain alleviation after musculoskeletal pelvic and extremity surgery, including both pharmacologic and nonpharmacologic therapies.<sup>6</sup> The goal of this type of initiative is to minimize opioid use postoperatively while maximizing patient outcomes.

One orthopaedic procedure that has received heightened scrutiny is anterior cruciate ligament reconstruction (ACLR). ACLR is often studied in this realm owing to its high-risk demographic for opioid dependence and abuse (adolescent and young adults),<sup>7</sup> high annual volume (up to 130,000 annual cases in the United States),<sup>8</sup> and risk of prolonged opioid use postoperatively.<sup>9,10</sup> Thus, minimization of excess opioid prescription, abuse, and diversion after this procedure is critical at both patient and population health levels.

Recently, there has been increased interest in characterizing opioid prescription practices after ACLR across the United States and internationally.<sup>1,11</sup> Furthermore, data are lacking regarding surgeon use of non-narcotic analgesic therapies and preoperative opioid education as methods of minimizing opioid use after ACLR. The purpose of this study was to characterize contemporary pain management strategies after ACLR within the US and international orthopaedic community. We hypothesized that a majority of surgeons would regularly prescribe opioids postoperatively after ACLR with standardized preoperative pain medication counseling. We also hypothesized that a majority of providers would have reduced their opioid prescription dosages over the past couple years and would have increasingly used non-narcotic pain management strategies.

## Methods

### Study Design

This was a cross-sectional survey-based study disseminated to an international group of expert orthopaedic surgeons in the management of anterior cruciate ligament injuries.<sup>11</sup> This consortium is multidisciplinary and includes orthopaedic surgeons, sports medicine physicians, physical therapists, and experts in knee biomechanics from various countries on 6 different continents, all selected based on their experience and leadership in a variety of international organizations. The survey was only sent to orthopaedic surgeon members of the consortium.

Institutional review board approval was obtained (STUDY00001163, Emory University Department of Orthopaedic Surgery) prior to survey distribution. Recipients of the survey were sent an email with a description of the background and purpose of the survey study and instructions for completion. Surveys were submitted anonymously to us over a 2-month period. Surveys answered in duplicate were excluded from analysis.

### Survey Design

The survey was a 27-question, multiple choice—style questionnaire (Appendix Table 1). Surgeons were encouraged to answer every question but were not required to do so if they did not know an answer or were not comfortable with providing a response. Question topics ranged from demographic characteristics and training experience to surgeon-specific pain management strategies in the postoperative period after ACLR. Specific topics of interest included the use of preoperative opioid education and/or counseling sessions, implementation of standardized pain management regimens, use of pain tracking systems, and use of any adjunct non-narcotic analgesic modalities. Surgeons were asked to provide the average number of opioid tablets and dosage prescribed postoperatively.

### Statistical Analysis

Categorical data were collected and displayed as proportions and percentages, whereas continuous variable data were presented as means and standard deviations.

## Results

### Respondent Demographic Characteristics and Practice Characteristics

A total of 34 completed surveys were collected, representing a 73.9% response rate. Respondent demographic characteristics including sex, race, location, medical degree earned, and experience as an attending are detailed in Table 1. Practice characteristics including practice type and setting, number of ACLRs performed annually, surgery setting, and discharge day are outlined in Table 2.

### Perioperative Management and Education Protocol

All 34 respondents reported having a standard analgesic protocol after ACLR. Most surgeons reported implementing their analgesic protocol greater than 2 years before survey completion (Fig 1A). Most surgeons (67.6%) denied having a standard preoperative opioid education and counseling session prior to ACLR. Of 34 respondents, 20 (58.8%) reported that they monitor postoperative pain levels (Fig 1B).

**Table 1.** Demographic Characteristics of Survey Respondents (N = 34)

Characteristic	Incidence, n (%)
Sex	
Male	32 (94)
Female	1 (3)
No response	1 (3)
Race	
White	29 (85.3)
Black	2 (5.9)
Asian	2 (5.9)
No response	1 (2.9)
Location	
United States	15 (44.1)
Northeast	7 (20.6)
Midwest	4 (11.8)
West	3 (8.8)
South	1 (2.9)
Canada	1 (2.9)
South America	1 (2.9)
Europe	11 (32.4)
Australia/Oceania	4 (11.8)
Africa	1 (2.9)
Asia	1 (2.9)
Degree	
Allopathic	34 (100)
Osteopathic	0 (0)
Experience as attending	
<5 yr	2 (5.9)
5-9 yr	2 (5.9)
10-19 yr	7 (20.6)
≥20 yr	23 (67.6)

### Postoperative Narcotic Regimen

A total of 29 respondents (85.3%) reported the use of opioids for post-ACLR pain management. Specific narcotics reported included tramadol, tapentadol, and oxycodone. The most common dose reported was 5 to 10 mg per tablet (Table 3). Of the 29 surgeons who regularly prescribed opioids, 8 (27.6%) reported decreasing the dosage prescribed over the past 6 months whereas 21 (72.4%) reported a stable dosage; no respondents reported increasing the dosage. Regarding tablet count, 10 of 29 surgeons (34.6%) prescribed 20 or more tablets postoperatively, 11 (37.9%) prescribed 10 to 19 tablets, and 5 (17.2%) prescribed fewer than 10 tablets (Table 3). Over the past 6 months, 7 (24.1%) stated that their opioid tablet count decreased whereas the remaining 75.9% of respondents reported that their prescribed tablet count remained stable.

### Postoperative Opioid Cessation

Of the 29 surgeons who prescribed opioids regularly after ACLR, a majority (55.2%) stated that they told patients to stop taking opioids between 2 and 4 days postoperatively (Fig 2). It is interesting to note that nearly one-third of the respondents (31.0%) reported

**Table 2.** Practice Characteristics of Survey Respondents (N = 34)

Characteristic	Incidence, n (%)
Practice type	
Private	22 (64.7)
Academic	12 (35.3)
Practice setting	
Urban (population > 50,000 persons)	31 (91.2)
Urban cluster (population of 2,500-50,000 persons)	3 (8.8)
No. of ACLRs performed annually	
<50	5 (14.7)
50-99	6 (17.6)
100-199	14 (41.2)
≥200	9 (26.5)
Surgery setting	
Outpatient	24 (70.6)
Inpatient	10 (29.4)
Discharge day	
Same day	21 (63.6)
Postoperative day 1	9 (27.3)
Postoperative day 2	3 (9.1)

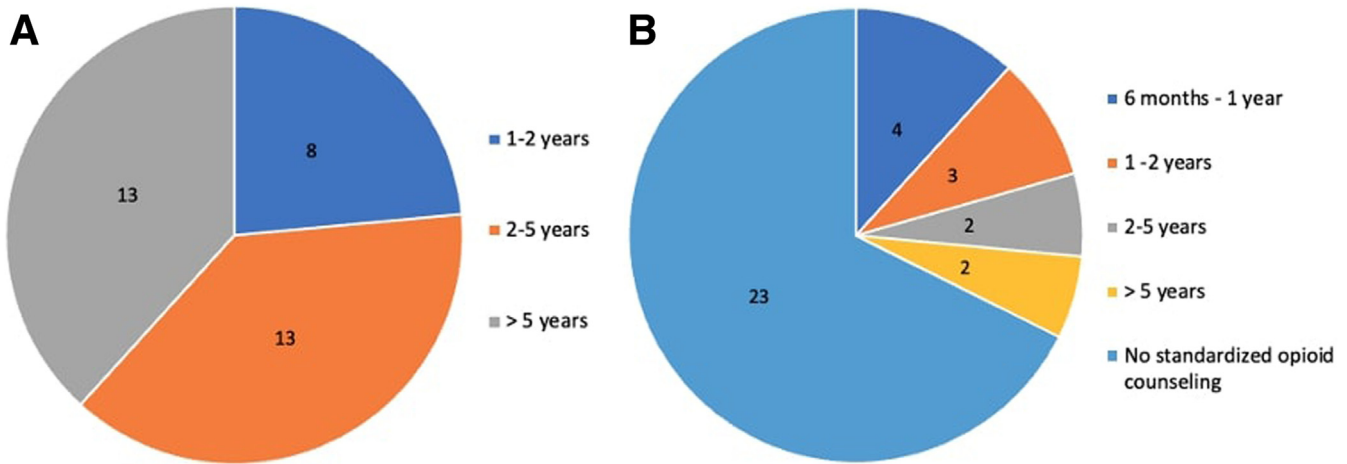
not giving any guidance on the timing of opioid cessation postoperatively.

### Postoperative Non-narcotic Regimen

The most commonly administered non-narcotic analgesics were nonsteroidal anti-inflammatory drugs (NSAIDs), used by 33 survey participants (97.1%), followed by acetaminophen (27 participants, 79.4%). Of the 34 surgeons, 3 (8.8%) regularly prescribed gabapentin, whereas no surgeons reported routinely prescribing an oral corticosteroid (Table 4).

## Discussion

The findings of this study indicate that greater than 85% of the surveyed orthopaedic surgeons prescribe opioids after ACLR. A vast majority of the surgeons have a standardized analgesic protocol after ACLR that they started implementing years prior to our survey. Although most surgeons monitor pain levels at every postoperative visit, fewer than one-third of respondents implement standardized preoperative opioid counseling. Furthermore, the results of this study indicate a stable or downward trajectory in the quantity of opioids prescribed, with all surgeons either maintaining or decreasing their dosages over the past 6 months. The surgeons report prescribing 5- to 10-mg doses, with the tablet count ranging anywhere from fewer than 10 tablets to more than 20 tablets, often instructing their patients to stop opioid use 2 to 4 days postoperatively, with a minority instructing discontinuation at 1 day postoperatively. However, around one-third do not instruct their patients at all regarding opioid discontinuation. Finally, an overwhelming majority of the surveyed surgeons use non-narcotic analgesics in



**Fig 1.** (A) Length of time with standardized pain management regimen in place. (B) Length of time with standardized preoperative opioid counseling in place.

conjunction with opioids, most commonly NSAIDs, followed by acetaminophen.

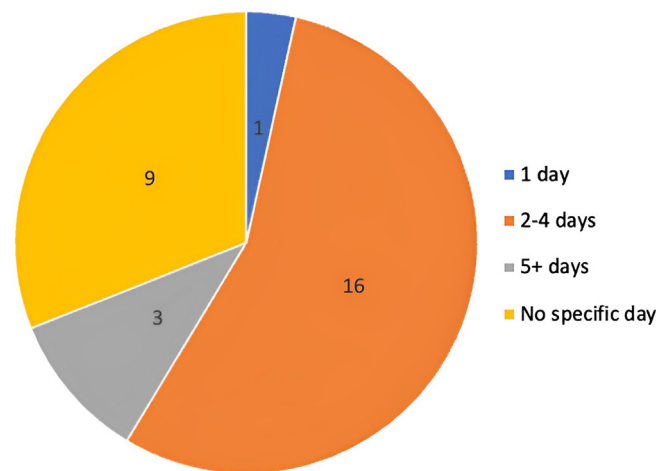
Although the opioid epidemic has garnered abundant attention over the past decade, studies have shown that opioid prescriptions and use have increased over this time. A recent study of over 90,000 ACLRs revealed that the rate of postoperative opioid use in patients in the United States increased from 62% in 2011 to 83% in 2017, with some US states prescribing 90 morphine milligram equivalents per day or greater in up to 30% of their patients.<sup>1</sup> Studies have also shown that up to 88% of orthopaedic surgeons prescribe opioids after ACLR to the pediatric population.<sup>12</sup> It is interesting to note that many studies have reinforced the notion that

these high quantities of opioids provide no added benefit for pain outcomes after ACLR. A study by Hartwell et al.<sup>13</sup> found no difference in postoperative pain outcomes when ACLR patients were prescribed 60 tablets as opposed to 30 tablets. The results of our study align with the trends revealed in the literature, with over 80% of the respondents prescribing opioids as part of their standardized postoperative pain regimen. However, our results indicate that the dosage of opioids prescribed has remained stable for most surgeons and has even decreased for about one-fourth of the surgeons over the past 6 months.

Regarding non-narcotic regimens after ACLR, the literature is limited. A recent randomized controlled trial study found that a multimodal, non-narcotic regimen provided equivalent pain relief to narcotic regimens after ACLR, suggesting a potential shift in the current pain management paradigm.<sup>14</sup> Furthermore,

**Table 3.** Opioid Prescribing Patterns of Survey Respondents

Opioid Prescribing Pattern	Incidence, n (%)
Use of opioids postoperatively (N = 34)	
Yes	29 (85.3)
No	5 (14.7)
Opioid dose (n = 29)	
<2 mg/tablet	4 (11.8)
2-4.9 mg/tablet	4 (13.8)
5-10 mg/tablet	16 (55.2)
>10 mg/tablet	0 (0)
No response	5 (17.2)
Change in dosage in past 6 mo (n = 29)	
Increase	0 (0)
Decrease	8 (27.6)
Stable	21 (72.4)
No. of tablets postoperatively (n = 29)	
0-9	5 (17.2)
10-19	11 (37.9)
≥20	10 (34.6)
No response	3 (10.3)
Change in No. of tablets in past 6 mo (n = 29)	
Increase	0 (0)
Decrease	7 (24.1)
Stable	22 (75.9)



**Fig 2.** Postoperative days on which patients are counseled to discontinue opioids by respondents.



**Table 4.** Non-narcotic Use Among Survey Respondents (N = 34)

Non-narcotic Adjunct	Incidence, n (%)
NSAID	33 (97.1)
Acetaminophen	27 (79.4)
Gabapentin	3 (8.8)
Oral corticosteroid	0 (0)

NSAID, nonsteroidal anti-inflammatory drug.

studies have shown that prescribing fewer opioids after ACLR was associated with lower postoperative opioid consumption without compromising postoperative pain outcomes, indicating that a gradual transition away from opioids is possible.<sup>13,15</sup> However, fewer than 15% of the respondents in this study use a fully non-narcotic postoperative regimen. Of those who do, none practice in the United States; instead, they practice in Europe, Africa, or the Middle East. This geographic disparity has been highlighted in prior orthopaedic studies. For example, a study found that 82% of US patients received opioids after ankle fracture repair compared with only 6% of Dutch patients undergoing the same procedure.<sup>16,17</sup> The reason for the ubiquitous use of opioids among the American surgeons in this cohort is likely multifactorial but may be attributed to the disproportionately high degree of emphasis on patient satisfaction, perhaps related to the risk of litigation associated with patient-perceived mismanagement of postoperative pain.<sup>18</sup>

As further studies examining the feasibility of opioid-free management of ACLR patients emerge and the push for minimizing opioid prescriptions continues, we predict that more US orthopaedic surgeons will adopt this strategy already seen in the global community. Perhaps this is highlighted by our results indicating that all the surgeons in the study report either maintaining or decreasing their opioid regimen dosage over the past 6 months. Another facet of this transition may be the use of non-narcotic pain medications in conjunction with opioids postoperatively. In this study, all but 1 surgeon use NSAIDs in the postoperative period whereas nearly 80% use acetaminophen. A less commonly used adjunct in this cohort is gabapentin, prescribed by a modest 8.1% of respondents. These medications, in combination with opioids, are common components of a multimodal pain regimen after ACLR and may serve to reduce pain while subsequently decreasing opioid use.<sup>19-21</sup>

In addition to multimodal analgesic regimens postoperatively, preoperative opioid counseling has been studied as an essential component to decreasing opioid use after orthopaedic surgery. Recent randomized controlled trials have shown that preoperative opioid education is associated with an up to two-thirds reduction in opioid use at all time points

postoperatively after both upper- and lower-extremity surgical procedures.<sup>22-24</sup> These studies cite multiple reasons: Offering counseling helps to strengthen the provider-patient relation, thereby establishing trust to manage pain expectations postoperatively. In addition, preoperative education arms patients with knowledge of side effects and alternative analgesic strategies, which encourages decreased opioid consumption.<sup>22-24</sup> However, in this study, we found that fewer than one-third of surgeons implement standardized preoperative opioid counseling. Although this study did not look specifically into tactics used as part of a preoperative counseling strategy, we did evaluate when surgeons advised patients to stop using opioids postoperatively. Although the responses were variable, nearly one-third of the surgeons in the study do not discuss postoperative opioid discontinuation with their patients. This further highlights the need for an evidence-based standardized counseling protocol. This may be imperative to reducing the surgeon-dependent factors driving the opioid burden in the global orthopaedic community.

We believe that the information from this study can be translated into future practice and guidelines for multimodal pain management after ACLR. Future studies should include larger surveys with pointed questions that further delineate variations in prescription practices in the global orthopaedic community and correlate these differences with opioid use outcomes.

### Limitations

This study is not without limitations. First, this is a survey study and is therefore subject to sample and cognitive bias. Second, given knowledge about the opioid epidemic, there may be an element of response bias introduced that may influence responses to opioid prescription practices. Although this survey captured data from expert surgeons of varying years of experience and countries of practice, the absolute number of survey responses was low; therefore, we may be unable to detect more subtle trends in practices. Furthermore, response options for many of the questions in the survey were limited to multiple-choice responses that may not have comprehensively represented opioid-prescribing practices among respondents.

### Conclusions

Over 85% of respondents prescribe opioids as a standardized postoperative regimen after ACLR, with only 15% providing non-narcotic pain regimens. However, prescribed dosages have remained stable or decreased over the past 6 months with increased use of non-narcotic adjuncts. Only one-third of respondents use standardized preoperative opioid counseling, with even fewer discussing postoperative discontinuation protocols.

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**Appendix Table 1.** Survey of Opioid Prescription and Pain Relief Strategies of Orthopaedic Surgeons for Patients Undergoing ACL Reconstruction

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Q1: Do you agree to take part in this study?

By selecting yes to this question, you certify that you have read the above introductory information and consent form, that you consent to participation in this study, including use of your survey response for data collection and analysis purposes, and that this is your FIRST AND ONLY time completing your survey

- Yes
- No

Q2: Please indicate your gender

- Male
- Female

Q3: Please indicate your race

- White
- Black or African American
- American Indian or Native American
- Asian
- Native Hawaiian or other Pacific Islander
- Decline to respond
- Other

Q4: Please indicate your medical degree type

- MD (allopathic)
- DO (osteopathic)
- Other

Q5: Where do you currently practice?

- Northeastern United States
- Southern United States
- Midwestern United States
- Western United States
- Canada
- Mexico
- Central America
- South America
- Caribbean Islands
- Europe
- Asia
- Africa
- Australia/Oceania
- Other

Q6: What best describes your current medical practice setting?

- Private institution
- Academic institution

Q7: What type of population setting do you work in?

- Rural (population <2500 people)
- Urban cluster (population 2500-50000 people)
- Urban (population >50000 people)

Q8: Have you completed a fellowship or other specialization requirement for the practice of sports medicine?

- Yes
- No

Q9: How many years have you been performing orthopaedic surgery as an independent attending (i.e., not as a resident or fellow)

- Less than 5 years
- Between 5 and 9 years
- Between 10 and 19 years
- 20 or more years

Q10: Estimate the number of ACL reconstructions you perform annually

- Less than 50 per year
- 50-99 per year
- 100-200 per year
- >200 per year

Q11: Are your ACL reconstructions performed in an inpatient or outpatient setting?

- Inpatient
  - Outpatient
- 

(continued)

**Appendix Table 1.** Continued

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- Q12: If you do not send patients home the day of surgery, how long on average do they stay in your facility?
- 1 day
  - 2 days
  - 3 days
  - 4 or more days
  - N/A—patients go home same day after surgery
- Q13: Do you have a standard medication regimen for pain management after ACL reconstruction?
- Yes
  - No
- Q14: For how long have you been implementing this current pain management regimen?
- <6 months
  - 6 months to one year
  - 1-2 years
  - 2-5 years
  - >5 years
  - N/A
- Q15: Do you perform a standard preoperative opioid education and counseling session with all patients prior to their ACL reconstruction?
- Yes
  - No
- Q16: For how long have you been implementing this education and counseling session?
- <6 months
  - 6 months to one year
  - 1-2 years
  - >5 years
  - N/A
- Q17: Do you have a system in place (section of the clinical note, database, etc) to track pain levels and pain satisfaction after ACL reconstruction?
- Yes
  - No
- Q18: Do you currently use opioids in the management of pain after ACL reconstruction?
- Yes
  - No
- Q19: What is the average per tablet/pill opioid dose prescribed?
- 1-1.9 milligrams per pill/tablet
  - 2-4.9 milligrams per pill/tablet
  - 5-10 milligrams per pill/tablet
  - >10 milligrams per pill/tablet
  - N/A
  - Other
- Q20: Have you changed your standardized opioid tablet dosage regimen for your ACL reconstruction patients in the past 6 months?
- Yes, I have DECREASED the opioid dose per tablet that I prescribe for each of my patients in the past 6 months
  - Yes, I have INCREASED the opioid dose per tablet that I prescribe for each of my patients in the past 6 months
  - No, there has been no change of opioid dose per tablet that I prescribe for each of my patients in the past 6 months
- Q21: What is the average number of tablets/pills that you prescribe per patient after ACL reconstruction?
- <5 tablets
  - 5-9 tablets
  - 10-19 tablets
  - 20-29 tablets
  - >30 tablets
  - N/A
- Q22: Have you changed your standardized opioid tablet count regimen for your ACL reconstruction patients in the past 6 months?
- Yes, I have DECREASED the number of opioid tablets that I prescribe for each of my patients in the past 6 months
  - Yes, I have INCREASED the number of opioid tablets that I prescribe for each of my patients in the past 6 months
  - No, there has been no change of number of opioid tablets that I prescribe for each of my patients in the past 6 months
- Q23: On what postoperative day do you tell your patients they should stop utilizing opioids?
- I do not tell them a specific post-operative day number
  - <1 day after surgery
  - 2-4 days after surgery
  - >5 days after surgery
- Q24: Do you usually prescribe acetaminophen for your patients after ACL reconstruction?
- Yes
  - No
- 

(continued)



**Appendix Table 1.** Continued

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Q25: Do you usually prescribe a steroid dose pack for your patients after ACL reconstruction?

- Yes
- No

Q26: Do you usually prescribe gabapentin for your patients after ACL reconstruction?

- Yes
- No

Q27: Do you usually prescribe any other medications for your patients after ACL reconstruction?

- Yes
  - No
- 

ACL, anterior cruciate ligament; N/A, not applicable.