Host: Welcome to the *Anesthesiology* journal podcast, an audio interview of study authors and editorialists.

Dr. BobbieJean Sweitzer: Hello, I’m BobbieJean Sweitzer, Professor of Anesthesiology at Northwestern University and an Associate Editor for *Anesthesiology*, and you are listening to an *Anesthesiology* podcast designed for physicians and scientists interested in the research that appears in our journal.

Today we are speaking with two authors of publications that appear in the December 2019 issue of the journal. With us is Dr. Daniel I. McIsaac. Dr. McIsaac is the senior author of an article titled “Peripheral Nerve Blocks for Ambulatory Shoulder Surgery: A Population Based Cohort Study of Outcomes and Resource Utilization.” Dr. McIsaac is an Assistant Professor of Anesthesiology and Pain Medicine and Epidemiology and Public Health, University of Ottawa, and a scientist at the Ottawa Hospital Research Institute, all in Ottawa, Canada. He’s also at ICES, formerly known as the Institute for Clinical Evaluative Sciences, Toronto, Canada. Welcome Dr. McIsaac.

Dr. Daniel McIsaac: Thank you Dr. Sweitzer. It’s really nice to be here today.

Dr. BobbieJean Sweitzer: And joining Dr. McIsaac is Dr. Eric C. Sun, who wrote an accompanying editorial “Regional Anesthesia; a Silver Bullet, Red Herring or Neither?” Dr. Sun is an Assistant Professor in the Department of Anesthesiology, Perioperative and Pain Medicine and the Department of Health Research and Policy, Stanford University School of Medicine in Stanford, California. And this year he is serving as a senior economist at the Council of Economic Advisors in Washington D.C.

However, his statements on this podcast are his personal views and do not necessarily represent the views of the Council or the United States government. Welcome Dr. Sun.

Dr. Eric Sun: Thanks for having me. It’s a pleasure.

Dr. BobbieJean Sweitzer: So let’s start with you Dr. McIsaac. Can you tell us briefly what the general aim of your study was?

Dr. Daniel McIsaac: Absolutely. So there are lots of studies that are available right now looking at pain control modalities for outpatient shoulder surgery, and a lot of them are mainly focused on fairly early postoperative outcomes. Can you minimize pain scores on day one or day two after surgery? Our aim was to look through a bigger lens at a population level to try and understand whether providing a peripheral nerve block compared to not in people who were having planned outpatient shoulder surgery might influence outcomes at a longer view forward, out to seven as well as 30 days, and more so looking at health system outcomes; whether people were going to need to be readmitted to hospital, go to the emergency department, et cetera. So we were trying to provide a bigger picture view of what the impact of different choices around pain management for outpatient shoulder surgery might be.

Dr. BobbieJean Sweitzer: So I think rather than just one singular primary outcome, I believe you described your primary outcome as a composite. Perhaps you’ve already described that in that previous answer, but could you be a little bit more specific and tell us, like, what specific outcomes you were looking at?

Dr. Daniel McIsaac: Absolutely. So we wanted to measure things that were accurately available within our data sets, and that were meaningful both to patients and to the healthcare system. So our composite outcome was a combination of unplanned admission on the day of surgery—and people who were supposed to have outpatient surgery, but couldn’t be successfully discharged home within 24 hours—people who had to come back into the emergency department for whatever reason within the week after surgery, or people who had to be readmitted on an unplanned basis to hospital within that week after surgery.

We also included death in that composite outcome because, although it’s quiet rare after ambulatory surgery, it could act as a bit of a competing risk for the other outcomes. But we felt that together those kind of represented accurately measured items that should be meaningfully potentially associated with pain management choices for patients having outpatient shoulder surgery.

Dr. BobbieJean Sweitzer: So did you look at anything else? Cost? Or your title talks about resource utilization?

Dr. Daniel McIsaac: Absolutely. So we had to secondary outcomes that we’d pre-specified as well. As you mentioned, one of them was cost from a health system perspective, starting from the day of surgery and going until seven days after surgery. So that was kind of to get a measure of overall resource utilization compared between our two groups. And then the other question that often comes up when it comes to, you know, doing peripheral nerve blocks is are we creating risk in terms of nerve injury. Now to our knowledge and what we were able to identify, there isn’t really a well validated way to identify peripheral nerve injuries within administrative data, which was what we were studying, but we did choose accurately measured kind of proxies. We also wanted to see whether there was any indication that people who had a peripheral nerve block were more likely to have to see a neurologist in the three months after surgery or have a nerve conductivity study, both of which could be indicative of having a peripheral nerve injury after surgery.

Dr. BobbieJean Sweitzer: Dr. Sun, has a similar study ever been done looking at these kinds of outcomes and costs of regional anesthesia of any type? And if so, what was found?

Dr. Eric Sun: Yes, well similar studies have been done in other surgeries looking at various subsets of the outcomes looked at in the study. So sometimes just looking at opioid use, sometimes looking just at cost. And in general, those studies have found that regional anesthesia is not beneficial for those longer term outcomes. One of the I think unique things about this study is that in general there’s not going on in this space because it’s so hard to study. It’s very hard to find the data that you would need to study this kind of question, because you need data that sort of is very granular and can tell you did someone get a block; what kind of block did they get. It’s something that’s sort of really detailed at that level. And at the same time, you need a data set that follows people over time so you can look at these longer term outcomes. Getting that kind of data is very rare, so that’s one of the unique strengths of this study is that they had a data set that would allow them to actually look at the question.

Dr. BobbieJean Sweitzer: So Dr. McIsaac, can you tell us a bit more about the design of your study and how you went about this?

Dr. Daniel McIsaac: Absolutely. So in Ontario we do have a fairly unique set of health administrative data, and I think Dr. Sun highlighted some of the strengths there really nicely; Anyone who’s a resident of Ontario is going to be in our universal health insurance plan, and we have fairly granular data that’s collected across a number of different databases that really allows us to kind of reconstruct the continuum of perioperative care, at least at a health system level. So one of the key things we wanted to address here was the effect of regional anesthesia at a population level and a health system level, so that was part of the design. It was an observational comparative effectiveness study.

But the other piece is that you need really accurate data. And one of the real challenges that we have in this era of, you know, big data sets and that type of thing is that we often have variables that have a nice looking name on them, like nerve block for example, but we can’t necessarily be sure that they definitely represent someone truly getting or not getting that technique. So as part of this study we also built in a validation study where we could compare a subset of our data to the clinical data at the hospital level to make sure that, yes, when we identified someone who had a nerve block in our administrative data, they truly had it in the clinical record. And we’re able to do that and show that with the billing records that we used it was, in fact, accurate.

And then that allowed us to move forward and associate the receipt of that nerve block with these important health system and also important to patient type of outcomes as we move forward over the first week after surgery. And then kind of a sensitivity analysis seeing if that effect might move out even in that month after surgery.
Dr. BobbieJean Sweitzer: So what specific kinds of surgeries did you include and what exact time period did you follow these patients or look at?

Dr. Daniel McIsaac: So we were looking specifically at outpatient shoulder surgeries. So these were surgeries that were planned to be done on an outpatient or ambulatory basis. And they included shoulder repairs, like rotator cuff repairs and other joint repairs, as well as shoulder replacements or shoulder arthroplasty types of procedure, and we included procedures both done on an open basis as well as those that were done arthroscopically. What we did was in our study period, which went from starting in 2009, we identified everyone having their first — every adult I should say, having their first outpatient shoulder surgery and we, from that time of their surgery, followed them forward for seven days to look at our primary outcome and then 30 days to look at a secondary analysis of those data to understand what had happened to them and try and understand what we might see as a potential effect of the nerve block moving forward.

Dr. BobbieJean Sweitzer: So, other than people having outpatient shoulder surgery, were there any other inclusion or exclusion criteria?

Dr. Daniel McIsaac: No, there were no other exclusion or inclusion criteria. This was a population based study. We wanted to include everyone who was potentially able to get a nerve block for an outpatient shoulder surgery. So we ensured that they were adults. We ensured that they were part of our universal health insurance program here in Ontario. But we wanted to have generalizable data that might reflect real world practice, so we tried to be minimalistic in terms of our exclusion criteria.

Dr. BobbieJean Sweitzer: Great. So Dr. Sun, what were the advantages or disadvantages of Dr. McIsaac’s study design?

Dr. Eric Sun: Well, as he just mentioned, I think one of the strengths of the study is the use of this population data set, which really allows them to get results that are generalizable and that reflect real world practice. So I think, to me, that is really the key strength of the study design and the study. Another strength of the study, and we don’t need to get into all the details, but any time you’re doing an observational study you might be concerned about bias. So the patients getting blocks, they may be different from those who don’t. But people who give the blocks take care of them, the surgeons who want blocks; all those things may be different for the patients who get blocks. And I think one of the strengths of the study design is that the authors did a lot to reduce the possibility that that kind of bias would influence the results.

Dr. BobbieJean Sweitzer: So Dr. McIsaac, why did you choose the time period that you did? Does it have anything to do with the data that’s typically available or the time you expected to see some of these outcomes you were looking for?

Dr. Daniel McIsaac: I think that’s a really important question, especially when it comes to studies that are using big data sources. Whenever you’re using data that comes from the health system level, you need to be aware of changes that have maybe happened in the health system, and you also want to be, you know, generating knowledge that’s relevant to current practice, because oftentimes you can go back fairly far. So in 2008 we knew that there was a change to the way that physicians both billed and were remunerated for providing regional anesthesia in our health system. So we made sure that we started to collect data after that point. And in fact, we left a year of early data out, recognizing that there may be some inconsistencies with how people applied these new billing practices. So that left us starting in 2009. And then the end of our study basically represented when we, you know, cut our data and did our analyses, the most recently available data. So we wanted it to be as up to date as possible, cover a relative recent time period, but also be consistent so that there weren’t anomalies in the data that were potentially biasing our results.

Dr. BobbieJean Sweitzer: Yes, I think that is an important point to make. Doing this kind of research that you guys do, using these data sets, and especially under administrative data sets. So did you include patients getting single shot peripheral blocks or did some of these patients have catheters? Was it regional anesthesia alone or did you look at patients who had to combine general anesthesia as well?

Dr. Daniel McIsaac: That’s a rich place to do health services research like this, because we do have a large population, a lot of hospitals, and a lot of surgery that’s happening every year.

Dr. BobbieJean Sweitzer: So finally, what did you find?

Dr. Daniel McIsaac: So what we found is that, as Dr. Sun mentioned earlier, controlling for a large number of potential confounders that might both influence whether someone received a nerve block and the outcome that they experienced and also accounting for people being clustered or quite similar to each other whenever they were in a given hospital, we actually found that there didn’t appear to be any significant difference in the composite outcome that we discussed earlier between those who had or didn’t have a nerve block. So there was no clear difference in terms of whether people went home on the day of surgery, ended up coming back to the emergency or getting readmitted within seven days of surgery, and that was consistent when we looked out to 30 days as well. We didn’t see any deaths, so although that was part of our composite it didn’t end up being a major part of our findings. But yes, we didn’t find that the provision of a peripheral nerve block made a big difference in terms of these health system level outcomes.

Dr. BobbieJean Sweitzer: So I guess the mere fact that you didn’t find any deaths is kind of interesting. So at least in those 59,000 patients, you know, with having ambulatory surgery no deaths.

Dr. Daniel McIsaac: That is reassuring, and I think it certainly speaks to you, know, a big picture issue if you want to have good patient selection for ambulatory surgery, and that’s obviously part of it. But what is interesting, you know, is that in this study about 10% of those people had shoulder surgery planned to be on an outpatient basis, requires people to go home and stay home successfully. 10% of those people overall did actually end up having to either stay on the day of surgery or come back into the health system within seven days. So although I agree with you,
very reassuring that there weren’t any deaths, there’s still actually a fair amount of contact with the healthcare system within seven days after surgery, regardless of whether you have a block or not.

Dr. BobbieJean Sweitzer: Hmm, and that’s not a small number when you’re looking at that volume.

Dr. Daniel McIsaac: Absolutely.

Dr. BobbieJean Sweitzer: So Dr. Sun, were you surprised by these findings?

Dr. Eric Sun: I would say I really wasn’t. Part of it is because, as sort of I’d hinted earlier, previous studies have suggested that blocks were not really associated with improvements in longer term outcomes. Another reason is, you know, as Dr. McIsaac has been talking a lot about, you know, looking at health system level outcomes and how a lot of this is determined by contact with the healthcare system, and so sort of for me when I think about longer term outcomes I think, and sort of health system level outcomes, they’re driven a lot by the healthcare system itself. And while blocks are important, they’re just one player in a larger healthcare system. And so for that reason, my guess would have been that blocks, while helpful, as they’re only a small part of the large healthcare system, they might have less of an effect on longer term outcomes and health system level outcomes.

There are some other aspects of the study that might sort of lead to smaller effects. I mean I don’t think they’re as important as these other factors I just talked about. But one is that, as Dr. McIsaac mentioned, there were a lot of different types of blocks looked at: single shot versus catheter. You might think that sort of the longer term catheters might have more of an effect than a single shot block. And then the other factor is just simply if you think blocks are helpful for a smaller subset of the population, so in other words, they’re only helpful for a fraction of the patients, then that would in general (inaudible) tend to bias your estimates towards finding no effect. So I think all those factors led me to not really be surprised by the results.

Dr. BobbieJean Sweitzer: So I guess sort of it begs the question as to why are we doing these blocks. But before you guys answer that question, Dr. McIsaac, did these patients have better pain control or was there greater satisfaction with the regional anesthetic, or were you able to look at any of those aspects?

Dr. Daniel McIsaac: So I think that question you just asked actually reflects back on the previous statement that you made about, you know, why are we doing these blocks. But before you guys answer that question, I think is, as you might imagine, just depends on so much more than just the block. It’s just, again, what happens once you leave the hospital is more than just the block. I mean first of all, once you leave the hospital, presumably the block is done. Although I guess sometimes we do send patients home with ON-Q pumps and things like that. But once you go home, the block is done or about to be done, and what happens the next 30 days I think is, as you might imagine, just depends on so much more than just the block.

Dr. BobbieJean Sweitzer: But we may just be kicking the can down the road a bit, it sounds like.

Dr. Eric Sun: I wouldn’t say so much kicking the can down the road. It’s just, again, what happens once you leave the hospital is more than just the block. I mean first of all, once you leave the hospital, presumably the block is done. Although I guess sometimes we do send patients home with ON-Q pumps and things like that. But once you go home, the block is done or about to be done, and what happens the next 30 days I think is, as you might imagine, just depends on so much more than just the block.

Dr. Daniel McIsaac: So, you know, when we say negative outcome I think what we more so look at here is maybe the pattern of people coming back to the healthcare system. And we did look at the reasons when people came back to emerg or when they were readmitted to try and understand, you know, what might be driving that. And interestingly, I think a combination of findings provides a little bit of insight into that. So, you know, there were a higher proportion of people who had a nerve block who were actually coming back to hospital or the emergency department with complaints around acute pain. Now diagnostic codes when people come back to the emergency department can be a little bit fuzzy, but it does make one wonder about, you know, issues of rebound pain. Is that something that’s maybe causing people to come back to the emergency department?

Dr. Eric Sun: Sure. So Dr. McIsaac, other than higher cost did you determine any other negatives of the regional anesthesia for these should surgeries?

Dr. Daniel McIsaac: So, you know, we have some evidence that the patients who had a block placed are going to have a lower length of stay, so patients are discharged faster, and then generally speaking, fewer complications during the stay itself for inpatient surgery.

Dr. BobbieJean Sweitzer: Yes, well Dr. McIsaac’s probably was really the best summary there. I mean mostly for short term outcomes we have evidence that they work. So I guess what I would say is better pain control and in general better outcomes, for the most part, during the admission itself. So generally lower length of stay, so patients are discharged faster, and then generally speaking, fewer complications during the stay itself for inpatient surgery.

Dr. BobbieJean Sweitzer: But we may just be kicking the can down the road a bit, it sounds like.

Dr. Eric Sun: I wouldn’t say so much kicking the can down the road. It’s just, again, what happens once you leave the hospital is more than just the block. I mean first of all, once you leave the hospital, presumably the block is done. Although I guess sometimes we do send patients home with ON-Q pumps and things like that. But once you go home, the block is done or about to be done, and what happens the next 30 days I think is, as you might imagine, just depends on so much more than just the block.

Dr. BobbieJean Sweitzer: Sure. So Dr. McIsaac, other than higher cost did you determine any other negatives of the regional anesthesia for these should surgeries?
types of shoulder surgeries or even subsets of patient characteristics that you think maybe would separate out those that are more likely to have benefits or more likely to have problems? Like perhaps was it more extensive procedures, like total shoulder arthroplasties or something like that?

Dr. Daniel McIsaac: Yes, so we did actually pre-specify looking at some different subgroups. And I think importantly, you know, not all shoulder surgery is obviously created equally. So we did look first to see whether there was a difference in terms of the effect between people having shoulder arthroplasty, which are probably really the biggest, most intensive shoulder surgeries, compared to people just having a more simple rotator cuff repair. But we didn’t actually find any strong evidence that there was a different effect between those two groups. And I think that was probably one of the key ones.

The second piece that we thought about was in 2014 some systematic reviews were published looking at the use of dexamethasone to prolong the duration of single shot blocks. And certainly in our practice we saw a change around people using more dexamethasone with their peripheral nerve blocks. So we also did analysis to see if whether who were later in our cohort who were having surgery after this new evidence was kind of summarized and put forward maybe they were getting a better effect because they maybe were more likely to get dexamethasone prolonging that effect. However, interestingly we didn’t really see any kind of modification of our findings there as well. So from what we can tell, anyhow, there weren’t any clear modifiers of this kind of lack of association that we found within these data.

Dr. BobbieJean Sweitzer: Dr. Sun, if you ran the health service in Ontario, Canada and were responsible for wisely using Canadian taxpayer’s money and you read this paper of Dr. McIsaac’s, could you make a case to either decrease reimbursements for regional anesthesia or just stop paying for them altogether?

Dr. Eric Sun: I wouldn’t go that far with this paper, I mean as Dr. McIsaac and I have talked about, blocks are associated with a lot of short term benefits, and those short term benefits such as pain control and lower length of stay may be valuable in and of themselves. And I think for the most part those short term benefits are probably worth the cost of the block. So I wouldn’t make that case based on this paper.

Dr. BobbieJean Sweitzer: Dr. McIsaac, I think you mentioned this briefly about a difference in 2008 and something about billing. But as I recall, I think it was in figure 2 of your paper I noticed there was a significant increase in the number of peripheral nerve blocks placed from 2009 to 2010, with a continued but very much more similar pattern of rise and fall. Can you explain a little bit more about what happened between 2009 and 2010?

Dr. Daniel McIsaac: Absolutely. So we can’t know for sure from the data, but extrapolating from experience and having been here working in the healthcare system when this happened, I think it was probably a combination of things. As I mentioned, in 2008 new billing codes for provision of nerve blocks were introduced into the fee schedule for physicians who were billing for their work here in Ontario, and most physicians are fee for service. And although we left the first year of data out of this cohort to allow a washout of that change over period, there could have been some in that moving forward into 2009 where people still weren’t necessarily as good with their billing. I think that was another important reason to see that there was consistency in the effect between the first and second half of that time period.

I think the other part probably reflects I can recall around that time ultrasound sounds were becoming more available. Regional anesthesia was starting to be more widely used, I think, as practice changed, as nerve visualization and echogenic needles and that kind of thing came along. So I think there’s probably both a documentation aspect to it as well as a true change in practice. And I’m not surprised to see an inflection point there, because technologically and practice wise we certainly saw a change around that time here in Ontario, and I suspect other people probably saw it in similar jurisdictions.

Dr. BobbieJean Sweitzer: So Dr. Sun, if you were having shoulder surgery tomorrow would you have a regional anesthetic?

Dr. Eric Sun: I would, and I think largely because of the pain control benefits. That to me would be quite useful and valuable.

Dr. BobbieJean Sweitzer: And what about you, Dr. McIsaac?

Dr. Daniel McIsaac: I think that’s a great question, and one that I’ve dreaded you asking me. I think what I would say is that for any individual, you know, having a nerve block is an elective procedure, but one that they probably deserve to have a thorough discussion about, and it’s going to come down to what are their preferences and values matched against the provider’s skill set they have available to them, and also within the context of what’s going on at that center where they’re having surgery. Is this a place that does a lot of nerve blocks? Is this a place that has a system to support people after they leave hospital? And those are questions I think that patients deserve to ask and have information about.

But I tend to agree with Dr. Sun. I don’t really have great interest in experiencing a lot of pain after surgery, and I think there probably is a value there that we haven’t quantified yet as anesthesiologists with our patients in terms of having that improved early pain control, but also making sure that that early benefit can potentially be moved forward into the postoperative period with changes to just the way we practice after the needle comes out of someone’s neck.

Dr. BobbieJean Sweitzer: I hope today’s discussion will interest many of our listeners and lead you to read this important article and editorial to learn more. Thank you Drs. McIsaac and Sun for discussing your work with us today. I wish you well as you continue your efforts to enhance the practice of anesthesia and strive to improve the care of our patients.

Dr. Eric Sun: Thank you very much.

Dr. Daniel McIsaac: Thank you very much. It’s been a pleasure to discuss it.

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