

# Predicting Orthopedic Surgeons' Preferences for Peripheral Nerve Blocks for Their Patients

Danielle Masursky, PhD\*

Franklin Dexter, MD, PhD†

Colin J. L. McCartney, MBChB,  
FRCA, FCARCSI, FRCPC‡

Sheldon A. Isaacson, MD\*

Nancy A. Nussmeier, MD\*

**BACKGROUND:** A 2002 survey of 468 Canadian orthopedic surgeons found that the "two principal reasons regional anesthesia is not favored" are "delays in operating rooms" and "unpredictable success." We reanalyzed the data from the study to evaluate whether these concerns were the best predictors of an individual surgeon's willingness to use peripheral nerve blocks for their patients.

**METHODS:** Of the five procedures included in the survey, three had relevant questions for our reanalysis of the results: arthroscopic shoulder surgery, arthroscopic anterior cruciate ligament reconstruction, and total knee replacement.

**RESULTS:** A surgeon's preference for peripheral nerve block for him or herself strongly predicted his or her anesthetic preference for patients (all  $P < 0.001$ ). Concordance rates were 89% for arthroscopic shoulder surgery, 87% for anterior cruciate ligament reconstruction, and 93% for total knee replacement. There was almost no incremental predictive value for the surgeon's preference for patients from the surgeon's perception of the times to perform a block ( $P \geq 0.27$ ) or perception of block success rate ( $P \geq 0.30$ ). There was also almost no direct predictive value for the surgeon's preference for patients from the surgeon's perception of the times to perform a block (Kendall's  $\tau \leq 0.04$ ,  $P \geq 0.28$ ) or perception of block success rate (Kendall's  $\tau \leq 0.02$ ,  $P \geq 0.24$ ). An economically important percentage of surgeons (37%, 95% confidence interval: 32%–41%) would choose a peripheral nerve block for their own surgery for some, but not all, of the procedures (i.e., for 1 or 2 versus 0 or 3).

**CONCLUSIONS:** A surgeon's preference for peripheral nerve blocks for his or her own surgery predicted a surgeon's preference for his or her patients. Perceptions of delays and success rate did not add sufficient incremental information to the surgeon's preferences to be of economic importance. These results are important to better forecast the net economic impact on an anesthesia group of a regional block team.

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**O**ur goal is to better understand how to forecast the net economic impact of a regional block team on an anesthesia group. The use of block teams and rooms is important, in part because many surgeons believe that the most important attributes of a high-performing anesthesia group include those related to working quickly in operating rooms (ORs) such as: timely starts and brief times for patient awakening, turnover, and induction.<sup>1</sup> OR delays are orthopedic surgeons' most common reason for not preferring the use of regional anesthesia.<sup>2</sup> Small increases in the rates of patient flow are sufficient to increase surgeons' feelings of personal competence

and achievement<sup>3</sup> and to motivate their scheduling a few extra cases per week.<sup>4,5</sup> Furthermore, the perception that the use of regional anesthesia reduces the rate of patient flow can be dispelled if an anesthesiologist not involved in the intraoperative care of the preceding patient places the block before the next patient enters the OR.<sup>6</sup>

Five factors can negatively influence the economics of a block team.<sup>7</sup> First, there is the salary of the extra anesthesiologist with or without a resident physician or student nurse anesthetist (e.g., \$2000 per day<sup>6</sup>). Second, there may be too few hours of cases per OR per day for small differences in anesthesia-controlled time<sup>8,9</sup> to affect productivity.<sup>10-12</sup> Third, staffing may be too poorly matched to OR workload for small changes in anesthesia-controlled time to result in reductions in staffing.<sup>10,13,14</sup> Fourth, use of a block team may not affect the overall anesthesia-controlled time much, because there are too few regional-eligible cases per day or there are other bottlenecks to throughput.<sup>6</sup> Fifth, less than one-third of potential cases may receive a block.<sup>9</sup> Our focus is the poorly understood fifth factor.

How many regional-eligible patients at a facility receive a regional anesthetic is of marked economic importance<sup>15</sup> and can be influenced, not only by the background and interest of the anesthesiologists,<sup>16</sup> but

From the \*Department of Anesthesiology, State University of New York Upstate Medical University, New York; †Division of Management Consulting, Departments of Anesthesia and Health Management & Policy, University of Iowa, Iowa; and ‡Department of Anesthesia, University of Toronto, Sunnybrook Health Sciences Centre.

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Address correspondence and reprint requests to Danielle Masursky, PhD, Department of Anesthesiology, SUNY Upstate Medical University, CWB Room 300B, 750 E Adams St., Syracuse, NY 13210. Address e-mail to masurskd@upstate.edu.

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**Table 1.** Surgeons' Preferences for Peripheral Nerve Block for Themselves as the Patient

Arthroscopic shoulder surgery	Arthroscopic anterior cruciate ligament reconstruction	Total knee replacement	N	Same or different
No	No	No	266	278 (63%)
Yes	Yes	Yes	12	
Yes	No	No	96	162 (37%)
No	Yes	No	27	
Yes	Yes	No	16	
No	Yes	Yes	11	
Yes	No	Yes	5	
No	No	Yes	7	

The table and its total of 440 surgeons excludes the 28 surgeons who had missing values for one or more of the three procedures. There were 376 respondents to the first mailing. Among those respondents, 36% said they would choose a peripheral nerve block for their own surgery for some procedures, but not for others (95% CI: 31-42%). Including the 94 respondents to the second mailing, the percentage was 37% (95% CI: 32-41%). The confidence intervals were calculated using the method of Blyth-Still-Casella.<sup>19</sup>

also by the surgeons.<sup>2,17</sup> Patients' choices of the types of anesthetics can be influenced as much by the surgeons as the anesthesia providers, and their influence can be several fold more than that of their friends or relatives.<sup>17</sup> Many more patients recognize their surgeon by name versus their anesthesiologist.<sup>18</sup> In a 2002 survey of 468 Canadian orthopedic surgeons, 48% reported that they "direct patients to make a choice of anesthetic technique" when "the surgical procedure is suitable for a regional anesthetic."<sup>2</sup> Consequently, we reanalyzed the responses of the survey to evaluate predictors of individual surgeons' preferences for the use of peripheral nerve blocks for their patients. We focused on delays in ORs and unpredictable success because both would be modified by use of a block team. Because they were the "two principal reasons regional anesthesia is not favored,"<sup>2</sup> we hypothesized that these two factors would be predictive of surgeons' preferences for their patients.

## METHODS

The original survey study included five procedures and reported univariate results.<sup>2</sup> Our reanalysis evaluated the multivariate data for the following three procedures: arthroscopic shoulder surgery, arthroscopic anterior cruciate ligament (ACL) reconstruction, and total knee replacement. Our reanalysis excluded trigger finger release because the regional anesthetic option (Bier block) would not be performed ahead of time by a block team. Our reanalysis excluded total hip replacement because the survey did not ask a surgeon's preference for his or her own surgery.

We tested whether a surgeon's preference for a peripheral nerve block for himself or herself would be a strong predictor of whether the surgeon would prefer the same for his or her patients. Cohen's kappa was used to quantify the concordance.

Our primary hypothesis was that a surgeon's perceptions of the time to perform a block and of the success rate of regional blocks would have a strong incremental influence on the surgeon's preference for the patient. The Cochran-Armitage trend test was used to assess the preference for peripheral nerve block as a

function of the two views of regional anesthesia, while stratifying surgeons based on their preference for their own surgery. The two views studied were the Likert scale ratings of "time efficiency" and "less successful" of regional versus general anesthesia, because these were the quantitative questions matching the two most commonly stated reasons for being "against regional anesthesia" in the open-ended question at the end of the survey. We also tested the direct predictive value of these two end-points using Kendall's  $\tau_b$ .

We evaluated what percentage of surgeons had different preferences toward nerve block for their own surgery depending on the procedure. The question of interest was whether the percentage was sufficiently large for the heterogeneity to be important economically. We used the method of Blyth-Still-Casella<sup>19</sup> to calculate a confidence interval for the percentage of surgeons responding differently among the three studied procedures as to whether the surgeon would prefer to receive a peripheral regional block during his or her surgery.

StatXact-7 was used for all analyses (Cytel Software, Cambridge, MA). The two-sided *P* values were calculated using Monte-Carlo simulations with accuracies within 0.001. The 95% confidence intervals calculated for Cohen's  $\kappa$  were asymptotic.

## Secondary Analyses to Assess Validity and Usefulness of Findings

We evaluated whether the survey's sample size had been sufficient to estimate an economically important incremental influence of the perception of the time to perform a block and of the success rate of regional blocks on surgeons' anesthetic preferences for their patients. The percentage differences in disagree and agree responses were used to estimate the maximum change in the percentage of surgeons' views on "time efficiency" or success rate being fully changed from a negative view to a positive view. Examples of the arithmetic are given in Tables 1-7.

Surgeons may have responded at random (i.e., guessed) to questions important to our reanalysis. We analyzed the three binary end-points of a surgeon's preference for nerve block for himself or herself when personally undergoing shoulder arthroscopy, arthroscopic ACL

**Table 2.** Surgeons' Preferences for Peripheral Nerve Block for Themselves Predicts Their Preferences for Their Patients

	Surgeon's preference of nerve block for themselves	Surgeon's preference of nerve block for themselves	N	Same or different
Arthroscopic shoulder surgery $\kappa = 0.74,$ $P < 0.001$ $0.67 \leq \kappa \leq 0.81$ $N = 409$	No	No	268	89% same
	Yes	Yes	97	
	No	Yes	17	11% different
	Yes	No	27	
Arthroscopic anterior cruciate ligament reconstruction $\kappa = 0.50,$ $P < 0.001$ $0.38 \leq \kappa \leq 0.61$ $N = 417$	No	No	329	87% same
	Yes	Yes	35	
	No	Yes	22	13% different
	Yes	No	31	
Total knee replacement $\kappa = 0.50,$ $P < 0.001$ $0.35 \leq \kappa \leq 0.65$ $N = 427$	No	No	378	93% same
	Yes	Yes	18	
	No	Yes	13	7% different
	Yes	No	18	

Cohen's kappa ( $\kappa$ ) are shown along with P-value and 95% confidence interval.

Among the respondents to the first mailing, concordance rates were 89% for arthroscopic shoulder surgery ( $N = 338$ ), 89% for ACL reconstruction ( $N = 339$ ), and 94% for total knee replacement ( $N = 355$ ). These percentages compare with 89%, 87%, and 93% for all respondents, respectively. Among surgeons not wanting a nerve block for his or her own surgery and responding to the first mailing, only 4%, 4%, and 3%, respectively, would recommend it for their patients. That compares with 4%, 5%, and 3% for all respondents, respectively.

**Table 3.** Lack of Value of Surgeon's Perceptions of Time Efficiency of Regional Anesthesia to Predict Surgeon's Preference for the Patient Receiving Regional Nerve Block While Controlling for Surgeon's Preference for Him/Herself

% Surgeons preferring regional for their patients	For self?	"I believe regional anesthesia is <i>more</i> time efficient than general anesthesia" (1 = strongly disagree, 5 = strongly agree)				
		1	2	3	4	5
Arthroscopic shoulder surgery $P = 0.27^a$ $N = 407$ $\text{Max } \Delta = 3\%^b$	No	4%	7%	7%	0%	11%
	(N)	4 of 91	7 of 100	4 of 61	0 of 14	2 of 18
	Yes	71%	81%	79%	100%	0%
	(N)	30 of 42	39 of 48	19 of 24	8 of 8	0 of 1
Arthroscopic anterior cruciate ligament reconstruction $P = 0.62^a$ $N = 414$ $\text{Max } \Delta = 2\%^b$	No	1%	6%	9%	4%	5%
	(N)	7 of 111	11 of 122	3 of 76	1 of 20	0 of 19
	Yes	46%	59%	50%	50%	100%
	(N)	11 of 24	16 of 27	6 of 12	1 of 2	1 of 1
Total knee replacement $P = 0.53^a$ $N = 423$ $\text{Max } \Delta = 1\%^b$	No	4%	4%	4%	0%	0%
	(N)	5 of 124	5 of 139	3 of 82	0 of 21	0 of 21
	Yes	44%	64%	38%	100%	
	(N)	7 of 16	7 of 11	3 of 8	1 of 1	0

The listed percentages are the same as that of the following "(N)" line (e.g., in the upper left hand corner, 4% = 4 of 91).

<sup>a</sup> Among the respondents to the first mailing, P-values were 0.47 for arthroscopic shoulder surgery ( $N = 336$ ), 0.44 for ACL reconstruction ( $N = 336$ ), and 0.14 for total knee replacement ( $N = 352$ ). The P-values were calculated using the Cochran-Armitage trend test.

<sup>b</sup> "Max  $\Delta$ " refers to an estimate of the increase in the percentage of surgeons who would prefer their patients to receive a regional nerve block if the surgeons who disagree with the statement were to agree. For example, for shoulder surgery,

$$\text{Max } \Delta = 3\% = \{ (91 + 100) / 407 \} \times \{ (0\% \times 14 + 11\% \times 18) / (14 + 18) - (4\% \times 91 + 7\% \times 100) / (91 + 100) \} + \{ (42 + 48) / 407 \} \times \{ (100\% \times 8 + 0\% \times 1) / (8 + 1) - (71\% \times 42 + 81\% \times 48) / (42 + 48) \}.$$

reconstruction, or total arthroscopic replacement. If responses were selected at random, then the probability of all "No" would be 1/8 and all "Yes" would be 1/8, where  $1/8 = 1/2 \times 1/2 \times 1/2$ . The probability of selecting all responses the same would be 1/4, where  $1/4 = 1/8 + 1/8$ . The Binomial Test was used to evaluate whether the percentage of the surgeons giving the same response for all procedures differed significantly from 25%.

There should be concordance between a surgeon's preference for his or her patients' anesthetic and "the

types of regional techniques that are commonly performed upon your patients." For example, surgeons preferring a nerve block for their patients' arthroscopic shoulder surgery should be significantly more likely to select "brachial plexus block" as one of the techniques used on their patients. Cohen's kappa ( $\kappa$ ) was used to test concordance.

Surgeons' strength of agreement with the statement "I believe regional anesthesia is less cost efficient than general anesthesia" should be positively correlated with their strength of agreement with "I believe regional

**Table 4.** Lack of Value of Surgeon's Perceptions of Success Rate of Regional Anesthesia to Predict Surgeon's Preference for the Patient Receiving Regional Nerve Block While Controlling for Surgeon's Preference for Him/Herself

% Surgeons preferring regional for their patients	For self?	"I believe regional anesthesia is less successful than general anesthesia" (1 = strongly disagree, 5 = strongly agree)				
		1	2	3	4	5
Arthroscopic shoulder surgery <i>P</i> = 0.82 <sup>a</sup> <i>N</i> = 407 Max Δ = 0% <sup>b</sup>	No ( <i>N</i> )	7% 6 of 88	7% 7 of 94	6% 3 of 47	0% 1 of 48	0% 0 of 7
	Yes ( <i>N</i> )	75% 36 of 48	74% 28 of 38	80% 16 of 20	94% 15 of 16	100% 1 of 1
Arthroscopic anterior cruciate ligament reconstruction <i>P</i> = 0.30 <sup>a</sup> <i>N</i> = 414 Max Δ = 0% <sup>b</sup>	No ( <i>N</i> )	4% 5 of 115	6% 7 of 114	9% 5 of 55	9% 5 of 55	0% 0 of 9
	Yes ( <i>N</i> )	55% 12 of 22	48% 10 of 21	47% 7 of 15	75% 6 of 8	0% 0
Total knee replacement <i>P</i> = 0.70 <sup>a</sup> <i>N</i> = 423 Max Δ = 0% <sup>b</sup>	No ( <i>N</i> )	3% 4 of 134	4% 5 of 127	2% 1 of 59	5% 3 of 58	0% 0 of 9
	Yes ( <i>N</i> )	40% 4 of 10	73% 8 of 11	56% 5 of 9	20% 1 of 5	0% 0 of 1

The listed percentages are the same as that of the following "(*N*)" line (e.g., in the upper left hand corner, 7% = 6 of 88).

<sup>a</sup> Among the respondents to the first mailing, *P*-values were 0.68 for arthroscopic shoulder surgery (*N* = 336), 0.99 for ACL reconstruction (*N* = 336), and 0.13 for total knee replacement (*N* = 352). The *P*-values were calculated using the Cochran-Armitage trend test.

<sup>b</sup> "Max Δ" refers to an estimate of the increase in the percentage of surgeons who would prefer their patients to receive a regional nerve block if the surgeons who agree with the statement were to disagree. For example, for shoulder surgery,

$$\text{Max } \Delta = 0\% = \left\{ \frac{(48 + 7) / 407 \right\} \times \left\{ \frac{(7\% \times 88 + 7\% \times 94) / (88 + 94) - (0\% \times 48 + 0\% \times 7) / (48 + 7)}{(16 + 1) / 407} \right\} \times \left\{ \frac{(75\% \times 48 + 74\% \times 38) / (48 + 38) - (94\% \times 16 + 100\% \times 1) / (16 + 1)}{(16 + 1)} \right\}.$$

**Table 5.** Surgeon's Preference for Patients' Anesthetics and Reported "Types of Regional Techniques . . . Commonly Performed Among Your Patients" Undergoing All Types of Surgery

Preferred by surgeon		Commonly performed		
		No	Yes	
"Interscalene (brachial plexus) block" selected with or without general anesthesia for "arthroscopic shoulder surgery"	No	50%	22%	$\kappa = 0.23,$ $P < 0.001,$ $N = 406$
	Yes	13%	16%	
"Femoral and/or sciatic nerve blocks" with "general anesthesia" for anterior cruciate ligament reconstruction	No	59%	27%	$\kappa = 0.28,$ $P < 0.001,$ $N = 414$
	Yes	3%	11%	
"Femoral and/or sciatic nerve blocks" with "general anesthesia" for anterior cruciate ligament reconstruction	No	79%	7%	$\kappa = 0.12,$ $P = 0.016,$ $N = 414$
	Yes	11%	3%	
"Femoral and/or sciatic nerve blocks" with "general anesthesia" for total knee arthroplasty	No	60%	32%	$\kappa = 0.14,$ $P < 0.001,$ $N = 425$
	Yes	2%	6%	
"Femoral and/or sciatic nerve blocks" with "general anesthesia" for total knee arthroplasty	No	84%	8%	$\kappa = 0.16,$ $P = 0.0034,$ $N = 425$
	Yes	5%	2%	

The surgeon was instructed to provide "for each . . . procedure, . . . the one anesthetic option you would most prefer to have performed . . .". By Fisher's Exact Test, the  $P < 0.001$ ,  $P < 0.001$ ,  $P = 0.017$ ,  $P < 0.001$ , and  $P = 0.0026$ , from top to bottom.

**Table 6.** Relationship of Surgeons' Perceptions of the Cost Efficiency of Regional Anesthesia and Time Efficiency (Table 3) and Success Rate (Table 4)

		"I believe regional anesthesia is <i>less</i> cost efficient than general anesthesia" (1 = strongly disagree, 5 = strongly agree)					
		5	4	3	2	1	
"I believe regional anesthesia is more time efficient than general anesthesia" (1 = strongly disagree, 5 = strongly agree)	1	3%	4%	17%	6%	4%	$\tau = -0.15$ $P < 0.001$ $N = 447$
	2	0%	3%	22%	9%	1%	
	3	0%	1%	9%	8%	3%	
	4	0%	0%	3%	0%	2%	
	5	0%	1%	2%	1%	1%	
		5	4	3	2	1	
"I believe regional anesthesia is <i>less</i> successful than general anesthesia" (1 = strongly disagree, 5 = strongly agree)	5	0%	0%	2%	0%	0%	$\tau = 0.16$ $P < 0.001$ $N = 447$
	4	0%	2%	8%	4%	1%	
	3	2%	2%	10%	3%	1%	
	2	1%	3%	18%	9%	2%	
	1	1%	2%	15%	8%	7%	

**Table 7.** Surgeons' Responses to Open-ended Questions at End of the Survey Were in Agreement With Their Quantitative Responses Reported in Tables 3 and 4

		"Generally speaking, I am against regional anesthesia for the following reasons," with response coded (2) as "delays in operating room"		
		Yes	No	
"I believe regional anesthesia is more time efficient than general anesthesia" (1 = strongly disagree, 5 = strongly agree)	1	49%	18%	$P < 0.001$
	2	39%	33%	
	3	7%	32%	
	4	2%	8%	
	5	2%	6%	
$N$		200	197	
		"Generally speaking, I am against regional anesthesia for the following reasons," with response coded (2) as "unpredictable success"		
		Yes	No	
"I believe regional anesthesia is <i>less</i> successful than general anesthesia" (1 = strongly disagree, 5 = strongly agree)	5	7%	3%	$P < 0.001$
	4	33%	12%	
	3	30%	14%	
	2	23%	32%	
	1	7%	38%	
$N$		57	341	

Wilcoxon-Mann-Whitney test was used to compare responses between the Yes and No groups.

anesthesia is less successful than general anesthesia" and negatively correlated with their strength of agreement with "I believe regional anesthesia is more time efficient than general anesthesia." The latter two questions were those used above in the primary analyses. Correlation of responses was assessed using Kendall's  $\tau_b$ .

Surgeons' responses to open-ended questions should be correlated with their strength of agreement with the two Likert scale items about regional anesthesia. Respondents were divided into two groups based on whether or not they mentioned either of the two disadvantages associated with the use of regional anesthesia that were most commonly mentioned in the survey (i.e.,

"delays in OR" and "unpredictable success"). The Wilcoxon-Mann-Whitney test was used to compare quantitative responses between groups.

## RESULTS

A surgeon's preference for peripheral nerve block for himself or herself (Table 1) strongly predicted his or her preference for patients (Table 2) (all Cohen's  $\kappa$  were  $P < 0.001$ ). Concordance rates were 89% for arthroscopic shoulder surgery, 87% for ACL reconstruction, and 93% for total knee replacement. Among surgeons not wanting a nerve block for his or her own surgery, only 4%, 5%, and 3%, respectively, would recommend it for their patients.

There was almost no additional predictive value for his or her patients in knowing a surgeon's perception of the times to perform a block ( $P \geq 0.27$ ) (Table 3). Likewise, there was almost no incremental predictive value to knowing the surgeon's perception of the rate of success of blocks ( $P \geq 0.30$ ) (Table 4).

There was almost no direct predictive value for his or her patients in knowing a surgeon's perception of the times to perform a block for arthroscopic shoulder surgery ( $\tau = 0.04, P = 0.37$ ), ACL reconstruction ( $\tau = -0.02, P = 0.66$ ), or total knee replacement ( $\tau = -0.02, P = 0.28$ ). There was also almost no direct predictive value to knowing the surgeon's perception of the rate of success of blocks for arthroscopic shoulder surgery ( $\tau = 0.00, P = 0.95$ ), ACL reconstruction ( $\tau = 0.02, P = 0.34$ ), or total knee replacement ( $\tau = 0.02, P = 0.24$ ).

An economically important percentage of surgeons (37%, 95% confidence interval: 32%–41%) would choose a peripheral nerve block for their own surgery for some procedures, but not others (i.e., for 1 or 2 versus 0 or 3 of the studied procedures) (Table 1).

### Secondary Analyses to Assess Validity and Usefulness of Findings

Even if there had been a relationship between surgeons' perceptions of delays and success rate and anesthetic preferences for patients, at most 0% (Table 4) to 3% (Table 3) of surgeons would have had different anesthetic preferences, too little to be of economic importance.

Surgeons' responses to questions about their preferences for personally receiving a peripheral regional block differed from that expected if the surgeons' responses were random ( $P < 0.001$ ) (Table 1).

A surgeon's preference for his or her patients' anesthetics was related to the types of regional techniques commonly performed on the surgeon's patients (all  $P \leq 0.016$ ) (Table 5).

Surgeons' perceptions of cost efficiency of regional anesthesia were in agreement with their perceptions of time efficiency ( $P < 0.001$ ) and success ( $P < 0.001$ ) (Table 6).

Surgeons' responses to open-ended questions at the end of the survey were in agreement with their quantitative responses earlier in the survey (all  $P < 0.001$ ) (Table 7).

## DISCUSSION

The previous univariate analysis of the survey of Canadian orthopedic surgeons found that the "two principal reasons regional anesthesia is not favored" are "delays in ORs" and "unpredictable success."<sup>2</sup> We reanalyzed the data to evaluate whether these concerns predicted individual surgeons' preferences for peripheral nerve block for their patients. They did not. Instead, a very strong predictor of a surgeon's preference for his or her patient was whether the surgeon would choose the block if he or she was undergoing the surgery. After controlling for this relationship, delays and success rate were not significantly related to anesthetic preferences. Even if such a relationship

were present, it would apply to too few patients to be of economic importance. The latter is what matters, because a solution for the concerns about increased anesthesia-controlled time and reduced success rate from peripheral nerve block is to place the block before OR entry, resulting in a large fixed cost that can substantially reduce the productivity of the anesthesia group.<sup>6,10,15</sup>

An economically important percentage of surgeons (about 1/3) wanted peripheral nerve block for themselves for some procedures, but not others (Table 1). This result shows that inquiring about why a surgeon has his or her preferences for his or her surgery needs to be procedure-specific. For example, in the open-ended questions, the most commonly mentioned reason for favoring regional anesthesia was the reduction in pain.<sup>2</sup> There was a strong positive relationship between a surgeon's Likert scale response to the question about whether regional anesthesia reduces pain and whether he or she would want a peripheral nerve block for shoulder arthroscopy ( $\tau = 0.22, n = 446, P < 0.001$ ), but no such relationship for total knee replacement ( $\tau = 0.05, n = 449, P = 0.29$ ). Yet, shoulder arthroscopy can be <2% of orthopedic cases performed (data from SUNY Upstate). Thus, even if the survey could have been used to find out why surgeons' preferences varied by procedure, the answer for any one procedure would be of little economic value from the perspective of the anesthesia group.<sup>10</sup> Furthermore, because there was also marked heterogeneity in responses among surgeons (Table 1), the results would likely have been of little economic relevance to anesthesiologists at facilities of typical size (i.e., with 1 to 3 orthopedic ORs per day). Those anesthesiologists need to discuss with their own few surgeons<sup>10</sup> what they would want for their anesthetic if they were the patient and why.

The finding that some surgeons wanted peripheral nerve block for themselves for some procedures but not others can explain why the reasons a surgeon was "against" or "favored" regional anesthesia did not predict anesthetic preference. Perceptions of regional anesthesia were so procedure-dependent that asking about regional anesthesia in general was of limited relevance to the economics of an anesthesia group's block team. Such insights may be useful for hospital administrators, anesthesiologists, and orthopedic surgeons who are interviewing a potential new surgeon to join a practice with an active regional program.

The survey did not differentiate between a surgeon's preference for regional anesthesia for his or her surgery and the anesthesiologists who might then care for the surgeon, as not all anesthesiologists routinely perform regional anesthesia. If a surgeon perceived that the anesthesiologist most likely to use regional anesthesia was also the most experienced, the surgeon's preference for regional anesthesia for his or her own care may be an indirect effect of a preference for

a specific anesthesiologist. Future studies could evaluate whether many surgeons' preferences for peripheral nerve block for his or her surgery would be different if he or she could pick the anesthesiologist.

The motivation for our work was to be able to more accurately forecast the economics of a block team from the perspective of an anesthesia department. In contrast, a cost utility analysis of a block team would take a societal perspective and include other benefits (e.g., reduction in pain, postanesthesia care unit time, and vomiting). If our findings were to contribute to better matching of the use of block teams to the demand for them, the societal cost per pain-free patient day would be reduced. However, we would need to know whether primary care physicians would use information about the availability of postoperative analgesia when referring patients to surgeons and facilities. For major surgery, decision-making is hierarchical: procedure (specialty), then payer, then hospital (based in part on distance), and then surgeon who practices at that hospital.<sup>20</sup> Knowing about referring physicians' decision-making would be important, since 31% of Medicare patients believe that a physician made the decision regarding choice of the hospital for surgery and 42% reported that their physician had as important a role as their own.<sup>21</sup>

Several previous studies have evaluated factors predicting patients' preferences for regional anesthesia. For example, patients who are emotionally stable under stress are more likely to choose regional anesthesia.<sup>22</sup> These studies are not the same as ours, because a factor can be highly predictive but occurs so infrequently as to result in little difference in numbers of patients. Our focus is economics.

In conclusion, a surgeon's preference for the studied peripheral nerve blocks for his or her own surgery of a specific procedure predicted the surgeon's preference for his or her patients. Surgeons' perceptions of delays and success rate were not of significant predictive value and, even if a relationship were present, would relate to too few patients to be of economic importance. These results are important to better forecast the net economic impact on an anesthesia group of a regional block team.

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