▼ Review Article

Measurement of Patient Satisfaction as an Outcome of Regional Anesthesia and Analgesia: A Systematic Review

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Patient satisfaction has become an important endpoint in outcomes research.[1,2] The perspective of which anesthesia-related outcomes our patients desire has become increasingly important.[3] Despite many studies investigating patient satisfaction with various aspects of medical care, the concept of patient satisfaction is quite complex. There are concerns about the methodology of many studies examining patient satisfaction which may cast doubt to the validity and reproducibility of the results from such studies. These factors, in part, contribute to the uncertainty of patient satisfaction in assessment of medical care today.

In the field of anesthesiology, assessment of patient satisfaction may be an important outcome measurement and indicator of quality of anesthesia care.[2,4] Regional anesthesia and analgesia (RAA) have been shown to improve clinically oriented outcomes,[5] and many studies investigating the use of RAA have incorporated patient satisfaction measurements. The effect and determinants of RAA on patient satisfaction are not well established, despite the potential benefits of RAA.

We will provide an overview of the concept of patient satisfaction, including the importance of measuring theories regarding and methodological issues involved in measuring patient satisfaction. We will then review the available literature investigating various studies of RAA that have incorporated measurements of patient satisfaction and provide future directions for investigations in this area.

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General Overview of Patient Satisfaction

Importance of Measuring Patient Satisfaction

Patient satisfaction is an important outcomes measurement as a result, in part, of its influence on the delivery of medical care at both the societal (total consumption of health care resources) and individual (patient participation) level.[6-10] Health care organizations frequently use patient satisfaction ratings as an integral part of marketing and benchmarking of services. Patient satisfaction may be an indicator of quality care.[7,11] Although measurement of patient satisfaction is important in improving delivery of quality medical care, the actual significance of patient satisfaction as an indicator of quality of health care service is controversial.[12]

Patient satisfaction is a recognized endpoint in outcomes research and measurement.[2] Clinicians are familiar with clinically oriented outcomes; however, patient-related outcomes also encompass other dimensions such as patient satisfaction, health-related quality of life, and economic measurements.[2] Outcomes research involves assessment of the efficacy and effectiveness of a health care intervention on patient-related outcomes, and measurement of patient satisfaction, as a patient-centered assessment, reflects the purpose of outcomes research.

Theories of Patient Satisfaction

Patient satisfaction is a complex concept that may incorporate many dimensions including sociodemographic, cognitive, and affective components.[1,13] Although there are many studies investigating "pa-

tient satisfaction," little work has been performed to conceptualize patient satisfaction. Part of the difficulty lies in the fact that patient satisfaction is a derived concept and potential inputs into this concept have not yet been fully clarified.[7]

Many theories for patient satisfaction have been proposed; however, none have been extensively tested and validated in different health care settings. Little work has been done to explain associations between patient satisfaction and dependent variables (e.g., patient characteristics) or subsequent patient behaviors.[13] Theories of patient satisfaction are difficult to categorize in an organized and easily comprehensible fashion; however, one may group these theories based on intrapatient comparisons (disconfirmation theory), or differences between individual patients and health care providers (attribution theory) or other patients (equity theory) (Table 1). Patient expectations play a significant role in formulation of patient satisfaction in many of these theories. Expectations are beliefs (created by a cognitive process) and may be classified into ideal, predicted-practical, normative (what should happen), or unformed expectations.[14]

Intrapatient comparison theories of patient satisfaction generally match patient expectations with perceptions of medical care. Differences between what is expected and what is perceived to occur will contribute to patient satisfaction or dissatisfaction. The disconfirmation theory is the most dominant model of nonmedical, customer satisfaction.[15] Consumers compare their perceptions of the product–service against prior expectations, and the resultant size and direction (negative or positive) of the disconfirmation results in satisfaction or dissatisfaction.[15]

Equity theories are based on the premise that patient satisfaction relates to whether patients believe that they have been treated fairly.[16] Equity occurs when patients compare their balance of inputs (e.g., time and money) and outputs (e.g., medical care and the results of such care) with those of other patients. Patient satisfaction occurs when people perceive they are treated fairly and may possibly increase when patients ascribed more favorable outcomes to themselves when compared with others.[14]

Attribution theories assume that any causes for failed expectations will be examined. Dissatisfaction may occur if the patient and provider assume different reasons for the failure.[15] A related concept is gap analysis, where identification of differences between provider and patient perceptions of services occurs.[17] Addressing potential gaps, which may occur as providers focus primarily on delivery of medical care whereas patients focus on services used, may increase patient satisfaction.[1]

Thus, there is no universally accepted theory of patient satisfaction, and many theories have been derived from work in the arena of marketing research and consumer satisfaction. Patient satisfaction theories compare differences between prior patient expectations and evaluations of medical care. A majority of the patient satisfaction research has been empirical, and further research is needed to elucidate and validate the conceptualization of patient satisfaction.

Table 1. Theories of Patient Satisfaction

Intrapatient comparisons
Disconfirmation theory (comparison of perceptions against prior expectations)
Assimilation effect (perceptions will shift toward expectations if the differences are small)
Contrast effect (perceptions will shift away from expectations if the differences are large)
Patient-provider comparisons
Attribution theories (examination of failed expectations)
Gap analysis (differences between patient and provider perceptions of services rendered)
Interpatient comparisons
Equity theories (satisfaction results from perception of fair treatment)

Measurement of Patient Satisfaction

Although "patient satisfaction" has become a common measurement in the clinical setting, proper assessment of a patient's cognitive evaluation of and affective response to medical care provided is an extremely complex task. The difficulty in measuring patient satisfaction lies in the fact that satisfaction is a multidimensional concept with inputs or determinants that are not yet clearly defined. Nevertheless, there appear to be several domains or determinants that may contribute to patient satisfaction with medical care.

Determinants of satisfaction. Although there are several factors that are thought to influence patient satisfaction, the relationship between these factors and patient satisfaction is complicated and it is unclear which of these are the most important in determining satisfaction, in part due to the fact that many studies have not incorporated each of these determinants in their instruments for assessing satisfaction.[18] Several reviews and meta-analysis have, however, provided a comprehensive overview of the factors believed to influence patient satisfaction.[18,19] We have organized these variables into patient-, provider-, and process of care-related determinants (Table 2).

Patient-related determinants. Patient-related factors that have been generally examined as determinants of patient satisfaction include sociode-

Table 2. Determinants of Patient Satisfaction

Patient-related
Sociodemographic factors
Age
Cultural
Education
Gender
Income
Marital status
Occupation
Race
Social class
Physical and psychological health
Expectations
Provider-related
Provider interactions
Verbal (information giving)
Nonverbal (body language)
Provider competence (reputation *v* observation)
Process-related
Accessibility and convenience
Ancillary services
Bureaucratic factors
Cost
Environmental factors
Organization of health care

mographic characteristics (e.g., age, gender, race, education, income, marital status, social class, and occupation), physical–psychological health, and expectations. With regard to sociodemographic factors, an increase in age and female gender have consistently correlated with increased levels of satisfaction,[1,20] although this may be due to these groups receiving more information or having more positive interactions with their providers.[19,21]

The patient's baseline physical and psychological health status before receiving care may also influence patient satisfaction. Patients who have higher levels of patient satisfaction will generally report greater satisfaction with self-rated health and other aspects of their lives.[11,22,23] Although the relationship for this correlation is unclear, it may be that poor health, in general, directly produces dissatisfaction.[24] In general, patients appear to have a greater degree of satisfaction when the conduct of medical care conforms to their expectations.

Provider-related determinants. Satisfaction with provider care is a major, if not the most important, determinant of patient satisfaction.[11,25,26] There is a significant correlation between patient satisfaction and provider verbal/nonverbal interactions (socioemotional behavior, information giving, total visit length) and characteristics (empathy, perceived competence).[19] However, the patient satisfaction–provider correlation is complex because the relationship is not unidirectional (provider → patient satisfaction), but may be reciprocal (provider ↔ patient satisfaction).[19]

Provider interaction, including type and extent of communication, partnership building, and nonverbal behaviors, has been examined and shown to contribute significantly to patient satisfaction.[19] Positive communication that reinforces a partnership-building relationship with the patient will most likely result in greater patient satisfaction.[19,27] In addition, the level of patient satisfaction increases with a greater amount of information provided.[27] Positive nonverbal behaviors and cues are associated with greater patient satisfaction.[19]

Patient's perception of a provider's competence is also related to patient satisfaction. Although it might seem intuitive that the quality of care delivered is determined primarily by the technical competence of the provider and, in turn, should correlate with higher patient satisfaction, this apparently is not the case. Patients may have difficulty in consistently determining quality of medical care.[28]

Process of care-related determinants. Patient satisfaction is also influenced by process of care-related factors, including accessibility and convenience of care, environmental, ancillary services, bureaucratic (admission, discharge process), setting of medical care (e.g., ambulatory *v* inpatient), and the organization and cost or financing of care.[11] Patient satisfaction is increased with greater accessibility, availability, and convenience of care.[11] However, the organization of health care services (e.g., managed care groups) may limit access and availability, which may result in a decrease in patient satisfaction.[29,30] In general, higher costs of medical care are associated with decreased patient satisfaction; however, disparate socioeconomic groups may respond differently and it may be difficult to distinguish between the effects of the organization from that of financing on satisfaction.[11] Although process of care-related factors may influence patient satisfaction, they appear to be less important than other determinants such as provider-related factors.[1]

Methodological issues in measuring patient satisfaction. One of the major criticisms of patient-satisfaction research relates to methodologic issues, including lack of psychometric standards, reliability and validity of surveys, and discriminatory assessment, which reflect the complexity in measuring the multidimensional nature of patient satisfaction. Many patient satisfaction survey instruments have not undergone rigorous psychometric construction, which is essential in evaluation of complex psychological phenomena such as patient satisfaction.[4]

Many patient satisfaction surveys lack discriminatory value to assess specific aspects of medical care. Use of a single global measurement to evaluate patient satisfaction generally results in high (>95%) satisfaction ratings.[4,31] Unfortunately, these single-item questions cannot distinguish satisfac-

tion with overall medical care from satisfaction with specific aspects of care. Often, these rudimentary instruments cannot accurately measure the multifaceted nature of patient satisfaction and may actually reflect satisfaction with other parts of the patient's medical care. It is important to note that only multi-item, multidimensional surveys that have undergone a process such as psychometric construction have the capability to assess the complex nature of patient satisfaction.

Implementation of the survey instrument may also be associated with potential bias. Possible problems include mode of administrative (e.g., telephone, interview and mail, and structured *v* unstructured), timing of survey, nonresponders, and use of proxies.[1] Although there does not seem to be a consensus of an acceptable response rate, different methods of administration may result in different response rates.[32] The response rate is important in that missing data from nonresponders may affect the validity of the results.[33] The differences between responders and nonresponders are important because patients who are less satisfied with their medical care may be less likely to respond to satisfaction surveys.[34]

The timing of survey and use of proxies may also introduce bias. There is a greater likelihood of recall bias with increasing lengths of times between hospital discharge and administration of the survey, which may affect patient responses.[35] Use of proxies (e.g., family members or friends) may not accurately reflect the views of the patient.[36] Patient satisfaction assessments are typically considered as nonparametric data and appropriate statistical analysis should be conducted. Thus, there are several methodologic concerns that affect assessment of patient satisfaction and reflect the fact that patient satisfaction is multidimensional in concept.

Patient Satisfaction With Regional Anesthesia

The use of RAA has been associated with benefits in quality of postoperative analgesia and clinically oriented outcomes; however, the effects of RAA on "nontraditional" outcomes have not been well established. The relationship of RAA and patient satisfaction is unclear despite the potential benefits of RAA (e.g., superior analgesia, decreased incidence of complications).

We performed an Ovid Medline search using the database covering the time period of 1966 through June 5, 2000. The key words "satisfaction" (15,204 articles), "perception" (31,631 articles), "anesthesia" (68,621 articles), and "analgesia" (22,741 articles) were used. The results from "satisfaction" and "perception" were combined using the "OR" function to yield 46,235 articles. Similarly, "anesthesia" and "analgesia" were combined to yield 88,056 articles. The results of these 2 searches were combined using the "AND" function to yield 1,120 articles, 957 of which were in English. The authors reviewed each abstract and included any articles that examined satisfaction with neuraxial or peripheral nerve block but excluded letters and any article investigating use of RAA in parturients. Studies in parturients were excluded because patient satisfaction, a complex issue per se, is a much more intricate concept with a birth of a child.[37] Further review of the remaining articles and exclusion of those that did not directly assess "satisfaction" (e.g., assessment of "quality of pain management" was not considered equivalent to measurement of "satisfaction") yielded 46 articles (Table 3). It should be noted that any conclusions regarding "patient satisfaction" from these studies are limited by methodologic issues in measuring patient satisfaction and should be considered in this context.

Review of Current Data Evaluating Satisfaction With Regional Anesthesia or Analgesia

An overview of trials in Table 3 shows that satisfaction ratings used typically were unidimensional as investigators assessed satisfaction by using either visual analog scale (VAS) scores or categorical, 3- to 5-point Likert-like scales. The limitations of these unidimensional instruments have been described earlier (see "Methodological Issues in Measuring Patient Satisfaction"). A majority of investigators assessed patient satisfaction through direct interviews of inpatients at the end of analgesic treatment or some time after surgery (usually within 72 hours), or through telephone calls 24 to 48 hours after outpatient surgery. A few investigators used mail-in questionnaires (given to patients before discharge) or mailed questionnaires where investigators actually sent surveys some time after patient discharge.

Regional anesthesia–analgesia versus general anesthesia–systemic analgesia. Eighteen trials have measured patient satisfaction when comparing regional versus general anesthetic techniques with a majority (13 trials) focusing on a comparison of postoperative regimens (Table 3). The preponderance of these studies was randomized and 7 of the 10 randomized trials showed that postoperative regional analgesia, especially with local anesthetics, resulted in significantly greater patient satisfaction when compared with systemic opioids. All 7 randomized trials (references 46, 50, 51, 54, 55, 58, 60) that showed greater patient satisfac-

Table 3. Overview of Regional Anesthesia—Analgesia Trials Using Measurements of Patient Satisfaction

Comparison of Regional Anesthesia—Analgesia Versus General Anesthesia–Systemic Analgesia

Study	Primary Purpose	n; Study Type	Response Format; Time of Assessment	Items Used to Assess Patient Satisfaction	Level of Satisfaction
Postoperative regional analgesia v *systemic analgesia*					
Borgeat et al[50] (2000)	Effect of PCIA *v* IV-PCA on diaphragmatic function after shoulder surgery	35; RT	Interview; 54 h after block	VAS— 0 = not satisfied 10 = entirely satisfied	mean (range) PCIA 9.7 (8-10) PCA 7.5 (2-10) $P < .05$
Mann et al[51] (2000)	Effect of PCEA *v* IV-PCA in the elderly after abdominal surgery	70; RT	Interview; POD no. 5	Categorical scale—Overall satisfaction to postoperative analgesia 3-point Likert scale	PCEA resulted in greater satisfaction than PCA ($P < .05$)
Silvasti and Pitkanen[52] (2000)	Epidural analgesia *v* IV-PCA after knee surgery	56; RT	NA	NA	One patient in both epidural groups was dissatisfied . . .
Singelyn and Gouverneur[53] (1999)	IV-PCA *v* PCEA *v* continuous "3-in-1" block after THA	1,300 (1,142 in the "3-in-1" group)	Interview; 72 h after surgery	VAS— 0 = completely dissatisfied 10 = completely satisfied	mean ± SD PCA 80 ± 16 3-in-1 87 ± 14 PCEA 81 ± 14 $P = .003$
Chudinov et al[54] (1999)	Continuous psoas block *v* IM meperidine for perioperative analgesia	40; RT	Interview; Before and 72 h after surgery	Categorical scale—2-point scale (not described)	Psoas block provided greater satisfaction pre- ($P < .05$) and postsurgical ($P < .03$) analgesia
Borgeat et al[46] (1998)	PCIA *v* IV-PCA after major shoulder surgery	60; RT	Interview; 54 h after surgery	VAS— 0 = not satisfied 10 = entirely satisfied	mean ± SD PCIA 9.6 ± 0.7 PCA 7.5 ± 2.4 $P < .05$
Al-Kaisy et al[55] (1998)	Comparison of IS block to placebo for postoperative analgesia	30; RT	Telephone call; 24 h after surgery	Categorical 2-point scale 1 = strongly satisfied 2 = would not choose IS block	100% IS 53% placebo
Motamed et al[56] (1998)	The effect of continuous epidural analgesia *v* PCA on postoperative hypoxemia	60; RT	Interview; 24 h after surgery	Categorical scale—4-point Likert scale	ND
Worwag and Chodak[57] (1998)	Use of epidural morphine *v* IM methadone as part of a clinical pathway after prostatectomy	100	Mail questionnaire; 3 wk after surgery	Categorical scale—5-point Likert scale	No patients were "very" or "a little" dissatisfied
Borgeat et al[58] (1997)	PCIA *v* IV-PCA after shoulder surgery	40; RT	Interview; 6 h after surgery	VAS— 0 = not satisfied 10 = entirely satisfied	mean (range) PCIA 9.8 (9-10) PCA 7.6 (2-10) $P < .05$
Liu et al[59] (1995)	Effects of epidural *v* IV hydromorphone on postoperative analgesia and patient recovery	16; RT	Mail-in questionnaire	VAS— 0 = poor 10 = excellent	mean ± SD EA 8.9 ± 0.7 IV 8.8 ± 0.8 ND
Schug and Fry[60] (1994)	Continuous intrapleural or epidural *v* IV opioids for postoperative analgesia	340; RT	Interview; At end of treatment	Numeric rating scale— 0 = complete dissatisfaction 10 = complete satisfaction	% rating "10/10" Block ~62% PCA ~42% $P < .01$
Egan and Ready[45] (1994)	Patient satisfaction with PCA or epidural morphine after a variety of surgical procedures	916	Interview; At end of treatment	VAS— 0 = very dissatisfied 10 = very satisfied	mean ± SD PCA 8.6 ± 1.8 Epid. 9.0 ± 1.5 $P < .01$
Intraoperative regional v *general anesthesia*					
Reeves and Myles[61] (1999)	SA *v* GA in patients undergoing TURP	261	Interview; POD no. 1	Categorical scale—5-point Likert scale	ND

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Table 3. (Continued)

Yeh et al[62] (1999)	Thoracic EA *v* GA for patients undergoing modified radical mastectomy	64; RT	Interview; POD no. 0-2	Numeric rating scale— 5 = "most" satisfaction 1 = "least" satisfaction	mean ± SD EA 4.4 ± 0.1 GA 3.5 ± 0.2 $P < .01$
Richardson and Dooley[63] (1998)	EA *v* GA for extracorporeal shock wave lithotripsy	26; RT	Telephone call; 24 h after surgery	Categorical scale—3-point Likert scale	ND
Parnass et al[64] (1993)	Comparison of EA *v* GA in patients undergoing outpatient knee arthroscopy	260	Telephone call; 24 h after surgery	VAS— 1 = worst 10 = best	mean ± SEM EA 8.1 ± 0.3 GA 7.6 ± 0.2 ND
Young[65] (1987)	Local *v* SA *v* GA for inguinal herniorrhaphy	368	Mail questionnaire; NA	"Satisfaction score" from 0 to 8	mean ± SD SA 5.7 ± 1.6 GA 6 ± 1.4 Local 6 ± 1.9 ND
Comparison among different regional anesthetic-analgesic techniques					
Wong et al[66] (2000)	Effect of PCEA background infusion after GYN surgery	41; RT	Interview; 24 h after surgery	Categorical scale—4-point Likert scale	ND
Bertini et al[67] (1999)	Comparison of ropivacaine to bupivacaine for axillary plexus block	90; RT	Interview: At end of surgery	Categorical scale—3-point Likert scale	% rating "excellent" Ropiv. 93.4-100% Bupiv. 73.3% $P < .05$
Connelly et al[68] (1999)	Addition of clonidine to peribulbar blocks for cataract surgery	40; RT	Telephone call; 24 h after surgery	VAS— 0 = not satisfied 10 = very satisfied	mean ± SD Clon. 9.8 ± 0.5 Plac. 9.5 ± 1.4 ND
Mollmann et al[69] (1999)	Continuous spinal *v* continuous epidural for postoperative analgesia	120; RT	Interview; 72 h after surgery	Categorical scale—3-point Likert scale	% rating "excellent" SA 92.2% EA 70.6% $P < .05$
Singelyn et al[70] (1999)	Comparison of PCIA *v* continuous infusion after open shoulder surgery	60; RT	Interview; 48 h after surgery	VAS 0 = not satisfied 10 = entirely satisfied	mean ± SD Continuous 88 ± 10 PCIA 85 ± 13 Bolus only 72 ± 16 $P < .001$
Stoneham et al[71] (1998)	Comparison of deep *v* superficial cervical plexus block for carotid surgery	40; RT	NA	NA	1 patient in each group expressed "dissatisfaction" with the anesthetic technique
Casati et al[72] (1998)	Comparison of separate spinal and epidural punctures *v* CSE anesthesia	120; RT	Interview; 24 h after surgery	Categorical—2 items	% prefer technique Separate 40/60 CSE 51/60 $P < .01$
Allen et al[73] (1998)	Femoral nerve block *v* sciatic-femoral *v* placebo after TKR	36; RT	Telephone call; 2 wk after surgery	VAS— 0 = most satisfied 10 = least satisfied Would choose same anesthetic technique?	% prefer technique Femoral 87% Sciatic-fem 83% Placebo 67% ND
Tanaka et al[74] (1997)	Effect of addition of epidural fentanyl to morphine for postgastrectomy analgesia	122; RT	Interview; 24 h after surgery	Categorical—4-point Likert scale	Groups receiving higher doses of fentanyl or morphine had significantly higher satisfaction ratings ($P < .05$).

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Comparison of Regional Anesthesia—Analgesia Versus General Anesthesia–Systemic Analgesia

Study	Primary Purpose	n; Study Type	Response Format; Time of Assessment	Items Used to Assess Patient Satisfaction	Level of Satisfaction
Goranson et al[75] (1997)	Comparison of IA *v* FNB *v* IA + FNB after knee arthroscopy	60; RT	Mail-in questionnaire	Categorical—5-point Likert scale	mean ± SD IA 1.4 ± 0.5 FNB 1.8 ± 0.9 IA + FNB 1.4 ± 0.6 ND
Paech et al[76] (1997)	Effect of different doses of clonidine in thoracic epidural analgesia after abdominal gynecological surgery	100; RT	Interview; Various intervals up to 24 h after surgery	VAS—not specified	median (interquartiles) Control 98 (84-100) 10 μg/mL 100 (78-100) 15 μg/mL 91 (78-100) 20 μg/mL 100 (86-100) ND
Vloka et al[77] (1997)	Femoral-genitofemoral nerve block *v* SA for saphenous vein surgery	68; RT	Telephone call; 24 h after surgery	Categorical: Would choose same anesthetic technique?	% prefer technique Femoral 36/36 SA 26/32 $P < .01$
Hirst et al[78] (1996)	Continuous *v* single shot for FNB in patients undergoing TKR	33; RT	Interview; 72 h after surgery	Categorical—5-point Likert scale	97% of all patients "satisfied" or "very satisfied." ND.
Norris et al[79] (1996)	Meperidine *v* lidocaine for SA for patients undergoing postpartum tubal ligation	20; RT	Interview; 24 h after surgery	Categorical—4-point Likert scale	median Meperidine "good" Lidocaine "good" ND
Baron et al[80] (1996)	Evaluation of epinephrine as an adjuvant to thoracic epidural fentanyl infusions	38; RT	Interview; 24 h after surgery	Categorical—4-point Likert scale	ND
Gao et al[81] (1995)	Bupivacaine-buprenorphine *v* bupivacaine via caudal block for analgesia after THA	30; RT	Interview; 24 h after surgery	Categorical—5-point Likert scale	% "very satisfied"/"satisfied" Bupivac. 13% Bupivac-bupren. 80% $P < .05$
McLeod et al[82] (1995)	Lateral popliteal sciatic *v* ankle block following foot surgery	40; RT	Telephone; Evening after surgery	Categorical—3-point Likert scale	% "satisfied" Popliteal 81% Sciatic 79% ND
Flory et al[83] (1995)	The effect of the addition of morphine after shoulder surgery	40; RT	NA	NA	ND
McLeod et al[84] (1994)	Lateral popliteal sciatic *v* SC infiltration following foot surgery	40; RT	Telephone; Evening after surgery	Categorical—3-point Likert scale	% "satisfied" Poplit-Sciatic 95% SC 58% $P < .05$
Nolan et al[85] (1992)	PCEA *v* continuous epidural analgesia following pelvic reconstruction	23; RT	Interview; 72 h after surgery	Categorical—4-point Likert scale	All patients "very" or "satisfied." ND.
Descriptive series of regional anesthetic-analgesic techniques					
Ptaszek et al[86] (1999)	Effectiveness of midfoot block in foot surgery	50	Interview after surgery; Telephone 24-48 h after surgery	Categorical—4-point Likert scale	44% = excellent 54% = good 2% = fair 0% = poor
Berry and Heindel[87] (1999)	Effect of mixture of lidocaine and tetracaine for axillary plexus block	58	Telephone; 24 h after surgery	VAS— 1 = completely displeased 10 = completely pleased	Mean ± SD = 9 ± 1.2 (min = 6; max = 10)
Gwirtz et al[88] (1999)	Use of intrathecal opioid postoperative analgesia	5,705	Interview; 24 h after surgery	Numeric rating scale 1 = complete dissatisfaction 10 = complete satisfaction	Mean score = 8.51
Klein et al[89] (1998)	Paravertebral nerve block for 22 inguinal herniorrhaphy	22	Interview; 24 and 48 h after surgery	Categorical—4-point Likert scale	% "very satisfied" 24 h 17/20 48 h 18/20

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Table 3. (Continued)

Kuusniemi et al[90] (1997)	Low-dose hypobaric SA for knee arthroscopy	70	Interview; In day-surgery unit after surgery	Categorical—3-point Likert scale	96% = good 3% = satisfactory 1% = poor
Waters et al[91] (1997)	Patient satisfaction with extremity blocks in remote locations	232	Mail-in questionnaire	VAS— 0 = complete satisfaction 10 = significant dissatisfaction	Mean score = 1.9 ± 2.7 78% agreeable to another block for future surgery
Tetzlaff et al[43] (1993)	Level of patient satisfaction with IS blocks for shoulder surgery in patients who received GA for prior shoulder surgery	25	Questionnaire	Series of "yes/no" questions	24/25 prefer nerve block for shoulder surgery
Rorie et al[92] (1980)	Sciatic nerve block *v* popliteal fossa block	119	Mail-in questionnaire	Categorical—4-point Likert scale	~75% of all patients "completely satisfied"

Abbreviations: ACL, anterior cruciate ligament; CSE, combined spinal epidural; EA, epidural anesthesia; FNB, femoral nerve block; GA, general anesthesia; GYN, gynecological; IA, intraarticular; IM, intramuscular; IS, interscalene; IV, intravenous; NA, not available or not specified; ND, no significant differences between groups; PCA, patient-controlled analgesia; PCEA, patient-controlled epidural analgesia; PCIA, patient-controlled interscalene analgesia; POD, postoperative day; RT, randomized trial; SA, spinal anesthesia; SC, subcutaneous; SD, standard deviation; SEM, standard error of mean; THA, total hip arthroplasty; TKR, total knee replacement; TURP, transurethral resection of the prostate.

tion with regional analgesic techniques had significantly lower VAS pain scores. For the 5 studies comparing the effect of intraoperative regional versus general anesthesia, the benefits of regional anesthesia are not as clear. Thus, it appears that postoperative regional analgesia (*v* systemic analgesia) will more likely provide a greater degree of patient satisfaction when compared with intraoperative regional anesthesia (*v* general anesthesia).

Comparison of different regional anesthetic techniques. Unlike those comparing RAA versus general anesthesia–analgesia, studies comparing various regional anesthetic techniques or analgesic regimens tend to show no significant difference between techniques or regimens with regard to degree of patient satisfaction. These studies generally compared the addition of an adjuvant agent (e.g., clonidine), effect of different regional blocks for postoperative analgesia, and differences in continuous versus demand ± continuous infusions. Of the 20 trials comparing different regional anesthetic techniques or analgesic regimens, only 8 trials showed any significant advantage of one technique or regimen over another. In general, it appears that one particular RAA technique may not offer significant advantages with regard to patient satisfaction.

Possible Factors Affecting Dis-/satisfaction With Regional Anesthesia and Analgesia

Although a comprehensive evaluation of the predictors of satisfaction with RAA is not currently available and no factor has been validated as a predictor of satisfaction with regional anesthesia, there are some data suggesting a relationship between various aspects of RAA and patient satisfaction. We have organized these into pre-, intra-, and postoperative predictors.

Preoperative. Several preoperative factors, including surgeon preference, age, and psychological factors, may influence patient satisfaction with regional anesthesia.[38] A surgeon's preference may affect the patients' preference of anesthetic choice, because 25% of patients decided on regional anesthesia with their surgeon.[39] The importance of psychological factors, especially anxiety, in influencing the degree of patient satisfaction has been shown in several studies.[38,40,41] Strategies to diminish anxiety may lead to improvements in patient satisfaction.[41] Patients with prior experiences with regional anesthesia tend to prefer regional anesthesia for future anesthetics.[39,40,42,43] Patients without any prior surgical experiences tend to prefer general anesthesia, in part, due to concerns regarding intraoperative awareness.[42]

Intraoperative. Intraoperative factors may also affect level of patient satisfaction with regional anesthesia. Although intraoperative incidents (e.g., hypotension) generally have no effect on patient satisfaction, certain aspects in the performance of regional anesthetic techniques (e.g., needle puncture) may adversely impact patient satisfaction.[40,44] Preliminary data showed that 37% of patients surveyed noted that needle insertion for regional anesthesia was "uncomfortable" and 22% were uncomfortable during surgery.[39] Adequate perioperative sedation may be an important factor for patient satisfaction with and acceptance of regional anesthesia in part by attenuating intraoperative anxiety.[40] Use of benzodiazepine premedication has been shown to decrease intraoperative anxiety and significantly improve patient satisfaction.[41]

Postoperative. There are several advantages of RAA, including superior postoperative analgesia, which may result in higher levels of patient satisfaction.[40,43,45] Patients receiving a postoperative regional analgesic technique generally had lower VAS pain scores and a higher level of satisfaction.[46,50,51,54,55,58,60] Patients who have a lower incidence of side effects with regional analgesic techniques may also have higher levels of satisfaction.[46] Advantages of RAA include less sedation, which allows earlier interaction with family members.[40,45] Although a correlation between lower pain scores/fewer side effects and higher satisfaction would seem intuitive, these relationships are quite complex and may not be directly linked, as noted in other literature which describe other factors (e.g., perceived control) that may influence satisfaction with analgesia.[47-49] Thus, lower levels of postoperative pain and analgesia-related side effects per se may not necessarily translate directly into a higher degree of patient satisfaction.

Little work has been performed specifically examining the relationship between use of RAA and patient satisfaction. Studies typically have incorporated a unidimensional assessment of patient satisfaction with regional anesthesia as a secondary or tertiary outcome measurement. There has been no psychometric construction of patient satisfaction surveys of regional anesthesia or attempt at modeling of the relationship between RAA and patient satisfaction. What rudimentary data exist suggest that use of regional analgesia, especially for postoperative analgesia, may result in a greater degree of patient satisfaction when compared to that with systemic analgesia.

Future Directions

Despite the fact that only multidimensional surveys may accurately evaluate patient satisfaction, current assessments of patient satisfaction and regional anesthesia are based primarily on unidimensional instruments. The elucidation of the relationship between patient satisfaction and RAA is still in its infancy, reflecting the difficulties in conceptualization and measurement of patient satisfaction in general and a lack of a widely accepted model of patient satisfaction. Similarly, future developments in improving our conceptual understanding and methodological assessment of patient satisfaction and regional anesthesia will most likely parallel any progress in research of patient satisfaction as a whole.

Modeling of the Relationship Between Patient Satisfaction and Regional Anesthesia

Current studies assessing patient satisfaction are primarily descriptive in nature. Additional hypothesis-driven research in theory building and modeling of patient satisfaction are necessary. At this time, we are uncertain of what determinants influence satisfaction with regional anesthesia or how RAA may affect patient satisfaction. Elucidation of the relationships between patient satisfaction with regional anesthesia and a variety of factors (e.g., preoperative expectations, postoperative pain control, outcomes, and complications) is needed.

With regard to research design, use of more control variables, which may have a direct or indirect influence on patient satisfaction, multiple types of surveys to assess method variance, and inclusion of qualitative data should be considered. In addition, nonresponders should be analyzed to establish external validity.[1] Although technically not directly contributing to patient satisfaction with regional anesthesia, patients who choose not to have a regional anesthetic technique should also be examined to determine what factors contribute to their decision not to have a regional anesthetic technique.

Creation and Validation of Survey Instruments

Assessment of patient satisfaction has been performed in several studies examining various aspects of the clinical use of RAA; however, satisfaction measurement was not the primary outcome assessed and instruments used to measure satisfaction were unidimensional in nature. Because patient satisfaction is a multidimensional concept, psychometric construction of survey instruments with inclusions of appropriate domains is needed to ad-

vance our understanding of the influence of regional anesthesia in contributing to patient satisfaction and the determinants of satisfaction with regional anesthesia. Development of validated instruments is essential to the establishment of patient satisfaction as a widely recognized patient-related outcome in the field of RAA.

Incorporation of Satisfaction With Regional Anesthesia and Analgesia in Clinical Trials

Once validated instruments for measuring patient satisfaction have been developed, it is important to consistently incorporate these instruments in ongoing clinical trials. Currently, only a small fraction of regional anesthesia trials incorporate patient satisfaction as an outcome. As psychometrically constructed, validated instruments are developed, assessment of patient satisfaction may become a primary outcome measurement of trials investigating various aspects of RAA. Confirmation of increased patient satisfaction using validated instruments may promote increased perioperative utilization of regional anesthetic techniques.

Conclusions

Like other clinically oriented outcomes, patient satisfaction is a valid patient-related ("nontraditional") outcome measurement. With the emphasis on patient-centered medical care, patient satisfaction has become an important indicator of quality of medical care. However, there are many questions regarding the methodology of measuring patient satisfaction, reflecting the fact that the concept of patient satisfaction is multidimensional and quite complex.

Although RAA may improve clinically oriented, patient-related ("traditional") outcomes, it is not clear whether use of regional anesthesia may improve patient satisfaction. In addition, the determinants of satisfaction with regional anesthesia are not well established, reflecting concerns with the conceptualization and measurement of patient satisfaction at this time. Further research into the theory and modeling of patient satisfaction, construction of validated surveys, and incorporation of such instruments into clinical trials will establish the role of patient satisfaction as a nontraditional outcome of regional anesthesia. Elucidation of the contribution of the anesthesiologists providing perioperative RAA to patient satisfaction may promote the increased use of regional anesthetic techniques among anesthesiologists and facilitate surgical acceptance of these techniques.

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