

AN EVALUATION OF ANESTHESIA PATIENT SATISFACTION INSTRUMENTS

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The purpose of this study was to systematically review the instruments used to obtain anesthesia-specific patient satisfaction data and to determine the degree to which each instrument controlled for measurement error bias, such as poor survey design. By using an assessment and evaluation tool developed for the present study that held proven internal reliability and construct validity, we analyzed and scored each instrument according to the presence or absence of measurement error in survey design. We found that a paucity of anesthesia-specific patient satisfaction studies exists and that patient satisfaction studies dealing with anesthesia care were erratically defined, nonstandardized, and imprecise regarding intent and method.

Moreover, the simple rating forms used in most of the reviewed studies were inadequate to achieve the goal of measuring the quality of anesthesia care. One instrument, the Iowa Satisfaction With Anesthesia Scale (ISAS), developed by Dexter et al (1997), was the first found to inculcate scientifically accepted psychometric item construction algorithms, an indicator of measurement reliability. Although the ISAS holds substantial potential for future application in this realm, we recommend that it be refined further and that the search for a superlative instrument to obtain anesthesia-specific patient satisfaction continue.

Key words: Anesthesia outcome, measurement techniques, patient satisfaction.

During the preceding decade, consumer satisfaction has been highlighted as an important objective of healthcare, a key determinant of service quality, and a useful indicator of outcome.¹⁻³ The emphasis on assuring that the patient remains the priority of service, along with the relative ease and apparent simplicity of undertaking satisfaction research, has led to a proliferation of such studies in the United States. Accordingly, this phenomenon has led to a rapid proliferation of survey questionnaires, the majority of which lack sufficient discrimination to accurately measure patient satisfaction with anesthesia care.⁴ Still, the question remains unanswered as to whether any of the existing instruments designed to elicit patient satisfaction data specific to anesthesia care have sufficient discrimination to measure intended outcomes. Moreover, the generalizability of data obtained from such instruments remains fundamentally unproven.⁴

In anesthesia, the perception of high healthcare costs and the reality of marketplace forces have led practitioners to consider the value of every resource and expenditure. The era of routine comprehensive preoperative testing, overnight hospital stays, and unrestricted use of pharmacologic agents and monitoring modalities has passed. Anesthesia providers are

reexamining historical approaches to preoperative evaluation, monitoring, choice of anesthetic techniques, and postanesthetic care based on their documented contribution to successful outcome. The goal is to provide the best possible care and to ensure satisfactory outcomes, while maintaining reasonable costs and assuring patient satisfaction with the care received.⁵ Attainment of these goals serves as the sine qua non of continuous quality improvement programs for anesthesia services.

Like most outcomes-based research, anesthesia-specific patient satisfaction studies seek to determine how to realize the best outcome at the most reasonable cost. Because there is a point of diminishing returns with the application of more technology and more expensive anesthetic agents, another closely related objective of these studies is to identify the trade-offs that produce the optimal outcome result. Still, outcomes measurement and stratification of outcomes by anesthesia-specific patient satisfaction studies are in their infancy.⁶

Although most anesthesia practitioners are aware that patient satisfaction is a highly desired outcome, we contend that few practitioners really understand why this is such an important issue in relation to their personal practices. The American Productivity Quality Center⁷ reports that average satisfied customers tell

5 other people about their positive experiences, whereas those who receive poor service tell 9 to 20 other people. Although dissatisfied customers may tell 9 to 20 other potential customers about their perception of a negative experience, the widespread use of electronic communications allows them to mass email thousands of contacts. Businesses are finding this to be a real problem due to the unrestricted and unverifiable nature of Internet communications.⁸ In addition, the use of the Internet provides a relative degree of anonymity and protection for persons who may use this communication source for malicious intent. When misinformation is disseminated in this manner, there is a high potential for the injection of some degree of unfounded bias that could inhibit the accurate measurement of satisfaction.

Although it may be argued that a direct correlation between the business world and the delivery of anesthesia care does not exist, there can be little doubt that the lessons regarding patient satisfaction are applicable. Consequently, for anesthesia practitioners to obtain a realistic view of their *satisfaction quotient*, it is imperative that indicators of quality and satisfaction be established by scientific investigational methods.

Materials and methods

The most commonly used method of collecting patient satisfaction data is the survey questionnaire.⁹⁻¹¹ Although popular, survey questionnaires often do not control or account for measurement error. Such methodological faults may bias the data, thus yielding spurious and nongeneralizable results.¹⁰ Therefore, the purpose of this study was to systematically evaluate the instruments used to obtain anesthesia-specific patient satisfaction data to determine the degree to which each instrument controls for measurement error bias, an indicator of validity and reliability (Table 1).

The goal of anesthesia care satisfaction studies is to show which elements of the entire anesthetic process are reasonably tolerated and acceptable to patients and which are not. Therefore, the main outcome measure for the present study was the quality of data acquired that purported to reflect patient satisfaction, as determined by a systematic evaluation of the instruments used for gathering such data. To the best of present knowledge, however, a well-validated instrument for systematically evaluating anesthesia-specific patient satisfaction studies does not exist.

Included in the present work were published anesthesia-specific patient satisfaction studies conducted in the United States. To identify these studies, the following databases were searched: MEDLINE, Embase, Science Citation Index, Social Sciences Citation Index,

Table 1. Tested categories of potential bias

1. Survey design (mode of administration)
2. Timing of questionnaire administration
3. Questionnaire length
4. Questionnaire response rate (n)
5. Questionnaire response format
6. Use of psychometrically constructed questions
7. Use of social desirability factors
8. Nonresponse error (unit or item)
9. Specificity of inclusion and exclusion criteria
10. Proxy use
11. Use of incentives
12. Controlled exogenous and/or contextual variables

Arts and Humanities Citation Index, and the TEL (Tennessee Electronic Library). Because they were not related to the purpose of the present study and because of the possibility of introducing confounding variables that could have adversely affected the outcome of this investigation, all studies and instruments that were not exclusively limited to the determination of patient satisfaction with anesthesia care were excluded. For the same reasons, data gathered from sources outside of the United States were not used.

As the basis for the evaluation of the studies designed to measure patient satisfaction, an instrument specifically designed for the present study to evaluate the methodological quality of randomized and nonrandomized studies of healthcare interventions was used. To accomplish this task, the Patient Satisfaction with Anesthesia Care—Analysis Tool (PSACAT) was developed (Figure).

The PSACAT was developed and tested according to accepted guidelines for survey questionnaire conceptualization and design, checklist construction, and measurement errors in psychometric questionnaire construction.^{10,12,13} The PSACAT was divided into 2 sections. Part I addressed the identification and methodological description of each instrument, including the survey design, mode of administration, and the response format. Part II contained subjective assessment questions concerning categories of potential or actual measurement error.^{10,13} The second part of the PSACAT used a 5-point Likert scale to allow for more discrete measurement.

Each instrument evaluated was categorized and rated based on the freedom from measurement errors

Figure. Patient Satisfaction with Anesthesia Care–Analysis Tool (PSACAT)

PART I

Title: _____

Author(s): _____ Publication: _____

Survey Design/Mode of Administration:

Mail-Back Questionnaire Self-Administered Questionnaire

Postoperative Interview (face-to-face) Other _____

Telephone Interview or Questionnaire

Timing of Questionnaire Administration: _____

Number of Items on Questionnaire: _____ Response Rate (n) : _____

Response Format:

Rating Scale Yes/No

Open-Ended Other _____

PART II

For each of the following statements, please indicate the extent of your agreement or disagreement by circling the appropriate number.

- The survey design (mode of questionnaire administration) allowed for the minimization of measurement bias.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
----- ----- ----- -----				
1	2	3	4	5
- The timing of the questionnaire administration did not adversely affect the ability of the patient to respond.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
----- ----- ----- -----				
1	2	3	4	5
- The number of items on the questionnaire allowed for a median completion time of approximately five (5) minutes or less.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
----- ----- ----- -----				
1	2	3	4	5
- A survey response rate (n) that allowed for adequate analysis and reporting of data was achieved.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
----- ----- ----- -----				
1	2	3	4	5
- The questionnaire response format was simple and unambiguous.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
----- ----- ----- -----				
1	2	3	4	5
- The questionnaire items were psychometrically constructed.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
----- ----- ----- -----				
1	2	3	4	5

continues on page 214

Figure. Patient Satisfaction with Anesthesia Care—Analysis Tool (PSACAT)—continued from page 213

7. The potential for social desirability bias was controlled.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
----- ----- ----- -----				
1	2	3	4	5

8. The author(s) of the questionnaire specified the inclusion and exclusion criteria.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
----- ----- ----- -----				
1	2	3	4	5

9. Administration of the questionnaire did not allow for completion by a patient's relative or proxy.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
----- ----- ----- -----				
1	2	3	4	5

10. Nonresponse bias was controlled or accounted for in the study.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
----- ----- ----- -----				
1	2	3	4	5

11. No incentives were used to encourage participation.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
----- ----- ----- -----				
1	2	3	4	5

12. Key contextual and exogenous variables, such as age, acuity and/or care setting, were controlled.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
----- ----- ----- -----				
1	2	3	4	5

FINAL SCORE (Sum of all ratings) _____

Rater's Initials _____

concerning the survey design, timing of questionnaire administration, questionnaire length, response rate, response format, use of proxies or incentives, whether the questionnaire was constructed psychometrically, whether the inclusion and exclusion criteria were specified, and whether the instrument controlled for exogenous and/or contextual variables.

Reliability testing for homogeneity of the PSACAT was measured at 0.9 using the Cronbach α statistic, thus indicating a high degree of internal consistency. By testing the correlation between individual items, it was possible to assert that the assessment tool possessed strong construct, discriminant, and convergent validity, thus measuring the variables as intended.

The same criteria for determining freedom from measurement error and construct reliability of the PSACAT were used to determine the degree of inter-rater reliability between the 2 researchers (DMB and JRH). Four measures of correlation, the Pearson R (0.942), Spearman correlation (0.975), Kendall τ -b (0.949), and Kendall τ -c (0.960), which tested both ordinal and interval agreement, indicated a high degree of interrater reliability.

For the purpose of the present study, the following operational definitions were applied to each of the following categories of measurement error:

- *Survey design.* A self-administered noninterviewed questionnaire completed in person or returned by mail

was considered the superior mode of administration for minimizing bias and improving response rates.¹⁰

- *Timing of questionnaire administration.* It was thought that a patient should be admitted to a phase II postanesthesia care unit (or its equivalent) for a minimum of 15 minutes after receiving monitored anesthesia care before being asked to complete a satisfaction questionnaire. This would permit most patients to achieve adequate reorientation and return of sufficient cognitive function to allow for unbiased questionnaire completion.¹⁴

- *Questionnaire length.* Questionnaires that could be finished within 5 minutes or less were considered to be superior to those requiring longer periods to complete.¹⁰

- *Response rate.* A response rate of at least 50% of patients who were asked to complete a particular evaluation form was considered sufficient for data analysis and reporting. In addition, a response rate of 60% was considered *good*, and a response rate of 70% or greater was classified as *very good*.¹⁰

- *Response format.* A closed-ended questionnaire with items that allowed respondents to select their answer from a list of responses was preferred over other types.^{10,13}

- *Proxy use.* A proxy use error existed in any circumstance in which the administration of the questionnaire allowed for item completion by someone other than the patient who received the anesthesia care.¹⁰

- *Use of incentives.* It was thought that encouraging patient participation by providing some type of monetary or service incentive might encourage respondents to provide a socially desirable answer rather than an honest opinion. For this reason, incentive use was scored as a methodological threat and a source of potential bias.¹⁵

- *Psychometric construction.* The criterion for determining psychometric construction was whether the questionnaire measured as it was purported, thus yielding anesthesia satisfaction scores with demonstrated reliability, validity, test dimensionality, and differential item functioning.

- *Social desirability.* An error in this category included any question or circumstance in which the respondents may have been tempted to give a socially desirable response rather than describe what they actually thought or believed.

- *Inclusion and exclusion criteria specified.* For the purpose of evaluating instruments in the present study, failure of the author to clearly specify inclusion and exclusion criteria was considered a measurement error. Moreover, it also was an error if the author failed to account for situations or circumstances that demanded exclusion from the study to avoid data contamination.¹⁰

- *Control of exogenous and/or contextual variables.* Failure of the author to control for, or to minimize the effect of, a contextual or exogenous variable was recognized as a measurement error.

Following the categorization and rating, each instrument evaluated was assigned a numerical score based on the sum of all ratings contained on the PSACAT. The range of possible scores for an instrument was 12 to 60; higher scores indicated greater freedom from measurement error. Use of the PSACAT allowed for the identification of the methodological characteristics of survey instruments that effectively revealed the satisfaction of patients with anesthesia care, thus providing a basis for determining which, if any, of the existing survey instruments was developed using principles of psychometric survey design, such as reliability, validity, test dimensionality, and differential item functioning.

Following a thorough review of the extant patient satisfaction literature and identification of the studies meeting the inclusion criteria, the instruments used in each instance were studied for the purpose of describing the methodological approaches used and evaluating the potential for measurement error contained therein. Examining the instruments and/or reviewing the author's details concerning their construction and administration supported the accomplishment of this objective.

To arrive at a single score that would be reflective of the raters' evaluation of each instrument, the individual summative scores were combined and averaged. The instruments then were ranked according to freedom from measurement error concerning the survey design, timing of questionnaire administration, questionnaire length, response rate, response format, use of proxies or incentives, whether the questionnaire was psychometrically constructed, whether the inclusion and exclusion criteria were specified, and whether the instrument controlled for exogenous and/or contextual variables. The superior questionnaire was assigned a rank order of 1. Questionnaires that contained greater measurement error were assigned a correspondingly lower rank order.

Descriptive statistics also were used to describe the basic features of the data in the present study and to present quantitative descriptions in a contingency table. Measures of central tendency and percentages were used to describe group data.

Results

For the purposes of evaluating instruments in the present study, a self-administered noninterviewed questionnaire completed in person or returned by

Table 2. Potential measurement errors by study (combined analysis of raters)*

Authors	Survey design	Timing	Length	Response rate	Psychometric construction	Social desirability	Criteria	Proxy	Non-response	Incentives	Key variables
Ahlgren ¹⁸	X			X	X		X	X	X		X
Brown ¹⁹		X			X			X			X
Dexter et al ¹⁷						X					
Phillip ²⁰			X	X	X		X	X	X		X
Zvara et al ¹⁶	X	X			X	X					X

* The "X" indicates consensus among authors regarding measurement errors.

mail was considered the superior mode of administration for minimizing bias and improving response rates.¹⁰ Whereas the majority of the studies used the mail-back questionnaire design, Zvara et al¹⁶ obtained data by using a postoperative face-to-face interview or a telephone interview. Dexter et al¹⁷ relied mainly on a self-administered questionnaire. However, approximately 25% of the participants were given another copy of the questionnaire, along with a self-addressed envelope, and were asked to complete and return the repeated questionnaire the following morning. Although each has distinct advantages and disadvantages, we determined that the self-administered survey design used by Dexter et al¹⁷ was superior to the others in terms of avoiding potential measurement error related to the mode of administration (Table 2).

Discussion

The analysis of instruments used to obtain anesthesia-specific patient satisfaction data revealed an alarming number of potentially serious measurement errors that directly affect instrument validity (Table 3). As is the case with most research endeavors, the present study revealed more questions than it answered, such as the following:

- Although it is commonplace for clinical outcomes to be assessed by the patient, is it acceptable to use the results from error-laden studies that may or may not accurately assess the quality of anesthesia care?
- Is it in the patient's best interest to make alterations in clinical anesthesia care by applying potentially spurious data? Moreover, should such data provide the impetus for change?
- Can the highest quality anesthetic outcomes be assessed subjectively with a high degree of accuracy?

Answers to these and many other questions are important because practitioners may make decisions regarding the anesthetic regimen based, in part, on what they believe to be important clinically and what

Table 3. Potential measurement errors in 5 instruments by category (combined analysis of raters)

Measurement error	No. of instruments containing the error	Percentage of instruments containing the error
1. Survey design	2	40
2. Timing of administration	2	40
3. Completion time	1	20
4. Response rate	2	40
5. Response format	1	20
6. Psychometric construction	4	80
7. Social desirability	1	20
8. Inclusion/exclusion criteria	2	40
9. Proxy use	3	60
10. Nonresponse	2	40
11. Incentive use	0	0
12. Context/exogenous variables	4	80

their perception of the ideal anesthesia outcome may be for the *typical* patient.

Because the information derived from patient satisfaction studies is used routinely to alter clinical practice, there can be no question that such studies routinely should be developed by using scientifically sound research methods. Pokras et al²¹ estimated that the total number of surgical procedures performed in 2001 exceeded 36 million, the overwhelming majority of which were performed under some form of anesthesia. For this reason alone, it is nearly inconceivable to discover that patient satisfaction data in the United

States routinely are obtained in such a cavalier manner and that so few studies are published.

The methods used in the present study to evaluate anesthesia-specific patient satisfaction instruments provide a model by which practitioners may assess the validity of instruments used in these clinical settings, thus yielding a more legitimate basis for decisions that ultimately may be made based on the survey results. By using this evaluation model, it was possible to state with confidence that the study authored by Dexter et al,¹⁷ which used the Iowa Satisfaction With Anesthesia Scale developed by those authors, seems to offer the best psychometric approach for collection of these data and contains all of the psychometric properties necessary for useful measurement based on the established criteria. Despite its high degree of measurement reliability, we recommend continued testing and refinement of the Iowa Satisfaction With Anesthesia Scale.

REFERENCES

1. Donabedian A. The Litchfield Lecture: quality assurance in health care: consumers' role. *Qual Health Care*. 1992;1:247-251.
2. Fitzpatrick R. Surveys of patient satisfaction: important general considerations. *Br Med J*. 1991;302:887-889.
3. Stallard P. Monitoring and assuring quality: the role of consumer satisfaction surveys. *Clin Psychol Psychother*. 1994;1:233-239.
4. Fung D, Cohen M. Measuring patient satisfaction with anesthesia care: a review of current methodology. *Anesth Analg*. 1998;87:1089-1098.
5. Higgins TL, Thompson GE, Tuman KJ, Ad Hoc Committee on Value-based Anesthesia Care. The importance of outcomes in value-based anesthesia. *ASA Newsletter*. October 1996;60:8-10.
6. Marcario A, Weinger M, Carney S, Kim A, Garber A. Which clinical anesthesia outcomes are important to avoid? The perspective of patients. *Anesth Analg*. 1999;89:652-658.
7. American Productivity Quality Center. How to avoid the traps of benchmarking customer satisfaction. *Continuous Journey*. 1992;2:36-39.
8. Purcell GP, Wilson P, Delamothe T. The quality of health information on the Internet. *BMJ*. 2002;324:557-558.
9. Fowler FJ. *Survey Research Methods*. London, England: Sage Publications; 2001:307-388.
10. Babbie ER. *Survey Research Methods*. Florence, Ky: Wadsworth Publishing; 1990:257-318.
11. Kerlinger FN, Lee HB. *Foundations of Behavioral Research*. Florence, Ky: Wadsworth Publishing; 1999:565-567.
12. Downs SH, Black N. The feasibility of creating a checklist for the assessment of the methodological quality both of randomized and non-randomized studies of health care interventions. *J Epidemiol Community Health*. 1998;52:377-388.
13. Nunnally FC, Bernstein IH. *Psychometric Theory*. New York, NY: McGraw Hill; 1994:135-139.
14. Gravenstein JS. Does anesthesia leave some of our patients with prolonged postoperative cognitive dysfunction? *ASA Newsletter*. February 1999;63:8-9.
15. DeVellis RF. *Scale Development: Theory and Applications*. Newbury Park, Calif: Sage Publications; 1991:33-189.
16. Zvara DA, Nelson JM, Brooker RF, et al. The importance of the postoperative anesthetic visit: do repeated visits improve patient satisfaction or physician recognition? *Anesth Analg*. 1996;83:793-797.
17. Dexter F, Aker J, Wright J. Development of a measure of patient satisfaction with monitored anesthesia care. *Anesthesiology*. 1997;87:865-873.
18. Ahlgren E, Bennett E, Stephen C, et al. Outpatient pediatric anesthesiology. *Anesth Analg*. 1971;50:402-408.
19. Brown DL, Warner ME, Schroeder D, Offord K. Effect on intraoperative anesthetic events on post-operative patient satisfaction. *Mayo Clin Proc*. 1997;72:20-25.
20. Philip B. Patient's assessment of ambulatory anesthesia and surgery. *J Clin Anesth*. 1992;4:355-358.
21. Pokras R, Kozak LJ, McCarthy E. *Ambulatory and Inpatient Procedures in the United States, 2000*. Washington, DC: National Center for Health Statistics US; 2001:132-234.

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