David S. Warner, M.D., Editor

Patient-Satisfaction Measures in Anesthesia

Qualitative Systematic Review

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ABSTRACT

Patient satisfaction is an important measure of the quality of health care and is used as an outcome measure in interventional and quality improvement studies. Previous studies have found that there are few appropriately developed and validated questionnaires available. The authors conducted a systematic review to identify all tools used to measure patient satisfaction with anesthesia, which have undergone a psychometric development and validation process, appraised the quality of these processes, and made recommendations of tools that may be suitable for use in different clinical and academic settings. There are a number of robustly developed and subsequently validated instruments, however, there are still many studies using nonvalidated instruments or poorly developed tools, claiming to accurately assess satisfaction with anesthesia. This can lead to biased and inaccurate results. Researchers in this field should be encouraged to use available validated tools, to ensure that patient satisfaction is measured and reported fairly and accurately.

PATIENT satisfaction is an important measure of the quality of health care. Satisfaction with anesthesia is used as an outcome measure in clinical trials,[1] and patient satisfaction is considered to be an integral part of service quality.[2] Its measurement is also required to fulfill performance improvement and revalidation agendas for healthcare professionals.[3] However, clinical experience tells us that appropriately developed or validated instruments are not widely used in any of these settings.

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Pascoe[4] defined patient satisfaction as the patient's reaction consisting of a "cognitive evaluation" and "emotional response" to the care they receive. It, therefore, seems prudent to ensure that patients are involved in the development of satisfaction tools, particularly because it is also subject to the sociodemographic, cultural influences, and cognition of the patients.[5] The Picker inpatient survey[6] is a well-known tool used in Europe to measure "patient experience," however, there have been many flaws detected in its design, including the lack of patient involvement in the development stage.[7] This has been compared with the Hospital Consumer Assessment of Healthcare Providers and Systems survey used by Press Ganey in the United States, which has been extensively developed.[8]

The development of a patient-satisfaction tool requires a step-wise psychometric process and subsequent validation in practice, and due to the multidimensional and complex nature of satisfaction, questionnaires should use multiple items to investigate specific events.[9] The steps generally involved in the psychometric development of a questionnaire are described in table 1. In the "satisfaction" field there is no "definitive standard" to compare with (criterion validity), so to guarantee validity of the questionnaires, a thorough item-generation process is required to ensure content and face validity. Results can then be correlated with other factors suspected to be associated with the topic, known as construct validity. Measuring the internal consistency of the questionnaire may also enhance the validity. Items within a dimension should correlate, and the individual dimensions should have a Cronbach α greater than the overall result.[10]

Quality of recovery[11] is sometimes joined with patient satisfaction and quality of life to provide "patient-centered" outcomes.[5] Previous work has comprehensively reviewed the literature on quality-of-recovery scores[12,13] and found there to be at least two suitable instruments available. However, systematic evaluations of instruments used to measure patient satisfaction after anesthesia, have been limited to two particular clinical settings: ambulatory anesthesia[14] and regional anesthesia;[15] both reviews demonstrated a paucity

Table 1. Psychometric Construction and Evaluation of a Questionnaire[1,5]

Item generation and dimensions	Involves gathering the opinions of patient-focus groups, anesthetists, and reviews of the current literature, to define items that are considered significant. These items are then divided into separate dimensions, with the subsequent development of a pilot questionnaire.
Testing of pilot questionnaire	The pilot questionnaire is then tested to assess its reliability, validity, and ease of understanding. At this stage, a number of items may be removed, if found to be ambiguous or superfluous.
Retesting of pilot questionnaire	The pilot questionnaire is then retested in another group of patients in the form of face-to-face interviews, written mail, and/or telephonic questionnaires. Biases related to sociodemographic status, social desirability (answering the questions in order to please the investigator, rather than giving their true opinion), and nonrespondent bias can all be addressed.
Validity	Multifaceted concept. Includes content validity, which ensures that the important components regarding satisfaction are included, and face validity, where the assessors ensure that the items measure what they are intended to. Criterion validity assesses the new measure against a current definitive standard. Construct validity asks whether the questions are constructed to ensure a valid result and includes convergent and discriminant validity. Convergent validity describes correlation with other factors measuring similar aspects, whereas discriminant validity should ensure that dissimilar factors are not correlated.
Reliability	Reliability is the consistency of results. Internal consistency is measured using Cronbach α, which is a value correlating the items, ensuring that they all measure the same thing within a dimension. If the Cronbach α is 0, there is no correlation between the questions, and the maximum possible value is 1. The result should be between 0.7 and 0.9. If the value is >0.9, it may indicate that the questionnaire is too small in range. Test–retest reliability is when the test is performed on the same patient on >1 occasion. The correlation coefficient of the test results should be >0.7. Inter- and intrarater agreements are how accurately different observers agree with each other, and how accurately the same observer agrees over time, respectively.
Acceptability	Measures of acceptability include the time to complete the questionnaire and the response rate. Different routes of administration of the questionnaire can affect the response rate,[84] which may also affect the validity of the questionnaire. Nonresponder bias deals with the potential differences between those who are highly satisfied and those who are poorly satisfied, and their participation in answering the questionnaire.[5]
Retest "final" questionnaire in new patient samples	This provides further assessment of validity and reliability, and reassesses confounding variables.

of appropriately validated tools. To our knowledge, there is no published evidence synthesis of instruments used to measure patient satisfaction with anesthesiology in general. Given the importance of using validated outcome measures, and the increasing focus on patient-centered outcomes in both research and clinical practice, this represents an important gap in the literature. Therefore, we have undertaken a qualitative systematic review, to answer the question: "What instruments have been psychometrically developed to measure patient satisfaction with anesthesia, and what is their validity?" The purpose of this review is to qualitatively appraise the literature and provide guidance about the strengths and limitations of patient-satisfaction tools that may be used for quality improvement and research purposes.

Methods

We have adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses statement standards in this article.[16]

Data Sources

We searched the online databases MEDLINE and Embase and ISI Web of Science (all database search) for articles published between January 1, 1980 and March 1, 2012 without language exclusion, but limited to human studies. The search strategy included snowballing of references and manual searching of citation lists, which is detailed in appendix 1.

Inclusion/Exclusion Criteria

For the purposes of this review, a "patient-satisfaction questionnaire" was defined as an instrument that was developed using psychometric techniques, and that consisted of at least two distinct dimensions. We included all studies that used a questionnaire developed in this way to assess patient satisfaction with some aspect of anesthesia: these included studies of pediatric patients and parental satisfaction, satisfaction with general anesthesia, local anesthesia, ambulatory anesthesia, and regional anesthesia. In order to avoid repeating previously published work, we have focused on measures of "patient satisfaction" and therefore, have excluded studies describing the development or validation of "quality of recovery" indicators. We also excluded questionnaires that were developed to measure satisfaction with sedation or satisfaction solely with pain management.

Data Extraction

We reported the characteristics and quality of every article by extracting the following information: year and country of origin, number of patients recruited into study, number of dimensions within the score, number and nature of the items within each dimension, the response format, the type of anesthesia and surgery being evaluated, and the results of the study as reported by the authors.

For every satisfaction measure we identified, we evaluated the rigor of the original psychometric construction and evaluation process by assessing how the authors reported the questionnaire development process, pilot testing, and the validity, reliability, and acceptability of each instrument. The criteria we have used for assessing validity is based on methodological descriptions of thorough item generation as well as authors claims. We were unable to find a published system for comparing the quality of the psychometric development processes for questionnaires in a structured and objective manner. Therefore, we have reported our evaluation of the psychometric development reported in each article, by dividing the process into three phases: (1) item generation and pilot testing, (2) validation and reliability, and (3) acceptability to patients, including response rate and completion time. Each questionnaire was then scored on a scale of 0 to 2 in each category, with a maximum achievable score of 6. Although this scoring system was not previously validated, it gives an indication of the depth of psychometric development and testing behind each questionnaire.

Results

The search identified 18,665 studies. Two authors independently screened the titles and abstract, and 15,454 articles were excluded. Three authors reviewed the full texts of the remaining 3,211 articles; manual searching of reference lists (snowballing) revealed a further 58 articles. Articles that excluded were 3,118 as they did not describe instruments that met our definition of a patient-satisfaction questionnaire. Of the remaining 150 articles, 79 were excluded as they did not use a questionnaire which met our criteria for psychometric development. Therefore, our final analysis consists of 71 articles describing a total of 34 patient-satisfaction scores, developed and evaluated using psychometric testing (fig. 1). Questionnaires meeting our inclusion criteria were not published before 1990, however, 6 were from the 1990s, and 28 were between 2000 and 2012 March.

Our description of the original articles developing each of these 34 patient-satisfaction tools is listed by clinical specialty in tables 2–7. We have reported the details of the psychometric evaluation process and scored the presence of item generation, validity and reliability, and acceptability for each of these studies in table 8. A list of studies which have subsequently used any one of these 34 questionnaires is provided in appendix 2. Below, we report a summary of the overall results and descriptions of the highest quality studies in each category.

Maternal Satisfaction (table 2)

We found three studies, which used questionnaires that had been psychometrically developed to measure maternal satisfaction with obstetric care: two were used following cesarean section, and one assessed maternal satisfaction after neuraxial blockade for labor analgesia. Of these, one[17] involved patients in the questionnaire design and

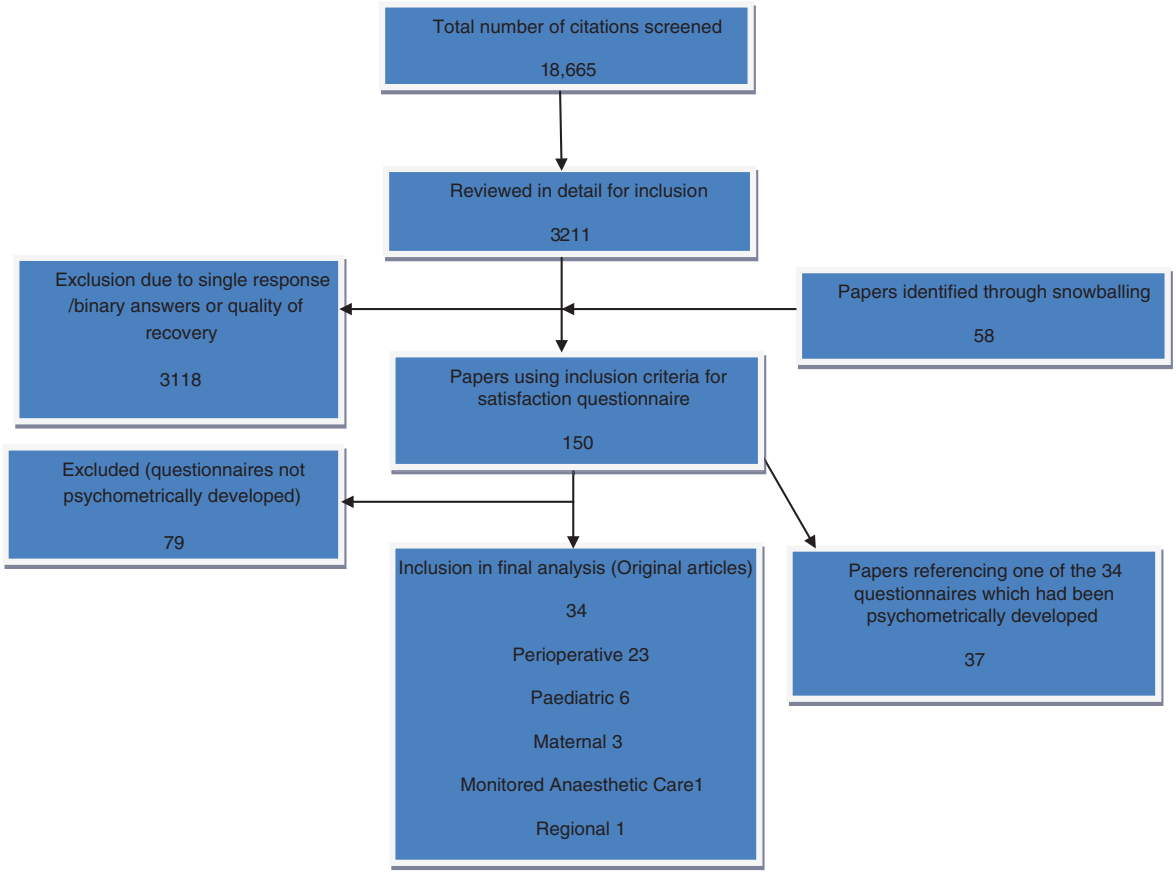

Fig. 1. Flowchart demonstrating systematic review process.

development process and two did not.[18,19] Morgan *et al.*[17] used a clearly defined psychometric development and evaluation process, a 22-item questionnaire, which they named the Maternal Satisfaction Scale for Cesarean Section. Hobson *et al.*[20] validated the Maternal Satisfaction Scale for Cesarean Section using a different distribution format to the original development article; Sindhvananda *et al.*[18] used the most objectively robust development and validation process (scoring 5 out of 6 on our assessment); however, their report was published in 2002,[21] and their questionnaire has not subsequently been used in any other published studies.

Regional Anesthesia (table 3)

Although there were many studies which included satisfaction with general and regional anesthetics, we could find only one French article, which used a psychometric development and evaluation process, to construct a questionnaire measuring satisfaction with regional anesthesia in the nonobstetric setting.[22] Despite a growing literature evaluating the efficacy and outcomes of regional anesthesia, this instrument has subsequently been used in only one other study.[23] This lack of validated tools for measuring satisfaction with regional anesthesia was also reported by Wu *et al.*[15] in their systematic review of this field of practice.

Monitored Anesthetic Care (table 4)

The American Society of Anesthesiologists defines Monitored Anesthetic Care as the delivery of local anesthesia together with sedation and analgesia for a planned procedure. The most referenced instrument assessing satisfaction with Monitored Anesthetic Care is the Iowa Satisfaction with Anesthesia Scale (ISAS), consisting of 11 questions;[24] this scored highly (6 out of 6) in our objective appraisal of the development process.

We found a further 17 studies using the ISAS to assess satisfaction. Eight of these used the ISAS for satisfaction with ophthalmology procedures;[25–32] only one of these studies[28] performed further validation of the scale within their patient cohorts. The remaining studies used the ISAS to assess satisfaction with Monitored Anesthetic Care for other procedures and surgery.[33–37,38–40]

Pediatrics (table 5)

We identified six tools used in pediatric anesthesia, which had undergone psychometric development.[41–46] Kain *et al.*[44] developed an 11-item questionnaire using a three-step approach starting with validity testing in the form of items grouping using input from anesthetists, surgeons, psychologists, play specialists, and nurses. A rigorous protocol and psychometric evaluation was recently

Table 2. Questionnaires Developed to Measure Satisfaction in Obstetric Anesthesia

Author	Country of Origin	Tool	No. of Questions	No. of Dimensions	Dimensions	Response Format	No. of Patients	Surgery	Anesthesia	Results
Morgan *et al.*[17]	Canada	MSSCS 22 items—7-point Likert scale	22	4	Communication and control, anesthetic effects, postoperative problems, side effects	Interview, pre- and postprocedure (for item generation only)	115	Cesarean section	Regional	Development of valid, reliable, maternal-satisfaction scale for women undergoing nonemergency cesarean section
Sindhvananda *et al.*[18]	Thailand	Questionnaire,11 items, 0–10 VAS	11	4	Procedure, hypotension, postoperative events, and quality of anesthesia	Interview in PACU or ward 24–48 h after surgery	114	Elective cesarean section	Spinal or epidural	Validation of scale to assess patient satisfaction with regional for cesarean section
Nikkola *et al.*[19]	Finland	Questionnaire, 44 items, pain VAS at three stages of labor, 4-point Likert scale	44	6	Pain, control, relationship with spouse, fears, and expectations, emotions after delivery, physical condition after delivery	1 day after delivery	90	Labor analgesia	Epidural PCEA *vs.* bolus	Minimal steps taken to ensure a valid tool to assess patient satisfaction with labor analgesia

MSSCS = Maternal Satisfaction Scale for Caesarean Section; PACU = postanesthetic care unit; PCEA = patient-controlled epidural analgesia; VAS = visual analog scale.

Table 3. Questionnaires Developed to Measure Satisfaction with Regional Anesthesia

Author	Country of Origin	Tool	No. of Questions	No. of Dimensions	Dimensions (No. of Questions in Each)	Response Format	No. of Patients Initially Recruited	Surgery	Anesthesia	Results
Montenegro *et al.*[22]	France	Questionnaire, 2 institutions Seven questions day 1. Nine questions day 8, open-ended and Likert	Seven questions day 1. Nine questions day 8	3	Information, pain, and anxiety during procedure, overall satisfaction. Side effects included in day-8 questionnaire	Telephonic interview day 1 and day 8 by pharmacist student not involved in care	314	Orthopedics and trauma, elective, day case, or emergency	Local/regional anesthesia ± sedation	Development and validation of a patient questionnaire to assess satisfaction with regional anesthesia

Table 4. Questionnaires Developed to Measure Satisfaction with MAC

Author	Country of Origin	Tool	No. of Questions	No. of Dimensions	Dimensions (No. of Questions in Each)	Response Format	No. of Patients Initially Recruited	Surgery	Anesthesia	Results
Dexter *et al.*[24]	United States	ISAS, 11 questions – 6-point Likert scale (bipolar, symmetrical summated rating scale)	11	No specific domains	Nausea and vomiting, same anesthetic again, itch, relaxed, pain, safe, comfort/temperature, satisfaction with anesthetic care, pain during surgery, felt good, hurt	Written, 15 min after phase 2 PACU, some also repeated within 1 h or the next morning	94	Inpatient and day surgery. Ophthalmology, plastics, brain biopsy, GI, ENT, orthopedics, gynecology	MAC	Development of reliable, internally consistent, and valid measure of patient satisfaction with MAC (not the perioperative experience)

ENT = ear, nose, and throat; GI = gastrointestinal; ISAS = Iowa Satisfaction with Anaesthesia Scale; MAC = Monitored Anesthetic Care; PACU = postanesthetic care unit.

Table 5. Questionnaires Developed to Measure Satisfaction with Pediatric Anesthesia Care (Patient and/or Parental)

Author	Country of Origin	Tool	No. of Questions	No. of Dimensions	Dimensions (No. of Questions in Each)	Response Format	No. of Patients Initially Recruited	Surgery	Anesthesia	Results
Chan *et al.*[41]	China	Parental Satisfaction with Care questionnaire (translated from Chinese)	18 questions, 1–5 Likert scale plus overall satisfaction rated 0–10	No specific dimension	Opinion of parental presence on induction, visitation in recovery, performance of operating staff-adequacy, relevancy, and understanding of information	NA	50 parents	Pediatric (aged 1–9), elective urology, hernia, ENT, plastic surgery	GA	Assessed pediatric parental anxiety and satisfaction with overall theatre care, which included anesthesia. Educational program improves satisfaction and anxiety for parents.

(Continued)

Table 5. (*Continued*)

Author	Country of Origin	Tool	No. of Questions	No. of Dimensions	Dimensions (No. of Questions in Each)	Response Format	No. of Patients Initially Recruited	Surgery	Anesthesia	Results
Tait *et al.*[42]	United States	Questionnaire	30 questions, 5-point and 4-point Likert scale responses and VAS for anxiety and overall satisfaction	3	Preferences (11), concerns (11), satisfaction (8)	Telephone interview day 1 post-operatively	331	Pediatrics elective	GA	Parents preferred shared decision-making with the anesthetist. Instrument developed to measure parental satisfaction with decisions regarding pediatric anesthesia
Iacobucci *et al.*[43]	Italy	Questionnaire, 2 parts; parent—6 item, 10-point Likert scale; child—9 items, 8 dichotomous, 1 multiple choice	6 questions for parent, 9 questions for children	5	Quality of communication, quality of environment, quality of care by anesthetists, parental opinion of child's recollection, parental opinion of overall experience, parent (dialog, comfort in environment, affection and care by nurses, quality of anesthetists observation postop, emotional judgment, child (preop fear, anesthetists' effect on fear, operating room, induction, calming effect of anesthetists on induction, presence of pleasant staff, and disturbing objects, greatest anxiety)	Written, on return to ward post-procedure	214	Pediatric, inpatients (aged 23 days to 15 yr), minor abdominal or genitor-urinary	GA	Development and validation of questionnaire to measure parental and child satisfaction

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Table 5. (*Continued*)

Author	Country of Origin	Tool	No. of Questions	No. of Dimensions	Dimensions (No. of Questions in Each)	Response Format	No. of Patients Initially Recruited	Surgery	Anesthesia	Results
Kain *et al.*[44]	United States	Questionnaire, 21 item—5 cm VAS	21 questions	No specific domains	Overall satisfaction with function of children's hospital, surgery center, anesthesiologists, surgeons, and nurses. Overall satisfaction with quality of separation process	Written, on discharge from recovery, 2 weeks postoperatively	103	Pediatrics (aged 2–8)	NA	Assessment of parental satisfaction. Parents who accompany children to operating room were less anxious and more satisfied. Parental satisfaction significantly higher in cases where premedication used
Khour *et al.*[45]	Canada	Questionnaire, 23 items, dichotomous and free-text responses	23 questions	5	State of information, organizational issues, anxiety, pain, and discomfort, and medication side effects	Parents and patients. Written first part during waiting time for procedure. Second part after procedure and before discharge	157	Pediatrics (aged 1 month to 19 yr), gastroscopy and colonoscopy	GA (<10 yr old) IV sedation	Development and validation of pediatric endoscopy service satisfaction instrument
Schiff *et al.*[46]	Germany	Pediatric perianesthesia questionnaire	37	5	Treatment of discomfort (7), privacy/waiting (10), information giving (7), discomfort (9), treatment pain (4)	6–48 h after returning to ward. Postal return or collected by research assistant	1,052	Pediatrics, elective, minor to major surgery	GA/RA	Psychometric questionnaire to assess pediatric patient satisfaction with anesthetic care

ENT = ear, nose, and throat; GA = general anesthesia; iv = intravenous; NA = not applicable; RA = regional anesthesia; VAS = visual analog scale.

Table 6. Questionnaires Developed to Measure Satisfaction with Preassessment

Author	Country of Origin	Tool	No. of Questions	No. of Dimensions	Dimensions (No. of Questions in Each)	Response Format	No. of Patients Initially Recruited	Surgery	Anesthesia	Results
Harms *et al.*[85]	Switzerland	Questionnaire, 86 items, 11 items on 6-point scale for preop visit satisfaction, Spielberger-State—Anxiety Score, 12 items using 10-cm VAS for preop anxiety	86	3	Preop visit, patient preop anxiety, perception of anesthetist	Written, up to 3 months pre- and postop	1,338	NA	NA	Modified Delphi procedure to construct the questionnaire. Anxiety measures validated, but unknown reliability and validity for measures of preoperative visit. Overall preop visit satisfaction: 78–79%. Training anesthetists in communication skills can improve patient satisfaction with preop visits (not significant)
Hering *et al.*[86]	United States	NA	NA	NA	Satisfaction with preoperative anesthetic experience	Before discharge	64	Elective, day surgery	GA	To assess whether a Web site enhances information acquisition, influences preoperative anxiety and overall patient satisfaction. No significant difference was found
Mercer *et al.*[50]	United Kingdom	CARE measure, 10 items, 5-point Likert scale	10	NA	Pre-op assessment consultation	Written, immediately after preoperative assessment anesthetist consultation	1,582	NA	NA	Feasibility study of previously validated tool used in other clinical settings. Measure of communication and empathy of clinical consultation and not technical skills. May have use in anesthetics
Snyder-Ramos *et al.*[48]	Germany	Questionnaire evaluating preanesthetic visit, 12 questions 6-point scale (–3 to +3) or 4 multiple-choice questions	12	2	Patient satisfaction (6) and information gained (6)	Written, inpatient, evening of preassessment (before premedication)	104	General and vascular	Preassessment	Development and validation of a preassessment satisfaction questionnaire

CARE = Consultation and Relational Empathy; GA = general anesthesia; NA = not applicable; VAS = visual analog scale.

Table 7. Questionnaires Developed to Measure Satisfaction with Perioperative Care

Author	Country of Origin	Tool	No. of Questions	No. of Dimensions	Dimensions (No. of Questions in Each)	Response Format	No. of Patients Initially Recruited	Surgery	Anesthesia	Results
Albaladejo *et al.*[87]	France	Questionnaire, 25 questions 5-point Likert scale	25	4	Structure (8), physician behavior (6), information (5), well-being (6)	On discharge, written, mailed back	176	Elective, gastrointestinal, urology, orthopedic, ophthalmology, neurosurgery, ENT, dental, others	GA	Information booklet increases satisfaction with preanesthetic visit
Auquier *et al.*[51]	France	Questionnaire—EVAN 25 questions 0–100 scale	25	6 + global score	Anxiety, embarrassment, fear, pain discomfort, information, physical needs	Postop, within 24 h, written	742	Elective non–day-case surgery mixed (except obstetrics)	GA ± regional	Initial construction and validation study for EVAN-G questionnaire
Auquier *et al.*[62]	France	Questionnaire—EVAN-G 26 questions, 5-point Likert scale scores transformed into 0–100 scale for satisfaction	26	6 + global index	Attention (5), privacy (4), information (5), pain (5), discomfort (5), waiting (2)	Within 48 h, before discharge, written	977, multicenter (8 anesthetic departments)	Gynecological, GI, orthopedic, ENT, vascular, endocrine, endoscopic, aesthetic, urology, neurosurgical, maxillofacial, ophthalmology, thoracic, day case	GA (exclusion of MAC and regional anesthesia)	Final psychometric validation of EVAN-G questionnaire (highest score in discomfort, lowest score in information, significantly greater satisfaction scores for patients aged > 65 yr)
Bauer *et al.*[63]	Germany	15-item written questionnaire *vs.* face-to-face interview. Semidichotomous scale or 4-item scale	15	2	Discomfort (10) and anesthesia care (5)	Postoperative day 2, written or standardized personal interview	700	Elective inpatient, general, vascular, trauma, urology, ENT, gynecology	GA	A valid questionnaire used for either a standardized interview or written questionnaire. Questions answered in a more critical manner during an interview, improving quality control

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Table 7. (*Continued*)

Author	Country of Origin	Tool	No. of Questions	No. of Dimensions	Dimensions (No. of Questions in Each)	Response Format	No. of Patients Initially Recruited	Surgery	Anesthesia	Results
Caljouw *et al.*[56]	The Netherlands	Questionnaire—LPPSq, 39 items 5-point Likert scale	39	6	Information (4), professional competence with discomfort and needs (7), fear and concern (7), staff–patient relationship (14), professional competence with problems (4), service (3)	Written, predischarge, within 2 days postoperatively	382	Elective, general surgical, gynecological, orthopedics, urological, obstetrics, plastic surgery	GA, GA + regional	Information and relationship between staff and patients were major determinants of satisfaction. LPPSq developed based on EVAN questionnaire, with inclusion of staff–patient relationship dimension and expansion of information dimension
Capuzzo *et al.*[52]	Italy	Questionnaire—NRS 10 questions 0–10 rating	10	3	Physical (2)—pain, nausea, and vomiting; emotional (4)—feeling of well-being, feeling safe, feeling relaxed, feeling anxious, or frightened; relational (4)—information given by anesthetist, attention to the patient, kindness/regard of caregivers, demands promptly answered	Face-to-face interview late morning second postoperative day	219	Inpatient abdominal, thoracic, surface surgery	GA 93.6%	High value to emotional and interpersonal relationships

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Table 7. (*Continued*)

Author	Country of Origin	Tool	No. of Questions	No. of Dimensions	Dimensions (No. of Questions in Each)	Response Format	No. of Patients Initially Recruited	Surgery	Anesthesia	Results
Capuzzo *et al.*[65]	Italy	Multicenter, questionnaire 0–10 NRS, 10 questions (previously developed tool) plus perceived health on NRS 0–10. Further information on sociodemographics and pre- and postoperative visits by anesthesia team	10	3	Physical (2)—pain, nausea, and vomiting; emotional (4)—feeling of well-being, feeling safe, feeling relaxed, feeling anxious, or frightened; relational (4)—information given by anesthetist, attention to the patient, kindness/regard of caregivers, demands promptly answered	Face-to-face interview or *via* written questionnaire. Median time 1 day except center E, 2 days	1,506	Inpatient orthopedic, urological, abdominal, endocrine, vascular, gynecological, thoracic, and other	GA regional, GA + regional	In patient satisfaction improved by: nurses dedicated to anesthesia, written information sheet, and enhanced postoperative visits
Fleisher *et al.*[88]	United States	Questionnaire, 6 questions—mixed Likert and open responses	6	No specific domains	Type of anesthesia, explanation, satisfaction, rate quality of anesthetic care, any improvements, enough information to inform future anesthetist of aspects that need improvement?	Written, in discharge pack. If no reply in 2 weeks contacted by research team	372	Day surgery adult and pediatric (if <18 yr old then parents completed form)	GA, epidural, MAC, spinal, regional block, other	Anesthesiology consultant report with information regarding their anesthetic care improves perception of quality of care
Fung *et al.*[59]	United States	Questionnaire, 36 items, four sets of nine items corresponding to four temporal phases of outpatient anesthesia care. Patients were required to rank the top three items in each group. Two sites	36	4	Preoperative, operating room, pre- and postdischarge. Covering the dimensions: physical structure, technical content, interpersonal relationships, efficiency, outcomes of care	Written, mailed back, day 3 postop. Telephonic follow-up day 4–7 to improve response rate	45	Day surgery, gynecological, orthopedic, ENT, plastic surgery, general surgery, other	GA	Compared patient ranking with anesthetists ranking of important values. Patients value the place of communication and provision of information at all phases of their outpatient anesthesia experience. Anesthetists differed

(*Continued*)

Table 7. (*Continued*)

Author	Country of Origin	Tool	No. of Questions	No. of Dimensions	Dimensions (No. of Questions in Each)	Response Format	No. of Patients Initially Recruited	Surgery	Anesthesia	Results
Heidegger *et al.*[53]	Switzerland	Questionnaire, 29 items—dichotomous problem rating, multicenter	29	6	Involvement in decision-making (9), respect/confidence (6), delays (4), nursing care in recovery (2), continuity of care by anesthetist (4), pain management (4)	Written, mailed 1–2 weeks postdischarge	3,785	NA	GA regional	Development of a psychometric satisfaction questionnaire. Benchmarked in 6 hospitals in Switzerland and Austria. Problems mainly in areas such as patient information, decision-making, and continuity of care. Summed scores for dimensions better than global score
Hüppe *et al.*[70]	Germany	Questionnaire, two parts, 66 questions in total. 4-point Likert scale, ANP	66	Part 1–3, part 2–3, total 6	Part 1—symptoms in recovery (20) and first hours on ward (20) and current state (16). Part 2—satisfaction with anesthetic care (4), unspecific perioperative care (4), and postoperative convalescence (2)	Written, first, second, and third postoperative day	431	Elective, aged 11–85 yr general surgery, orthopedics, maxillofacial, other	GA	Development of the ANP
Hüppe *et al.*[71]	Germany	Modified ANP after initial study, questionnaire, 2 parts, 46 questions in total, 4-point Likert scale	46	Part 1—2, part 2—3	Part 1—postoperative period (recovery and first hours on ward) (19), current time (17). Part 2—satisfaction with anesthetic care (4), unspecific perioperative care (4), and postoperative convalescence (2)	Written day 1	1,490	Elective >18 yr, general surgery, orthopedics, and trauma, plastic surgery, others	GA, regional, both	Reliability and validity of the ANP

(*Continued*)

Table 7. (*Continued*)

Author	Country of Origin	Tool	No. of Questions	No. of Dimensions	Dimensions (No. of Questions in Each)	Response Format	No. of Patients Initially Recruited	Surgery	Anesthesia	Results
Hüppe *et al.*[72]	Germany	ANP modified for cardiac surgery	46	Part 1—2, part 2—2	Differences to part 1—after wakening from anesthesia and first hours after. Part 2—no questions regarding unspecific postoperative care	Between day 1 and day 8	1,688	Elective, multicenter, cardiothoracic surgery	GA	Practicability and validity of ANP-KA (cardiac) for assessment of postoperative patient satisfaction after cardiac surgery
Jlala *et al.*[57]	United Kingdom	English adaptation of LPPSq (extended from original to include common anesthetic side effects), 39 items—varying graded responses	39	6	Information provision, discomfort and needs, fear and concern, staff–patient relationship, professional competence, service quality	Written, up to 24 h preop and returned up to 3 days postop in a survey returns box	100	Elective orthopedic surgery	GA regional	English adaptation of LPPSq. High overall satisfaction. Lowest satisfaction was with information provided and highest for staff–patient relationships. Patients more satisfied with information provision for regional anesthesia
Le May *et al.*[54]	Canada	SOPPCAS, 17-item 6-point Likert scale plus sociodemographic and open-ended questions	17 (Plus 10 sociodemographic and 3 pen-ended)	4	Patient/anesthesiologist interactions, preoccupations related to anesthesia, experience with anesthesia, pain management	Day 4 postop interview (T1), day 15 postop mailed (T2)	170 at T1 and 133 at T2	Elective and urgent cardiac surgery procedures	GA	Development of an instrument to measure patients perceptions of quality of cardiac anesthesia services
Lockyer *et al.*[89]	Canada	Multisource feedback program: patient survey, 11 questions, 5-point Likert scale	11	2	Professionalism and communication	NA	30	NA	NA	Patient survey included within a multisource feedback program

(*Continued*)

Table 7. (*Continued*)

Author	Country of Origin	Tool	No. of Questions	No. of Dimensions	Dimensions (No. of Questions in Each)	Response Format	No. of Patients Initially Recruited	Surgery	Anesthesia	Results
Mui *et al.*[79]	Taiwan	PSPACq	30	7	Information (5), discomfort and needs (4), provider–patient relationship (7), anesthesia-related sequelae (4), fear (3), concern (3), waiting period (4)	Written, 6–48 h postoperatively	1,100	General, Orthopedic, Eye, ENT, Gynecology, Obstetrics	GA RA	A valid and reliable questionnaire with Taiwanese culture for patients receiving general or regional anesthesia
Schiff *et al.*[55]	Germany	Heidelberg perianesthetic Questionnaire 38 items, 4-point Likert scale multicenter	38	5	Trust and atmosphere, fear, discomfort, treatment by personnel, information, and waiting	Written, Mean 32 h postsurgery	1,265	Trauma, gastrointestinal, vascular, urology, gynecology, neurosurgical/ENT/ophthalmology, thoracic, missing	GA regional	Dissatisfied patients had a median 74% and satisfied patients 92% of the sum score. The Heidelberg perianesthetic questionnaire offers a valid and reliable method to identify dissatisfaction. May assist with quality improvement and is useful as a benchmark tool
Sindhvananda *et al.*[58]	Thailand	Questionnaire, 10 items, multicenter	10	3 and overall satisfaction	Preanesthetic visit (2), Service in theater (3), Postoperative care (4) plus overall satisfaction (1)	Written, timing unclear	531	Elective general surgery, obstetrics and gynecology, eye, ENT, orthopedic	GA	Validation of satisfaction survey in Thai population

(*Continued*)

Table 7. (*Continued*)

Author	Country of Origin	Tool	No. of Questions	No. of Dimensions	Dimensions (No. of Questions in Each)	Response Format	No. of Patients Initially Recruited	Surgery	Anesthesia	Results
Tong *et al.*[48]	Canada	Questionnaire NA	NA	NA	Pain, headache, muscle ache, malaise, drowsiness, dizziness, nausea, vomiting, fever, hoarseness, sore throat, bleeding. Severity evaluated by 4 criteria: pain score: mild, moderate, or severe, functional level 0–100%, medication for symptoms, returned to see a physician. Information given assessed + global satisfaction	Telephonic interview 24 h after surgery	5,228	Ophthalmology, laparoscopy, dilation and curettage, arthroscopy, others	GA, regional MAC	Dissatisfaction with anesthesia is a predictor of global dissatisfaction with ambulatory surgery. The validity of the questions about satisfaction were established in another study (not anesthetic study)
Whitty *et al.*[60]	United Kingdom	Questionnaire, 44 items, varied Likert scales	44	8	Before hospital (3), before operation (14), the operation (8), after the operation (5), at home (1), looking back (8), about yourself (4), open question (1)	Written, on discharge	172	Ophthalmology and maxillofacial	GA	Specific questions about process of care draw responses that go undetected by global satisfaction scales

(*Continued*)

Table 7. (*Continued*)

Author	Country of Origin	Tool	No. of Questions	No. of Dimensions	Dimensions (No. of Questions in Each)	Response Format	No. of Patients Initially Recruited	Surgery	Anesthesia	Results
Wilkinson *et al.*[90]	United Kingdom	Questionnaire developed from Heidelberg perianesthetic questionnaire 16 items, 4-point Likert scale	16	No specific domains	Pleasant environment, friendly, time pressure, enough information, understanding, fear, atmosphere in anesthetic room, anesthetic went as planned, waking up comfortable, pain, sick, hoarseness/ sore throat, cold, thirst, recovery, trust	NA	147	Elective exclusions: emergency, obstetric, pediatrics, ECT, TOP	NA	Generally satisfied with communication and recovery and trusted anesthetic staff. Dissatisfaction with pain, nausea, sore throat, shivering, and thirst

ANP-KA = Anesthesiological Questionnaire Cardiac; ECT = electroconvulsive therapy; ENT = ear, nose, and throat; EVAN (G) = Evaluation du Vecu de l'Anesthesie (Generale); GA = general anesthesia; GI = gastrointestinal; LPPSq = Leiden Perioperative care Patient Satisfaction Questionnaire; MAC = Monitored Anesthetic Care; NA = not applicable; NRS = numerical rating score; PSPACq = Patient satisfaction with Perioperative Anesthetic Care; RA = regional anesthesia; SOPPCAS = Scale of Patients' Perceptions of Cardiac Anesthesia Services; TOP = termination of pregnancy.

Table 8. Description of Psychometric Development Process in Original Development Articles

	Item Generation Score (0–2)		Validity and Reliability Score (0–2)		Acceptability Score (0–2)		Total
Author/Instrument	Item Generation	Pilot Testing	Validity Tested	Reliability Testing (Cronbach α)	Time to Complete	Response Rate (% of Recruited Patients Completing Questionnaire)	Total Score (Max 6)
Perioperative							
Auquier *et al.*[51] EVAN	Yes including patients (1)	Yes (1)	Content (1)	0.59–0.97 (1)	11 ± 8 min (1)	>99% (1)	6
Auquier *et al.*[62] EVAN-G	Yes including patients (1)	Yes (1)	Content, convergent, discriminant (1)	0.73–0.91 (1)	9 ± 7 min (1)	89.5% (1)	6
Capuzzo *et al.*[52]	Yes including patients (1)	Yes (1)	Content, construct (1)	0.84 (1)	Mean 9 min (pilot study) (1)	75% (1)	6
Heidegger *et al.*[53]	Yes including patients (1)	Yes (1)	Content, construct (1)	0.43–0.77 (1)	NA in final questionnaire <20 min (90%) in pilot (1)	62% (1)	6
Le May *et al.*[54] SOPPCAS	Yes including patients (1)	Yes (1)	Content (1)	0.58 (1)	15 min for first questionnaire (1)	95% for stage 1, 78% for stage 2 (1)	6

(*Continued*)

Table 8. (*Continued*)

	Item Generation Score (0–2)		Validity and Reliability Score (0–2)		Acceptability Score (0–2)		Total
Author/Instrument	Item Generation	Pilot Testing	Validity Tested	Reliability Testing (Cronbach α)	Time to Complete	Response Rate (% of Recruited Patients Completing Questionnaire)	Total Score (Max 6)
Schiff *et al.*[55] Heidelberg Perianesthetic questionnaire	Yes including patients (1)	Yes (1)	Content, construct, discriminant (1)	Sum score 0.79 (0.42–0.79) (1)	12 min (1)	84% (1)	6
Bauer *et al.*[63]	Yes (1)	Yes (1)	Content (1)	0.84 (1)	NA (0)	84% (1)	5
Caljouw *et al.*[56] LPPSq	Yes including patients (1)	Yes (1)	Face, content, construct: item-discriminant (1)	0.69–0.94 0.9 for total (1)	NA (0)	80.4% (1)	5
Hüppe *et al.*[71] ANP	Yes (1)	Yes (1)	Content, construct (1)	0.76–0.91 (1)	NA (0)	74.6% (1)	5
Jlala *et al.*[57]	Yes including patients (1)	Yes (1)	Construct (1)	0.94 (1)	NA (0)	>90% for pilot 74% for comparison study (1)	5
Lockyer *et al.*[89]	Yes (1)	Yes (1)	Content, face (1)	0.93 (1)	NA (0)	56.2% (1)	5
Mui *et al.*[79]	Yes (1)	Yes (1)	Content, construct, discriminate, nomological (1)	0.71–0.92 (1)	3–8 min (1)	NA (0)	5
Sindhvananda *et al.*[58]	Yes including patients (1)	Yes (1)	Content (1)	0.76 and 0.88 (1)	NA (0)	80.09% (1)	5
Albaladejo *et al.*[87]	Yes (1)	Yes (1)	Content (1)	No (0)	NA (0)	66% before intervention; 71% after intervention (1)	4
Fung *et al.*[59] 2001	Yes including patients (1)	Yes (1)	Content (1)	No (0)	NA (0)	71% (1)	4
Whitty *et al.*[60]	Yes including patients (1)	Yes (1)	Content (1)	No (0)	NA (0)	73% (1)	4
Wilkinson *et al.*[90]	Yes (1)	Yes (1)	Content (1)	No (0)	NA (0)	63% (1)	4
Hüppe *et al.*[70] ANP	Yes (1)	NA: initial development study (0)	Content (1)	Anesthesia 0.82, nonspecific care 0.75, recovery 0.88 (1)	NA	NA	3
Tong *et al.*[91]	No validation of Abramovitz *et al.* questionnaire (0)	No (0)	Yes, based on previous study (1)	No but interrate agreement K >0.9 (0)	NA (0)	52% (1)	2

(*Continued*)

Table 8. (*Continued*)

	Item Generation Score (0–2)		Validity and Reliability Score (0–2)		Acceptability Score (0–2)		Total
Author/Instrument	Item Generation	Pilot Testing	Validity Tested	Reliability Testing (Cronbach α)	Time to Complete	Response Rate (% of Recruited Patients Completing Questionnaire)	Total Score (Max 6)
Fleisher *et al.*[88]	NA (0)	NA (0)	NA (0)	0.62 for pain management (1)	NA (0)	61.4% (1)	2
Preassessment							
Snyder-Ramos *et al.*[48]	Yes (1)	Yes (1)	Content (1)	>0.7 (1)	NA (0)	100% (1)	5
Harms *et al.*[85]	Yes (1)	No (0)	Content (1)	No (0)	NA (0)	91% (1)	4
Hering *et al.*[86]	NA (1)	Yes (1)	Content (1)	Yes, but no details (1)	NA (0)	NA (0)	3
Maternal							
Sindhvananda *et al.*[18] Maternal satisfaction	Yes (1)	Yes (1)	Content, construct (1)	0.77 (1)	NA (0)	100% (1)	5
Morgan *et al.*[17] (MSSCS)	Yes including patients (1)	No (0)	Face, content, construct (1)	0.82 (1)	NA (0)	100% (1)	4
Nikkola *et al.*[19]	Yes (1)	Yes (1)	Content (1)	No (0)	NA (0)	100% (1)	4
Pediatrics							
Schiff *et al.*[46] Pediatric Perianesthesia Questionnaire	Yes including parents and children (1)	Yes (1)	Content, convergent and discriminant (1)	Sum score 0.868 (0.738–0.896) (1)	NA (0)	71% (1)	5
Kain *et al.*[44]	Yes (1)	Yes (1)	Content (1)	0.94 (1)	NA (0)	68% (1)	5
Khour *et al.*[45]	Yes (1)	No (0)	Content (1)	0.62 (1)	NA (0)	100% (1)	4
Tait *et al.*[42]	Yes including parents (1)	No (0)	Content (1)	0.88–0.91 Satisfaction 0.9 (1)	NA (0)	93.1% (1)	4
Iacobucci *et al.*[43]	Literature only (1)	No (0)	Construct (1)	0.86 (1)	NA (0)	84% parents, 52.3% children (1)	4
Chan *et al.*[41]	No (0)	No (0)	Content (1)	0.89 (1)	NA (0)	100% (1)	3
Regional							
Montenegro *et al.*[22]	Yes (1)	Yes (1)	Content (1)	0.78 (1)	NA (0)	100% (1)	5
Monitored Anesthesia Care							
Dexter *et al.*[24] ISAS	Yes including patients (1)	Yes (1)	Content, convergent (1)	0.8 (1)	4.6±2.3 min (1)	92% (1)	6

Scoring system: 0 if not present, 1 if present, max score for each questionnaire 6.

ANP = Anesthesiological Questionnaire; EVAN (G) = Evaluation du Vecu de l'Anesthesie (Generale); ISAS = Iowa Satisfaction with Anesthesia Scale; LPPSq = Leiden Perioperative care Patient Satisfaction questionnaire; MSSCS = Maternal Satisfaction Scale for Cesarean Section; NA = not applicable; SOPPCAS = Scale of Patients' Perceptions of Cardiac Anesthesia Services.

Table 9. Recommendations for Satisfaction Questionnaires in Different Clinical Settings

Name of Questionnaire	Authors	Anesthesia Subspecialty	Clinical Setting Where Applicable	Notes
ISAS[24]	Dexter *et al.*	Monitored Anesthesia Care	Research and quality improvement	Commonly used tool. Widely used in follow-up studies. Demonstrates both a robust development process and a high patient and clinician acceptability
Quality of preanesthetic visit[92]	Snyder-Ramos *et al.*	Preassessment	Quality improvement	A good questionnaire suitable for evaluating the preanesthetic visit, however, it was developed in Germany; validation and suitability in other countries is yet to be determined
Perioperative questionnaire[52]	Capuzzo *et al.*	Perioperative	Quality improvement	Well-developed, short questionnaire, which has been used to assess satisfaction after general anesthesia and regional anesthesia
Perioperative questionnaire[63]	Bauer *et al.*	Perioperative	Quality improvement	Good quality, yet brief questionnaire assessing anesthetic satisfaction and anesthesia-related discomfort. It has been validated both as a written test and interview
English adaption of the LPPSq[57]	Jlala *et al.*	Perioperative	Research	The English validation of the LPPSq is an acceptable, reliable, and useful tool in clinical research where the English language is spoken. Despite being longer, this questionnaire demonstrated highly acceptable response rates from patients
Heidelberg Perianesthetic questionnaire[55]	Schiff *et al.*	Perioperative	Research	Although originally developed for the purposes of quality improvement and benchmarking, this lengthy questionnaire may be more suitable for research

ISAS = Iowa Satisfaction with Anaesthesia Scale; LPPSq = Leiden Perioperative care Patient Satisfaction questionnaire.

undertaken when Schiff *et al.*[46] constructed a "Pediatric Perianesthesia Questionnaire." This comprised 37 questions and demonstrated extensive item generation, content, and convergent and discriminant validity with excellent internal consistency for all five dimensions. The questionnaire developed by Iacobucci *et al.*[43] is notable for being one of two we identified, which attempted to assess the child's satisfaction with the anesthetic experience. Although they reviewed the literature, they did not undertake any formal item generation or pilot testing for their questionnaire assessing parental (6 questions) and child (9 questions) satisfaction. They assessed construct validity by comparing parental satisfaction with the child's reported anxiety, and they tested reliability with test-retesting on 18 parents and 11 children a day after the intervention. They demonstrated good internal consistency (Cronbach α 0.86), with response rates of 84% for parents and 52.3% for children, respectively. This instrument was modified by Lew *et al.*[47] to assess satisfaction with pediatric sedation, rather than anesthesia.

Perioperative Satisfaction

We found 23 original articles that developed and validated patient-satisfaction measures with perioperative anesthetic care. Within this cohort, these tools have been used to evaluate satisfaction with preoperative assessment conducted by anesthetists, regional anesthesia, and/or general anesthesia. We have summarized these preoperative assessment instruments in table 6 and perioperative instruments in table 7; the details of the most rigorously developed and subsequently validated measures are described in the following sections on preoperative assessment and perioperative care.

Preoperative Assessment (table 6)

Snyder-Ramos *et al.*[48] developed their measure in order to evaluate the quality of the anesthetist's preoperative visit. The tool was divided into two parts: evaluation of satisfaction with the preoperative visit; and the information the patient gained as a result of the visit. This was a German study and its validity and suitability when translated into other languages is yet to be established; however, a recent study,

looking at the use of a preanesthetic information form, used some questions from this original tool.[49] The Consultation and Relational Empathy questionnaire[50] is a 10-question modification of a tool that had been previously developed and validated to assess patient satisfaction with consultations in primary care. The Patient Liaison Group of the United Kingdom Royal College of Anesthetists, discussed the tool to establish validity where generalized reliability, interrater reliability (using G-coefficient, similar to Cronbach α), and internal consistency were calculated. This resulted in a reliable and internally valid tool to assess patients' views on anesthetists' interpersonal communication skills.

Perioperative Care (table 7)

Nineteen questionnaires measuring patient satisfaction with perioperative care are included in our review. Of these, 10 sought patient advice in the development process.[51–60] When Auquier *et al.*[51] initially constructed their 25-item Evaluation du Vecu de l'Anesthesie questionnaire, they conducted a pilot study on 742 patients who underwent procedures under general anesthetic.[51] They concluded that the Evaluation du Vecu de l'Anesthesie questionnaire is valuable in assessing patients' opinions on the perioperative period,[61] and went on to develop the Evaluation du Vecu de l'Anesthesie Generale questionnaire,[62] consisting of 26 questions, which was rigorously psychometrically developed and validated. Both these questionnaires used patient input in the development processes.

Bauer *et al.*[63] looked primarily at measuring satisfaction with anesthesia and secondarily, comparing a 15-item written questionnaire with face-to-face interviews. A robust item-generation process was undertaken and content validity was assured by using anesthetists, nurses, and a literature review in the development of questions; however, no patients were consulted at this initial item stage. Pilot testing, question streamlining, and test–retest reliability were conducted and internal consistency measured (Cronbach α 0.84). This tool has been used once subsequently, to measure satisfaction after carotid endarterectomy.[64]

Caljouw *et al.*[56] developed the 39-question Leiden Perioperative care Patient Satisfaction questionnaire, using the Evaluation du Vecu de l'Anesthesie questionnaire by Auquier *et al.*[51] as their basis for items generation. The English adaptation of the Lieden Perioperative care Patient Satisfaction questionnaire was validated by Jlala *et al.*[57] Pilot and follow-up studies found this tool to be acceptable (response rate >90% for all questions) and reliable (Cronbach α 0.94).

Capuzzo's pilot study[52] generated 10 items for a new questionnaire, using a panel of doctors, nurses, experts, and interviews with patients who had recently received an anesthetic. Reliability and internal consistency were evaluated, and construct validity was assessed based on an assumption that young patients would have a lower satisfaction than older patients, and that a significant relationship between the items and satisfaction would be found. This tool has been used in two further studies.[65,66]

Another rigorous protocol was used in the development and validation of the 29-item patient-satisfaction questionnaire by Heidegger *et al.*[53] They concluded that a psychometric questionnaire for satisfaction with anesthesia care must include areas related to information, involvement in decision-making, and contact with the anesthetist. This tool has been used in three studies since this initial study.[67–69]

During a 5-yr period, Hüppe published three studies evaluating a new perioperative questionnaire now known as the Anesthesiological Questionnaire. The initial study described the development and initial evaluation.[70] The result was a two-part questionnaire with 66 items; part 1 assessing the postoperative period and the patients' symptoms, and part 2 more concerned with satisfaction with anesthetic care, perioperative care, and postoperative recovery. The questionnaire was then modified to 46 items and a further study was performed to test its reliability and validity.[71] Finally, the authors adapted it for use in cardiac anesthesia with further psychometric evaluation in this cohort of patients.[72] The Anesthesiological Questionnaire was also used by Reurer *et al.*[73] to assess satisfaction after elective surgery.

Le May *et al.*[54] also addressed patients' perceptions of cardiac anesthesia services, developing the Scale of Patients' Perceptions of Cardiac Anesthesia Services scale. This included 17 Likert-type questions with 10 sociodemographic and 3 open-ended questions. Of importance, this trial addressed a very homogenous group of cardiac patients and therefore, this specific questionnaire is not necessarily a valid tool for more generalized patients.

In 2008, Schiff *et al.*[55,74] published two studies and developed the 38-item Heidelberg perianesthetic questionnaire to assess perioperative satisfaction for quality improvement and benchmarking purposes. They also used this tool in a study of the anesthetic preoperative evaluation clinic[75] along with another group of questions addressing the preanesthetic consultation.[48] The Heidelberg questionnaire has been used by another research group to psychometrically assess patients' suitability for local anesthesia for carotid endarterectomy.[76]

Discussion

Summary of Findings

This systematic review identified a large number of questionnaires that have been psychometrically developed to measure patient satisfaction with anesthesia in a variety of clinical specialties and settings. However, of more than 3,000 articles using patient satisfaction as an outcome measure, only 71 used patient-satisfaction measures that were multidimensional and had undergone some sort of psychometric development process. Our qualitative appraisal of the tools used in different areas of anesthesia practice leads us to make recommendations about the tools researchers and clinicians may choose to use for measuring patient satisfaction in different settings. For "Monitored Anesthetic Care," the ISAS[24] is robust, with

high patient and clinician acceptability. For the perioperative assessment of satisfaction, the questionnaires by Capuzzo *et al.*[52] and Bauer *et al.*[63] are short, yet well developed and may be suitable for use in quality-improvement projects. However, the more lengthy questionnaires, such as the English adaption of the Leiden Perioperative care Patient Satisfaction questionnaire[57] and Heidelberg perianesthetic questionnaire,[55] are also acceptable to patients, and therefore, may be suitable for research purposes. These recommendations are listed in table 9.

Limitations

Our study has some limitations. This is not the first systematic review of patient-satisfaction measures in anesthesia; however, previous publications have focused on specific areas of practice, such as ambulatory or regional anesthesia.[14,15] We believe that this is the first systematic review to cover instruments measuring satisfaction with each and every element of the anesthetic experience (including preoperative assessment and postoperative recovery) and every patient group (for example, pediatrics and maternity). We have attempted to minimize bias by not restricting our search on the basis of language; however, we did limit the search to articles published from 1980 onward, as our intention was to provide the reader with information on questionnaires that would be relevant to current practice. Finally, although we have attempted to locate all relevant articles by using a robust search methodology, it is possible that with a review of this size, some relevant articles may have been missed.

Clinical Implications

The need for a summary of the literature in this field has been demonstrated by our finding that only a small proportion of studies that use patient satisfaction as an outcome, use a multidimensional validated questionnaire to measure it. Within this systematic review we have differentiated "patient satisfaction" questionnaires from "quality of recovery" questionnaires. A poor recovery may delay discharge from the postanesthetic care room or hospital, which has obvious resource implications.[77] Yet, there is evidence that incomplete recovery from various postoperative recovery domains does not always influence patient satisfaction.[78]

Psychometrically developed questionnaires are important for the reliable measurement of patient satisfaction with anesthesia care for a number of reasons. First, patient-reported satisfaction with anesthesia is generally high, both in studies and clinical practice; a single question or visual analog scale is likely to lead to this result,[1] therefore providing limited information to enable service evaluation or quality improvement. Second, it is not unusual for patients to have limited knowledge regarding anesthesia and the role of the anesthetist; these issues may skew data collection, as questions may be answered with a focus on the "perioperative experience" and not the specific anesthetic care.[15] Finally, a poorly constructed survey instrument can lead to a bias toward the investigators who designed it; this may result in the reporting of misleading outcomes in clinical studies. During the development process, involving patients in item generation can ensure a patient-focused approach and help to address patient expectations.[52]

Although our review may prove helpful to clinicians and researchers in the future, by summarizing the available measures, there are still unanswered questions in this field. For example, the generalizability of questionnaires across different settings is unclear: it is not necessarily right to assume that a questionnaire is valid outside its country of origin as there may be disparities in health care and patient expectations between nations and healthcare systems. Furthermore, we identified a number of the questionnaires that were developed in countries that did not have English as the first language; their validity after translation has not been established.[18,22,48,58,71,72,79] Only one instrument developed in a non–English-speaking country (the Leiden Perioperative care Patient Satisfaction questionnaire) has been validated after translation into English.[57]

The optimal timing for completing a satisfaction questionnaire for patients undergoing anesthesia is also not clear. A dilemma exists, as within the acute recovery period, the patient may still be under the influence of anesthesia and yet, with the implementation of enhanced recovery programs, many patients are not in hospital for extended periods of time. Patient demographics also require consideration: there is evidence that women have lower satisfaction levels for up to 3 days postoperatively,[80] and also that patients having major and minor surgery will have differences in their recovery profile and, therefore, in their responses to satisfaction surveys.[11] Therefore, the optimal timing (and therefore method) of administration of a patient-satisfaction survey may be different depending on the surgical specialty and the extent of the surgical procedure.

These issues may in turn have an impact on the answers that patients provide and also, on the response rates. Patient responses may be biased in order to please the hospital staff to avoid negative repercussions,[1] and equally satisfaction may be dominated by relief that the operation was a success.[63] In theory, in order to avoid the phenomenon of transference and countertransference, a questionnaire should lead to less bias than an interview.[81] However, Bauer *et al.*[63] found that their standardized interview identified more patients reporting lower degrees of satisfaction and was, therefore, superior in detection of anesthetic quality; however, the resource and cost implications of interviews rule out this method as a means of recording patient satisfaction outside the research setting. In contrast, using a postal questionnaire some time after the patient episode of interest may impact on the number of responses received. Perhaps, surprisingly, there is some evidence that postal questionnaire response rates may be higher than those achieved by questionnaires administered at the hospital.[82] However, this is not consistent with evidence from within the setting of anesthesia

satisfaction surveys, where response rates have been shown to be significantly lower at 9 weeks compared with 1 week and 5 weeks after an anesthetic.[68]

When choosing a questionnaire to use in clinical practice or for research purposes, there are a number of considerations must be taken into account. Successful completion of a satisfaction questionnaire with minimal missing data is an indication of the clinical acceptability of the tool, thereby supporting its use in practice. Although the optimal length of time to complete an assessment is not clear, a shorter questionnaire that maintains a good level of validity and reliability with simple and easy-to-understand vocabulary is likely to be less of an imposition for patients who are asked to complete it.[79] A validated yet brief questionnaire will be more suitable for audit and quality-improvement purposes, whereas more detailed questionnaires, providing more information, may be more valuable as outcome measures in clinical trials. In areas of anesthesia practice, where there is a range of well-developed tools to choose from, we have made recommendations based on instruments that may be used in either the quality-improvement or research settings, based on the quality of the psychometric development process. However, there are many branches of anesthesiology where further work is required on the development and/or validation of satisfaction measures is required.

Regional anesthesia is gaining popularity, partly due to improvements in safety and success attributed to ultrasound-guided techniques.[83] Our review identified only one tool developed for measuring patient satisfaction after regional anesthesia;[22] further evaluation of this measure would be of value. Satisfaction surrounding the birth of a child is a complex and emotive subject; for this reason, a tool specifically assessing maternal satisfaction with the anesthetic care would be invaluable. Although our review found three original questionnaire designs, the two most robustly developed and validated instruments measured satisfaction after cesarean section.[17,20] There is, therefore, an unmet need for a survey, which can be used to measure the quality of anesthesia care in obstetric patients who do not have operative deliveries, or at least a requirement for further evaluation of the two existing published tools.[17,20] Pediatric anesthesia, where satisfaction measurement is complicated by the parent–child unit, is another area where an evidence-based process for developing satisfaction measures is important. Children may not evaluate their treatment in the same way as adults; memory at a young age may not be reliable, the power of suggestion should not be overlooked, and there is currently no research to fully elucidate whether a parent can accurately judge their child's satisfaction with anesthesia.[46] The Pediatric Perianesthesia Questionnaire, which is answered by the patient and parent together, was the most robustly developed measure in this field. Although it is lengthy and complex, the high response rate in its development study indicates that it is acceptable to parents, although reducing its complexity may improve its feasibility even further. However, it is only with further evaluation in multiple centers that the true acceptability of this tool can be ascertained.

Conclusion

It is reassuring that our study has found a large number of well-developed tools to measure satisfaction with perioperative anesthesia care. However, we have also been able to highlight areas where further work would be of benefit. Perhaps our most significant finding is that the vast majority of anesthesia-related studies do not use validated tools to measure satisfaction, where this outcome is thought to be of importance. This omission may lead to biased and misleading results in studies of clinical effectiveness. As well as focusing on further evaluation of existing measures, and development of new tools where necessary, there is a need to encourage clinicians and researchers to incorporate validated measures into everyday practice and in clinical studies. This qualitative appraisal of the literature should provide a guide to anesthetists, reviewers, and editors on the measures that are available and valid, and therefore, assist in increasing the standards of outcome reports in academic studies, and quality improvement in clinical practices.

Appendix 1. Search Strategy

The MEDLINE search was carried out by searching and exploding the following MeSH (Medical Subject Headings) terms; "Patient satisfaction," or "consumer satisfaction" and combining with the terms; "Questionnaire(s)" or "Health surveys," which were also exploded. These were then combined with "Anaesthesia, Obstetrical" or "Anaesthesia" or "Anaesthesia, Epidural" or "Anesthetics, Local" or "Anesthetics" or "Anaesthesia, Spinal" or "Anaesthesia, General" or "Anaesthesia" and the exploded terms were combined with "Anaesthesiology" or "Anaesthesiology". This search found 9859 articles.

We searched for the following terms in EMBASE; "patient satisfaction" was exploded and combined with "McGill pain questionnaire" or "Questionnaire" or "open ended questionnaire" and "Anaesthesia or Anaesthesia" or "Anaesthesiology or Anaesthesiology," which were also exploded. To ensure that coverage was broad and complete these were also combined with the following exploded terms; "Local anaesthesia or Local anaesthetic" and "Deep sedation or sedation" or "conscious sedation." This search found 8806 articles.

Appendix 2. Additional Articles Using Psychometrically Developed Satisfaction Questionnaires

Author	Country	No. of Patients	Type of Surgery	Instrument
Attigah *et al.*[76]	Germany	102	Carotid endarterectomy	Heidelberg Perianesthetic questionnaire
Benatar-Haserfaty *et al.*[25]	Spain	58	Dacrycystorhinostomy	ISAS
Benatar-Haserfaty *et al.*[26]	Spain	233	Phacoemulsification	ISAS
Bevilacqua *et al.*[64]	Italy	181	Carotid endarterectomy	Bauer's instrument
Candiotti *et al.*[33]	United States	326	Broad range of procedures requiring MAC	ISAS
Capuzzo *et al.*[65]	Italy	1,506	Mixed	Cappuzzo Questionnaire NRS (0–10)
Capuzzo *et al.*[66]	Italy	150	Abdominal, thoracic, endocrine, vascular, skin	Cappuzzo Questionnaire NRS (0–10)
Cehajic-Kapetanovic *et al.*[27]	United Kingdom	140	Phacoemulsification	ISAS
Dalsasso *et al.*[39]	Italy	500	General surgery	ISAS
Dexter *et al.*[93]	United States	315	Sedation with dexmedetomidine	ISAS
Fung *et al.*[29]	United States	306	Phacoemuslification	ISAS
Fung *et al.*[28]*	United States	306	Phacoemuslification	ISAS
Harms *et al.*[94]	Switzerland	654	Elective surgery	Patient satisfaction questionnaire (unknown validity/ reliability)
Heidegger *et al.*[67]*	Switzerland	600	NA	Heidegger Problem Rating score
Hobson *et al.*[20]	United Kingdom	85	Elective cesarean section	MSSCS
Huncke *et al.*[34]	United States	55	Elective vascular	ISAS
Hüppe *et al.*[72]	Germany	1,688	Cardiac	ANP-KA (adapted ANP for cardiac)
Ionescu *et al.*[38]	Romania	70	Laparoscopic cholecystectomy	ISAS
Kwak *et al.*[40]	Korea	40	Third molar surgery	ISAS
Lee *et al.*[30]	United Kingdom	32	Ptosis surgery	ISAS
Lew *et al.*[47]	United States	220	Pediatric sedation procedures	Iacobucci instrument
Mercer *et al.*[50]	United Kingdom	1,582	NA	CARE measure
Morgan *et al.*[95]	Canada	27	Elective cesarean sections	MSSCS
Onutu *et al.*[35]	Romania	40	Orthopedics	ISAS
Pernoud *et al.*[61]	France	742	Mixed adult surgery	EVAN
Renna *et al.*[36]	United Kingdom	41	Outpatient transesophageal echocardiography procedures	ISAS
Reurer *et al.*[73]	Germany	710	Elective GI, extremities, ENT, thoracic	ANP-II
Rüschen *et al.*[31]	United Kingdom	28	Phacoemuslification	ISAS
Ryu *et al.*[32]	South Korea	81	Phacoemuslification	ISAS
Saal *et al.*[69]	Austria	642	NA	Heidegger Problem Rating score
Saal *et al.*[68]	Switzerland	2,214	Elective general, orthopedics, urology, ophthalmology, ENT, neurosurgery, gynecology surgery	Heidegger Problem Rating score

(*Continued*)

Appendix 2. (*Continued*)

Author	Country	No. of Patients	Type of Surgery	Instrument
Samin *et al.*[23]	France	288	Ambulatory hand surgery	Montenegro Regional questionnaire
Schiff *et al.*[74]	Germany	480	Abstract only	Heidelberg Perianesthetic questionnaire
Schiff *et al.*[75]	Germany	207	Anesthesia Preoperative Evaluation Clinic	Heidelberg Perianesthetic Questionnaire and Snyder-Ramos preanesthetic questionnaire
Snyder-Ramos *et al.*[92]	Germany	284	Preassessment	Snyder-Ramos *et al.* instrument
Straessle *et al.*[49]	Switzerland	200	Orthopedic surgery	Snyder-Ramos *et al.* instrument
Winton *et al.*[37]	United Kingdom	25	Tension-free vaginal tape insertion	ISAS

ANP = Anesthesiological Questionnaire; ANP-KA = Anesthesiological Questionnaire Cardiac; CARE = Consultation and Relational Empathy; ENT = ear, nose, and throat; EVAN = Evaluation du Vecu de l'Anesthesie; GI = gastrointestinal; ISAS = Iowa Satisfaction with Anesthesia Scale; MAC = Monitored Anesthetic Care; MSSCS = Maternal Satisfaction Scale for Cesarean Section; NA = not applicable; NRS = numerical rating scale.

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