Consent for Anesthesia Clinical Trials on the Day of Surgery

Patient Attitudes and Perceptions

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ABSTRACT

Background: Opportunities for anesthesia research investigators to obtain consent for clinical trials are often restricted to the day of surgery, which may limit the ability of subjects to freely decide about research participation. The aim of this study was to determine whether subjects providing same-day informed consent for anesthesia research are comfortable doing so.

Methods: A 25-question survey was distributed to 200 subjects providing informed consent for one of two low-risk clinical trials. While consent on the day of surgery was permitted for both studies, a preadmission telephone call was required for one. The questionnaire was provided to each subject at the time of discharge from the hospital. The questions were structured to assess six domains relating to the consent process, and each question was graded on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). Overall satisfaction with same-day consent was assessed using an 11-point scale with 0 = extremely dissatisfied and 10 = extremely satisfied.

Results: Completed questionnaires were received from 129 subjects. Median scores for satisfaction with the consent process were 9.5 to 10. Most respondents reported that the protocol was well explained and comprehended and that the setting in which consent was obtained was appropriate (median score of 5). Most patients strongly disagreed that they were anxious at the time of consent, felt obligated to participate, or had regrets about participation (median score of 1). Ten percent or less of subjects reported negative responses to any of the questions, and no differences were observed between the study groups.

Conclusion: More than 96% of subjects who provided same-day informed consent for low-risk research were satisfied with the consent process. **(Anesthesiology 2016; 124:1246-55)**

THE majority of patients undergoing surgical procedures in the United States present to the hospital on the morning of surgery.[1] For many anesthesia investigators, the initial contact with potential subjects for clinical trials occurs in the ambulatory surgery unit or preoperative holding area a few hours before entering the operating room. Obtaining appropriate informed consent in this setting presents several unique challenges. Patients may be uncertain whether study personnel are involved in their clinical care and may feel an obligation to consent to research. In addition, anxiety in relation to the forthcoming surgery may impair understanding of the study protocol. Furthermore, the time available to read the consent form and adequately comprehend the risks and benefits of the investigation may be limited. Finally, patients may perceive the immediate preoperative environment as coercive, with inadequate privacy and restricted ability to discuss the study with family members or physicians.[2–5] Only a few studies have examined attitudes of research subjects who have given their informed consent to participate in research on the day of surgery.[2–4,6]

What We Already Know about This Topic

- Informed consent for anesthesia research is frequently obtained on the day of surgery, raising concerns regarding whether patients are comfortable to do so

What This Article Tells Us That Is New

- In a survey conducted on 200 patients who provided informed consent for anesthesia research on the day of surgery, 96% of respondents were satisfied with the consent process, and most disagreed that they were anxious, felt obligated to participate, or had regrets about participation

In the absence of compelling evidence, many institutional review boards (IRBs) are reluctant to allow investigators to obtain consent for trial participation in this setting.[6,7]

Informed consent is based on the concept that an individual of competent mind has the right to determine what is done to him or her.[8] The elements of informed consent have been defined in the Helsinki Protocol and Belmont Report.[9,10] Investigators obtaining consent for research must be satisfied that subjects have appropriate decision-making

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capacity and understanding of the proposed interventions. Furthermore, adequate understanding of the research protocol requires full disclosure of information, which includes details about the purpose of the investigation, the procedures to be performed, expected risks and potential benefits of study participation, available alternatives, and the right to withdraw from the study at any time.[8]

Consent for anesthesia research on the day of surgery is not permitted at some medical centers. IRBs at these hospitals believe that approaching patients on the day of surgery is unethical, as it does not meet the requirements for autonomy, confidentiality, absence of coercion, and time for reflection.[7] Other IRBs allow same-day consent for research, but require a preadmission telephone call describing the research protocol to potential subjects before hospital admission.[7] The aim of this prospective, cohort-matched observational study was to determine subjects' attitudes toward consent for anesthesia research on the day of surgery. A negative response rate of more than 10% was considered to represent clinically significant subject dissatisfaction with the same-day consent process. Our primary outcome was overall satisfaction with the consent process using an 11-point visual analog scale (with 0 = extremely dissatisfied to 10 = extremely satisfied), for which a negative response was considered to be a response of 0 to 4. This outcome was assessed as part of a questionnaire used to assess patients' attitudes about participation in same-day research developed by Brull *et al.*[2,3] The effect of a preadmission telephone call on subject satisfaction with consent for research was also assessed.

Materials and Methods

This investigation was approved by the NorthShore University HealthSystem and registered at ClinicalTrials.gov (NCT01546194). The NorthShore University HealthSystem IRB waived the requirement for written informed consent for this survey study. The questionnaire was administered to subjects providing written consent for one of two low-risk clinical trials (examining the effect of dexamethasone on blood glucose concentration in gynecologic surgical patients and the impact of acceleromyography on postoperative symptoms of muscle weakness).[11,12] During reviews of these two studies, several members of the IRB expressed concerns about obtaining consent for anesthesia research projects on the day of surgery. In particular, the possibility that subjects may not have time to adequately review and comprehend the clinical protocols on the day of surgery was debated. Furthermore, there were limited published data regarding the percentage of subjects with negative experiences with same-day research consent. After consideration, the IRB allowed consent on the day of surgery for both investigations. However, for the acceleromyography study, a preadmission phone call was required, whereas none was required for the previously approved dexamethasone investigation.

The survey questionnaire was provided to 100 consecutive subjects participating in the two clinical trials. High-risk patients or those undergoing major operative procedures who would be unable to complete the questionnaire due to cognitive or physical impairment were not enrolled in either investigation. Enrollment for both studies occurred over the same time period, and the 200 surveys were distributed and collected over the same number of months. On the day before recruitment, the operating room schedule was reviewed for potential study subjects. Written informed consent to participate in the dexamethasone and in the acceleromyography clinical trials was obtained on the day of the scheduled surgery. Subjects in the acceleromyography investigation also received a preadmission telephone call. Telephone calls were placed between the hours of 1:00 PM and 4:00 PM. Using a standard format, research assistants informed subjects that they would be approached about participation in a clinical trial. A brief overview of the study was provided and questions were answered. If contact at the provided telephone numbers was unsuccessful, a message conveying this information was left on voicemail or on an answering machine. On the day of surgery, at least 1 to 2 h before the scheduled time of the procedure, one of two female research assistants approached the patient in the preoperative holding area (recruitment rates are influenced by the sex of the researcher and of the patient[4]). The research assistant verbally reviewed the proposed project with the patient; uniformity of the information presented was accomplished by developing a standard script. Family members and friends were allowed in the room when the protocol was reviewed unless the patient did not wish others to be present (no patient expressed an interest in having these individuals leave the room). The consent form was provided to the patient and at least 20 min was allowed to review the information (the length of the consent forms for both investigations was five pages). Patients were allowed, on average, 30 to 60 min to consider participation in the clinical trials. Patients could discuss the study with family members or friends during this time period. Any further questions were answered when the research assistant returned to the preoperative holding area.

If the patient agreed to participate in one of the two clinical trials, written informed consent was obtained. A brief, standardized explanation of the survey study was then provided. Potential subjects were informed, "Our department is providing a survey to subjects agreeing to participate in research on the day of surgery in order to determine attitudes about this process." The research assistant then explained that the department of anesthesiology was conducting a survey to determine subjects' attitudes about the consent process for clinical investigations. Subjects were informed that they would be provided with a questionnaire at the time of discharge from the hospital that was to be completed within 24 h of hospital discharge. Oral consent for the survey study was required, and all subjects consenting for the two clinical trials agreed to participate in the survey investigation. At the time of discharge from the hospital, subjects were provided with a copy of the questionnaire, a letter reviewing

the purpose of the survey and instructions for completion, and a self-addressed and stamped envelope. On the first day postdischarge, subjects received a telephone call to serve as a reminder to complete the questionnaire and to answer any further questions about the clinical trials. The study participants were informed that all survey responses would contain no identifying information and remain confidential (to reduce self-report bias).

The questionnaire used to assess subjects' attitudes about participation in same-day research was developed by Brull *et al.*[2,3] and used in two previous investigations. The questionnaire was structured to assess six domains concerning the recruitment and consent process: comprehension (seven questions); situation (privacy and time, six questions); obligation (five questions); motivation (three questions); compunction (regrets, three questions); and satisfaction (one question).[2,3] Each of the 25 questions was graded on a 5-point Likert scale with responses ranging from 1 to 5 (1 = strongly disagree, 2 = disagree, 3 = uncertain, 4 = agree, and 5 = strongly agree). In addition, overall satisfaction with the consent process was evaluated using an 11-point visual analog scale with 0 = extremely dissatisfied to 10 = extremely satisfied. The questionnaires were first provided to lay individuals to determine face validity of the items. Content validity was then assessed by administering the questionnaire to members of the department of anesthesia (research assistants and faculty); ambiguous or unnecessary content was removed. Only surveys with complete data were considered for analysis. Any question with a negative response rate of greater than 10% was considered significant enough to warrant additional investigation (predetermined threshold for clinical significance). The same-day consent would be reconsidered if any question had a negative response rate above this threshold.

Statistics

Subject characteristics are reported as mean ± SD or number of subjects and the percent of subjects with a given characteristic. Questionnaire responses are reported as median and range and were compared among the groups using the Kruskal–Wallis test, with the resulting *P* value adjusted for ties by a method that is standard in the software. In selecting the criterion for rejection of the null hypothesis, it was necessary to balance the desire to minimize the chance of a type I error with the potential investigator bias that there were no between-group differences when in fact there might have been (a type II error). Given that the answers of three groups to 26 questions were to be analyzed statistically, the authors chose to set the criterion for rejection of the null hypothesis as a two-tailed *P* value of less than 0.01 to help minimize the chance of a type I error while not overly biasing against finding differences between groups. *Post hoc* testing was not necessary. Questionnaire responses were also reduced to the number of responses of four or five, and the percent of all responses represented by responses of four or five for ease of discussion of the present results. The StatsDirect statistical software, Version 2.8.0 (Cheshire WA14 4QA, United Kingdom), was used for all statistical analyses.

In a *post hoc* sensitivity analysis, an attempt was made to determine whether the 35% nonresponse rate posed a threat to the interpretation of the results of the study, focusing on the primary outcome, overall satisfaction with the consent process, for the no telephone call group and for the preadmission call groups.[13] This was done first by determining the number of nonresponders in each group who would have had to have a negative response to overall satisfaction with the consent process (*i.e.*, a response of 0 to 4 on the 11-point visual analog scale) for the negative response rate for each group to have exceeded the threshold of 10%, which was deemed to represent clinically significant subject dissatisfaction with the same-day consent process. Values were then imputed to the "negative" nonresponders and "positive" nonresponders in each group, and responses were again compared among the groups using the Kruskal–Wallis test.

Results

Questionnaires were distributed to all 200 subjects. Written responses were received from 69 subjects in the no telephone call group (dexamethasone study) and 66 subjects in the preadmission call group (acceleromyography investigation). Five surveys in the no telephone call group and one survey in the preadmission call group were not fully completed and excluded from further evaluation, as a result of which 129 complete surveys were available for analysis. In the preadmission call group, 26 subjects were directly contacted by a research assistant (spoken with cohort), and messages were left with 39 subjects who did not answer the telephone call (message left cohort).

Characteristics of the respondents are presented in table 1. All of the subjects in the no telephone call group were female, whereas approximately one half of the subjects in the preadmission call group were female. All groups were similar in American Society of Anesthesiologists physical status scores as well as in the presence of preexisting medical problems. In the preadmission call group, general surgical procedures were more common in the message left cohort, and orthopedic procedures were more frequently performed in the spoken with cohort.

Responses to the 25 questions relating to attitudes about same-day research consent are presented in table 2. No differences in responses were observed among the no telephone call, the preadmission call-spoken with, and the preadmission call-message left groups. Median scores for satisfaction with the consent process, the primary outcome, were 9.5 to 10 on a 0 to 10 scale (0 = extremely dissatisfied and 10 = extremely satisfied). Median Likert scale scores of 5 (1 = strongly disagree to 5 = strongly agree) were reported for questions relating to comprehension (subjects were aware that they were participating in a research project and that participation was voluntary; the study was well explained and the consent form was read

Table 1. Patient Characteristics

	No Telephone Call	Preadmission Call, Message Left	Preadmission Call, Spoken with
Number	64	39	26
Sex (female)	64 (100%)	19 (48.7%)	12 (46.2%)
Age (yr)	57 ± 10	56 ± 11	53 ± 19
Weight (kg)	75 ± 18	80 ± 16	85 ± 21
Height (cm)	164 ± 5	171 ± 10	172 ± 11
ASA physical status			
1	10 (15.6%)	4 (10.3%)	5 (19.2%)
2	43 (67.2%)	24 (61.5%)	16 (61.5%)
3	11 (17.2%)	11 (28.2%)	5 (19.2%)
Smoking history	4 (6.3%)	4 (10.3%)	2 (7.7%)
Drinking history	0 (0%)	1 (2.6%)	0 (0%)
Hypertension	18 (28.1%)	14 (35.9%)	8 (30.8%)
Coronary artery disease	0 (0%)	0 (0%)	1 (3.8%)
Congestive heart failure	0 (0%)	0 (0%)	1 (3.8%)
Arrhythmia	2 (3.1%)	1 (2.6%)	3 (11.5%)
COPD	1 (1.6%)	1 (2.6%)	0 (0%)
Asthma	8 (12.5%)	1 (2.6%)	3 (11.5%)
Sleep apnea	4 (6.3%)	4 (10.3%)	0 (0%)
Liver disease	1 (1.6%)	1 (2.6%)	1 (3.8%)
Chronic renal insufficiency	1 (1.6%)	0 (0%)	1 (3.8%)
Thyroid disease	9 (14.1%)	5 (12.8%)	1 (3.8%)
Diabetes mellitus	2 (3.1%)	2 (5.1%)	2 (7.7%)
Cerebrovascular accident	1 (1.6%)	0 (0%)	0 (0%)
Transient ischemic attack	0 (0%)	1 (2.6%)	0 (0%)
Operative procedures			
General	0 (0%)	20 (51.3%)	8 (30.8%)
Gynecologic	64 (100%)	3 (7.7%)	2 (7.7%)
Neurologic	0 (0%)	3 (7.7%)	3 (11.5%)
Orthopedic	0 (0%)	3 (7.7%)	6 (23.1%)
Plastic	0 (0%)	3 (7.7%)	1 (3.8%)
Urologic	0 (0%)	7 (17.9%)	6 (23.1%)

Data are mean ± SD and number of patients (%).

ASA = American Society of Anesthesiologists; COPD = chronic obstructive pulmonary disease; drinking history = more than two alcoholic drinks per day.

and comprehended; and subjects understood the purpose, benefits, and risks of the investigations). Similarly, questions about situation (asked to consent at the appropriate or ideal time and place; enough time and privacy to consider participation) had median scores of 5. Subjects reported that they were not anxious about study participation; nor did they feel pressured or obligated to enroll (median scores of 1). In addition, respondents understood that they could withdraw from the study without jeopardizing their care (median score of 5). Most subjects reported that they believed their involvement in research was important, and the data gained would benefit other patients and contribute to medical knowledge (median scores of 5). Few subjects had regrets about involvement in the study or suffered complications (median scores of 1) and most would participate in a similar study (median score of 5).

The number and percentage of subjects reporting "agree" or "strongly agree" responses to the 25 questions are presented in table 3. The responses to the questions were similar for the three groups. Overall, 95% or more of respondents were satisfied with the structure of the same-day consent process (satisfaction quantified as a score of 7 or more on a 0 to 10 scale [0 = extremely dissatisfied and 10 = extremely satisfied]). More than 90% of subjects reported that they understood the research protocol (aware that they were participating in research and that participation was voluntary [96 to 100%]; understood the purpose, benefits, and risks of the study [94 to 97%]; the protocol was well explained [97 to 100%]; and the consent form read and comprehended [94 to 96%]). The setting in which consent was obtained was acceptable to most subjects (asked to participate at the appropriate [92 to 100%] or ideal [91 to 97%] time and place; enough time [95 to 96%] and privacy [95 to 96%] to consider the study). Fifteen to 26% of respondents indicated that they wished to review the study with someone else before agreeing to participate. However, most subjects (59 to 73%) noted that they had actually discussed the protocol with someone else before enrolling. A small percentage of subjects felt anxious when asked to participate in the study (6 to 10%) or experienced anxiety about participation (5 to 9%). Few patients felt pressured (0 to 3%) or obligated (3 to 8%) to enroll, and most understood that they could withdraw from the study without affecting their care (94 to

Table 2. Volunteers' Responses to a Questionnaire Regarding Their Participation in an Anesthesia Study

	No Telephone Call	Preadmission Call, Message Left	Preadmission Call, Spoken with	*P* Value
Sample size	64	39	26	—
1. I am aware that I participated in an anesthesia research study.	5 (4–5)	5 (4–5)	5 (3–5)	0.624
2. I was asked to participate in the study at the appropriate time and place.	5 (1–5)	5 (3–5)	5 (4–5)	0.244
3. I was asked to participate in the study at the ideal time and place.	5 (1–5)	5 (3–5)	5 (3–5)	0.571
4. I felt anxious when I was asked to participate in the study.	1 (1–4)	1 (1–4)	1 (1–4)	0.889
5. I understood the purpose of the study before I agreed to participate.	5 (1–5)	5 (2–5)	5 (3–5)	0.835
6. I understood the benefits and risks of the study before I agreed to participate	5 (1–5)	5 (1–5)	5 (3–5)	0.737
7. The study was well explained to me before I agreed to participate.	5 (3–5)	5 (3–5)	5 (4–5)	0.574
8. I had enough time to consider the study before I agreed to participate.	5 (1–5)	5 (1–5)	5 (2–5)	0.270
9. I had enough privacy to consider the study before I agreed to participate.	5 (2–5)	5 (1–5)	5 (3–5)	0.659
10. I read and understood the consent form before I agreed to participate.	5 (1–5)	5 (1–5)	5 (2–5)	0.408
11. I discussed the study with someone else before I agreed to participate.	4.5 (1–5)	4 (1–5)	4.5 (1–5)	0.323
12. I wished to discuss the study with someone else before I agreed to participate.	1 (1–5)	1 (1–5)	1.5 (1–5)	0.862
13. My participation in the study was voluntary.	5 (5–5)	5 (4–5)	5 (4–5)	0.211
14. I could have withdrawn from the study at any time without affecting my medical care.	5 (1–5)	5 (1–5)	5 (4–5)	0.309
15. I felt anxious about participating in the study.	1 (1–5)	1 (1–5)	1 (1–5)	0.512
16. I felt pressured to participate in the study.	1 (1–5)	1 (1–5)	1 (1–3)	0.599
17. I felt obligated to participate in the study.	1 (1–5)	1 (1–5)	1 (1–4)	0.550
18. My medical care would be jeopardized if I did not participate in the study.	1 (1–5)	1 (1–2)	1 (1–2)	0.394
19. My participation in the study is important.	5 (3–5)	5 (3–5)	5 (4–5)	0.379
20. My participation in the study will benefit other patients in the future.	5 (3–5)	5 (4–5)	5 (4–5)	0.279
21. My participation in the study will contribute to medical knowledge.	5 (1–5)	5 (3–5)	5 (1–5)	0.830
22. I regret participating in the study.	1 (1–4)	1 (1–2)	1 (1–2)	0.858
23. The study put my health and/or well-being at risk.	1 (1–5)	1 (1–2)	1 (1–2)	0.263
24. I suffered from one or more complications as a result of my participation in the study.	1 (1–3)	1 (1–2)	1 (1–2)	0.729
25. I would participate in another study similar to this one.	5 (3–5)	5 (3–5)	5 (3–5)	0.185
26. Please indicate your satisfaction with the consent process for the study on a 0–10 scale (0 = extremely dissatisfied and 10 = extremely satisfied).	9.5 (3–10)	10 (7–10)	10 (5–10)	0.058

Questionnaire responses: 1 = strongly disagree; 2 = disagree; 3 = uncertain; 4 = agree; and 5 = strongly agree. Data are reported as median (range) and were analyzed with the Kruskal–Wallis test, with the resulting *P* value adjusted for ties.

100%). Similarly, the percentage of respondents expressing regret about participation was small (regret participation [0 to 2%]; study placed health at risk [0 to 2%]; suffered complications [0%]), and most would enroll in a similar study in the future (94 to 97%).

In the *post hoc* sensitivity analysis, an attempt was made to determine whether the 35% nonresponse rate posed a threat to the interpretation of the results of the study. Only 1 subject of the 64 in the no telephone call group who completed the questionnaire had a negative response to overall satisfaction with the consent process, while none of the 39 subjects in the preadmission call-message left group and none of the 26 subjects in the preadmission call-spoken with group had a negative response to overall satisfaction with the consent process. For the negative response rate of each group to have exceeded the threshold of 10%, which was deemed to represent clinically significant dissatisfaction with the same-day consent process, 10

Table 3. Volunteers' Agree (4) and Strongly Agree (5) Responses to a Questionnaire Regarding Their Participation in an Anesthesia Study

	No Telephone Call	Preadmission Call, Message Left	Preadmission Call, Spoken with
Sample size	64	39	26
1. I am aware that I participated in an anesthesia research study.	64 (100%)	39 (100%)	25 (96%)
2. I was asked to participate in the study at the appropriate time and place.	59 (92%)	38 (97%)	26 (100%)
3. I was asked to participate in the study at the ideal time and place.	58 (91%)	38 (97%)	25 (96%)
4. I felt anxious when I was asked to participate in the study.	4 (6%)	4 (10%)	2 (8%)
5. I understood the purpose of the study before I agreed to participate.	62 (97%)	37 (95%)	25 (96%)
6. I understood the benefits and risks of the study before I agreed to participate.	60 (94%)	38 (97%)	25 (96%)
7. The study was well explained to me before I agreed to participate.	63 (98%)	38 (97%)	26 (100%)
8. I had enough time to consider the study before I agreed to participate.	61 (95%)	37 (95%)	25 (96%)
9. I had enough privacy to consider the study before I agreed to participate.	61 (95%)	37 (95%)	25 (96%)
10. I read and understood the consent form before I agreed to participate.	60 (94%)	37 (95%)	25 (96%)
11. I discussed the study with someone else before I agreed to participate.	43 (67%)	23 (59%)	19 (73%)
12. I wished to discuss the study with someone else before I agreed to participate.	16 (25%)	10 (26%)	4 (15%)
13. My participation in the study was voluntary.	64 (100%)	38 (97%)	26 (100%)
14. I could have withdrawn from the study at any time without affecting my medical care.	60 (94%)	38 (97%)	26 (100%)
15. I felt anxious about participating in the study.	6 (9%)	2 (5%)	2 (8%)
16. I felt pressured to participate in the study.	2 (3%)	1 (3%)	0 (0%)
17. I felt obligated to participate in the study.	2 (3%)	1 (3%)	2 (8%)
18. My medical care would be jeopardized if I did not participate in the study.	1 (2%)	0 (0%)	0 (0%)
19. My participation in the study is important.	60 (94%)	38 (97%)	26 (100%)
20. My participation in the study will benefit other patients in the future.	60 (94%)	39 (100%)	26 (100%)
21. My participation in the study will contribute to medical knowledge.	61 (95%)	38 (97%)	24 (92%)
22. I regret participating in the study.	1 (2%)	0 (0%)	0 (0%)
23. The study put my health and/or well-being at risk.	1 (2%)	0 (0%)	0 (0%)
24. I suffered from one or more complications as a result of my participation in the study.	0 (0%)	0 (0%)	0 (0%)
25. I would participate in another study similar to this one.	60 (94%)	38 (97%)	25 (96%)
26. Please indicate your satisfaction with the consent process for the study on a 0–10 scale (0 = extremely dissatisfied and 10 = extremely satisfied) (# ≥ 7, % ≥ 7)	61 (95%)	39 (100%)	25 (96%)

Data are reported as the number of responses of 4 or 5 and %.

of the 36 nonresponders (28%) in the no telephone call group would have had to have a negative response to overall satisfaction with the consent process. Similarly, 6 of the 20 nonresponders in the preadmission call-message left group (30%) would have had to have a negative response to overall satisfaction with the consent process, and 5 of 15 nonresponders in the preadmission call-spoken with group (33%) would have had to have a negative response. If the imputed negative and positive responses of the no telephone call group are less than those for the preadmission call groups (*e.g.*, the negative responses in the no telephone call group are all 0 and their positive responses are all 7 while those in the preadmission call groups are all 4 or 10, respectively), then pairwise comparisons among samples using the Dwass–Steel–Critchlow–Fligner test after a positive Kruskal–Wallis test found that both preadmission call groups would differ from the no telephone call group, but not from each other. However, if the imputed negative responses of the no telephone call group are all 2 and the positive responses in the no telephone call group are all 9 or 10 while those in the preadmission call groups are all 10, then there would be no differences among the three groups.

Discussion

Changes in the healthcare environment have resulted in the majority of surgery being performed on the day of admission or on an ambulatory basis. In order to further reduce the cost of perioperative care, many hospitals have eliminated preoperative clinics. Therefore, the opportunity to obtain informed consent for anesthesia research is often restricted to the day of surgery, which may not represent the ideal setting for discussion of research protocols.[7] Some medical ethicists and IRBs have questioned this approach to consent, as the hospital may be regarded as a coercive environment and patients may be anxious and have insufficient time for reflection or consultation.[7,14] The ability of subjects to freely decide about participation in clinical trials may be limited in this setting. Only a small number of studies have investigated patients' attitudes toward providing consent for anesthesia research on the day of surgery.[2,3,6,9,15,16] The findings of the current investigation support the observations from these previous studies. Despite the limitations imposed by the same-day consent process, most of the responding participants reported that they understood the purpose, benefits, and risks of the clinical trials. The majority of respondents strongly agreed that approach by a research assistant in the setting of the preoperative holding area allowed sufficient time and privacy to review the protocols, and few respondents felt obligated to enroll. Only a small number of subjects expressed regret about study participation, and most were highly satisfied with the overall consent process. As noted by Brull *et al.*,[2] use of a preadmission phone call did not improve understanding of the protocol, reduce anxiety, or increase satisfaction with same-day consent for low-risk anesthesia research.

The utility of a preadmission telephone call in the consent process remains controversial. A telephone call before hospital admission allows time for deliberation and discussion of the protocol with family members. In contrast, it is possible that this form of contact may be perceived as an invasion of privacy and create undue anxiety. In a questionnaire completed by subjects who had taken part in clinical trials, 41% "would like to have been warned about the study before coming into the hospital," whereas 51% of subjects "did not want to know about the trial before admission."[9] In a similar survey, only 34% of ambulatory surgery patients preferred to be approached about study participation *via* a telephone call.[14] Brull *et al.*[2] randomized 124 patients participating in an orthopedic clinical trial to receive a preadmission telephone call on the day before surgery or no telephone call. Using a questionnaire similar to that of the current investigation, the authors noted that a telephone call to initiate the consent process for minimal-risk anesthesia research did not improve satisfaction scores among the 63 respondents. Our findings are in agreement with the observations of Brull *et al.*[2] Responses on the 5-point Likert scale, as well as overall satisfaction with the consent process, did not differ among the no telephone call, the preadmission call-spoken with, and the preadmission call-message left groups. Similarly, the percentage of subjects providing negative responses to the questions were similar for the three groups. These findings suggest that contact by telephone before hospital admission does not improve the subjects' already high satisfaction with the consent process for anesthesia research.

Four important issues related to informed consent must be addressed if recruitment for clinical trials is sought in the immediate preoperative period: comprehension, suitability of the setting or situation, obligation, and anxiety. The conduct of ethical research requires that the subjects involved have the ability to comprehend the purpose and implications of the proposed research. It is possible that subjects may not fully understand the information presented by investigators on the day of surgery due to time constraints and preoperative anxiety. In the current investigation, respondents strongly agreed that they comprehended the required elements of informed consent (median score of 5). Six percent of the study participants or less indicated that they did not understand the purpose of the clinical trial or the benefits and risks of involvement. Similarly, 6% of respondents or less replied that they did not understand the consent form or that enrollment in the study was voluntary. These findings confirm the observations of previous investigators. Brull *et al.*[3] reported that 80% of respondents understood the purpose of the clinical trial in which they had consented to enroll on the day of surgery. Chludzinski *et al.*[6] measured comprehension scores in patients agreeing to hear about a moderate- to high-risk clinical trial before the day of surgery or on the day of surgery. Patients approached on the day of surgery had noninferior understanding or comprehension of the research protocol.

Anesthesia research teams must often obtain consent in a unique setting or situation. The first contact between investigators and potential research subjects is frequently only a few hours before the procedure on the day of surgery. When approached in the preoperative holding or ambulatory surgical areas, patients may have insufficient time and privacy to fully consider the implications of study participation and may be limited in their ability to discuss the study with family members or physicians. In a study in which subjects were provided a questionnaire on the morning of surgery, 75% of respondents reported that they would prefer being approached at the time of preadmission testing and have the ability to consult with their own physician.[15] In contrast to these findings, a survey of 109 obstetric patients who did not consent for anesthesia research reported that only 10 to 12% of patients strongly considered lack of time and privacy as deciding factors and only 1% of patients strongly considered input from others in making a decision.[16] Similar findings were reported in subjects participating in an orthopedic surgery

clinical trial.[2] Respondents in the current investigation who agreed to participate in the clinical trials appeared to understand the limited ability of anesthesiologists to obtain consent before the day of surgery. The majority of respondents (92 to 100%) agreed that they were asked to participate at the appropriate time and place. Most of the respondents (95 to 96%) also noted that they had enough time and privacy to consider the study. A relatively low percentage of subjects (15 to 26%) reported that they wished to discuss the study with someone else before agreeing to participate although 59 to 73% actually discussed the study with another person before consenting. These responses indicate that the majority of subjects who wished to review the protocol with a family member had the opportunity to do so. However, it should be noted that this investigation examined the responses of those subjects who consented to participate; the opinions and attitudes of all patients who were approached on the day of surgery are unknown.

The decision to consent for participation in anesthesia research should be made voluntarily, without undue influence or coercion from investigators, and the subject should not feel obligated to participate. It is important for researchers to appreciate how subjects may perceive the influence of study personnel and the degree to which these perceptions may affect the decision process.[17,18] Furthermore, the hospital setting on the morning of surgery may be seen as a coercive environment. Sessler *et al.*[6] examined the extent to which patients felt obligated to participate in a clinical trial, either on the day of surgery or before, using a 6-point Likert scale (0 = no obligation and 5 = very much obligated). Mean perceived Likert scores were less than 1 in both groups and did not differ between groups. Less than 3% of patients approached to participate in an obstetric anesthesia trial felt obligated to consent or participate.[16] In contrast to these studies, Brull *et al.*[3] observed that 21 to 26% of subjects felt obligated or pressured to participate in a clinical trial when investigators sought informed consent on the day of surgery. We observed that consenting subjects did not perceive a sense of obligation to enroll in research if consent was sought on the day of surgery. Few respondents agreed or strongly agreed that they felt pressured or obligated to participate in the study (0 to 8%). Furthermore, the majority of subjects responded that they understood that they could withdraw from the clinical trial without compromising care from the medical team (94 to 100%) and that attention from the medical staff would not be jeopardized if they did not participate. Available evidence from our investigation and from others[6,16] support the belief that the immediate preoperative environment is not perceived as a coercive setting in which to discuss participation in research protocols.

Another primary concern relating to same-day anesthesia research consent is patient anxiety. It is possible that anxiety on the day of surgery may impair understanding and increase feelings of vulnerability.[19] Using a visual analog scale of 0 to 100 to assess the degree of preoperative anxiety (0 = no anxiety and 100 = worst anxiety), mean anxiety scores of 35 to 43 have been reported for study subjects in the preoperative period.[4,5] Patients approached on the day of surgery for participation in moderate- to high-risk research reported mean baseline anxiety scores of 12 on a scale of 6 (minimal anxiety) to 24 (high anxiety); however, anxiety scores decreased after the protocol was reviewed with subjects.[6] Other investigators have reported that subjects providing consent for research on the day of surgery did not experience anxiety in relation to study enrollment.[2,3] Subjects in the current investigation who agreed to participate strongly disagreed that they were anxious at the time they were asked to participate in the clinical trials or anxious about actual study participation. Ten percent of respondents or less reported anxiety on the day of surgery. The low levels of anxiety observed in this survey may have been attributable to characteristics of the patient population and nature of the surgical procedures (healthy subjects undergoing low-risk operations).

An assessment of satisfaction scores is necessary in determining whether same-day consent for research violates any general principles of informed consent. In the absence of national guidelines in North America, quantification of subject satisfaction scores may assist local IRBs in determining the suitability of consent for clinical trials on the day of surgery. Brull *et al.*[2,3] reported overall satisfaction scores of 71 to 79 on a 100-mm visual analog scale (0 = least satisfied and 100 = most satisfied) for the consent process for low-risk anesthesia clinical trials. Global satisfaction scores on a visual analog scale of 0 to 10 (0 = extremely dissatisfied and 10 = extremely satisfied) were higher in consenting patients in the current investigation, with median score of 9.5 reported in the no telephone call group and score of 10 reported in the preadmission call groups. Using a threshold value of 7 to represent overall satisfaction, less than 5% of respondents reported dissatisfaction with the consent process for the two clinical trials.

There are several limitations to the current investigation. First, the survey was provided to subjects enrolled in two low-risk research projects. The setting of the study may potentially influence a subject's comfort level with providing same-day consent. Factors such as the experience of the individual obtaining consent or the type of research project (high- or moderate-risk study, industry- *vs.* investigator-initiated trial) may significantly impact responses. Second, in contrast to the survey by Brull *et al.*,[2] a high percentage of females were studied (one of the trials enrolled only gynecologic surgery patients). Previous research has demonstrated that females are less likely to consent for research[4,5,20] and may have more preoperative anxiety.[21] Third, an observational, cohort study design was used; randomization into a no telephone call group and preadmission call group was not permitted by our IRB.

In addition, our study did not use a control group, which could have consisted of subjects who provided consent in the days before surgery. The appropriateness of same-day consent compared to consent obtained in the days before surgery was not determined in the current investigation. In the only anesthesia study directly assessing this issue, the authors concluded that approaching patients to obtain consent on the day of surgery did not compromise the essential elements of the consent process when compared to those consenting before the day of surgery.[6] Furthermore, given the small number of negative responses reported in the current study, it is unlikely a significant difference would have been observed between such a control group and our two study cohorts. Fourth, the survey tool developed by Brull *et al.*[2,3] has not been formally validated. Finally, data were not collected for patients who did not consent for research participation or for subjects who did not return the surveys. This is a potential source of bias since the responses may have differed in those not consenting or not returning surveys. However, in a small pilot study, we observed that those subjects not agreeing to participate in research were unlikely to return surveys.

Sensitivity analysis revealed that the 35% nonresponse rate could pose a threat to the interpretation of the results of the study only under extreme conditions. For example, if 30% of the nonresponders had a negative response to overall satisfaction with the consent process, then the negative response rate for each group will exceed the threshold of 10%, which was deemed to represent clinically significant subject dissatisfaction with the same-day consent process. Given that only 1 of the 129 subjects (less than 1%) completing the questionnaire had a negative response to overall satisfaction with the consent process, this seems unlikely.

In conclusion, subjects participating in low-risk anesthesia research projects are comfortable providing consent on the day of surgery. Respondents reported that the protocols were comprehended and that consent in the immediate preoperative setting was appropriate. Subjects did not perceive that they were obligated to enroll, and overall satisfaction was high. IRBs should not be reluctant to allow anesthesiologists to obtain consent for low-risk projects on the day of surgery due to concerns that consenting subjects might feel that their ability to make informed, autonomous decisions had been compromised.

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Competing Interests

Dr. Murphy has served as an Advisory Board member and speaker for Merck (Kenilworth, New Jersey) and as a speaker for CASMED (Branford, Connecticut). Dr. Greenberg has served as a speaker for CASMED. The other authors declare no competing interests.

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ANESTHESIOLOGY REFLECTIONS FROM THE WOOD LIBRARY-MUSEUM

A Real Headache for an Anesthesia Machine Maker: "AN-A-CIN" by Heidbrink

A master purveyor of dental supplies and anesthesia machinery, Dr. Jay A. Heidbrink (1875–1957; dentist-anesthetist and manufacturer, Minneapolis, Minnesota) was perhaps the most successful American businessman and dentist-anesthetist of all time. Among his more unusual acquisitions were the rights to "Anacin" and to the trademark "AN-A-CIN" (*top left*) for a "NO NARCOTICS" (*bottom left*) analgesic compounding of acetaphenetidin (phenacetin), aspirin, quinine sulfate, and caffeine. Dentist Heidbrink advertised An-a-cin for toothaches, of course, as well as for "headache, …, earache, neuritis, neuralgia, colds, la grippe, influenza, rheumatism, tooth extraction and periodical pains …" (*top right*). After a mild reprimand by the American Medical Association (1925) for hyperbolic advertising, Heidbrink assigned the An-a-cin trademark successively to the Anacin Chemical Company (1926) and the Anacin Company (1927). Note that the depicted tin (*bottom right*) proves that even though technically manufactured by the "ANACIN CO.," An-a-cin was still being distributed by the "HEIDBRINK CO." Dr. Heidbrink and his namesake company would eventually forsake "Oh, my headache" tins in favor of a merger with the "Ohio" line of anesthesia machinery. (Copyright © the American Society of Anesthesiologists, Inc.)

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