Public Perceptions and Informational Needs Regarding Surgical Residents

William T. Quach, MD, [*,†] Cassandra Hennessy, MS, [‡] Christopher J. Lindsell, PhD, [‡] and Alexander Langerman, MD, SM [†,§]

[*]Vanderbilt University School of Medicine, Nashville, Tennessee; [†]Surgical Ethics Program, VUMC Center for Biomedical Ethics and Society, Nashville, Tennessee; [‡]Department of Biostatistics, Vanderbilt University Medical Center, Nashville, Tennessee; and [§]Vanderbilt University Medical Center, Department of Otolaryngology – Head and Neck Surgery, Nashville, Tennessee

OBJECTIVE: Identify what topics are of most interest to patients regarding surgical residents.

DESIGN: Survey of general public describing a hypothetical surgery and then assessing comfort level with resident involvement in surgery, reactions to disclosure statements regarding resident involvement, and desires for additional information. This data was used to produce an amended statement about surgical residents and their involvement in a hypothetical surgery to determine the impact of increased information on participant comfort.

SETTING: : Online survey via Mechanical Turk.

PARTICIPANTS: Our sample was broadly representative of the United States based on race and age, but with higher education level than United States census data.

RESULTS: Using a combination of hierarchical clustering, weighted averages, and VAS scoring, questions that were most highly valued by participants were related to what the resident will be doing in the operation and the impact of resident involvement. Participants who had a past negative experience with residents assigned higher importance to all questions, even those that may be seen as not clinically relevant. Increasing the amount of proactively provided information did not have a significant effect on comfort ($p = 0.219$) when compared to our baseline statement, except with those who reported past negative experience with residents ($p = 0.039$).

CONCLUSIONS: These results demonstrate that the majority of potential patients want to know specific details about the residents' skills, what they will be doing in their surgery, and the impact of their participation. Surgeons should be attuned to patients with past negative experiences, who may desire more information. Additional information alone may not be sufficient to comfort some patients, and future research should consider information delivery styles and interpersonal effects on patient comfort level. (J Surg Ed 81:37–47. © 2023 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: resident education, surgery, ethics, patient care, informed consent, trainee involvement

COMPETENCIES: Professionalism, Interpersonal and Communication Skills, Systems-Based Practice

INTRODUCTION

Residents are an integral part of the surgical team at academic medical centers, and necessarily take on greater responsibility for performing operations as they advance through training.[1] However, despite residents' substantial involvement in surgical procedures, evidence suggests that patients may be unaware of the extent of resident involvement, and express reluctance with having residents perform portions of their procedures when presented with realistic scenarios of resident involvement.[2]

This understandable patient hesitancy has potential negative effects: surgeons might limit resident involvement or independence; or, alternatively, might obfuscate the extent of resident involvement. The former contributes to decreased trainee autonomy and inadequate preparation for independent practice.[3,4] The latter

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Correspondence: Inquiries to Alexander Langerman, MD, SM, FACS, Vanderbilt University Medical Center, 1215 21st Avenue South, Medical Center East, South Tower, Suite 7209, Nashville, TN 37215; fax: 615-936-2887; e-mail: Alexander.langerman@vumc.org

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reflects a failure of transparency in the consent process. Surgical program directors have flagged both of these scenarios as occurring in surgical training programs and indicated that resident education is frequently prioritized over transparency.[5,6]

Out of respect for patient autonomy, recognition of their contribution to medical education, and acknowledgment of their right to seek nonteaching care, patients must be informed of resident involvement in their care. The consent form, while meaningful, is not enough — not only because the boilerplate disclosure may not be read or understood by the patient, but also because it lacks the specificity to a given patient's care and the potential for reassurance when explaining resident involvement. Indeed, truthfulness and reassurance are appropriate goals for designing a discussion between a surgeon and their patient.

From previous research, we know that most patients want detailed information about trainee participation in their surgery and want it from their surgeon.[7] This notion has led to the creation of informational resources for patients to learn about the role of residents that cover a variety of topics related to resident involvement.[8,9] However, what has been absent to date is an investigation into which *specific* topics regarding resident involvement are most important to patients. The purpose of this study is to build upon our prior research to assess the relative importance of particular topics, exploring patient preferences for information to identify what is *most* important to patients about the involvement of residents in their procedures.

METHODS

To develop the foundation of this research protocol, we re-analyzed qualitative transcripts from previously published studies from our research group involving interviews with patients[10,11] and attending surgeons to identify thematic elements of discussions regarding resident involvement. Briefly, we accumulated quotes that were given by participants to answer questions related to resident involvement in surgeries, as well as what they believe patients should know about resident involvement.

These quotes were categorized by 2 authors (W.Q., A. L.) into distinct thematic domains representing what patients reported they wanted to know about residents and/or surgeons reported they told patients about residents. From this, we identified 22 domains. We then conducted a search on PubMed to identify additional studies examining patient informational needs regarding residents; this search yielded 7 additional resources,[8,9,12-17] that reiterated 15 of the 22 domains that were identified from our previous interviews (Table 1).

We used the 7 most common domains mentioned by patients (italics in Table 1) to generate a quote from an attending surgeon that would be used for testing in a hypothetical surgical scenario:

> *Baseline Surgeon Statement:* "This is a teaching hospital, as such, there will be a resident, who is another doctor, in there with me who will be assisting me and learning how to perform surgery. That resident will be doing a portion of the surgery and I will be there talking them through the process if they need help. No matter who is doing what part of the surgery I will be in charge of the whole process."

Recognizing that this statement covers only 7 of the 22 informational topics we identified, we converted the remaining domains into follow-up questions that patients might ask regarding residents and their involvement in operations, using patients' own words from our prior qualitative interviews when possible. We also generated 4 "distractor" questions which should be irrelevant to quality of care (resident age, gender, religion, and medical school); while biases may lead some patients to associate such factors with quality of care, we included these to more generally serve as a litmus test of information hunger by patients.[19-23] Based on pilot cognitive debriefing on these questions with 17 patients in our preoperative anesthesia assessment clinic and, based on this, refined these questions to the format shown in Table 2. The type of surgery domain was excluded as patients were given the type of surgery in the setup for the survey; the logistical domain was also excluded as patients in the pilot cognitive debriefing sessions felt it was too similar the continuity of care domain, leaving 13 questions based on the identified domains, as well as 4 distractor questions.

Surveys

Using the information generated above, a 38-question survey was developed to assess demographics, baseline knowledge of surgical residents, and what questions were most important to participants (see Supplement). Surveys were administered on Amazon Mechanical Turk (MTurk, Amazon Corp, Seattle, WA) from August 2021 to January 2022.

After basic demographic questions, participants were asked for their general comfort with residents assisting in surgeries. They were then given a simulated scenario where they were being consented by the attending for a hypothetical elective thyroidectomy. Participants were given a general definition of "resident," "attending," and "teaching hospital" before being given the baseline

TABLE 1. Categories and Domains of Information Regarding Resident Involvement in a Patient's Surgical Procedure That Patients and/or Attending Surgeons Identified as Important to Convey to Patients as Part of Informed Consent

Information Domains Regarding Surgical Resident Involvement		
Resident	**Attending**	**Hospital**
Resident Doing (resident will actively be operating)	*Attending Presence (the attending will be in the operating room along with the resident)*	*Teaching Hospital (this hospital is known for training residents)*
Resident Learning (residents need to learn how to operate to become independent)	*Responsibility (Attending is always responsible for the outcome)*	Reputation (how well known is the hospital for providing good care)
Resident Presence (there will be a resident in the operation)	Opinion (attending surgeon's opinion of the abilities of the resident)	Requirement (hospital policy regarding resident involvement in surgery)
Doctor (statement that a resident is a doctor)	Oversight (amount of oversight the attending will have over the resident)	
General Experience (how long they have been performing surgery)	Routineness (how often the surgeon works the residents)	
Specific Involvement (what the resident will be doing in surgery)	What Type of Surgery (Elective vs emergent vs cosmetic)	
Continuity of Care (Residents provide care to the patient beyond the surgery)		
Risks (effect of resident's involvement on likelihood of complication)		
Success (impact of resident's involvement on success of surgery)		
Teamwork (necessity of resident help to perform surgery)		
Specific Experience (number of times resident has trained for this surgery)		
Logistical (Residents allow the hospital to run smoothly)		
Skill (resident's operative ability)		

These domains are derived from re-review of primary data from our own prior qualitative studies[11,15,18] and from other published literature[8,9,12–14] Domains in italics represent those domains that were used to generate the baseline surgeon statement in this study.

surgeon statement (above) and asked how comfortable they would be with having a resident assist in ***their*** operation. Subsequently, participants were shown the 17 informational questions in Table 2 and asked to score each on a visual analogue scale (VAS) anchored at 0 (a question that they would not want answered) and 100 (a question that they must have answered). Finally, participants were asked to select the 5 questions most important to them and rank them from most to least important. To verify that the surveys were being filled out accurately, 2 "attention checks"[24] (e.g., asking participants to choose a specific value on the VAS scale and a specific answer on a multiple-choice question) were included in the survey.

Using information gathered from the first administration of this survey, we augmented the baseline statement in an attempt to preemptively answer the questions that were seen as the most important and relevant; the added text is underlined:

> *Amended Surgeon Statement:* "This is a teaching hospital, as such, there will be a resident, who is another doctor, in there with me who will be assisting me and learning how to perform surgery. That resident will be doing a portion of the surgery and I will be there talking them through the process. This is an experienced resident who has assisted me many times, and their participation will not affect the success or the complication rate of your surgery. No matter who is doing what part of the surgery I will be in charge of the whole process."

To test whether this revised statement improves potential patients' comfort when compared to the original statement, we repeated the initial surveys, without the ranking exercise. Participants were randomized to receive either the baseline statement or the amended statement, and comfort with involvement of the resident was then assessed as before. Both of these new surveys were administered in parallel on MTurk in May 2022.

Recruitment and Participants

Surveys were distributed using Amazon Mechanical Turk, an online crowdsourcing marketplace where users are compensated for completing different tasks.[25]

TABLE 2. Questions Based on the 13 Information Domains Not Captured in the Baseline Surgeon Statement, Plus 4 Questions Generated as Distractors (*)

Domain	Question
General Experience	How long has the resident been performing surgery?
Specific Involvement	Who would be performing the majority of the operation?
Specific Experience	How many times has this resident assisted with this specific surgery?
Risks	How will the resident's involvement affect the likelihood of a complication with my surgery?
Success	How will the resident's involvement affect the success of my surgery?
Teamwork	Is the resident necessary for this surgery?
Continuity of Care	Will the resident also be involved in my care after my surgery?
Opinion	What is the attending's opinion of the resident's surgical abilities?
Routineness	How often is the attending working with residents?
Oversight	How often has this attending worked with this specific resident?
Reputation	What is the reputation of this hospital for training residents?
Requirement	What is the policy of this teaching hospital to have residents involved in surgery?
Skill	What was the resident's score on a surgical skills test?
Distractor	*How old is the resident?
Distractor	*Where did the resident go to medical school?
Distractor	*What is the resident's gender?
Distractor	*What is the resident's religion?

Eligible participants were US residents aged 18 years or older who reported having personally used the healthcare system in the last 2 years, and who reported they did not work in healthcare. Participants were compensated $0.50 for completing the survey if they accurately answered all the attention checks and submitted a correct survey code. All survey results were manually reviewed by key study personnel to verify complete and accurate answering of attention checks before approving payment and inclusion of the response in the analysis. Secondary data review also revealed duplicate surveys – where a Mechanical Turk worker with the same ID completed more than 1 survey – and the chronologically second survey was removed prior to final analysis of the data.

Power Analysis

To determine how many participants would be necessary a power analysis was performed and for the confidence interval of a proportion of 0.5, the reduction in the 95% CI width starts to be less with additional participants above about n = 100. We aimed for at least 400 usable responses as that is where we believed there would be little additional information gleaned from increased sampling.

Statistical Analysis

Participants are characterized using descriptive statistics; categorical variables are presented as counts (%) and continuous variables as medians (interquartile range [IQR]) and means (standard deviation). To ascertain relative importance of study questions, a ranking process was used; simple comparison of the VAS among questions does not reflect individual participant's utilities. To summarize ranking information, a weighted average was calculated for each question. Briefly, the proportion of times the questions was selected as being in the top 5 was multiplied by the inverse of the average ranking of the question within the top 5. A question could receive a score of 5 if 100% of participants selected it as being among the top 5, and all participants ranked it as the most important. A question would receive a score of zero if 0% of participants selected it. The weighted average was then used to order the importance of questions to participants and to adjust the information given to the participants.

Using data from the second survey, a proportional odds model was used to determine if there was a different effect of the baseline and the amended statement on the comfort level of having a resident assist in surgery. The primary outcome was comfort level of having a resident in surgery measured after being presented the statement. The measure is a 6-level ordinal outcome with 1 being "very comfortable" and 6 being "I would never consent to having a resident in the surgery". The baseline comfort level, that is, comfort level prior to seeing the statement, was included in the model as an covariate. Whether the effects of the 2 statements differed based on past experiences with residents (a negative experience or not), past experiences with healthcare (a negative experience or not), and baseline comfort level (uncomfortable or comfortable) were assessed by testing the interaction between survey and grouping variable in the proportional odds model; *a priori* it was determined that a p-value of 0.2 would suggest some possibility of differential effect.

For exploratory analysis, Mann Whitney U tests were used to ascertain whether individual questions had different importance for patients who have had a negative experience with the healthcare system compared to those who have not, and subjects who have had a negative experience with residents compared to those who

did not. Similarly, the importance of individual questions was compared between participants whose comfort level was influenced by presentation of the statement and those for whom the statement did not influence comfort level.

All analyses were conducted using R version 4.0.2, including the rms extension package.

RESULTS

First Survey

The first survey was completed by 673 MTurk users. Of these, 117 were rejected for being incomplete, duplicate, failing an attention check, or having the incorrect survey code. There were 466 usable surveys. Of the 466 respondents, 43.1% were female, 84.3% white, 23% were Hispanic, and 85.2% held a bachelor's degree or higher (Table 1). The mean age was 36.5 years old. The study population was broadly similar to the US adult population in terms of age and race, but had achieved a higher level of education level based on US Census data.[26] Two hundred and fifty (53.6%) respondents had a negative experience with the healthcare system, 285 (61.2%) had been previously cared for by residents with a 149 of those participants (52.3%) having had a negative experience with residents. After the scenario presentation and representative statement, 69.7% were comfortable with residents participating in their operation while 24.5% of respondents showed a decrease in comfort from before to after the statement.

Figure 1 shows the importance of individual questions, and Figure 3 presents the weighted ranking of questions. Hierarchical clustering was used on the 17 questions using squared Spearman correlations (Fig. 2).

Using a weighted analysis (Fig. 3) combined with hierarchical clustering (Fig. 2) we identified a cluster of 5

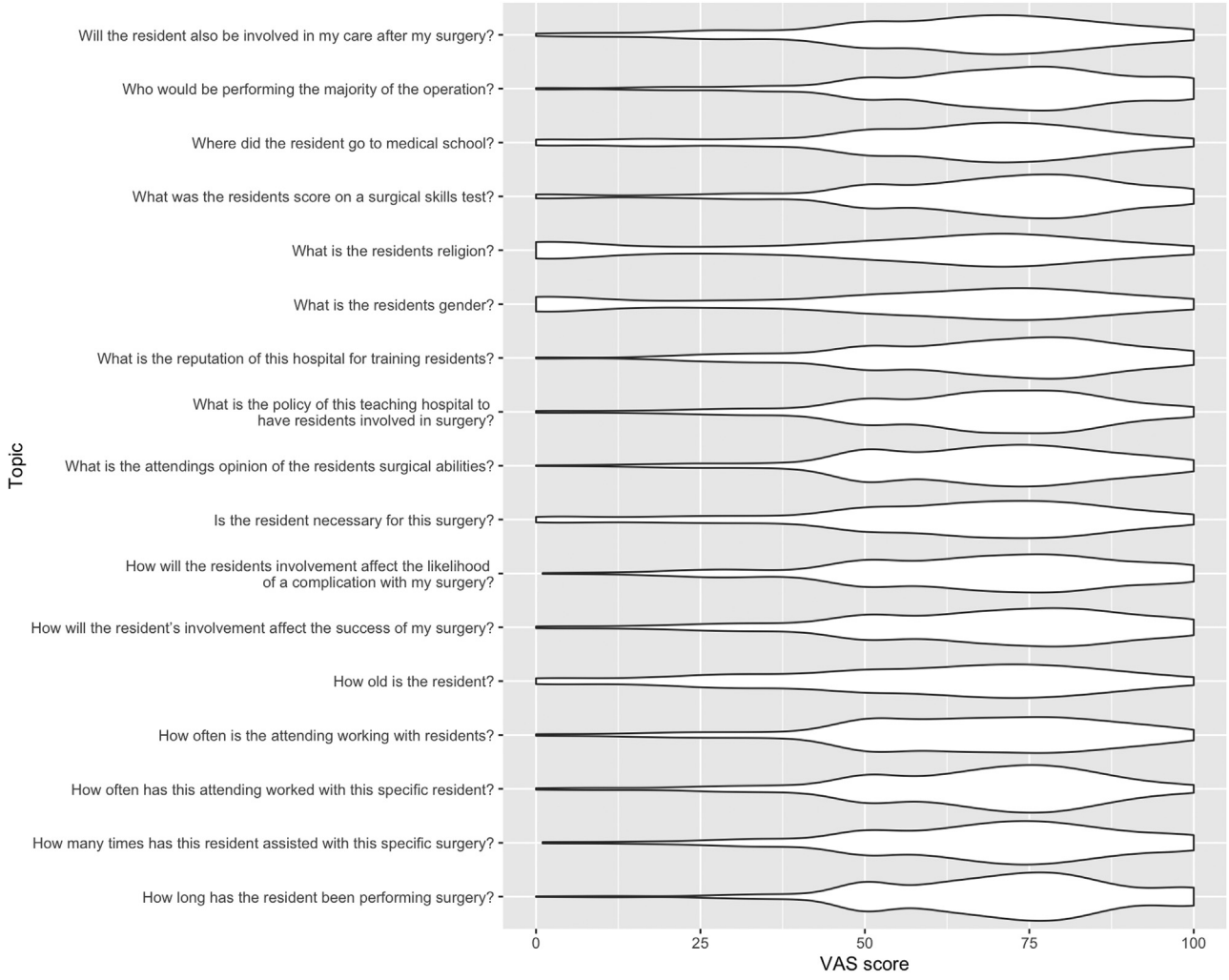

FIGURE 1. VAS scores of each topic represented in a violin plot to better demonstrate densities of values.

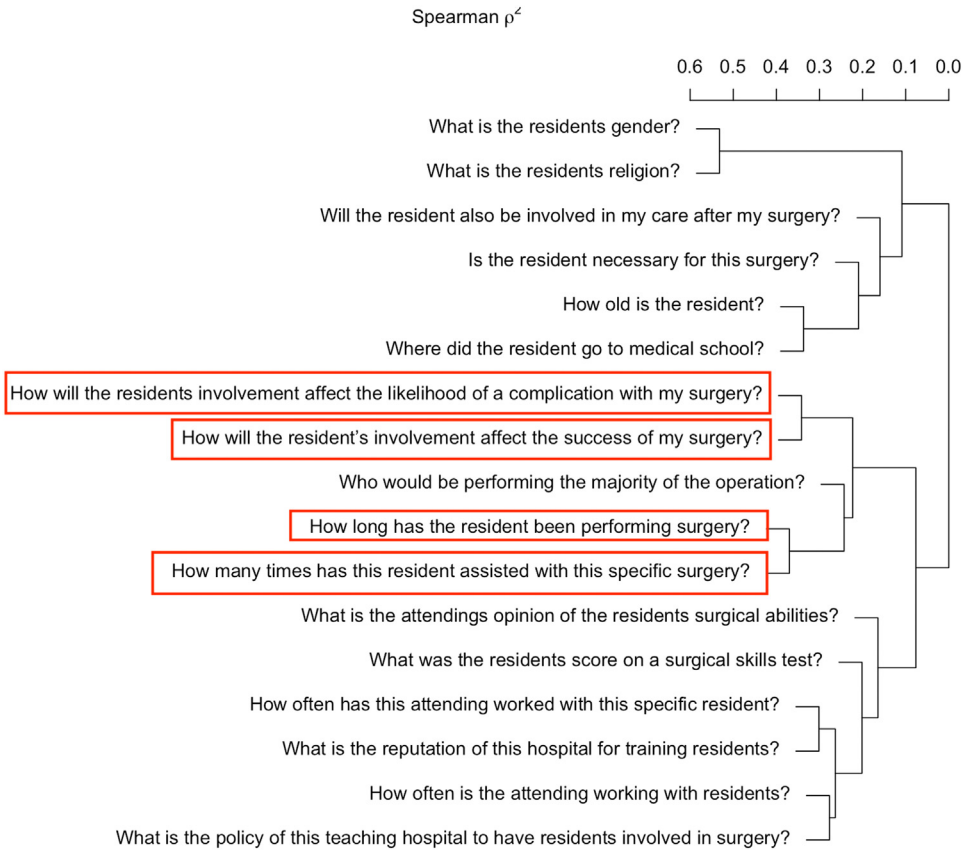

FIGURE 2. Hierarchical clustering of the questions based on responses on the primary survey. This dendrogram figure allows comparisons of survey items based on similarity of responses (i.e., what questions do participants tend to give the same ratings). This visual output from hierarchical cluster analysis via Spearman correlation was used to assess collinearity, redundancy, and to group variables for possible inclusion in the second survey. The items in the boxes were selected for the second survey.

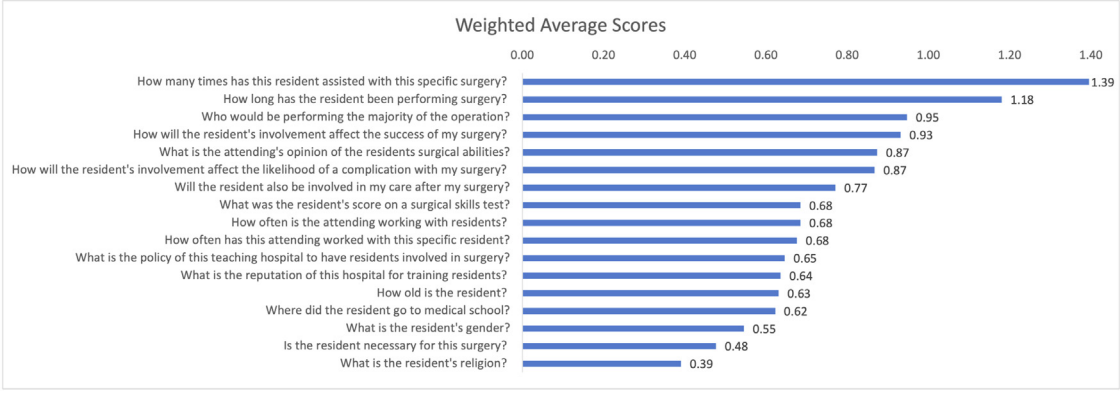

FIGURE 3. Weighted averages of the 17 questions in the initial survey.

highly important questions: "how many times has this resident assisted with this specific surgery"; "how long has the resident been performing surgery"; "how will the resident's involvement affect the success of my surgery"; "how will the residents involvement affect the likelihood of a complication with my surgery"; and, "who would be performing the majority of the operation." We then generated an amended statement (above) to cover 4 of these 5 domains; we excluded "who will be performing the majority of the surgery" because this answer would be dependent on the specifics of a given case and may change based on context.

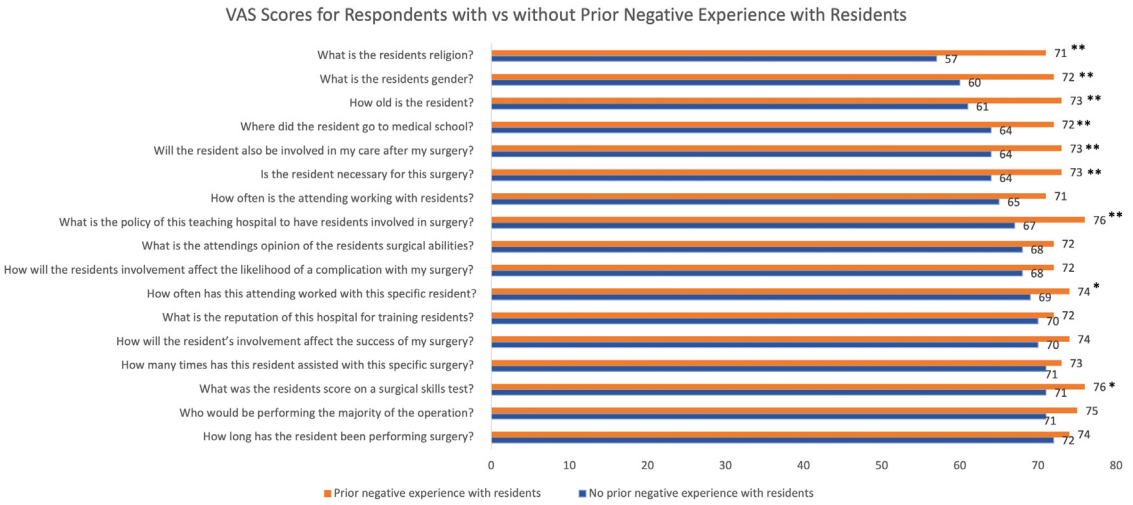

FIGURE 4. Table comparing VAS scores for the participants who did not have a negative experience with residents and those who did have a negative experience with residents. * denotes p-value< 0.05 and ** denotes p-value of <0.001.

Regarding resident experience, however, we did include an affirmative statement of experience as we were testing patient comfort with a scenario where the resident would be actually "doing" parts of an operation and based on our surgeon qualitative interviews[15] this should only occur when residents have appropriate experience for such tasks. Further, we wanted this statement to be read as strongly endorsing the resident to capture any potential beneficial effect of adding this information on patient comfort.

Upon subgroup analysis, the only meaningful differences were observed between those that had a negative experience with residents compared to those who have not. Patients with prior negative experiences with residents had significantly higher VAS scores than those who did not have prior negative experience, including for the distractor questions (age, gender, race) (Fig. 4). However, the ranking of importance of questions was largely similar between patients who had and had not had negative experiences with residents.

Second Survey

Participants in the second survey were generally similar to those in the first survey (Table 3). The survey with the baseline statement received 242 usable responses and the survey with the amended statement received 245 usable responses. Of the total responses across both secondary surveys, 19 participants responded to the first survey.

There was not statistical evidence that the revised statement resulted in greater comfort than the original statement (OR: 1.24, 95% CI: 0.88-1.75, p = 0.219), suggesting that adding more information did not have a significant impact on comfort for the entire cohort. The interaction between subgrouping variable and which statement was presented suggested no difference in effect of the change in the statement between those who have and have not had a negative experience with the healthcare system (p = 0.848), or those who had discomfort with residents helping in surgery and those that did not (p = 0.647). There was evidence, however, of a differential effect between those who have had a negative experience with the residents and those who have not. Among participants who have had a negative experience with residents, the survey with the amended statement suggested increased comfort when compared to the survey with the baseline statement (OR = 1.82 [95% CI: 1.03-3.23], p = 0.039).

DISCUSSION

Informed consent is a cornerstone of medicine. During the initial consultation before a surgery, patients are often provided a large amount of information about their disease and proposed procedure (e.g., complications, risks, benefits, and other options). Informed consent concerning the participation of residents in their operation might therefore be limited to a short disclosure within the informed consent document or briefly mentioned by the attending physician. Providing the "right" amount of information to patients on any topic is a challenge – too much can be burdensome or upsetting, too little may miss the purpose of informed consent. With mounting evidence that the topic of resident involvement is both important to patients[7,11] and not automatically understood without explicit discussion[9,18] there

TABLE 3. Demographic Information of Participants

	Level	First Survey	Second Survey Baseline Statement	Amended Statement
N		466	242	245
Age (mean [SD])		36.54 (11.26)	36.10 (9.69)	46.28 (124.24)
Age (median [IQR])		33.00 (28.00-41.00)	33.00 (30.00-42.00)	35.00 (29.00,46.00)
Gender (%)	Male	263 (56.4)	145 (59.9)	140 (57.1)
	Female	201 (43.1)	97 (40.1)	105 (42.9)
	Nonbinary	2 (0.4)	0 (0.0)	0 (0.0)
Race (%)	White	393 (84.3)	221 (91.3)	225 (91.8)
	Black or African American	52 (11.2)	15 (6.2)	12 (4.9)
	Asian	17 (3.6)	3 (1.2)	5 (2.0)
	Native Hawaiian or other Pacific Islander	0 (0.0)	1 (0.4)	0 (0.0)
	American Indian or Alaskan Native	2 (0.4)	1 (0.4)	0 (0.0)
	More than one race	0 (0.0)	0 (0.0)	1 (0.4)
	Prefer not to answer	2 (0.4)	1 (0.4)	2 (0.8)
Ethnicity (%)	Hispanic/Latino	107 (23.0)	51 (21.1)	55 (22.4)
	Not Hispanic/Latino	347 (74.5)	187 (77.3)	182 (74.3)
	Prefer not to answer	12 (2.6)	4 (1.7)	8 (3.3)
Education level (%)	8th grade	1 (0.2)	0 (0.0)	0 (0.0)
	Some high school	6(1.3)	0 (0.0)	0 (0.0)
	High school graduate	26 (5.6)	9 (3.7)	11 (4.5)
	Some college credit	13 (2.8)	4 (1.7)	11 (4.5)
	Trade/technical/vocational training	2 (0.4)	1 (0.4)	2 (0.8)
	Associate degree	21 (4.5)	3 (1.2)	7 (2.9)
	Bachelor's degree	303 (65.0)	168 (69.4)	166 (67.8)
	Master's degree	90 (19.3)	54 (22.3)	47 (19.2)
	Professional or doctorate degree	4(0.9)	2 (0.8)	1 (0.4)
	Prefer not to answer	0 (0.0)	1 (0.4)	0 (0.0)
Insurance (%)	None	22 (4.7)	16 (6.6)	12 (4.9)
	Medicare/Medicaid	256 (54.9)	141 (58.3)	153 (62.4)
	Private (through my employer)	152 (32.6)	68 (28.1)	63 (25.7)
	Private (purchased individually)	34(7.3)	17 (7.0)	17 (6.9)
	Other	2 (0.4)	0 (0.0)	0 (0.0)
Negative Experience with the healthcare system (%)		250 (53.6)	134 (55.4)	140 (57.1)
Experience with residents (%)		285 (61.2)	162 (66.9)	151 (61.6)
Negative Experience with residents (%)		149 (52.3)	97(60.0)	93(61.5%)

comes a need for strategies to optimally discuss resident involvement.

Our data suggest approximately one quarter of participants showed a decrease in comfort with the idea of a resident participating in the participant's own hypothetic surgery once given an objective description of what a resident does. While a decline in comfort is consistent with prior research testing patient reactions to realistic scenarios of the resident's role,[7] a large percentage (75.6%) of respondents remained comfortable or became more comfortable with the explanatory statement we derived from surgeon and patient input.

In an attempt to augment this salutary effect of this transparent explanation, we used a combination of the hierarchical clustering, VAS score, and weighted averages, to identify additional major topics that participants wanted to know about residents; these were the abilities of the resident and outcome/risk impact of

their involvement in the operation. While adding this information has face validity and support from recent studies of the effect of resident participation on surgical outcomes,[3,27-30] we were surprised to find that even a highly reassuring version of this information ("This is an experienced resident who has assisted me many times, and their participation will not affect the success or the complication rate of your surgery") had little effect on comfort levels – more information was not better in this scenario.

The only exception was for a subgroup of patients who reported prior negative experiences with residents; for this group, the additional information in the surgeon statement had a slight effect on increasing comfort in the secondary survey. Increased comfort with more information in this group also follows from the increased emphasis this group placed on many topics in the first survey, including topics that we would not associate with effectiveness of clinical care, such as the residents age, religion, and gender. This "subgroup" was quite large - over half of our participants reported having a negative experience with the healthcare system and, of those with prior experience with residents, over half reported a negative experience with residents. The commonality of negative experiences is consistent with our prior research[31] and other recent studies of patient perceptions[32,33] and suggests this subgroup is worthy of additional attention in future investigations. In the meantime, enquiring about past negative experiences and addressing biases may be beneficial when interacting with patients who express discomfort with resident involvement.

Even with a relatively reassuring amended statement, there still remained a meaningful minority (10%) of participants who were uncomfortable with residents. There are many potential unmeasured factors that may be influencing this discomfort, including general distrust of the medical system and/or a misunderstanding of the information provided. Further the artifice of our online hypothetical scenario leaves out other aspects of face-to-face surgeon-patient conversations that drive trust. While rare, when asked how comfortable they would be with residents in their operation, there was a small group (<1%) who responded that they would "never consent to having a resident in their surgery", suggesting that some patients may be so resolute against residents that they self-select away from teaching institutions. However, for others the interpersonal trust from a strong surgeon-patient relationship may successfully cross the comfort divide. More work is needed to examine information delivery styles and the effect of interpersonal factors on patient trust.

Our results demonstrate that potential patients want to know specific details about the residents' involvement in surgery and are generally comfortable with transparent information, in contrast to a common perception that transparency will disrupt patient consent. Our sample surgeon statements were well-received by most in our survey population, address many key informational needs of patients, and might serve as a good, brief starting point for disclosure. It appears further that patients who have had past negative experiences with residents have an increased interest in information about residents. While our results suggest proactive information can only go so far in engendering patient comfort, preemptively discussing this topic may serve as an open door for patients to ask questions and seek reassurance on topics most important to them. Future research should focus on optimizing surgeon-patient communication regarding residents, via focused stakeholder interviews and engagement with patient advocacy groups to determine how the information found in this study can be applied in the practice setting.

ETHICS STATEMENTS

This project was reviewed by the Vanderbilt University IRB and was deemed exempt under 45 CFR 46.104 (d) category (2).

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SUPPLEMENTARY INFORMATION

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jsurg.2023.09.007.