



Education

A comparison of patient satisfaction when office-based procedures are performed by general surgery residents versus an attending surgeon



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ABSTRACT

Background: Patient satisfaction is an increasingly important quality metric nationwide. The impact that surgical trainees have on patient-reported satisfaction when they perform operations independently, however, has not been studied.

Methods: We conducted a prospective study at a single academic institution from October 2016 to June 2017. An office-based, postprocedure survey was developed by adapting questions from the validated Consumer Assessment of Healthcare Providers and Systems Surgical Care Survey. Top-box scoring was used to determine satisfaction for categorical questions and a comparison of the means was used for overall quality ratings (scale 0–10). Patients indicated whether their operation was completed by an attending surgeon or a postgraduate year 3 general surgery resident. The primary outcome measured was patient satisfaction with overall quality of care. Individual questions were grouped by phase of care and composite scores were measured as a secondary outcome.

Results: The survey response rate was 87.4% ($n = 195$). There were no differences in patient demographics or the types of procedures performed by residents or an attending surgeon. Excision of a soft tissue mass (ie, lipoma) accounted for 89.2% of all procedures performed ($n = 174$). There were no differences between preprocedure (resident = 92.5% vs attending = 94.2%) or postprocedure (resident = 95.3% vs attending = 97.7%) composite scores. There was, however, a significant difference in peri-procedure satisfaction (resident = 78.7% vs attending = 90.7%, $P = .02$). There was no difference in overall ratings of quality of care given by patients who had their procedure performed by residents (9.8 ± 0.5) versus an attending surgeon (9.9 ± 0.3 , $P = .15$). Finally, on adjusted analysis, resident care did not independently impact the likelihood of a “best possible care” rating for overall quality of care (odds ratio 0.84 ± 0.27 , confidence interval 0.45–1.57, $P = .58$).

Conclusion: Patient satisfaction was very high when residents independently performed minor surgery operations in an office-based setting. Of note, there was no difference in satisfaction with overall quality of care compared with an attending surgeon. This study demonstrates that high resident operative autonomy and patient satisfaction are not mutually exclusive goals when postgraduate year 3 residents perform office-based outpatient procedures.

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Introduction

Patient satisfaction is an increasingly important hospital metric nationwide. Although this aspect of medicine has long been valued

by physicians, the emphasis increased after the landmark 2001 report, *Crossing the Quality Chasm*,¹ in which the Institute of Medicine named patient-centered care as one of the fundamental aims of the US health care system. Indeed, hospital reimbursement is now tied to patient ratings of their experience of care.^{1,2} The desire to financially reward high patient satisfaction is motivated by studies demonstrating that patient satisfaction is associated with markers of high-quality clinical care, decreased risk of readmission, and better clinical outcomes.^{3–6} Given the financial incentive, an important consideration for training programs is how the involvement of residents impacts patient satisfaction.

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Although multiple studies have demonstrated that resident physicians can provide high-quality care associated with high patient satisfaction, this relationship is less understood in the field of surgery.^{7–14} In contrast to noninterventional specialties, it is necessary that surgery trainees participate actively in invasive operations in addition to providing postoperative care. One study found that, although patients express a high level of satisfaction with the care they receive from surgical house staff, 32% of the patients surveyed would not want them to participate in their operation.⁷ Knowledge of this patient preference and fear of decreasing satisfaction outcomes may in part explain the increasing concern that surgery residents receive less operative autonomy and are inadequately prepared to operate at graduation.^{15–20}

Whether knowledge of resident participation in a surgical procedure actually impacts patient satisfaction is unknown. Our earlier work has described our department's resident-run minor surgery clinic in which residents perform procedures independently on patients who are under local anesthesia, with a complication rate equivalent to that of an attending surgeon.²¹ In this study, we sought to determine patient satisfaction when the minor surgical procedures are performed by either a postgraduate year 3 (PGY-3) general surgery resident or an attending general surgeon. We hypothesized that there would be no difference in patient ratings of overall quality of care when they were fully aware of which provider performed the procedure.

Methods

Study design and outcomes

English-speaking and Spanish-speaking patients who had a procedure performed in the minor surgery clinic during the period from September 2016 to June 2017 were given a study fact sheet and postprocedure satisfaction survey at the completion of their visit ([Supplemental File](#)). Patients were all adults (>18 years), and the procedure was performed by either a PGY-3 general surgery resident or an attending surgeon. No incentives were given for survey completion. Survey completion was voluntary and did not include identifiable patient information. Patients self-identified if the procedure was performed by the attending surgeon or the resident, and the results were compared. The primary outcome measured was overall quality-of-care ratings. Secondary outcomes included phase-of-care composite satisfaction scores (as discussed later in this report). This study was approved by the Partners Institutional Review Board (2015P001836).

Structure of the minor surgery clinic

We have described our resident-run minor surgery clinic in detail elsewhere.²¹ Briefly, an office-based minor surgery clinic is held one day each week in which patients are seen by either a PGY-3 general surgery resident or a single attending general surgeon. The clinic is filled completely, such that both the resident and the attending surgeon each have a full patient schedule and run their own procedure rooms. Whether a patient was seen initially by the resident or the attending surgeon is random, with the goal of equal patient loads. Residents completed an online minor procedures curriculum and clinic orientation before they were able to operate on patients seen in the resident-run minor surgery clinic. Residents conducted a history and physical examination, reviewed labs/imaging, and performed a bedside ultrasonography if indicated. Their treatment plan was discussed with the attending surgeon who met the patient before any procedure was performed. If a procedure was indicated, it was performed during the same visit unless the patient deferred. Attending surgeons met with the

patients before the procedures, described the experience level of the residents, explained that they would view the wounds before closure, and offered patients the option of declining resident involvement. The purpose of this conversation was to ensure 100% transparency with patients that a physician currently in the process of training to become an independent surgeon would be completing the procedure.¹⁷ Patients provided verbal confirmation to the attending surgeon that they agreed to proceed with the resident before any procedure was begun. The resident was present for the conversation that the attending surgeon held with the patient.

Residents operated alone in their own procedure room and were responsible for all aspects of obtaining consent, techniques of field block local anesthesia, patient comfort, performing the operative procedure, discussing postoperative wound care, and reviewing concerning symptoms that should prompt a follow-up office visit. On completion of the appointment, the provider (attending surgeon or surgery resident) distributed the voluntary, anonymous, postprocedure satisfaction survey to the patient, who was asked to complete it and to deposit it in a locked box before leaving the clinic. Patients were not seen routinely in follow-up unless a complication arose; however, all patients were called via telephone to inquire about wound healing and to provide pathology reports. Residents were responsible for calling the patients whose procedures they performed and also for any follow-up visits for wound complications.

The attending surgeon was immediately available during the resident procedures and entered the room after being notified that the resident had reached the critical portion of the case. The critical portion was a priori determined to be inspection of the surgical site just before closure to ensure the attending surgeon's judgment concurred with resident's judgment regarding hemostasis and adequate excision or drainage. If the attending surgeon asked the resident to attain further hemostasis or excise additional tissue, the attending surgeon would complete a final check of the surgical check before closure.

Office-based postprocedure satisfaction survey

An office-based, postprocedure satisfaction survey was developed based on the Consumer Assessment Healthcare Providers and Systems Surgical Care Survey (S-CAHPS) and a fact sheet that was provided to each patient before consenting to the survey ([Supplemental File](#)). The S-CAHPS is published by the Agency for Healthcare Research and Quality to capture metrics of patient satisfaction.^{22,23} Items selected from the S-CHAPS included interaction with the provider, comfort during the procedure, overall quality-of-care ratings, and patient demographics. Questions were edited to reflect the fact that procedures were performed in an office-based setting. The survey was reviewed independently by two survey methodology experts to ensure appropriate wording. It was then piloted with actual patients before the start of the study to ensure clear instructions. The final survey was available in English and Spanish versions.

The office-based postprocedure satisfaction survey included 22 questions. Questions 1–4 provided data regarding the date of the visit, number of procedures performed, the type of procedure, and asked the patient to self-identify if the procedure was performed by the attending or resident surgeon. Questions 5–14 constituted the majority of the satisfaction survey and were grouped according to phase of care: preprocedure, periprocedure, and postprocedure. Individual questions for each phase of care are presented in [Table 1](#). Question 15 asked the patient to rate their overall quality of care, which was marked on a scale from 0 (worst care possible) to 10 (best care possible). Question 16 asked patients whether they would recommend the clinic to family and friends. Questions 17–21 collected demographic data, including age, patient sex,

Table I
Unadjusted comparison of satisfaction survey responses grouped by phase of care

Phase-of-care satisfaction questions*	Top-box respondents %		P value
	Attending patients (n = 87)	Resident patient (n = 108)	
Preprocedure satisfaction composite	94	93	.65
Did you see the surgeon within 15 minutes of your appointment? [†]	94	93	.63
Did this surgeon listen to you carefully?	100	100	
Did this surgeon show respect for what you had to say?	100	100	
Did this surgeon explain the surgery in a way that was easy to understand?	100	100	
Periprocedure satisfaction composite	91	79	.02
Was the procedure room comfortable?	99	89	<.01
Did this surgeon make you feel calm and relaxed during the procedure?	100	97	.12
Did you experience on average mild pain or less during the procedure? [‡]	92	89	.48
How satisfied were you with the amount of time it took to complete the procedure? [§]	100	98	.21
Postprocedure satisfaction composite	98	95	.39
Did this surgeon clearly explain discharge instructions for your recovery period?	99	96	.26
Did this surgeon answer all your questions in a way that was easy to understand?	100	100	
During your visit, did this surgeon spend enough time with you?	98	98	.98

* 3-point response scale with top-box “yes, definitely” equating to complete satisfaction unless otherwise noted.

[†] Dichotomous answer with top-box “yes” equating to complete satisfaction.

[‡] Item dichotomized into two groups of “Mild Pain or Less” (0–2) or “Greater than Mild Pain” (3–10).

[§] Four-point response scale with top-box “very satisfied” equating to complete satisfaction.

education level, and race. The final question allowed patients to write comments regarding their provider or experience.

Top-box scoring was used to determine patient satisfaction for questions 5–14. For each question, patients were only considered to have complete satisfaction if they chose the best possible response. These patients were considered “top-box respondents.” The majority of the survey items were answered on a 3-point (Yes, definitely / Yes, somewhat / No) or 4-point (Very satisfied / Somewhat satisfied / Somewhat dissatisfied / Very dissatisfied) scale. There were 2 exceptions. The preprocedure phase-of-care question regarding seeing the surgeon within 15 minutes of the scheduled time had 2 possible responses, yes or no, in which yes equated to top-box. Additionally, the periprocedure phase-of-care question regarding pain during the procedure asked patients to rate their pain on a scale from 0 to 10 (0 = no pain, 2 = mild pain, 5 = moderate pain, 8 = severe pain, 10 = worst pain possible). This question was dichotomized into mild pain or less (rating 0–2) or more than mild pain (3–10), with mild pain or less equating to top-box.

Composite scores were determined for each phase-of-care for questions 5–14. Patients who indicated the best-possible response for each of the individual questions from which the composite score was comprised were designated as top-box respondents for that phase of care composite score. For example, for the preprocedure phase-of-care composite score to be considered top-box for a particular patient, he or she had to indicate the top-box response for each of the 4 questions. If any of the questions for a particular phase of care were not answered top-box, the patient was not considered a top-box respondent for the composite score.

Finally, the mean rating of quality of care for each group was determined using the continuous scale listed in question 15. This

Table II
Unadjusted patient and procedure characteristics

Characteristic	Attending patients (n = 87) n (%)	Resident patients (n = 108) n (%)	P value
Age (years)			.19
34 or Less	16 (19)	24 (22)	
35–54	40 (47)	36 (34)	
55 or Greater	30 (35)	47 (44)	
Female	45 (52)	41 (38)	.19
Education level			.11
High school or less	19 (22)	12 (11)	
College	36 (42)	52 (49)	
Postgraduate degree	30 (35)	43 (40)	
Hispanic	13 (16)	8 (8)	.08
Race			.052
White	65 (77)	97 (91)	
Black	4 (5)	1 (1)	
Asian	8 (9)	4 (4)	
Other	8 (9)	5 (5)	
Primary procedure			.12
Lump excision	73 (84)	101 (94)	
Mole/skin spot excision	3 (4)	3 (3)	
Skin tag excision	4 (5)	2 (2)	
Abscess incision and drainage	7 (8)	2 (2)	
Multiple procedures	5 (6)	13 (12)	.13
2	3 (4)	10 (9)	
3	2 (2)	2 (2)	
4	0 (0)	1 (1)	

analysis was also performed using top-box scoring to help identify high performers. Responses were converted to categorical data by dichotomizing responses into highest quality of care (10) or less than highest quality of care (0–9), with only those rating care as a 10 equating to top-box.

Statistical analysis

An unadjusted comparison was made using χ^2 test for categorical data and Student's *t* test for continuous data (reported as mean \pm standard deviation). Multivariable analysis with highest quality-of-care rating (a rating of 10) as the dependent outcome was performed to adjust for a resident performing the procedure, age, sex, education level, procedure type, having multiple procedures performed, and periprocedure satisfaction. Statistical analysis was conducted using Intercooled Stata software, v 13.1 (StataCorp, College Station, TX). Statistical significance was accepted at the *P* value < .05 level. Graphs were generated using GraphPad Prism v 7.0 (GraphPad Software, San Diego, CA).

Results

Response rate

A total of 223 office-based, postprocedure, satisfaction surveys were administered to eligible patients during the period between September 2016 and June 2017. A total of 195 patients completed the survey, resulting in a response rate of 87.4% for this study. The response rate for English-speaking respondents (*n* = 187) was 88.6%, which was greater than the 66.7% for Spanish-speaking respondents (*n* = 8).

Patient characteristics

A comparison of patient characteristics as seen by the attending (*n* = 87) and residents (*n* = 108) is presented in Table II. A total of 3 patients (3%), requested to have their procedure performed by the attending surgeon. There were no differences in age, sex, education level, race, primary procedure type, or having multiple procedures performed. Excision of a soft tissue mass (ie, lipoma, pilar cyst, or

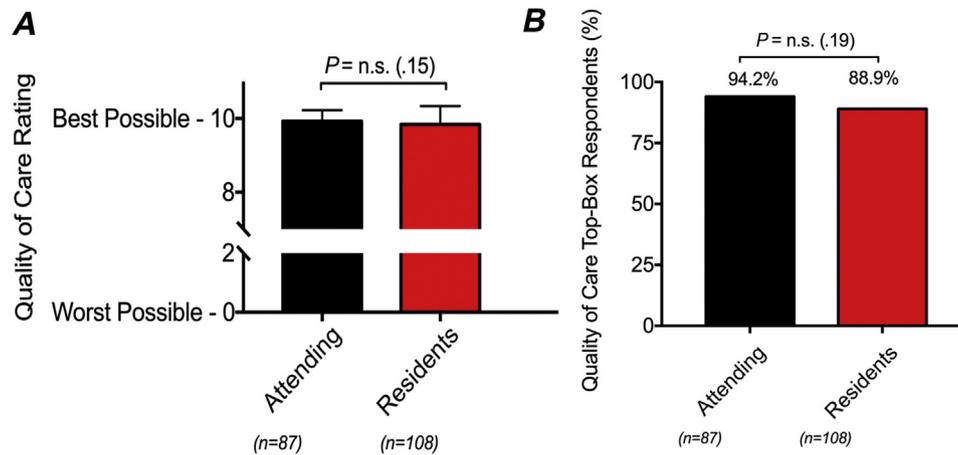


Fig 1. Unadjusted analysis comparing overall quality of care satisfaction rates as (A) a continuous variable and (B) using top-box scoring.

Table III
Adjusted analysis for overall quality-of-care top-box respondents

Variable	Odds ratio	95% CI	P value
Resident provider	0.84 ± 0.27	0.45–1.57	.58
Female patient	1.02 ± 0.59	0.33–3.15	.98
Age (years)			
18–34	0.30 ± 0.23	0.06–1.37	.12
35–54	0.47 ± 0.33	0.12–1.89	.29
55–74	Reference	Reference	
Patient education			
High school	0.65 ± 0.60	0.11–3.95	.64
College	Reference	Reference	
Postgraduate	0.36 ± 0.22	0.11–1.22	.10
Lump excision	2.02 ± 1.76	0.37–11.10	.42
Multiple procedures	0.71 ± 0.68	0.11–4.58	.98
Periprocedure satisfaction*	10.37 ± 7.29	2.62–41.15	.001

CI, confidence intervals.

* Periprocedure satisfaction composite score top-box respondent.

epidermal inclusion cyst) was the most commonly performed procedure in both clinics (attending $n = 73$ vs resident $n = 101$). Multiple procedures were performed for 8% ($n = 18$) of respondents.

Procedural phase-of-care composite scores

Unadjusted analyses of responses to the office-based, post-procedure, satisfaction survey grouped by phase of care are displayed in Table I. Preprocedure and postprocedure satisfaction was very high in both groups. The rate of preprocedure satisfaction composite top-box respondents was 94% for attending patients versus 93% for resident patients ($P =$ non-significant [NS]). Similarly, the rate of postprocedure satisfaction composite top-box respondents was 98% for attending patients compared with 95% for resident patients ($P =$ NS). There were no differences in the rate of top-box responses for individual preprocedure or postprocedure, phase-of-care survey questions.

The percent of top-box respondents for the periprocedure, composite scores, however, was 91% for the attendings' patients compared with only 79% for the residents' patients ($P = .02$). Within the periprocedure questions, the attending surgeon's patients indicated greater satisfaction with the comfort level of the procedure room (99% vs 89%, $P < .01$). There were, however, no other differences in individual responses to the periprocedure satisfaction question between groups. Specifically, a similar number of patients reported experiencing only mild pain or less during

the procedure (92% attendings' patients vs 89% residents' patients, $P =$ NS).

Predictors of satisfaction with quality of care

An unadjusted comparison of patient satisfaction with the overall quality of care they received by their provider is presented in Fig 1. Quality of care was rated by patients on a scale from 0 (worst possible care) to 10 (best possible care). There was no difference in mean quality-of-care ratings between patients who had their procedure performed by attending surgeons (9.9 ± 0.3) versus residents (9.8 ± 0.5 , $P = .15$; Fig 1, A). This finding was further corroborated by performing an unadjusted analysis using top-box scoring in which only a rating of 10 equating to a top-box score (Fig 1, B). There was no difference in the proportion of top-box respondents rating the overall quality of care they received from attendings (94.2%) versus residents (89.9%, $P =$ NS).

Results of an adjusted, multivariate analysis to determine predictors of patient satisfaction with the overall quality of care received is presented in Table III. This analysis corroborated unadjusted findings by showing that resident providers did not independently impact the rate of top-box respondents for quality of care (odds ratio 0.84 ± 0.27 , confidence interval [CI] 0.45–1.57, $P =$ NS). Periprocedure satisfaction was the only variable that independently impacted overall quality-of-care ratings (10.4 ± 7.3 , CI 2.62–41.14, $P = .001$). There was a trend toward decreased satisfaction with the youngest (odds ratio 0.3 ± 0.2 , CI 0.06–1.37, $P = .12$) and most highly educated (0.36 ± 0.22 , CI 0.11–1.22, $P = .1$) patient groups.

Patient quality-of-care ratings for individual residents

Results of an unadjusted analysis comparing patient ratings for overall quality of care for the attending surgeon and individual residents are presented in Fig 2. A total of 9 residents rotated through the minor surgery clinic and completed between 2–4 clinic days depending on the month. The average number of surveys completed for each resident was 12 ± 6 (range 6–24). A total of 2 residents had significantly lesser quality-of-care ratings than the attending surgeon (Fig 2, A).

This analysis was also performed using top-box scoring to help identify high performers for quality of care and periprocedural pain ratings (Fig 2, B). A total of 2 residents had lesser quality-of-care ratings than the attending surgeon, and 2 residents had lesser

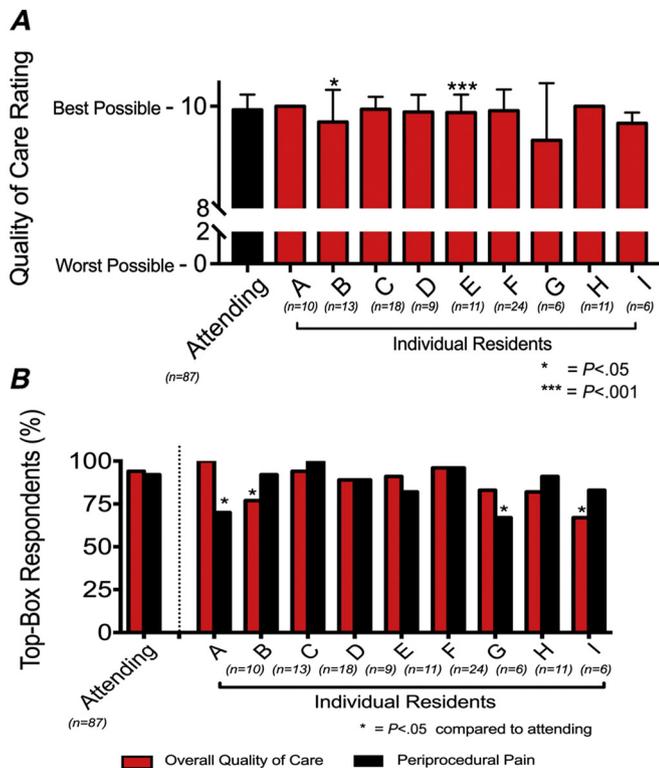


Fig 2. Bar graphs displaying quality-of-care ratings by individual resident compared with the attending surgeon treating quality of care (A) as a continuous variable and (B) as scored using the top-box method. Top-box scores of periprocedural pain ratings are also presented in B.

periprocedural pain ratings. Lesser periprocedural pain and overall quality-of-care satisfaction did not coincide for any resident.

Discussion

General surgery resident physicians are critical providers of health care in the United States in many regions and cities. Despite the increasing emphasis that has been placed on the patient experience, it is not clear how resident participation in an operation impacts patient satisfaction. In this study, we attempted to define this relationship within the context of an office-based minor surgery clinic in which only local anesthesia was utilized during the procedure. Patient satisfaction with the quality of care they received was very high for both the resident and attending surgeon. Further, patient knowledge that a trainee performed an operation with a very high level of autonomy did not impact quality-of-care ratings. Although patient satisfaction related to provider interactions before and after the procedure did not differ, residents' patients reported lesser levels of periprocedure satisfaction. Specifically, the pain experienced during the procedure did not differ between groups, but residents' patients were less satisfied with the comfort level of the room. Finally, individual trainees were identified whose patients reported less-than-average satisfaction in regard to pain or quality of care.

Although concern for patient safety has been the largest driving factor for limiting resident autonomy across all of graduate medical education, studies also note an attempt to fulfill patient expectations of involvement of the attending surgeon as a reason for limiting operative autonomy of the trainee.^{24–29} Within the context of our minor surgery clinic, we demonstrated previously equivalent postoperative outcomes between patients operated on by a

resident versus an attending.²¹ The findings of our current study now demonstrate equivalent patient satisfaction with their overall quality of care. To the best of our knowledge, this is the first study that directly measures patient satisfaction when general surgery residents perform a procedure independently with full patient knowledge and consent. Our results demonstrate that when resident operative autonomy is introduced in a well-planned and organized fashion with minor surgical procedures, patients are agreeable, and their postoperative satisfaction is not diminished.

Knowledge of how care by a surgery resident impacts patient satisfaction is particularly relevant in a health care environment that increasingly values patient satisfaction and ties reimbursement to such ratings.^{1,2} Previous studies have focused primarily on how involvement by a surgery trainee in the postoperative care impacts the patient's overall hospital experience.^{7,30} Cowles et al⁷ surveyed 200 patients at a major teaching hospital who required an inpatient stay after a gastrointestinal operation to assess how resident involvement impacted their care. In their study, 91% of respondents believed it was important to help educate the next generation of surgeons, 86% felt comfortable having them directly involved in their own care, and 74% believed they received extra attention by having their operation at a teaching hospital.⁷ These opinions rely primarily on their social interactions with residents in which information is conveyed between provider and patient. A recent meta-analysis demonstrated that the most commonly cited contributor to patient satisfaction is in fact the interpersonal skills of health care providers.³¹

That interpersonal skills contribute substantially to patient satisfaction scores may explain why surgery residents achieved similar preoperative and postoperative, composite satisfaction scores with the attending surgeon. Multi-institutional studies have characterized profiles of emotional intelligence (EI) of resident physicians and demonstrated that surgery residents score well in sociability, emotion management, and social awareness.^{32,33} These EI traits may support positive patient perception of surgery residents, because individuals who score high in these domains are confident in their communication and their ability to influence others. Future work could correlate the EI profiles of individual residents with patient satisfaction scores to determine whether particular EI facets are associated with high or low patient-satisfaction scores. EI is believed to be malleable and could present a target for intervention if this were found to be the case.

Patient apprehension to intraoperative involvement by a surgery resident has been demonstrated in additional survey studies of both the general population and surgeons facilitating these conversations.^{27,34} Strategies that may decrease this patient fear include establishing a patient-resident rapport during the preoperative phase of care and full disclosure of resident involvement through a conversation with the attending surgeon.^{17,27,35–37}

These strategies were incorporated into our clinic model by allowing the residents to workup the patients before they met the attending surgeons who explained the autonomous role of the residents in performing the procedures. As a result, only 2.7% of patients in our study requested that their procedure be performed by the attending. Patients in our clinic often note making this request, because their primary care physician specifically recommended the attending surgeon only.

Residents' patients did demonstrate significantly lesser periprocedure, composite satisfaction scores compared with an attending's patients. Surprisingly, this difference was not attributed to increased pain or duration of the procedure. The only periprocedure question on our satisfaction survey that showed a significant difference between groups was residents' patients reporting the procedure room to be "less comfortable." Although

the procedure rooms used for both groups are identical, this may reflect poor patient positioning or subtle verbal/nonverbal cues that may increase patient anxiety. Alternatively, this may be attributed to a lack of confidence in the surgery resident performing the procedure, as opposed to the attending surgeon, despite their consent. More research is required to elucidate this difference in periprocedure scores.

Finally, patient satisfaction with their overall quality of care and pain were analyzed by provider to assess for individual resident strengths and weaknesses. Auditing and feedback has become an increasingly common practice in the US health care system.^{38–40} Although active research in this field is seeking to determine the most efficient mechanism at collecting data and conveying it to providers, a Cochrane review found it to be effective at improving professional practice.⁴⁰ Specifically, it is best utilized when baseline levels of provider performance are low, the information is provided in both written and verbal formats at more than one time point, and the process includes specific goals moving forward.⁴⁰ Because many specialties have national, regional, and local mechanisms in place to track provider-level outcomes, auditing and feedback have been utilized primarily for attending physicians; however, as surgery residents hone their professional skills, it seems optimal to provide them with information to develop their individual practice patterns. Data on patient satisfaction might be included on a comprehensive “report card” that also contains data on individual clinical performance. Patients provide a unique source of feedback about a resident’s progress in achieving key milestones in the Accreditation Council for Graduate Medical Education core competencies of patient care, interpersonal skill and communication, and professionalism.⁴¹ Although utilizing our data for resident feedback was not within the confines of our current study, we were able to identify trainees whose patients reported lesser overall quality of care. Further analysis of an individual resident’s evaluations would help to identify specific areas in which they may have deficiencies (ie, increased pain). It is the opinion of the authors that providing such information to the surgery resident and incorporating it into performance reviews will enhance learning and improve their practice moving forward. Our model of a resident-run minor surgery clinic allows for tracking of both patient satisfaction and postprocedure outcomes for individual residents. Future work will focus on providing detailed feedback to trainees and measuring its effectiveness as an educational tool.

This study should be interpreted in the context of its design. On a post hoc power analysis, our study was slightly underpowered for our primary outcome, quality of care, as measured on a continuous scale. The study was, however, powered enough to detect a difference of 0.16 points, using a continuous rating scale, or a difference of 10.3%, using top-box scoring, which may be clinically relevant. Given that and the high overall patient satisfaction scores in both cohorts, we believe that we would still not observe a clinically relevant difference with more patient accrual. Second, the number of procedures performed by each individual resident ranged from 6 to 24. Such a small sample size likely influenced these results. An individual resident-to-attending comparison was not the primary goal of our study. We did choose to display these data, because we believe that the patterns can be used to identify the strengths and weaknesses of individual trainees. Our group plans to conduct a rigorous study utilizing these data as an educational tool to motivate improvement. Third, the patients in this study sample were primarily English speaking. Although the response rate for English-speaking patients was greater than that of the Spanish-speaking patients, the sample size for Spanish-speaking patients was very low. Therefore, we cannot make conclusions at this time regarding the experiences of non-English

speaking patients. Fourth, our outpatient postprocedure satisfaction survey is not without inherent limitations. To achieve our high response rate, we limited the number of questions contained in the survey. As a result, there are data that may not have been captured, and we were not able to ask duplicate questions regarding each outcome to measure consistency. Fifth, patient satisfaction was very high in both groups, which may indicate that a ceiling effect is present. In an attempt to mitigate this possible effect, our survey was based on validated S-CAHPS questions, reviewed by two survey methodologists independently, and utilized top-box scoring.

Finally, the major limitation of this study is the generalizability of our results. This study was conducted at a single institution and satisfaction ratings were compared with a single attending surgeon. The conclusions are limited to a select number of basic outpatient procedures performed using only local anesthesia. We acknowledge that other outpatient procedures, such as a complex skin cancer excision or more complicated outpatient operations, could have different results. Future studies should focus on obtaining similar satisfaction data when patients are aware of the participation and extent of involvement of surgery residents during operations that require general anesthesia. Admittedly, this will be challenging to study but may best be accomplished by studying chief residents in surgery during apprenticeship-style rotations. To this end, we have begun to pilot the process of collecting ratings of patient satisfaction from surgical inpatients.⁴² We believe that our resident-run minor surgery clinic provides a controlled environment in which we are able to reliably measure satisfaction while minimizing confounding variables. Our clinic model is well described, and it should be feasible to incorporate into other general surgery residency training programs.

In conclusion, patients are agreeable to a PGY-3 surgery resident performing simple, low-risk, office-based procedures independently in a setting where they are able to establish a rapport with the trainee preoperatively and to discuss the procedure with the attending surgeon. The level of satisfaction with the overall quality of care that they receive when residents perform procedures is very high and equivalent to levels attained by the attending surgeon. Individual residents demonstrate strengths and weaknesses in the performance of office-based procedures, and these data may be used as an educational tool to provide valuable patient feedback to the resident. Of importance, our study demonstrates that, when introduced in an organized manner, high levels of resident operative autonomy and patient satisfaction are not mutually exclusive goals. We must plan future studies to assess patient satisfaction when residents perform more complicated operations on patients under general anesthesia and to incorporate this feedback into the 360-degree evaluation of our surgery trainees.

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Conflict of interest

All the authors certify that they have NO affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers’ bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or

beliefs) in the subject matter or materials discussed in this manuscript.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at <https://doi.org/10.1016/j.surg.2019.02.009>.

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