

Factors Influencing the Entrustment of Resident Operative Autonomy: Comparing Perceptions of General Surgery Residents and Attending Surgeons

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ABSTRACT

Background General surgery residents may be underprepared for practice, due in part to declining operative autonomy during training. The factors that influence entrustment of autonomy in the operating room are unclear.

Objective To identify and compare the factors that residents and faculty consider influential in entrustment of operative autonomy.

Methods An anonymous survey of 29-item Likert-type scale (1–7, 1 = strongly disagree, 7 = strongly agree), 9 multiple-choice, and 4 open-ended questions was sent to 70 faculty and 45 residents in a large ACGME-approved general surgery residency program comprised of university, county, and VA hospitals in 2018.

Results Sixty (86%) faculty and 38 (84%) residents responded. Faculty were more likely to identify resident-specific factors such as better resident reputation and higher skill level as important in fostering entrustment. Residents were more likely to identify environmental factors such as a focus on efficiency and a litigious malpractice environment as impeding entrustment. Both groups agreed that work hour restrictions do not decrease autonomy and entrustment does not increase risk to patients. More residents considered low faculty confidence level as a barrier to operative autonomy, while more faculty considered lower resident clinical skill as a barrier. Improvement in resident preparation for cases was cited as an important intervention that could enhance entrustment.

Conclusions Differences in perspectives exist between general surgery residents and faculty regarding entrustment of autonomy. Residents cite environmental and attending-related factors, while faculty cite resident-specific factors as most influential. Residents and faculty both agree that entrustment is integral to surgical training.

Introduction

The goal of general surgery residency is to produce competent surgeons who are prepared for independent practice.¹ This has traditionally been achieved through graduated independence in which autonomy is progressively entrusted as residents advance through training.² Recently, it has been suggested that the level of independence afforded to general surgery residents may not be adequate, resulting in residents who are seen as lacking preparedness to enter practice or fellowship.^{3–6}

Studies of factors influencing entrustment are limited.^{3,7} Although work hour restrictions may have reduced residents' exposure to operations and decreased opportunities for entrustment,⁸ residents are

graduating with higher case volumes than a decade ago.⁹ Patient safety is another often cited barrier to entrustment, although evidence supports that resident involvement in patient care is safe.¹⁰ Financial, legal, and institutional pressures have also been suggested as factors that influence entrustment.^{11–15}

The changing health care and educational environment is inadequate to explain a decline in resident autonomy, as entrustment decisions are substantially influenced by resident-faculty interaction.¹⁶ Studies have investigated the perceptions of attending surgeons in their decisions to entrust autonomy.^{3,11,14,17} For example, Williams et al³ found that faculty entrustment decisions are based both on perceived resident performance and on prior behavior of the faculty. This and other studies, however, do not fully explore the perceptions of residents. Limited qualitative data suggest that resident perspectives do not completely align with the perspectives of attending surgeons,¹⁸ and they disagree regarding the amount of autonomy that is expected and granted in the operating room.^{17,19} As entrustment decisions are

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Editor's Note: The online version of this article contains the surveys used in the study, the overall level of autonomy reported by postgraduate year, and resident-reported attributes of an effective operating room teacher.

influenced by the interaction of faculty and residents, the perspectives of both groups warrant investigation.

The objective of this study is to identify and compare the factors that residents and attending surgeons consider influential in entrustment of operative autonomy.

Methods

This study included all 70 core faculty and 45 general surgery residents in a single Accreditation Council for Graduate Medical Education (ACGME)-accredited general surgery residency program comprised of 3 institutions. Core faculty were defined as attending surgeons who routinely perform operations with resident involvement.

After a review of the literature, the authors, who include program directors and residents, created a 29-item Likert-type agreement scale survey (1–7, 1 = strongly disagree, 7 = strongly agree), with 9 multiple-choice and 4 open-ended questions relating to how resident operative education can be improved (see online supplementary data) and distributed it via the Qualtrics platform (Qualtrics LLC, Provo, UT) in May 2017. Two versions of the anonymous survey with parallel questions were formatted for distribution either to faculty or residents. Survey questions included faculty decade and region of training, current institution type, and whether they were fellowship trained. Resident postgraduate year (PGY) was also collected. No survey testing was performed. Weekly reminder emails were sent to study participants for 3 weeks.

Likert scale data were compared using Student's *t* tests and multiple-choice answers using chi-square tests.²⁰ Open-ended responses were organized by the authors into themes, and representative comments were selected. We performed statistical analysis using JMP Pro 14 (SAS Institute Inc, Cary, NC) and defined statistical significance as an uncorrected *P* value ≤ .05. The University Hospitals Cleveland Medical Center Institutional Review Board reviewed this study and declared it exempt.

Results

Demographics

A total of 60 attending surgeons (86%) and 38 residents (84%) completed the survey. The 7 residents who did not respond included 6 PGY-1s and 1 PGY-5. The 10 attending non-responders were evenly distributed among the 3 institutions. Demographic information is summarized in TABLE 1. The majority of attendings trained in the Midwest and Northeast United States, after the year 2000, and obtained fellowship training.

Objectives

To identify and compare the factors that residents and faculty consider influential in entrustment of operative autonomy.

Findings

Residents cite environmental and attending-related factors, while faculty cite resident-specific factors as most influencing entrustment.

Limitations

A single residency program was studied using an unvalidated survey instrument.

Bottom Line

Residents and attending surgeons hold dissimilar perspectives on the factors that influence entrustment of autonomy in the operating room.

Overall Autonomy

Attending surgeons reported that they entrust a higher level of autonomy than residents perceive (4.57 vs 4.03; 95% CI dif 0.15–0.93; *P* = .007). Sixty percent of attendings reported entrusting a resident complete autonomy to perform major aspects of operations in the past year, and 71% of residents reported being entrusted with complete autonomy. The overall level of autonomy reported by residents increased over the first 2 years and plateaued in the final 3 years, but residents were more likely to report complete autonomy in PGYs 3–5 (see online supplementary data). There was no difference in the reported level of autonomy entrusted by attendings based on demographic data (practice institution, region of training, decade of training, fellowship training).

Factors Influencing Entrustment

Respondents rated the influence of various factors on the entrustment of operative autonomy (TABLE 2). Attendings were more likely to identify resident-specific factors, such as better resident reputation (5.12 vs 4.11; 95% CI dif 0.4–1.6; *P* = .001) and higher demonstrated skill level of the resident (6.28 vs 5.29; 95% CI dif 0.5–1.5; *P* < .001) as influential in the decision to entrust greater autonomy. Both groups agreed that residents who spend more time with an attending are granted greater autonomy (5.90 vs 6.16; 95% CI dif -0.1–0.6; *P* = .17), and both groups disagreed that work hour restrictions decrease entrustment (3.33 vs 3.47; 95% CI dif -0.5–0.8; *P* = .65).

Residents felt that attending-specific factors such as concern for malpractice litigation decrease autonomy, while attendings disagreed (3.35 vs 4.89; 95% CI dif 0.9–2.1; *P* < .001). Residents felt more strongly that attendings who can fix residents' mistakes (4.97 vs 5.92; 95% CI dif 0.5–1.4; *P* < .001) and those who are later in their career (4.48 vs 5.53; 95% CI dif 0.5–

TABLE 1
Demographics of Respondents

Attending Characteristics	N (%)
Decade of training	
Before 1980	2 (3)
1980–1989	8 (13)
1990–1999	13 (22)
2000–2009	21 (35)
2010–present	16 (27)
Institution type	
University hospital	33 (55)
County hospital	20 (33)
VA	7 (12)
Training region	
Midwest	27 (45)
Northeast	23 (38)
South	4 (7)
West	4 (7)
Outside United States	2 (3)
Fellowship trained	55 (92)
Resident Characteristics	N (%)
PGY level	
1	4 (11)
2	11 (29)
3	10 (26)
4	7 (18)
5	6 (16)

Abbreviations: VA, Veterans Affairs; PGY, postgraduate year.

1.6; $P < .001$) entrust more autonomy, while those who perform complex operations entrust less autonomy (3.87 vs 5.18; 95% CI dif 0.6–2.0; $P < .001$).

Residents felt that environmental factors such as limitations on block time availability (3.71 vs 5.09; 95% CI dif 0.7–2.1; $P < .001$), institutional focus on efficiency (4.27 vs 5.5; 95% CI dif 0.5–1.9; $P = .001$), and increased scrutiny of patient outcomes (3.39 vs 4.67; 95% CI dif 0.5–2.0; $P = .001$) reduce entrustment, while attendings disagreed.

General Opinions

Both groups agreed that residents should make important decisions in the operating room (5.31 vs 5.92; 95% CI dif 0.2–1.0; $P = .004$) and that senior residents should be allowed to complete straightforward cases with minimal guidance (5.82 vs 6.63; 95% CI dif 0.5–1.2; $P = .001$). Both groups disagreed that entrustment puts patients at risk (3.7 vs 3.1; 95% CI dif -1.1–0; $P = .49$); however, 53% (32 of 60) of attendings and 37% (14 of 38) of residents felt they have seen a patient complication directly result from resident participation in an operation. Residents were

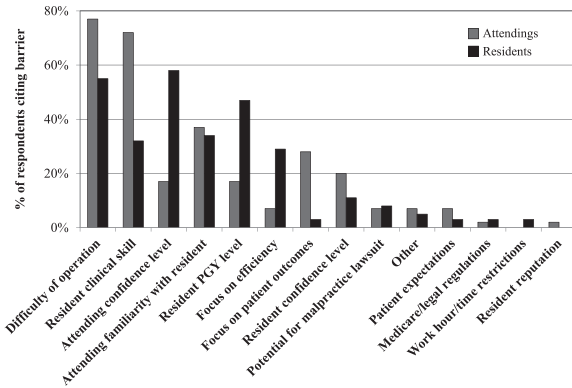


FIGURE
Responses of Residents and Attending Surgeons to the Question, "What Are the Most Significant Barriers to the Entrustment of Operative Autonomy?"

asked via multiple choice to identify attributes of an effective teacher in the operating room (see online supplementary data). Ninety-five percent (36 of 38) considered verbalization of thinking and decision-making an effective attribute, and 76% (29 of 38) considered provision of autonomy as effective. Few respondents considered seniority an important attribute (24%, 9 of 38), and none felt that fellowship training was important.

Barriers to Entrustment of Autonomy

Residents and attendings were asked via multiple choice to identify up to 3 barriers to entrustment (FIGURE). Difficulty of operation was the most cited barrier (77% attendings, 55% residents). More residents considered low attending confidence level as a barrier (17% vs 58%; 95% CI dif 22–60; $P < .001$), while more attendings considered resident skill level as a barrier (72% vs 32%; 95% CI dif 24–62; $P < .001$). Less than 10% of respondents considered malpractice, patient expectations, Medicare/legal regulations, work hour restrictions, or poor resident reputation to be major barriers.

Open-Ended Responses

Respondents were asked what residents could do to enhance their operative education. A majority felt that better resident preparation would lead to improved entrustment. One attending noted, "They must know the patient and the disease to impress on me that they can take on the technical aspects of the operation." Respondents also felt that resident engagement of faculty prior to an operation could enhance learning. One resident said, "Discuss the case and your learning objectives with the attending ahead of time. They appreciate it, and they recognize that the resident has been thinking about the incisions, the

TABLE 2
Mean Likert Scores and Statistical Comparison of Survey Responses Between Resident and Attending Surgeons

Factors and Opinions	Attendings (n = 60)	Residents (n = 38)	Absolute Difference	P Value
Resident-specific factors				
Residents are prepared for OR	4.87	6.18	1.32	< .001
Entrustment is based on resident clinical skill	6.28	5.29	0.99	< .001
Entrustment is based on PGY level	3.68	4.79	1.11	< .001
Entrustment is based on resident reputation	5.12	4.11	1.01	.001
Graduates are well prepared for practice	5.4	5.95	0.55	.002
Entrustment increases for residents exhibiting patient ownership	5.32	4.50	0.82	.013
Entrustment increases with time on service	5.90	6.16	0.26	.17
Work hour restrictions prevent entrustment	3.33	3.47	0.14	.65
Attending-specific factors				
Malpractice concerns prevent entrustment	3.35	4.89	1.54	< .001
Attendings who can fix mistakes entrust more autonomy	4.97	5.92	0.95	< .001
Entrustment increases later in career	4.48	5.53	1.04	< .001
Cases are too complex to entrust significant autonomy	3.87	5.18	1.32	< .001
Environmental factors				
Limits on block time prevent entrustment	3.71	5.09	1.38	< .001
Scrutiny of patient outcomes prevents entrustment	3.39	4.67	1.28	.001
Institutional focus on efficiency prevents entrustment	4.27	5.50	1.23	.001
Medicare regulations prevent entrustment	3.27	4.25	0.98	.002
OR staff judge entrustment behaviors negatively	3.61	3.75	0.14	.68
Residency culture promotes autonomy	4.03	4.00	0.03	.92
General opinions				
I/Attendings verbalize thinking in OR	6.12	4.82	1.30	< .001
Senior residents should complete straightforward cases independently	5.82	6.63	0.81	< .001
I give/am given appropriate autonomy	5.47	4.50	0.97	.001
Residents should make important decisions in OR	5.31	5.92	0.62	.004
Residents should obtain skills primarily through simulation	4.57	5.21	0.64	.041
Entrustment of autonomy puts patients at risk	3.70	3.13	0.57	.049
Attending is personally responsible for education	6.20	5.87	0.33	.10
Residents should be allowed to struggle in OR	4.20	3.76	0.44	.17

Abbreviations: OR, operating room; PGY, postgraduate year.

Note: 1 = strongly disagree, to 7 = strongly agree. Bold P values are significant.

approach, etc.” Respondents in both groups felt that better attending engagement would improve operative education. One attending suggested, “Review the operative plan with the resident before the operation and debrief with them afterwards. Ask for resident input during the operation and give active feedback.”

Discussion

This single program survey of residents and attending surgeons regarding factors that influence operative autonomy found that attendings were more likely to cite resident-specific factors such as resident ownership of patient care, resident reputation, and resident skill level as influential. Conversely, residents perceived attending-specific and environmental factors

such as institutional focus on efficiency and patient outcomes, malpractice environment, and Medicare regulations as influential. Both groups reported that work hour rules and patient safety do not substantially affect entrustment decisions. Further, residents felt that a low confidence level from attendings was a barrier to entrustment, while attendings thought resident skill level was a barrier.

The results of our study suggest that entrustment decisions are strongly influenced by perceptions that residents and attendings have of one another, which has been reported previously.²¹ For example, residents whose personality traits do not align with the attendings are provided less operative autonomy.²² Residents and attendings in our study also noted that

engagement with one another could improve entrustment. This confirms prior work showing that formal processes such as a time-out to encourage preoperative educational engagement can promote entrustment.²³ Tools such as OpTrust²⁴ and the Zwisch scale^{25,26} have been developed to assess entrustment behaviors using a common language and structure. They also facilitate resident-attending engagement and implicitly encourage entrustment.²⁷

Respondents in our study agreed that entrustment does not put patients at increased risk, though a surprising number reported observing patient complications resulting from resident involvement. As this finding is incongruent with multiple studies supporting the safety of resident involvement in patient care,^{10,28,29} it is unclear whether complications were misattributed to resident involvement, if patient harms are underreported in the literature, or if this represents recall bias. Our finding is also incongruent with work by Teman et al who identified patient safety concerns as the most important barrier to entrustment.¹⁴ Importantly, Wojcik et al reported no increase in adverse patient outcomes with implementation of a structured autonomy service and a resident-run minor surgery clinic.²⁸ Patient safety should also be considered within the context that trainees must be prepared to operate safely when they cross the threshold into independent practice. As has been reported,³⁰ trainees may not achieve meaningful autonomy for many of the 91 operations designated by the American Board of Surgery as “Core,” despite an ACGME requirement that a minimum number of those cases are performed during residency,³¹ and an expectation that they can be performed independently at the conclusion of training. Although residents in our study reported that they are entrusted with a lower level of autonomy than attendings believe they are entrusting, our study suggests that substantial educational benefits can be derived from parts of operations regardless of entrustment. Residents reported verbalization of thinking and decision-making as the most important attribute of an effective teacher. This supports prior work recognizing these teaching moments as important aspects of intraoperative education, which are independent of entrustment.³²

Our findings are limited by studying a single ACGME-approved academic residency program, limiting generalizability to other programs with different cultures and educational environments. This program does include 3 affiliate hospitals with their own institutional cultures, providing some heterogeneity. As the survey instrument was created for this study without testing, respondents may have interpreted questions differently than intended. The multiple-choice format may have limited respondents’ ability

to fully express their opinions. Although overall response rate was high, resident non-responders were mostly PGY-1, possibly skewing results toward the perceptions of more senior residents. Although beyond the scope of this study, entrustment behaviors were not objectively measured, therefore, survey results could not be corroborated with direct observations. Other factors not measured in our study, such as bias, may affect entrustment decisions. For example, female residents have been shown to be entrusted with less operative autonomy.³³ Despite these limitations, this study represents an important comparison of resident and attending perspectives regarding the factors that influence entrustment of autonomy. Correlating these factors with objective measures of intraoperative entrustment, determining the effect of implicit bias on entrustment decisions, and determining the origin of differing perspectives will be important future areas of inquiry.

Conclusions

Differences in perspectives exist between general surgery residents and faculty regarding entrustment of autonomy. Residents cite environmental and attending-related factors, while faculty cite resident-specific factors as most influential. Residents and faculty both agree, however, that entrustment of autonomy is integral to surgical training.

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