



Achieving progressive operative autonomy at a teaching hospital in Kenya

Robert K. Parker^{1,2} · Michael Mwachiro¹ · Kimutai Sylvester¹ · Elizabeth Mwachiro¹ · Andrea S. Parker^{1,2} · Serena S. Bidwell³ · Xilin Chen⁴ · Brian C. George⁴ · Grace J. Kim⁴

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Abstract

Purpose Operative autonomy during training is necessary to produce competent surgeons. A lack of autonomy may lessen trainee readiness for practice upon completion of training. Within training programs in Kenya, there is less faculty oversight, but the impact on autonomy has not been assessed. This study evaluates and describes trainee operative autonomy at a teaching hospital in Kenya where there is a deliberate attempt by faculty members to balance oversight and provide appropriate graduated autonomy.

Methods Autonomy was measured with the Zwisch scale utilizing the System for Improving and Measuring Procedural Learning (SIMPL™) application, a workplace-based assessment platform facilitating real-time feedback for surgical trainees. We reviewed the levels of autonomy perceived by trainees and faculty and compared autonomy by post-graduate year (PGY). We explored this relationship using ordinal mixed models with trainee PGY level and case complexity included as fixed effects and procedures as a random effect.

Results From Jan 1, 2021, to Dec 31, 2021, 619 evaluations were completed by all 14 residents and 7 faculty in the general surgery program. By PGY, there was an increase in perceived granted autonomy by both faculty and trainees. On mixed modeling, trainees achieve more autonomy with advancing PGY [coefficient: 1.77 (95% CI 1.37–2.17), $p < 0.01$]. Fourth- and fifth-year trainees achieved meaningful autonomy, defined on the Zwisch scale as “passive help” or “supervision only,” in 79% of operative evaluations (96 of 121).

Conclusions This study shows an increase in autonomy granted to trainees with more advanced training years. Meaningful autonomy can be achieved within surgical training, which should help to prepare surgeons for independent practice in Kenya.

Keywords Operative autonomy · Surgical education · Evaluation · Feedback

Background

Surgical education ideally produces competent, safe, and independent surgeons. One facet of this involves the development of autonomy in the operating room [1, 2], and

numerous training paradigms exist by which autonomy is afforded to trainees [3, 4]. Various reports indicate that general surgery residents may not be universally ready for independent practice upon completion of training [5, 6]. A lack of autonomy within training has been implicated as one contributor to this finding [7–12]. Though numerous reasons are cited for this experience, lack of oversight from faculty does not seem to be a primary factor [2, 13, 14].

Within Kenya, autonomy has not been extensively studied. However, limited reports from select training institutions in Kenya report less faculty oversight of resident trainees in the operating room than is routinely described in the USA [15–18]. At the national referral and training institution in Kenya, Ojuka et al. reported that residents rarely operated with meaningful autonomy except in the emergent setting, and in those emergent cases they rarely operated with the

✉ Robert K. Parker
bob.parker@tenwekhosp.org

¹ Department of Surgery, Tenwek Hospital, PO Box 39, Bomet 20400, Kenya

² Department of Surgery, Alpert Medical School of Brown University, Providence, RI, USA

³ University of Michigan Medical School, Ann Arbor, MI, USA

⁴ Center for Surgical Training and Research, Department of Surgery, University of Michigan, Ann Arbor, MI, USA

attending present. In other words, in this single-institution study trainee autonomy was often “all or nothing,” with trainees in elective cases having little to no autonomy and trainees in emergent cases having complete autonomy [16]. A lack of supervision has been reported by other institutions in the region [4]. For example, trainees in South Africa were recently reported as performing 85% of laparoscopic appendectomies unsupervised [19], and a study reviewing laparotomies in Rwanda and South Africa showed that 72% were performed by trainees without supervision [20].

Tenwek Hospital is a teaching and referral center in rural western Kenya with a five-year surgical residency training program, where the majority of trainees continue to independent general surgery practice. The program matriculates and graduates two to three residents each year and incorporates graduated levels of responsibility throughout training. To support that goal, we introduced a framework for progressive autonomy (the Zwisch scale) at our training program in 2016 [21]. As part of this initiative, the Zwisch scale was posted on the operating room doors and conversations between faculty and trainees were encouraged.

A recent review of trainee readiness for practice was conducted within a network of training programs, including our institution in Kenya. Faculty and graduates from our institution report that our graduates are ready for independent practice upon completion of training [22]. Operative autonomy is at the discretion of faculty, with few external constraints, and we have deliberately attempted to provide appropriate graduated autonomy according to a trainee’s ability [23]. For example, if a resident has demonstrated proficiency in a common procedure, then at the faculty member’s discretion, the resident may perform the procedure without the faculty scrubbed or present but available for consultation. It is unknown if this training model has, in fact, ultimately resulted in greater autonomy for trainees. The experience with autonomy is particularly important as new programs in the region are established, and as existing programs undergo reform. We hypothesized that resident trainees at our institution would demonstrate progressive autonomy with increased post-graduate training level.

Methods

Beginning in 2021, the Tenwek Hospital general surgery department implemented the use of the Society for Improving Medical Professional Learning (SIMPL™) application, a workplace-based assessment platform that facilitates real-time operative feedback for surgical trainees [24]. This smartphone-based tool includes the use of the Zwisch scale as a measurement for autonomy (Table 1), with “passive help” or “supervision only” having been previously defined to indicate meaningful autonomy [21, 25]. The SIMPL™

Table 1 Number of autonomy evaluations by faculty and trainees stratified by post-graduate year

Ratings	Trainees	Faculty
PGY 1	50	44
PGY 2	73	49
PGY 3	81	54
PGY 4	79	56
PGY 5	68	65

evaluation system includes three questions, answered by both faculty and trainee within 72 hours of an operation. The questions relate to the level of guidance provided by faculty to the trainee, the performance of the trainee, and complexity of the case relative to other cases of the same type. Trainees were responsible for requesting feedback. There are no standard criteria to assess and report autonomy; however, the use of the Zwisch scale and the SIMPL™ evaluation allow for comparisons to other investigators [26].

Use of the SIMPL™ app was piloted from January 2021 through December 2021 for all general surgery trainees ($N=14$) and faculty ($N=7$) at Tenwek Hospital. Before beginning the pilot, each trainee and faculty member was oriented to the use of the app, and the use of the Zwisch scale was reviewed using a standardized rater training curriculum. Operative autonomy is granted to trainees at the discretion and judgment of the individual faculty member who is responsible for supervision.

We aimed to review the initial reported levels of autonomy perceived by trainees and faculty and compare those by post-graduate year (PGY) for cases with SIMPL™ evaluations. We explored this relationship using ordinal mixed models with trainee PGY level and case complexity included as fixed effects. Procedures were included as a random effect. Ethics approval was granted by Tenwek Hospital, and the research was licensed by the National Commission for Science, Technology, and Innovation.

Results

From Jan 1, 2021 to Dec 31, 2021, 619 evaluations were completed by all 14 residents and 7 faculty members in the general surgery program (Table 1). The most commonly rated procedures were thyroidectomy, laparotomy, inguinal hernia repair, and laparoscopic cholecystectomy. By post-graduate year, there is an increase in the perceived granted autonomy by both faculty (Fig. 1) and trainees (Fig. 2). On mixed modeling, trainees achieve more autonomy with advancing PGY (coefficient: 1.77 [95% CI 1.37-2.17], $p<0.01$). 4th- and 5th-year trainees achieved meaningful autonomy in 79% of rated operations (96 of 121). The adjusted probabilities of autonomy by PGY are displayed in Fig. 3.

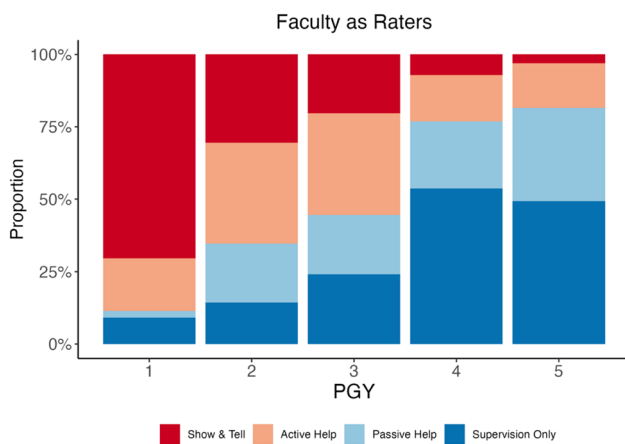


Fig. 1 Unadjusted autonomy ratings by post-graduate year as rated by faculty demonstrating a progressive increase in autonomy

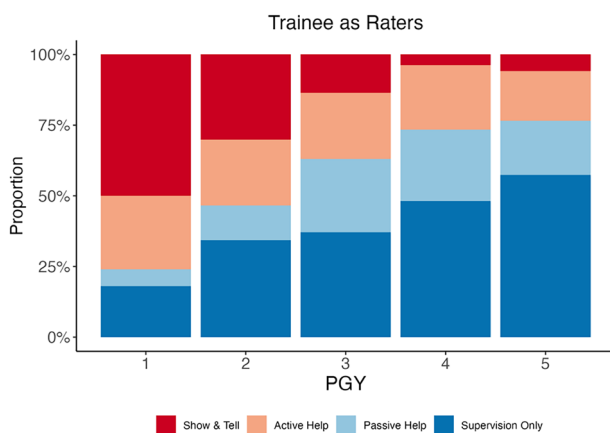


Fig. 2 Unadjusted autonomy ratings by post-graduate year as rated by residents demonstrating a progressive increase in autonomy

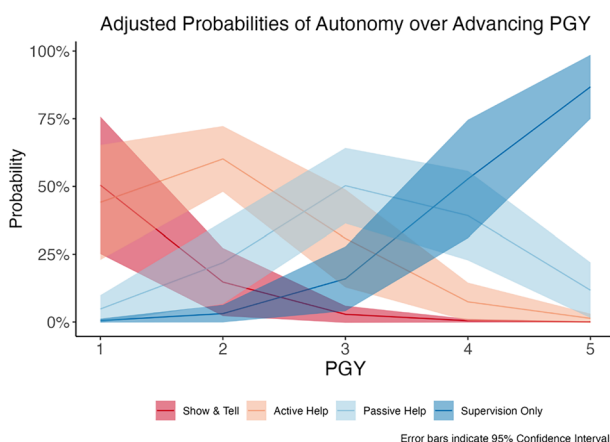


Fig. 3 Adjusted predicted probabilities of autonomy by post-graduate year

Conclusions

For surgeons to be competent and prepared for independent practice, they must become autonomous [1, 2]. The “right” amount of resident autonomy should balance patients’ immediate and long-term needs [2, 9]. For example, there may be implications for patient safety if trainees are provided too much autonomy before the required competence has developed [9, 27]. In contrast, there may be long-term consequences for early career surgeon performance when autonomy is not appropriately granted during training. Autonomy is, therefore, a key feature of surgical residency that is guided by numerous training paradigms [3, 4, 28]. Progressive autonomy should result in competent surgeons being ready for practice on completion of training because they have been given appropriately supervised opportunities to thrive. This impacts surgeons at the individual level, but society also benefits from a continuous stream of surgeons who can safely operate independently, which requires the progressive granting of autonomy throughout training [9]. Despite this understanding of the fundamental importance of autonomy to safety, competence, and independence, faculty surgeons often struggle with how to grant autonomy appropriately to trainees, especially given medicolegal and financial constraints [2, 13, 14].

This study shows a successful balance between faculty involvement and autonomy granted to trainees. Progressive resident autonomy leading to meaningful autonomy was more present within the studied cohort than in reports from other institutions [5, 12, 29, 30], with a significant increase in autonomy by post-graduate year of training. Trainees experienced meaningful autonomy in most operative cases during their fourth and fifth post-graduate years. This observation reinforces previous survey-based findings that trainees, at our institution, are ready for independent practice upon completion of training [22].

A limitation is the lack of information concerning cases that did not receive an evaluation. While it is likely that evaluations were chosen on specific operations, we suspect that operations with meaningful autonomy were less likely to be reported because limited feedback could be gained or given if the faculty member was not physically present for the case. Operations with more interactions between residents and faculty would provide more opportunities for feedback and, therefore, be more frequently requested. This potential limitation would have led us to underreport the degree of progressive autonomy. We did not capture the number of repeated interactions between residents and faculty; however, with a limited number of faculty surgeons, there are numerous opportunities for repeated interactions which may improve autonomy in our setting [31]. Additionally, the cross-sectional study design is a

limitation to prospective evaluation of the development of autonomy for an individual trainee over time.

Future directions include exploring factors that influence autonomy and entrustability within our setting, perceptions between faculty and residents, and evaluating patient outcomes to demonstrate that care is not compromised and safety is maintained [20, 32–34]. As the number of evaluations increases over time, an analysis of specific procedures would be a worthwhile endeavor, and individual trainees' longitudinal development could be tracked. Standardized reporting of trainee autonomy could improve comparisons across different training contexts and allow various educational programs to learn from one another [3].

In conclusion, the training paradigm at our institution results in significant increases in trainee autonomy with more post-graduate years of experience. Meaningful autonomy can be achieved within surgical training to prepare surgeons in Kenya for independent practice.

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Data availability Supporting data underlying this article may be available upon request to the corresponding author.

Declarations

Conflict of interest The authors have no relevant financial or non-financial interests to disclose.

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