

Resident Autonomy in the Operating Room: Expectations Versus Reality



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Background. There is concern about graduating thoracic trainees' independent operative skills due to limited autonomy in training. This study compared faculty and trainee expected levels of autonomy with intra-operative measurements of autonomy for common cardiothoracic operations.

Methods. Participants underwent frame-of-reference training on the 4-point Zwisch scale of operative autonomy (show and tell → active help → passive help → supervision only) and evaluated autonomy in actual cases using the Zwisch Me!! mobile application. A separate "expected autonomy" survey elicited faculty and resident perceptions of how much autonomy a resident should have for six common operations: decortication, wedge resection, thorascopic lobectomy, coronary artery bypass grafting, aortic valve replacement, and mitral valve repair.

Results. Thirty-three trainees from 7 institutions submitted evaluations of 596 cases over 18 months (March

2015 to September 2016). Thirty attendings subsequently provided their evaluation of 476 of those cases (79.9% response rate). Expected autonomy surveys were completed by 21 attendings and 19 trainees from 5 institutions. The six operations included in the survey constituted 47% (226 of 476) of the cases evaluated. Trainee and attending expectations did not differ significantly for senior trainees. Both groups expected significantly higher levels of autonomy than observed in the operating room for all six types of cases.

Conclusions. Although faculty and trainees both expect similar levels of autonomy in the operating room, real-time measurements of autonomy show a gap between expectations and reality. Decreasing this gap will require a concerted effort by both faculty and residents to focus on the development of independent operative skills.

(Ann Thorac Surg 2017;104:1062–8)

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There is a perception among surgeons of many specialties that graduating residents in the modern era are less prepared to enter practice than their predecessors [1, 2]. A resident's ability to perform an operation independently is best determined by observation and evaluation during progressively independent operative experiences. In past decades, senior residents proved their ability to operate independently by performing operations with limited or no supervision, often at night. Currently, there are multiple competing demands on academic faculty. Financial pressures to improve productivity, quality, safety, throughput, and efficiency, increased scrutiny of outcomes from multiple databases, and detailed regulatory requirements combine to limit the opportunity for resident operative autonomy. In this new era, surgical faculty must find creative ways to enhance resident autonomy while still providing

adequate supervision to ensure patient safety, quality, and throughput.

Scant data are available on how much autonomy thoracic residents achieve in the operating room. Odell and colleagues [3] asked all trainees taking the Thoracic Surgery In-Training Exam in 2013 the percentage of the cases they felt they were functioning as the operating surgeon in a series of common case types. Overall, 83% felt they performed at least one-half of the procedure, while only 60% performed at least three-fourths of the procedure. As procedures became more complex and emergent, the proportion of the operation done by residents decreased. Wide variation in definitions of what constitutes "doing a case" make these data even more difficult to interpret [4].

One description of the progression to autonomy, the Zwisch scale, provides a validated reproducible framework to measure autonomy in the operating room [5]. The Zwisch scale is a 4-point scale describing faculty supervision behaviors associated with different degrees of resident autonomy (Table 1).

The first level of the scale is "show and tell," where the attending narrates the procedure to the assisting resident. This level has the least autonomy. At "active help," the resident performs the technical steps of the operation

Accepted for publication May 11, 2017.

Presented at the Fifty-third Annual Meeting of The Society of Thoracic Surgeons, Houston, TX, Jan 21–25, 2017.

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Table 1. The Four-Step Zwisch Scale for Evaluating Operative Autonomy

Zwisch Scale	Faculty and Resident Behaviors
Show and tell	Faculty performs the case while explaining actions and decisions Resident actively assists
Active help	Faculty directs the flow of the case, guides resident through steps Resident performs actual steps of the operation
Passive help	Faculty actively assists, guides resident decision making Resident moves from step to step and controls flow of the case
Supervision only	Faculty observes to maintain safety, answers questions Resident performs the case with minimal assistance

under the direct guidance of the attending surgeon. During “active help,” the attending is the leader and the resident follows. At “passive help,” the roles reverse. Now the resident is the leader in setting the flow of the operation and the attending follows the lead and directions of the resident. Attending-level help is still required to optimize exposure and retraction, improve efficiency, and confirm intraoperative decisions. The final level is “supervision only,” where the resident is now able to safely accomplish the operation independently, with minimal oversight and fine tuning from the attending. This level mimics independent practice and represents the final stage of operative training.

The Zwisch scale is applicable to any procedure or operation, including discrete components of more complex operations. The Zwisch score for the entire procedure is defined as the level at which the resident spent the key portions of the procedure. Factors that may affect the Zwisch score include the resident’s prior experience, intrinsic technical skills, familiarity with the specific or a similar operation, relative difficulty of the procedure compared with other similar procedures, and experience with the specific attending [6].

This scale allows a consistent assessment of autonomy across raters, cases, and programs. This study used the Zwisch scale in the form of a smartphone application to provide real-time assessment of operative autonomy by thoracic surgery trainees and compare actual autonomy to resident and faculty expectations.

Patients and Methods

Participants

After approval by each participating institution’s Institutional Review Board, all thoracic surgery faculty and residents at each participating institution received an in-person (S.L.M.), frame-of-reference training on the Zwisch scale. This consisted of a 1-hour discussion of the levels of the scale, including key behaviors associated with each level and cues that the resident was ready to

move to the next level for a given operation [7]. Simulated video examples of each level were presented and discussed.

Data Collection

We developed a free smartphone application called “Zwisch Me!!” to facilitate real-time evaluation of resident operative autonomy based on the four-step Zwisch scale. Participation was limited to faculty and residents whose information was submitted by program directors to the data store through the software developers. Security was provided by participant-generated secret user names and passwords. At the completion of frame-of-reference training, participants signed an informed consent, if required by their local Institutional Review Board, and received instructions on the download and use of the Zwisch Me!! app.

Upon completion of each operation, the resident opened the application and initiated a new evaluation by entering procedure information, including the specific procedure, date, and attending faculty surgeon. The resident then rated his or her perception of autonomy level as well as the difficulty of the case compared with other cases of the same type (Fig 1). Submission of the case by the resident triggered an automated text message to the attending surgeon with a clickable link to the application to complete his or her evaluation of resident autonomy and case difficulty, blinded to resident ratings. A comment box at the bottom of the evaluation screen allowed the attending to enter brief, case-specific feedback.

At the conclusion of the frame-of-reference training, residents and faculty also completed a survey about their expectations regarding resident operative autonomy. The survey addressed six common cardiac and thoracic operations: decortication, wedge resection, thoracoscopic lobectomy, coronary artery bypass grafting, aortic valve replacement, and mitral valve repair. Respondents selected the amount of autonomy they believe a resident should have at each level of training (integrated resident postgraduate year 1 to 6, traditional fellow year 1 to 3).

Data Analysis

Descriptive statistics including mean and standard deviation were used to analyze the distribution of cases, Zwisch scores, and difficulty ratings. Spearman rank order correlation was used for the relationship between Zwisch level and year of training and between Zwisch level and case difficulty. Pearson χ^2 testing was used to assess differences in Zwisch score between year of training categories and between resident and faculty expectations and actual operating room data with an α level of 0.05 being defined as significant. All analyses used SPSS 22 software (IBM, Armonk, NY).

Results

Thirty-three residents in integrated or traditional thoracic surgery training programs at 7 institutions submitted evaluations of 596 cases during an 18-month period (March 2015 to September 2016). Thirty

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