

Orthopaedic Surgery Residency Training: Consideration for a Surgical and Procedural Skills Competency

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This perspectives report discusses the need to create a surgical and procedural skills competency for orthopedic surgery residency training programs. (J Surg Ed ■■■■-■■■. © 2018 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

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Patients often ask about the number of times their physician has performed a given procedure.¹ Based on the pioneering work of Ericsson et al.,² Gladwell³ suggested that 10,000 practice hours over a 5-year period (2,000 hours/year) was needed to learn high-level skills. Logic suggests that the more time spent by a physician practicing a particular skill, the more proficient at it they should become.⁴ Surgical and procedural skill development is associated with resident professional identity,⁵⁻⁷ probabilistic reasoning,^{8,9} decision-making,¹⁰⁻¹⁵ leadership and shared-leadership traits^{16,17} and patient-procedure matching capabilities.¹⁸ Physician surgical and procedural skill competence scrutiny is increasing.¹⁹ Residency programs remain unsure of how best to teach surgical and procedural skills and how best to evaluate competence. The Accreditation Council for Graduate Medical Education (ACGME) has identified 6 core competencies for resident training: patient care, medical knowledge, practice-based learning and improvement, systems based practice, professionalism and interpersonal skills and communication.²⁰ In orthopaedic surgery residency programs, only 2 of these competencies, patient care and medical knowledge are linked directly to surgical and procedural skills. Only the patient care competency includes

subcompetencies related specifically to actual surgical procedure performance and complication management capability. This perspectives report discusses the need to consider creating a separate surgical and procedural skills competency for specific residency training programs.

In 2006, the ACGME Surgical Council for Resident Education suggested that residency training programs should consider surgical and procedural skills as the “seventh competency.”²¹ To date, however, a specific surgical and procedural skills competency does not exist. Some have suggested that resident surgical and procedural skills have decreased in association with reduced working hours and fewer surgical learning experiences,²²⁻²⁴ leading to reduced professional identity as a surgeon,²⁵ decreased confidence,²⁶ and diminished surgical independence readiness.^{27,28} Residency training programs in general surgery,^{22,25-27,29-37} plastic surgery,³⁸ obstetrics and gynecology,³⁹⁻⁴¹ neurosurgery,⁴² otolaryngology,^{43,44} pediatrics,⁴⁵ cardiothoracic surgery,^{46,47} and orthopaedic surgery^{23,24,48} have each reported concerns related to this missing competency.

A shift from process- to outcomes-oriented residency training has led to competency development, however, the skill level that defines competence is debatable, unstable, and highly task-specific.⁴⁹⁻⁵¹ The surgical and procedural skills that residents must learn are as varied as the specialties that use them. Creation of a separate surgical and procedural skills competency would increase the likelihood that this key factor is adequately represented for educational time, equipment, and faculty workload resource allocations. In lieu of not having this competency, orthopaedic surgery residency training programs have mandated resident participation in a combination of surgical case minima, post-graduate year (PGY) 1 surgical skills training modules, PGY 1 clinical education rotations, and specific learning achievement milestones.^{23,51} Case minima represent the minimum acceptable standard of 15 routine surgical procedures that orthopedic surgery residents should learn. PGY 1 surgical skills training modules help improve basic skills such as knot

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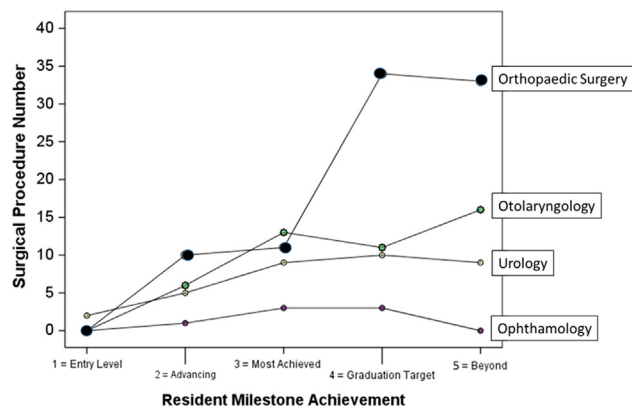


FIGURE 1. Surgical procedure number and resident milestone achievement level comparison (derived from ACGME Milestone Projects for orthopaedic surgery,⁵³ otolaryngology,⁵⁴ urology,⁵⁵ and ophthalmology⁵⁶).

tying, casting, wound care, tissue handling, and basic surgical techniques. Clinical rotations help orthopaedic surgery residents better link patient care and medical knowledge milestones with actual clinical patient care. The 41 milestones of the Next GME Accreditation System for resident subspecialty education include 16 for orthopaedic surgery residents that are directly related to patient care.^{52,53} Orthopaedic surgery,⁵³ otolaryngology,⁵⁴ urology,⁵⁵ and ophthalmology⁵⁶ programs each embed actual surgical procedure performance and complication management capability subcompetencies solely within patient care milestones.

We evaluated surgical procedure performance and complication management capability milestone subcompetency learning in orthopaedic surgery,⁵³ otolaryngology,⁵⁴ urology,⁵⁵ and ophthalmology.⁵⁶ Although otolaryngology, urology, and ophthalmology displayed similar surgical procedure subcompetency volumes for resident milestone achievement progressions through graduation target level 4 and beyond, orthopaedic surgery residents had a far greater primary surgical procedure learning expectation between milestone levels 3 and 4 (Figure 1). Additionally, orthopaedic surgery residents displayed far greater surgical procedure complication management capability expectations between the same milestone levels (Figure 2). Analysis of the 25th–75th interquartile rating ranges for level 3 and 4 patient care milestone achievement revealed that orthopaedic surgery residents also had a greater proportion of ratings that varied by at least one full performance level (50%, 8/16) compared to otolaryngology (13%, 1/8), urology (13%, 1/8), and ophthalmology (0%, 0/8) ($\chi^2 = 9.3$, $p = 0.025$).⁵⁷ Combining surgical and procedural skills volume and rating observations leads us to suggest that orthopaedic surgery resident training differed from these other specialties in that surgical and procedural skill capabilities represent a far greater portion of the residency

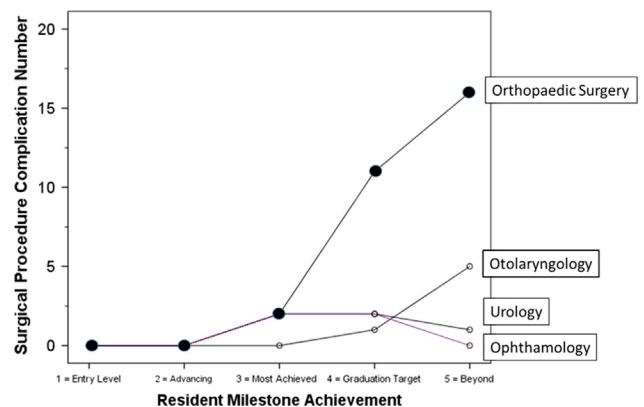


FIGURE 2. Surgical procedure complication management capability number and resident milestone achievement level comparison (derived from ACGME Milestone Projects for orthopaedic surgery,⁵³ otolaryngology,⁵⁴ urology,⁵⁵ and ophthalmology⁵⁶).

training expectation and may be more difficult to accurately measure. Given that orthopaedic surgery residents have surgical and procedural skills and complication management capability requirements in subspecialties as diverse as trauma, foot and ankle, hand, pediatrics, shoulder and elbow, spine, musculoskeletal oncology, adult reconstruction, and sports medicine, differences with these other residency training specialties becomes easier to appreciate.

Medical student and entry level orthopaedic surgery resident core entrustable professional activity capabilities must improve.⁵⁸ More capable entry level orthopaedic surgery residents may reduce the steep surgical procedure performance and complication management capability milestone subcompetency slopes and high milestone achievement rank variability observed between levels 3 and 4. Earlier, more frequent mentored surgical and procedural skills virtual reality-haptic technology simulator and cadaveric surgery practice may also better prepare entry level residents.^{59,60} Given the high volume and wide diversity of surgical procedure and complication management capability expectations for orthopaedic surgery residents, we suggest that surgical and procedural skills proficiency should become an independent core competency for this specialty. Mechanisms to resolve this perceived need include both formal and informal discussions with key constituent groups such as the Association of American Medical Colleges, the Residency Review Committee for Orthopaedic Surgery of the ACGME, and the American Board of Orthopaedic Surgery. Early discussions and workshops should focus on perceived need validation, ways to optimize medical student entrustable professional activity instruction, how to best integrate virtual reality-haptic technology simulator and cadaveric surgical skills training, and ways to improve objective measurement proficiency across each activity. Further, more comprehensive studies of other residency training subspecialties are needed.

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