



Orthopedic Resident Education and Patient Safety

Gregory L. Cvetanovich, MD

The mantra “See one, do one, teach one” is a long-standing cliché in surgical education. Although this mantra does not apply literally in the case of complex modern orthopedic procedures, the reality is that all surgical education, including orthopedic surgery residency, involves learning “on the job” in the clinic, emergency room, and operating room. In conjunction with a sound basis of textbook learning and observation, orthopedic residents receive graduated patient care responsibilities leading to the goal of entering independent practice at the conclusion of 5 years of residency.

Moreover, the academic medical centers involved in orthopedic resident education often also serve as referral centers for patients with challenging problems and multiple comorbidities, so that attending physicians teaching orthopedic residents must balance educating residents with caring for complex patients. In contrast to their physicians’ dual focus on patient care and resident education, some patients are hesitant to allow residents to participate in their surgical care, fearing increased errors and complications due to resident inexperience.^{1,2} How do we address these patients’ legitimate concerns while continuing to provide the on-the-job training experience so important to resident education?

Does Orthopedic Resident Surgical Education Affect Patient Safety?

The sparse literature generally suggests that orthopedic resident involvement in patient care may lengthen procedures but is not associated with substantively worse patient outcomes. Studies at single centers found that resident involvement in adolescent idiopathic scoliosis surgery and hip and knee arthroplasty leads to slightly longer operative times, without increased complica-

tion rates or clinical outcomes.^{3,4} One study found significantly less acetabular anteversion in resident-involved total hip arthroplasty cases, although there was no difference in dislocation rate, other complications, or patient clinical outcome.⁵ These single-center studies showing no change in patient complications or outcomes based on resident involvement could reflect unique experiences that do not generalize beyond a few academic medical centers. Alternatively, the relatively small patient samples may leave these studies underpowered to detect small changes in patient complication rates.

[B]ased on current evidence, patients can be reassured that orthopedic resident participation in surgery does not increase complication rates.

Recently, several studies in the orthopedic literature have addressed the role of resident involvement in patient complications using the large American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) database.⁶⁻¹¹ This database contains high-quality information from over 400 hospitals across the United States about whether residents were involved with a surgery, as well as patient comorbidities, operative variables, and 30-day post-operative complications. These studies have found that resident participation is associated with either a decreased rate of complications or no change in the complication rate for common orthopedic surgeries, though the studies have corroborated the small increase in operative time associated with resident involvement.⁶⁻⁹ Interestingly, other ACS-NSQIP database studies failed to identify a “July effect” of increased complications due to resident inexperience at the beginning of the residency academic year.^{10,11}

These studies suggest that, based on current evidence, patients can be reassured that orthopedic resident participation in surgery does not increase complication rates. Moreover, there is no evidence that having orthopedic surgery at the

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Author’s Disclosure Statement: The author reports no actual or potential conflict of interest in relation to this article.

Am J Orthop. 2015;44(7):E245-E247. Copyright Frontline Medical Communications Inc. 2015. All rights reserved.

beginning of the residency academic year in July results in a higher complication rate. Although operative time for cases involving residents is on the order of 10 to 15 minutes longer, this small difference in operative time has not translated into differences in patient outcomes or complications. It is worth noting that hospital billing for surgical procedures may take operative time into account based on duration of anesthesia. Appropriate resident training, then, should not be expected to harm patient safety. Resident training should include educational preparation prior to the operating room, intraoperative supervision, and graduated responsibility appropriate to resident training level and skill level.

Have Recent Changes in Orthopedic Resident Education Improved Patient Safety?

Fifteen years ago, the Institute of Medicine published its seminal work, *To Err is Human: Building a Safer Health System*, highlighting medical errors leading to patient injury and death.¹² In 2003, the Accreditation Council for Graduate Medical Education (ACGME) implemented resident work-hour restrictions (subsequently refined in 2011) designed to improve resident education, promote resident well-being, and maximize patient safety.¹³ The work-hour regulations have been met with mixed reactions, with orthopedic surgeon-authors expressing concerns that the work-hour limits compromise resident education and professionalism in patient care without leading to any proven increase in patient safety.¹³⁻¹⁵ These views are supported by a recent systematic review of the orthopedic literature, which found that, while work-hour changes have subjectively improved resident quality of life and fatigue, there has been no clear benefit to resident education or patient safety.¹⁴ A review of the overall surgery literature similarly found no benefit for resident education and no improvement in patient outcomes associated with the work-hour regulations, with some of the literature suggesting increased complications for high-acuity patients.¹⁶ Patient safety, a major impetus behind the work-hour regulations, appears not to be impacted by the regulations except in limited circumstances, though additional studies more specific to common orthopedic procedures and to orthopedic patients could provide additional insight.

Orthopedic resident education standards are constantly changing in an effort to improve education, quality of care, and patient safety. Recently, the ACGME and American Board of Orthopaedic Surgery (ABOS) have implemented clinical “milestones” for evaluating residents’ competency based on knowledge and skill rather than postgraduate year (PGY).^{15,17} Education of orthopedic PGY-1 residents (interns) has evolved in the last 2 years as well, with 6 months of orthopedic rotations and surgical skills training now required.¹⁸ Additionally, the use of surgical simulation in orthopedic resident education has been rapidly increasing, particularly for arthroscopic surgery.¹⁹ Whether these recent changes improve patient care remains unclear, and future studies should address whether these changes objectively improve orthopedic surgical education, patient care, and patient safety.

Conclusions

Patients inquiring about resident involvement in their orthopedic procedure can be counseled that available evidence shows resident involvement does not hinder patient safety and does not increase complications. In the author’s opinion, academic medical centers with orthopedic residents involved in patient care may provide superior patient care and expertise in complex, challenging cases. In addition, we should strive to improve patients’ awareness of the orthopedic resident education process and the multiple recent changes designed to improve both resident education and patient care and safety.

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Commentary



Graduate Medical Education— A System in Evolution

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Orthopedic residency programs began as apprenticeships. Observation, imitation, and performing operations until deemed to be proficient by a single mentor was the method in which generations of surgeons were trained. Today, our system has evolved and is based upon a structured curriculum, and competence is not limited to technical abilities or number of cases. Residents are consistently supervised and observed in the development of their skills. Learning through simulation is standard practice. Programs must ensure that graduates are competent in their ability to communicate with patients and that they demonstrate professionalism and appropriate interpersonal skills. They must understand the health care system and be prepared for a lifetime of learning and improvement. Similarly, to remain accredited, residency programs must validate that they have the proper environment for learning. This includes a milieu of scholarship, oversight of work hours, and an atmosphere where residents may express concerns. Under the Next Accreditation System (NAS), teaching hospitals have regular external reviews to ensure that they provide the proper learning environment.¹ Trainees and practitioners must fo-

cus on outcomes, patient safety, quality, and disparities in care. This results in the development of better surgeons and competent physicians who can practice in a complex and changing system. The public should be assured that the care provided to patients in teaching hospitals is not only appropriately supervised, but is at the highest level of quality. Dr. Cvetanovich describes our new paradigm that, in order for academic medical centers to remain accredited, we must constantly prove that our outcomes are as good or better than those at nonteaching hospitals.

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Author's Disclosure Statement: The author reports no actual or potential conflict of interest in relation to this article.

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