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Humanitarian skill set acquisition trends among graduating US surgical residents, 2004-2014

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ABSTRACT

Background: Although interest in practicing surgery in resource-constrained settings is on the rise among graduating US surgical residents, there is ongoing debate about an optimal humanitarian skill set for surgeons who chose to work in such settings. In addition, increased emphasis on general surgery case exposure at the cost of specialty surgery case exposure has been documented and may have a negative impact on the breadth of resident training. Review of general surgery resident case logs to gauge experience in specialty surgery may provide insight into residents' readiness for work in resource-limited settings.

Methods: We compared Accreditation Council for Graduate Medical Education general surgery resident case logs from 2004 to 2014 for operations thought to be essential for working in resource-constrained settings. These operations were chosen from published literature on this topic and authors' personal experience. Case numbers for specialty operations were compared by unpaired t-test analysis between the two periods.

Results: Case averages in pediatric, genitourinary, and gynecologic surgery decreased significantly from 2004 to 2014 (range, 27%-46%). Orthopedic surgery case averages were unchanged, and plastic and general abdominal surgery case averages increased (range, 47%-50%).

Conclusions: Case mix among graduating US surgical residents has narrowed over the past 10 y. Resident experience in a variety of specialty fields, thought to be essential in resource-constrained settings, decreased markedly over the study period. Residents who intend to work in resource-constrained settings may need to craft individualized residency experiences or pursue postgraduate training in specialty surgery courses to best prepare for such work.

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Introduction

The past decade has seen an explosion of interest in the field of global surgery and in decreasing the burden of surgical disease in resource-poor areas in a sustainable manner.[1-3] Humanitarian surgery represents a subset of global surgery, generally understood to signify surgical care provided in emergent, resource-poor, and unstable settings; this is particularly important in an era of increasing global emergencies (such as Ebola), natural disasters,[4] and armed conflicts.[5] In the United States and abroad, a majority of surgery, critical care, and anesthesia residents have expressed interest in working in the humanitarian field[6,7]; however, given the increasingly complex situations of this field, obtaining adequate skill set and overall preparation for working in these situations is necessary.

Humanitarian surgery is by obligation a broad field, requiring expertise in a range of surgical skill sets including obstetrics and gynecology, orthopedics, plastic surgery, and visceral (abdominal) surgery, as well as experience with pediatric populations and trauma management.[8] This need for broad exposure conflicts with evidence that US surgical training has become more narrowed over the past decade, with intra-abdominal and alimentary tract surgery constituting the majority of a chief resident's operative experience.[9]

This study compares US general surgery resident case logs from 2004[10] and 2014[11] for operations thought to be essential for working in resource-constrained settings, in an effort to evaluate graduating residents' preparedness for working in humanitarian surgery settings.

Methods

The Accreditation Council for Graduate Medical Education (ACGME) compiles resident caseloads annually for accreditation purposes. We compared ACGME general surgery resident case logs (comprising the entire residency caseloads) of graduating residents from 2004 to 2014 for operations thought to be essential for working in resource-constrained settings. This determination was based on previously published work examining case distribution among surgical cases reported by several nongovernmental organizations working in low- and middle-income country settings.[8,12,13] The categories of interest were obstetrics, orthopedics, general surgery, pediatric surgery, and plastic surgery; the specific cases of interest included cesarean sections, closed reductions of fractures, burn debridement and grafts, and abdominal surgeries.

Case numbers for specialty operations were compared by unpaired *t*-test analysis between the two periods. Statistical analyses were performed using STATA software (StataCorp. 2013. Stata Statistical Software: Release 13. College Station, TX: StataCorp LP).

This study was deemed exempt from formal review by the University at Buffalo Institutional Review Board (665571-1).

Results

Case averages in pediatric, genitourinary, and gynecologic surgery decreased significantly from 2004 to 2014 (range, 27%-46% decreases). Orthopedic surgery case averages were unchanged, and plastic and general abdominal surgery case averages increased (range, 47%-50% increases).

More importantly, when assessing general surgery residents' exposure to other surgical specialties, many absolute numbers were very low: on average, only 1.5 orthopedic procedures were performed during an entire general surgery residency, 2.3 gynecologic procedures, and 4.0 genitourinary procedures; total pediatric cases decreased from 40.1 to 29.1 ($P < 0.0001$) cases averaged over a residency. Only plastic surgery average caseload numbers increased from 15.4 to 22.6 ($P < 0.0001$) (Table and Fig. 1).

Regarding laparoscopic *versus* open procedures, appendectomies are an effective indicator: in 2004, residents had on average performed 29.4 open appendectomies and 17.8 laparoscopic appendectomies. In 2014, these numbers were reversed, with a mean of 9.8 open appendectomies and 54.9 laparoscopic appendectomies.

We compared overall caseload proportions between 2014 graduating general surgery resident caseloads and a recently published caseload of a large international nongovernmental organization (Médecins Sans Frontières-France), to highlight differences in surgical caseloads present in humanitarian settings and the ACGME graduating resident caseloads (Fig. 2). This group's caseload was chosen as it might reasonably represent a caseload typical for emergency surgery work in resource-constrained settings.

Discussion

In a comparison of general surgery resident graduating case logs from two periods that spanned significant changes in duty hours and general surgery training approaches, we found a worrisome trend in general surgery education: general surgery residents caseloads' are narrowing,[9] and residents are performing fewer procedures from other specialties regularly required in humanitarian settings (OB-GYN, orthopedics, and pediatrics). Building on previous suggestions,[14] electives in these specialties and experience working in resource-limited settings may help better train surgeons preparing for working in humanitarian settings. Indeed, a recent publication by the World Health Organization Foreign Medical Team Working Group lists explicit minimal surgical requirements for surgical teams responding in sudden onset disasters, including "definitive wound and basic fracture management, damage control surgery, and emergency general and obstetric surgery."[15]

However, establishing competency remains an issue. How many procedures are enough to be considered proficient in a surgical technique? Laparoscopic colorectal resection learning curves plateau at 30 procedures.[16] Certain orthopedic publications indicate that 30-35 procedures per year of a common procedure, such as total hip arthroplasty, are sufficient to significantly lower complication rates—a substitute for determining expertise.[17,18] These numbers vary according to procedure and surgical training; four pediatric pyloromyotomies per year are recommended to have overall decreased complication rates, when performed by appropriately trained