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## Commentary: Boot camps may improve skills, but how can they be further strengthened?

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Excellence in technical skills is expected from our cardiothoracic (CT) surgical residents and fellows. This expectation arises from the nature of the work that we do; our operations are high-stakes, and there is minimal room for error. Simulation training and boot camps play valuable roles as compliments to time spent in the operating room. Such adjuncts enhance resident performance by permitting repetition of complex technical tasks until competence is achieved,<sup>1,2</sup> and they enable training in the management of complications and adverse events.<sup>3</sup>

In this issue of the *Journal*, Wiggins and colleagues<sup>4</sup> share their experiences with use of a boot camp to augment the skills of integrated CT residents, reflecting on the benefits achieved by the Thoracic Surgery Directors Association Boot Camp. The authors highlight the incredible advances made in the field of CT surgery that permit the optimization of education for our future workforce. The Thoracic Surgery Directors Association Boot Camp<sup>5</sup> has been able to reach an average of 33 trainees per year and has led the way by setting an exemplary standard in surgical simulation. This annual event has coupled simulation events with full performance assessments and blinded scoring.<sup>1</sup> Moreover, the Boot Camp directs resources toward further simulation training development and increases the number of expert educators in our field.<sup>6</sup> Its organizers and leaders have also investigated teaching behaviors, as the simulation setting provides an opportunity for educators to showcase



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### CENTRAL MESSAGE

Bootcamps and surgical simulation are advantageous in enhancing resident performance; however, further investigation is needed to clarify the efficiency of boot camps and simulation over time.

positive teaching behaviors compared with the clinical environment.<sup>7</sup>

It has been reported that the vast majority of CT surgery faculty concur that simulation is extremely useful<sup>8</sup>; nonetheless, attention must still be paid to both the efficacy and efficiency of any time allocated for trainees to spend outside of the operating room. While Wiggins and colleagues discuss the effectiveness and skill expansion speed of a boot camp, numerous analyses have shown that continuation of practice is equally important in the maintenance of skills competency.<sup>9,10</sup> Unfortunately, due to the demanding responsibilities of surgical training, voluntary longitudinal self-directed training can be difficult to foster.<sup>11,12</sup>

The work by Wiggins and colleagues is a great source of much-needed discussion in this era, although it does have certain limitations. The claim that boot camps expand skills rapidly remains unanswered by the data provided, and, as most of us believe this hypothesis to be true, it leads to the key question regarding whether the maintenance of this competency extends after the boot camp ends. The durability of such benefits has been proven to be somewhat limited, with the differences between those who participate and those who do not participate in boot camps having been shown to dissipate after a few (critical) months into clinical training.<sup>13</sup>

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While surgical education remains fundamental to progress in our field, its development needs to be data-driven and scientifically rigorous.<sup>14</sup> Undoubtedly, boot camps and simulation serve as invaluable approaches to enhance resident performance, and further investigations should be encouraged to ensure that laboratory-based teaching can translate into patient-oriented benefits with minimal detriment to clinical responsibilities and operating room time that have already been heavily impacted by the pandemic.<sup>15</sup> Ultimately, ongoing surgical curricular development is a necessary and iterative process, and, just as we persist in applying rigor to the evaluation of our clinical interventions, the impact of our educational efforts on trainees and patients must continue to be meticulously investigated.

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