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EDITORIAL

''Changing the focus'' for simulation-based education assessment... not simply ''changing the view'' with videolaryngoscopy☆,☆☆

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Tracheal intubation is a critical life-saving procedure performed by pediatric healthcare providers to support critically ill and injured children. These children often have challenging airway anatomy, low oxygen reserve, and unstable hemodynamics with high risk for severe desaturation and other adverse tracheal intubation-associated events.[1] These short-term adverse outcomes during tracheal intubation are associated with worse long-term outcomes: longer duration of mechanical ventilation and ICU stay, and higher mortality.[2] Pediatric tracheal intubation in the emergency department is a low-volume and high-risk procedure, especially when performed by pediatric residents.[3] The age-old training adage of ''see one, do one, teach one'' on real patients during pediatric residency training is slowly being replaced by the emergence, dissemination, and labor intensive but effective implementation of simulation-based education.[4–6] In this issue of *Jornal de Pediatria*, Couto et al.[7] describe how they are ''changing the view'' in airway management education. They describe the impact of simulation-based mastery learning with directed practice to teach residents how to transition from using their usual direct view of the larynx with a standard laryngoscope, to a new technology-augmented view through videolaryngoscopy. Using a checklist based upon ''work as imagined,'' Couto et al.[7] implemented a simulation-based educational intervention to teach videolaryngoscopy, trained until learners achieved ''mastery level'' performance on manikins to assess ''work as simulated,'' and then assessed the impact of simulation-based educational interventions on real patient intubation process of care and outcomes in the emergency department (''work as done'').[8,9] In fact, they have gone far beyond ''changing the view.'' They have completely changed the ''lens'' and shifted the ''focus'' from measuring theoretical improvements in processes of care and outcomes on manikins to actual processes of care and outcomes for real patients!

The two-year, single-center, retrospective cohort study by Couto et al. included 59 pediatric physician trainees who voluntarily completed a simulation-based mastery learning intervention early in their second year of residency, prior to rotation in their hospital emergency department. The tracheal intubation skills evaluation checklist completed by trained observers included measurable cognitive, behavioral, and technical metrics, with appropriate attention to validation for reliability and inter-rater consistency. Within 30 min to two hours of training, 100% of trainees were successfully trained to achieve prospectively designated mastery-level performance on manikins. This general approach, of deliberate practice and mastery learning, has

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previously been reported as effective for procedural skill training.[10,11] What is particularly impressive in Couto et al.'s study[7] is the attention to five important components which support successful implementation of new technology or processes of care into the clinical environment: 1) proactive training on new techniques with the sharp-end providers who will actually be deploying them, 2) ''bundling'' the introduction of the new technology with specific training on that technology, 3) mastery-level instead of minimal competence training goals, 4) measuring and documenting the acquisition of the skill (uptake) in a simulated realistic environment after training has been completed, and 5) assessing transfer of the procedural skill acquired during simulation to safe and effective performance on real patients in real care environments. Indeed, this study reports an impressive improvement from a previously published historical first-attempt tracheal intubation success rate of 39%,[12] to a much improved 78% success rate. The associated 26% adverse tracheal intubation outcome (severe desaturation and/or other adverse event during intubation) rate is now comparable to the 24–31% rate reported from the NEAR4KIDS international registry for critically ill children across multiple centers.[13]

The authors do acknowledge several important limitations of this study. As a single-center study, the training and approach was contextualized to the learners, facilitators, and environment of this particular hospital and training program. It is difficult to know if this is generalizable to other settings. In addition, the pre-intervention clinical data was historical and general, and demonstrated a very low baseline performance of residents (39% historical success rate). Whether the time, effort, and commitment of faculty and trainees would provide effective return on investment if the baseline performance started at a more typical (higher) level cannot be determined without a concurrent and contemporary control group. Finally, the size and type of videolaryngoscopy equipment available at the time of the study was limited to sizes only appropriate for children over the age of 1 year, thus intubation attempts on infants under the age of 1 year could not be included. Of note, these younger infants often have challenging airways and little respiratory reserve, making them prone to desaturation and other adverse events during tracheal intubation.[14,15]

Despite these acknowledged limitations, this study should be heralded as a landmark in the evolution from traditional ''see one, do one, teach one'' apprenticeship paradigms of medical education to a more contemporary simulation-enhanced healthcare system with embedded learning.[16,17] The report by Couto et al.[7] illuminates the opportunity to integrate simulation and validated summative assessments to more profoundly inform learner achievements of procedural milestones, teamwork, crew resource management, and clinical competence while acknowledging consistent barriers to dissemination and implementation of simulation-based education. These barriers include time constraints of faculty, trainees, and simulation support staff combined with omnipresent funding challenges for both simulation and residency training programs.[5,18–20] This landmark study not only literally ''changes the view'' for the specific procedure of tracheal intubation with videolaryngoscopy, but ''changes the lens and the focus'' through which we should judge future educational intervention studies. With thought, diligence, and perseverance there is now evidence that transformative educational interventions can permeate to enrich our trainee clinician performance and – most importantly – to benefit our patients.

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Conflicts of interest

The authors declare no conflicts of interest.

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