



Innovations in Simulation

Into the sim arena: Competing to learn, learning to compete—An experience report on the first Brazilian simulation competition

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ABSTRACT

The first Brazilian realistic simulation competition in trauma and emergency care is a pioneering initiative in simulation-based health education. The event involved eight medical schools and multidisciplinary teams in a three-day program combining technical and nontechnical skills training. Twenty-six scenarios were designed by experts, utilizing mannequins of varying fidelity, standardized patients, and part-task trainers. Team performance was assessed through structured checklists integrated into SimCapture®, enabling real time scoring, and detailed competency analysis. The competition was conducted to explore the role of simulation events in promoting and consolidating a culture of simulation in Brazil, fostering interprofessional teamwork and patient safety.

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Introduction

Health education based on simulation methodology has been increasingly recognized as an effective strategy for training healthcare professionals, enabling the development of both technical and nontechnical skills in safe and controlled environments (Cant & Cooper, 2010; Cook, 2014; Robinson et al., 2024). With the growing emphasis on patient safety initiatives, simulated practices using mannequins and structured scenarios have been increasingly applied to minimize the risks inherent to the learning process (Higham & Baxendale, 2017).

However, the implementation of this methodology in developing countries such as Brazil faces significant challenges, including infrastructure limitations, restricted access to technology, a shortage of qualified personnel, and resistance to the use of active learning methodologies in education. Conversely, initiatives have emerged to facilitate the use of simulation in resource-limited contexts. These solutions include online platforms, simulation-based games, and artificial intelligence tools for clinical case planning and assessment (Cecilio-Fernandes et al., 2024; de Lima et al., 2023; Lulic et al., 2025).

By navigating the limitations of the Brazilian context and aiming to promote a culture of simulation in the country, we designed the first Brazilian realistic simulation competition in trauma and

emergency care as an innovative approach to promote a culture of simulation and overcome the identified barriers. This report aims to describe the development, and implementation of the first national simulation competition in Brazil.

Description of the innovative approach in Brazil

The first clinical simulation competition in Trauma and Emergency took place from March 14 to 16 in 2025 in a Simulation Center in Brazil. The study was approved by the Institutional Review Board (Approval Number: 91964825.8.0000.5404).

Fifteen medical schools were invited to participate in the competition and eight Brazilian medical schools from four different Brazilian states accepted it. Each interdisciplinary team was composed of up to six participants, including four medical students and two nursing students or registered nurses, resulting in teams with varied levels of clinical experience. In total, 48 students participated in the competition.

Scenario development phase

Prior to the competition, a total of 26 scenarios (Table 1) were developed collaboratively by a panel of 16 experts composed primarily of physicians from various medical fields, including pediatrics, trauma surgery, intensive care, radiology, gynecology and obstetrics, emergency medicine, as well as nursing faculty and reg-

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Table 1

Title, Type, Simulator, Brief Scenario Description, and Mean Team Score (0-100 points) for Each Scenario.

	Station	Medical Specialty	Fidelity	Simulator	Brief Scenario Description	Mean Score (SD)
DAY 1	1	Pediatric emergency	High	Laerdal SimJunior®	Severe respiratory failure in a child due to laryngitis	80.00 (14.07)
	2	Trauma surgery	High	Laerdal SimMan®	Polytrauma with hypovolemic shock of abdominal origin	87.00 (6.78)
	3	Intensive care medicine	Medium	All Solutions EMS-Man®	Initiation and management of brain death protocol in the ICU	64.53 (15.09)
	4	Gynecology and obstetrics	High	CAE Healthcare Lucina®	Eclampsia in a pregnant patient at 37 weeks of gestation	56.77 (15.14)
	5	Emergency medicine	High	Laerdal SimMan®	Respiratory failure due to acute hypertensive heart failure	64.93 (17.22)
	6	Internal medicine	High	Standardized patient	Stroke (identification during an outpatient consultation)	66.13 (15.39)
	7	Trauma surgery	High	Standardized patient	Prehospital care of polytrauma in an urban setting	73.69 (10.13)
	8	Nursing	Medium-	Laerdal MegaCode®	Polytrauma with tension pneumothorax	89.72 (6.65)
DAY 2	9	Pediatric emergency	High	Laerdal SimJunior®	Application of cardiac arrest algorithm according to PALS	93.08 (6.47)
	10	Anatomy	Low	Csanmek 3D Anatomic Atlas®	Identification of anatomical structures	58.75 (12.18)
	11	Trauma surgery	Low	All Solutions EMS-Man®	Intraosseous puncture	90.28 (8.67)
	12	Gynecology and obstetrics	High	Laerdal SimMom®	Performance of McRoberts and Rubin Maneuvers in shoulder dystocia delivery	55.31 (26.68)
	13	Emergency medicine	High	Laerdal SimMan®	Electrical cardioversion for ventricular tachycardia	64.71 (17.34)
	14	Public health	High	Standardized patient	Blood pressure measurement and ECG interpretation	63.44 (16.39)
	15	Radiology	Low	None	Assessment of simple chest X-rays	54.38 (14.92)
	16	Intensive care medicine	Low	None	Interpretation of arterial blood gas and ECG	76.72 (17.06)
	17	Pediatric emergency	Low	Laerdal Little Baby QCPR®	Airway clearance (foreign body airway obstruction)	94.69 (4.23)
	18	Radiology	Low	Csanmek 3D Anatomic Atlas®	Assessment of CT scans	55.00 (7.07)
	19	Trauma surgery	Low	All Solutions EMS-Man®	Hemorrhage control using a tourniquet	54.69 (9.56)
	20	Emergency medicine	Medium	Laerdal MegaCode®	Application of the cardiac arrest algorithm recommended by the AHA	63.91 (15.28)
	21	Emergency medicine	Low	Laerdal Airway Management Trainer®	Difficult airway management/use of LMA	61.25 (20.41)
	22	Gynecology and obstetrics	High	Standardized patient	Immediate care of sexual assault victim	68.84 (14.19)
	23	Trauma surgery	Low	Anatomic Skin Suture Training TGD- 4003-S	Suturing technique	87.50 (10.90)
	24	Radiology	Low	Csanmek 3D Anatomic Atlas	Assessment of cranial CT	57.66 (17.73)
DAY 3 - Final stage	25	Trauma surgery	High	Laerdal SimJunior®	Emergency room management of polytrauma with grade IV liver injury	85.00 (1.67)
	26	Pediatric emergency	High	Laerdal SimMan®	Emergency room management of a child with traumatic brain injury/Extensive subdural hemorrhage	61.56 (9.69)

Note. AHA = American Heart Association; CT = computerized tomography; ECG = electrocardiogram; ICU = intensive care unit; LMA = laryngeal mask airway; PALS = pediatric advanced life support; SD = standard deviation.

istered nurses with experience in clinical nursing, trauma care, and emergency settings.

Before the competition, the organizing committee defined the educational focus of each day: the first and last days were dedicated to scenarios aimed at training nontechnical skills, whereas the second day focused on technical skills. This predefined structure guided the selection of the type of simulation for each scenario, which included part-task trainers, standardized patients, and full-body manikins. Standardized patients were medical students who received specific training on the same day the scenarios were conducted to ensure scenario fidelity and to prevent prior dissemination of scenario information.

Checklist development and evaluation phase: SimCapture® system

For each scenario, a checklist was developed by the same panel of experts who designed the scenarios. The evaluation criteria were defined based on the learning objectives of each scenario, aligned with current clinical guidelines and principles of simulation-based education. Each item was scored using a Likert-type scale: “performed” (2 points), “partially performed” (1 point), and “not performed” (0 points), with a maximum possible score of 100 points per checklist. The checklists were integrated into the SimCapture® system (Laerdal®), a platform designed to manage, record, and evaluate simulation-based training through scoring. Team perfor-

mance was monitored in real-time using the software-generated results, with overall scores calculated based on the sum of assessed items throughout the competition and automatically converted into a percentage of correct actions by the system.

Additionally, SimCapture® enables the mapping of team performance across different competency categories within each station, allowing detailed analysis, identification of well-established competencies, and areas requiring improvement. The platform also facilitates comparisons of overall and competency-specific results between teams from different specialties. Each team was evaluated by two independent examiners at each station, who were the same experts responsible for developing the respective scenarios, resulting in a total of 52 performance records corresponding to 26 stations over the three days of activities.

The checklist evaluated both the students' technical and non-technical skills. In this context, technical skills were defined as the set of practical abilities related to performing clinical and surgical procedures and direct patient management, grounded in scientific knowledge. Regarding nontechnical skills, no formal structured framework (e.g., TeamSTEPPS or other teamwork competency models) was explicitly adopted. However, cognitive, social, and personal competencies essential for safe and effective patient care were evaluated. These included aspects such as interpersonal communication, leadership, teamwork, time management, decision-making, situational awareness, and the ability to cope with stress inherent to critical situations.

Competition procedures and daily schedule

Psychological safety

Although competition may induce stress and potentially hinder learning, specific strategies were implemented to ensure psychological safety throughout the activity, particularly for students. These included a supportive learning environment, clear communication of expectations, emphasis on learning rather than performance outcomes, and structured debriefing sessions focused on reflection and constructive feedback. Such measures aimed to minimize anxiety, encourage active participation, and promote meaningful learning experiences.

At the beginning of each day, students received an introductory presentation explaining the purpose of the activity, participation procedures, and evaluation criteria. Prior to the event, participants were informed about the general scope of the competition; however, no specific scenario content was provided in advance to preserve the authenticity of the simulation experience.

Day 1—Nontechnical skills assessment: On the first day of competition, the teams participated in eight stations conducted simultaneously across eight rounds. Each station lasted 18 minutes, comprising a five-minute prebriefing followed by a 13-minute scenario simulation. Medium-and high-fidelity mannequins were employed to enhance scenario realism. Timing was strictly monitored by event facilitators, and the commencement and conclusion of each stage were indicated by whistles.

Day 2—Technical skills assessment: On the second day, the students engaged in 16 stations, each one lasting ten minutes with two minutes to review the case. The stations emphasized the assessment of technical skills through procedural execution in low-fidelity simulators.

Day 3—Finals: On the third day, following participation in 24 scenarios, the two teams with the highest cumulative scores advanced to the final stage. This stage comprised two high-fidelity scenarios involving complex pediatric and trauma cases: initial management of a child with traumatic brain injury and initial trauma care, respectively. Both stations lasted 20 minutes each, with three minutes allocated to the prebriefing. The team which achieved the highest combined score across these scenarios was

declared the winner. No monetary or material awards were distributed; however, the winning team earned eligibility for the forthcoming international stage of the competition.

End-of-day collective feedback

At the conclusion of each competition day, a collective feedback session lasting approximately 30 minutes was conducted in the Faculty auditorium, facilitated by evaluators experienced in simulation-based education. Feedback addressed both successful strategies and areas requiring improvement, with a brief, focused explanation of the main clinical and teamwork-related topics explored during the scenarios, followed by an interactive question-and-answer discussion. Students and faculty actively engaged in the session, clarifying doubts and reflecting on decision-making processes, team performance, and the experiential learning gained throughout the competition.

Although no formal debriefing framework was applied, this feedback-oriented approach incorporated core elements of reflective learning, including guided discussion and constructive comments aligned with observed performance. Due to the competitive format and time constraints, feedback was intentionally concise and delivered collectively, representing a pragmatic adaptation to the educational context.

Conclusion

The implementation of this competition provided key insights for large-scale simulation events. From an organizational perspective, these included the logistical necessity of dedicated software (SimCapture®) for real-time scoring, the challenge of ensuring rater consistency without access to disaggregated scores, the practical compromise between competitive rigor and psychological safety, and the adaptation of collective feedback to replace in-depth debriefing under time constraints. In addition, the success of the competition highlighted the critical role of strong commitment and engagement from the team responsible for scenario development, whose coordination and preparedness were essential to ensure standardization, realism, and educational alignment across stations. These factors are crucial considerations for future organizers.

From an educational perspective, the competition incorporated key principles of active learning, experiential learning, and simulation-based education, which are widely recognized as effective strategies for developing clinical and teamwork competencies. Immersion in realistic scenarios, combined with the use of technology for performance recording and analysis, might have enhanced the objectivity of the results. The adopted model facilitated active learning and enabled identified weaknesses to be addressed and discussed in a safe setting, potentially reinforcing knowledge internalization. Events of this nature have the potential to strengthen the culture of simulation in Brazil and foster interinstitutional and interprofessional collaboration. Moreover, the success of the event could provide a foundation for future competitions, offering a platform for continued innovation and excellence in simulation-based education.

Limitations and recommendations

- The replication of the event may be constrained by the required infrastructure, limiting its applicability in resource-limited settings.
- In addition, the heterogeneity of the teams—reflecting differences in training levels and including both undergraduate students and already qualified practicing professionals—may have

influenced performance outcomes and, consequently, limited the comparability of results across teams.

- For future editions, we recommend standardizing the overall scoring of the assessment checklists by establishing a fixed maximum score for both technical and nontechnical skills across all scenarios. This approach would enhance comparability and ensure consistent evaluation of team performance.
- The scenarios were not submitted to a pilot session due to time constraints and adjustment challenges, and we strongly recommend including this step in future implementations.
- Although two independent evaluators assessed each station, inter-rater reliability coefficients were not calculated, which represents a limitation of the study. Future implementations should include formal assessment of inter-rater agreement using reliability coefficients such as intraclass correlation coefficient or Cohen's kappa, depending on the nature of the scoring system.
- There were no structured participant evaluation data, such as measures of satisfaction, perceived confidence, teamwork attitudes, or perceptions of simulation as a learning method. Future studies should incorporate validated evaluation instruments and comparative analyses to better capture participants' educational experiences and learning gains in simulation-based competitions.
- This selective participation may introduce selection bias and limit the generalizability of the findings, as participating schools may have had greater interest in or access to simulation-based education.

Declaration of generative AI and AI-assisted technologies in the writing process

Portions of this manuscript were translated from Portuguese to English using ChatGPT. After using this tool, the authors reviewed and edited the content as needed and took full responsibility for the content of the publication.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

CRediT authorship contribution statement

Flávia Cristina Zanchetta: Writing – review & editing, Writing – original draft, Visualization, Project administration, Method-

ology, Investigation, Formal analysis, Data curation, Conceptualization. **Nathália Bariján Crepaldi Bezerra:** Writing – review & editing, Writing – original draft, Visualization, Investigation, Conceptualization. **Andrea de Melo Alexandre Fraga:** Writing – review & editing, Supervision, Project administration, Investigation, Conceptualization. **Gustavo Pereira Fraga:** Writing – review & editing, Visualization, Supervision, Resources, Project administration, Investigation, Conceptualization.

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References

- Cant, R. P., & Cooper, S. J. (2010). Simulation-based learning in nurse education: Systematic review. *Journal of Advanced Nursing*, 66(1), 3–15. <https://doi.org/10.1111/j.1365-2648.2009.05240.x>.
- Cecilio-Fernandes, D., Peccin, M. S., Sandars, J., Couto, T. B., & Mazza, A. (2024). Advancing simulation-based education in Brazil: Bridging research and practice for healthcare excellence. *Einstein (Sao Paulo, Brazil)*, 21(Suppl 3), eEDS3. https://doi.org/10.31744/einstein_journal/2023EDS3.
- Cook, D. A. (2014). How much evidence does it take? A cumulative meta-analysis of outcomes of simulation-based education. *Medical Education*, 48(8), 750–760. <https://doi.org/10.1111/medu.12473>.
- de Lima, M. F., Meschial, W. C., Cecilio, H. P. M., Coimbra, J. A. H., Zago, M. G. C., Castro, V. C., Uema, R. T. B., & Higarashi, I. H. (2023). Workshop on pediatric trauma care: Low-cost simulation. *Revista Brasileira de Enfermagem*, 76(Suppl 4), Article e20210485. <https://doi.org/10.1590/0034-7167-2021-0485>.
- Higham, H., & Baxendale, B. (2017). To err is human: Use of simulation to enhance training and patient safety in anaesthesia. *British Journal of Anaesthesia*, 119(suppl_1), i106–i114. <https://doi.org/10.1093/bja/aex302>.
- Lulic, I., Mesquita, C., Lulic, D., Simões, R. L., Ferreira, L., Koleda, P., Baptista, S., Alexandrino, H., Calderan, T. R., Carvalho, V. H., Kruger, V. F., Belem, R. C., López-Mozos, F., Yanez, C., Saric, J. P., & Fraga, G. P. (2025). Strengthening trauma resuscitation education and training in low-resource settings: A call for global inclusion. *Resuscitation Plus*, 23, Article 100935. <https://doi.org/10.1016/j.resplu.2025.100935>.
- Robinson, S. J. A., Ritchie, A. M. A., Pacilli, M., Nestel, D., McLeod, E., & Nataraja, R. M. (2024). Simulation-based education of health workers in low- and middle-income countries: A systematic review. *Global Health, Science and Practice*, 12(6), Article e2400187. <https://doi.org/10.9745/GHSP-D-24-00187>.