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EDITORIAL COMMENT

''Observe, simulate, execute and mentor'': A contemporary approach to learning in Interventional Cardiology

«Observar, Simular, Executar e Orientar»: uma abordagem contemporânea ao processo de aprendizagem na cardiologia de intervenção

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In a rapidly evolving world, in which the complexity of procedures continues to grow, simulation has emerged as an indispensable tool for teaching, learning and improvement across diverse domains. Starting with aviation; simulators were introduced in the 1920s, covering areas ranging from medicine to engineering. The ability to simulate real-life situations plays a pivotal role in training high skilled professionals and simultaneously mitigating. Simulation not only provides a platform for practice and risk-free hands-on experience but also offers a controlled, reviewing, and reproducible environment for testing hypotheses, developing, improving skills, and enhancing performance.

The aim of this editorial is to underscore the growing importance of simulation as a crucial tool in a continuous quality improvement process, especially within the field of Interventional Cardiology.

Learning through simulation offers numerous benefits, as outlined in the existing literature.[1,2] Being able to repeat procedures without risking harm to patients or trainees is particularly important, especially in the context of invasive procedures such as those performed in Interventional Cardiology, which carry inherent risks due to their invasive nature. Training on simulators enables the repetition of the same scenario multiple times and the practice of both technical and non-technical skills using real medical equipment. This repetition is beneficial not only to the trainee repeating the task but also for others. Indeed, simulation training enables the development of teamwork management by improving communication skills. It is also possible to train on more rare clinical scenarios and/or complex procedures. And, in a simulation scenario there is room for error as it is possible to test different workouts, without the risk of causing life-threatening situations. Both the repetitive practice and learning from our mistakes are integral stages in the learning process.

Despite the numerous advantages of learning through them, simulators are only an approximation or imitation of reality, and their validation as a tool with close resemblance in appearance and content to reality is very important. In this study from Sequeira et al.,[3] the authors evaluated the face and content validity of a three-dimensional (3D) printed simulator called SimulHeart® for training in Interventional Cardiology. The study involved recruiting health professionals from sixteen Portuguese Interventional Cardiology units who received theoretical instruction, demonstrations, and then performed interventions on the simulator. A post-training questionnaire assessed the appearance, content, and satisfaction/self-efficacy of the simulation. Results indicated that the SimulHeart® has a good level for face and content validity, with no apparent significant difference between experts and novices, suggesting a potential value in Interventional Cardiology training programs. Participants were satisfied and had confidence in their skills

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post-training, with most feeling confident enough to perform procedures on patients after simulation.

This was the first published article in Portugal on the validation of a 3D model simulator for training in Interventional Cardiology, and the authors should be congratulated on this important step. However, further research is needed to establish a correlation between simulator performance and clinical outcomes in real patients.

In Interventional Cardiology, the learning curve to improve operator skills was traditionally mentor-based training in the first years of the career. Nevertheless, some evidence suggests that training using simulators for coronary angiography enhanced operator proficiency in contrast to conventional mentor-based training methods.[4,5] This concept has already been recognized in Interventional Cardiology training programs.[6,7] In conventional mentor-based training programs for Interventional Cardiology, trainees are exposed to a variety of acute and elective cases under direct supervision. They progress from being second operators to first operators and ultimately to achieving independent operator status by the time they complete their training. The 2020 EAPCI Core Curriculum for Percutaneous Cardiovascular Interventions[7] advocated for training facilities to integrate Interventional Cardiology simulators onsite or to offer simulation sessions during the initial stages of trainees' education and/or skill development.

Not only are we far from having a structured program with a precise definition of the type and quantity of Interventional Cardiology procedures that should be included in the initial phase of simulator-based training, but there are also no guidelines regarding how simulators should perform these tasks. A national training core curriculum for Cardiology in general, and Interventional Cardiology in particularly, supported by simulator training has not yet been established. Perhaps because there are still several barriers to the use of simulators. Despite the increasing number of different simulators, we still face the limitation of their availability due to the inherent cost of purchase. In addition, there is also the cost of maintaining simulation programs, which require constant software updates and the creation of additional scenarios.

It is also important to remember that simulator-based training does not replace supervised education because providing feedback during its use through debriefing sessions is crucial simulators to be an effective tool. Recruiting a team of well-trained instructors who are available to develop simulation programs can be challenging. Finally, regular, and consistent practice by both trainees and instructors is necessary to apply the acquired knowledge effectively in real-life situations. This process can, however, be time and cost consuming.

In Portugal, in recent years, training in medical simulation has been expanding and gaining recognition, but access is not uniform as already mentioned. Some Portuguese universities and hospitals have established dedicated simulation centers equipped with high-fidelity simulators and advanced technology. These centers offer practical training for medical students, resident physicians, and practicing healthcare professionals. In the future, the creation of cardiac catheter laboratory simulators, facilitating the acquisition and maintenance of skills, would be desirable. Advancements in technology, such as artificial intelligence and augmented reality, are expected to further enhance the realism and effectiveness of simulation training. Moreover, once these laboratories are established, we can work toward encouraging the attainment of simulation-based certifications. These certifications would not only enable the initial training of early-career trainees, but also facilitate ongoing education for senior operators. Although simulators complement training, they do not replace the richness of training with mentors in real-life scenarios. I'm tempted to say that soon, the classic adage of ''see one, do one, teach one'' may be obsolete and should be replaced with ''see many, simulate many, do many and teach many'', which is equivalent to saying ''Observe, simulate, execute and mentor''.

This principle emphasizes the importance of observation, simulation-based hands-on experience, practice in a real environment, and sharing knowledge with others as integral parts of the learning process. It emphasizes the multifaceted nature of the learning process, and the different ways individuals may approach acquiring new skills or knowledge.

Conflicts of interest

The author has no conflicts of interest to declare.

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