Guest Editorial

Anaesthetic simulation, and education and training in South Africa

Medical simulation offers innovative and reproducible training experience for anaesthetists at all levels. It is established in medical curriculums across the globe, providing a platform from which to teach the introduction of new skills, critical incident training and multiprofessional team training. However, despite its widespread use in medical and anaesthesia education, well conducted research and subsequent publication is scarce.

Simulation offers the medical profession an opportunity for simulation based assessment of competence. Assessment of medical competence remains a challenge facing medicine today,[1] with numerous pitfalls, especially surrounding fairness, reproducibility, validity and rater variability. Boulet and Murray[1] provide insight into the key issues surrounding the implementation of simulation-based assessment in anaesthesiology (Table I).

Table I: Steps to follow when developing a simulation-based assessment tool

- Define the skills and choose the appropriate simulation tasks
- Develop appropriate metrics
- Assess reliability
- Provide evidence to support the validity of the test score

In this issue, Horsten et al[2] provide insight into both the complexity of establishing a simulation-based assessment tool and some of the techniques necessary to ensure the success of research in this area. They established a clear clinical scenario to assess, and used the Delphi technique to ascertain the high-content validity (the extent to which the assessment was representative of what it was supposed to measure) of their assessment tool.

The Delphi technique has been used in both medical[3] and nursing professions[4] to establish content validity for the assessment of a key technical skill. However, one of the drawbacks of the Delphi technique is that it does not address cognitive skills or non-technical skills, such as situation awareness, communication, decision-making and planning. The assessment of these cognitive skills becomes more relevant with experienced clinicians, when many actions become intuitive. To test these cognitive skills, an assessment tool such as the Anaesthetists' Non Technical Skills[5] scoring system has been developed and validated, and could be used in conjunction with the technical skills assessment tool to provide better insight into an individual's performance.

Horsten et al's construct validity (the degree to which a test measures what it claims, or purports, to measure) is also high as they showed that scores improve with increased clinical experience. The performance was rated in real time which can be more challenging than using post-simulation video analysis, although they achieved good inter-rater reliability. Enhanced rater training, while using different rating tools, such as a global rating score, can improve inter-rater reliability.[5] A combination of a checklist and a global rating score can be used to improve reliability in an anaesthetic scenario, and ensure that both technical and non-technical skills are assessed.

Face validity (which is the relevance of a test as it appears to test participants) is difficult to achieve, especially when there are financial constraints. The key issue is that the assessment tool should take this into account, and not negatively affect an individual's outcome assessment. It is important to maintain a high degree of realism, while ensuring commitment from the participants, to improve the face validity. The use of a standardised patient for the history-taking element, for example, could have improved the face validity of the scenario in this study.[2]

The authors did not establish criterion validity (which relates the candidates' performance to established standards of practice) and concurrent validity (which relates the test performance to the candidates' performance in tests that are believed to assess the same attributes). They were difficult to establish in the context of this study, but future studies on simulation assessment tools should address criterion and concurrent validity.

What this paper[2] highlights is that clinically relevant simulation research is possible in South Africa. South Africa has a burgeoning simulation network, and it is important that centres collaborate and establish a national anaesthetic simulation curriculum, similar to what is being achieved by the Canadian Royal College.[7]

Medical simulation is an educational method. Thus, sound medical educational methodology must be applied when conducting research in this field. The book by Fraenkel and Wallen,[8] which offers an excellent introduction into educational research, is a good starting point to guide research in this field for non-educationalists.

Table II: Medical simulation research features

1. Feedback
2. Deliberate practice
3. Curriculum integration
4. Outcome measurement
5. Simulation fidelity
6. Skill acquisition and maintenance
7. Mastery learning
8. Transfer to practice
9. Team training
10. High-stake testing
11. Instructor training
12. Educational and professional context

Opportunities for research in simulation-based medical education are extensive. An in-depth analysis of many of the research questions that need to be answered is provided in a paper by McGaghie et al.[9] The authors explore 12 features pertaining to medical simulation which should form the basis of research in this area (Table II).

Six consistent flaws[10] which should be avoided when conducting simulation-based research are outlined in another review by McGaghie et al (Table III).

Table III: Six simulation research flaws which should be avoided

1. Awareness of research and scholarship beyond an individual's medical specialty
2. Few subjects, with no attention given to statistical power
3. Lack of awareness about the basic designs used for research in education and behavioural science
4. The reliability of dependent variables
5. The inconsistent use of statistics and statistical reporting
6. Properties of the educational intervention are rarely described

Research is a key factor in advancing the field of medical simulation in order to benefit both patients and healthcare professionals. Medical simulation research is a young and exciting area of research, with many potential pitfalls. I would again recommend that simulation centres in South Africa collaborate and establish a joint research agenda. Issenberg et al conducted extensive work in setting out a research agenda for American and European simulation societies,[11] and this could form the foundation for collaboration in South Africa. Collaborative South African simulation research could lead to high-quality outcomes for both patients and healthcare professionals in South Africa.

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