

Stress and heart rate in high-fidelity training scenarios for undergraduate medical students

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Aims

To evaluate whether the simulation environment is a significant contributor to stress for participants of high-fidelity simulation teaching, and whether heart rate is a realistic and practical surrogate measure for stress within simulation.

Methods

Seven third-year medical students underwent continuous ambulatory heart rate monitoring while performing a high-fidelity simulation of an upper gastrointestinal haemorrhage. Pre- and post-simulation Likert-style questionnaires were distributed, in which students rated their levels of perceived anxiety regarding a selection of common clinical situations encountered in simulation. Intra-simulation heart rate readings were taken at 2-minute intervals, and compared to baseline reading taken in a classroom. Paired Student's *t*-test was used to compare average baseline heart rate to average heart rate on entering the simulation environment, and average heart rate increase during the scenario. Point data were used for anecdotal comment. Local ethical approval was granted as a service evaluation.

Results

The average heart rate (HR) on entering the simulation environment was 118% (n=7) of baseline, which was not a significant increase (paired Student's *t*-test: $t(6)=-1.228$, $p>0.05$).

A significant rise was noted between heart rates on initial entry into the simulation room, and heart rates during the scenario (paired Student's *t*-test comparing initial heart rate and average simulation heart rate: $t(6)=-3.265$, $p<0.05$); this was particularly increased when confronted with a peri-arrest patient (mean HR 159% of baseline (n=7)). Heart rates also rose when performing initial ABCDE assessment (144% of baseline, n=4), and during phone handovers to a sympathetic registrar (136% of baseline, n=3) and an angry consultant (160% of baseline, n=3).

Out of eight clinical stressors, students on average ranked 'dealing with deteriorating physiology' as the most stressful scenario, and 'a session in the SIM suite' as the least stressful. 100% of students rated the simulation experience 'extremely useful'.

Conclusions

This pilot suggests that it is the scenario within the simulation suite that causes stress to participants, and not the simulation environment itself. Anecdotal data suggest that heart rate rose at points that students reported maximal stress, suggesting that measurement of heart rate is a good surrogate marker for stress. The pilot achieved its objectives as proof of concept, and heart rate monitoring will be integrated into the simulation and debrief experience within the undergraduate and postgraduate education departments, allowing trainers to identify and target specific learning needs. ■