SIMULATION STRESS

IN A STUDENT PARAMEDIC

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The undergraduate paramedicine education setting often attracts high achieving students who are motivated to gain knowledge, challenge themselves, and expand their skill sets to become the greatest clinicians possible. This competitive drive often stems from students' passion for a career in paramedicine and their desire to make a difference in the lives of patients. This is furthered by the prospect of securing a job post-graduation, which is known to be a competitive task among students and paramedics. This is an environment that yields stress.

Student life & stress

Students partake in many academic, practical, and extra-curricular activities throughout their undergraduate program to further their academic development and cultivate desirable employability skills. This includes classroom-based academic lectures, tutorials, assessments, and training simulations, in addition to clinical placements and additional volunteer and research opportunities.

However, the competitive educational environment often yields stress among many students. This is particularly prominent in case-based training simulations, which simulate realistic stressors that a qualified paramedic may face in their work environment [1].

These simulations are performed up to several times each week, and aim to challenge students' clinical knowledge, technical skills, and their ability to devise and implement suitable management plans for a range of high and low acuity patients with varying medical conditions.

Simulation stress

The literature identifies that this training simulation-associated stress is not only confined to paramedicine, but is also shared across other nursing and medical student cohorts. Understanding the nature and effect of this stress is critically important in promoting personal well-being and career longevity for students striving for a career in health.

As a student enrolled in the third year of a paramedicine degree, I have experienced this stress first-hand and have sought to investigate this through a pilot study research project under the guidance of a research-active paramedicine academic. This project involved data collection and analysis using an innovative physiological recording device to measure student vital signs and determine their stress response surrounding clinical training simulations.

Method

The physiological response of one student paramedic was recorded using the Hexoskin biometric shirt. This occurred during three separate data collections over a one-week period: student-directed learning (SDL), 'trauma' practical assessment, and 'respiratory conditions' practical assessment.

1. The participant was fitted with the Hexoskin biometric shirt prior to each session.
2. The assigned data pack was attached and activated.
3. Vital signs were recorded for 10-minutes prior to, during, and after a case-based training scenario.
   a. Heart rate (HR), respiratory rate (RR) and G-force were measured through electrodes on the inner lining of the Hexoskin.
   b. Heart rate variability (HRV) was measured through changes in R-wave intervals of successive heart beats [2].
   c. Anxiety levels were measured using the Spielberger State-Trait Anxiety Inventory (STAI-6) model in addition to an interview.
4. Data was downloaded in binary form to Vivosense and Kubios for artefact cleaning and interpolation.
5. HR, RR, and G-force variables were analysed through Vivosense.
6. HRV was examined through Kubios and graphed on Poincare plots.
7. STAI-6 results were calculated and interpreted using the recommended guidelines [3].

Results

The participant exhibited similar stress index levels across the three sessions – SDL (session 1), trauma (session 2), and respiratory (session 3).

The lowest stress index levels occurred pre-scenario across all sessions at approximately ~7 SI. Elevated stress index levels of ~14.61 SI were observed during the case-based scenarios. These values then reduced to 8.47 SI and 9.49 SI post-scenario in sessions 1 and 3. Contrastingly, a significant increase in stress index was observed post-scenario in session 2 (19.18 SI), which was the highest stress index value obtained.

Greater heart rate variability (HRV), as measured through RMSSD, was associated with increased stress index values. The participant generally demonstrated moderate RMSSD pre-scenario (~48ms) and reduced RMSSD during each scenario (~22ms), which indicates an increased stress response. Increased RMSSD values were observed post-scenario (~40ms). This is represented visually through the distribution of SD1 and SD2 on the Poincare plots, where greater distribution indicates lower stress response (session 3 examples depicted in Figures 1-3). This was further corroborated by mean HR values, which were typically elevated during the scenarios compared to pre- and post-scenario, which is indicative of an increased stress response. Changes in mean RR were not significant between sessions. Similar STAI-6 results were sustained across all sessions, indicating moderate stress levels overall.

The results indicate that students exhibit an increased stress response during clinical simulations. However, the highest overall stress response occurred in post-scenario session 2. This highlights the need for further investigation into post-incident stress and the prolonged effects of stress and trauma on students.

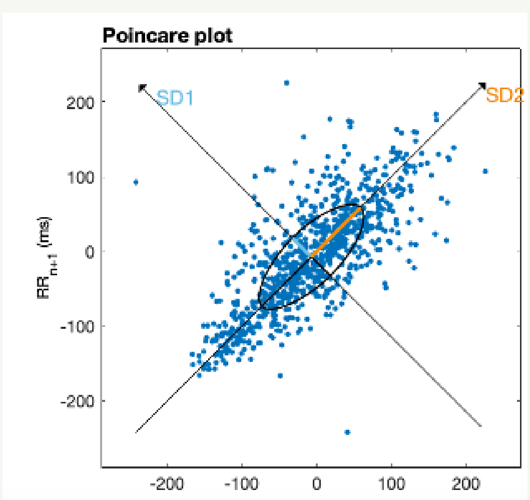

Figure 1. Pre-scenario HRV in session 3

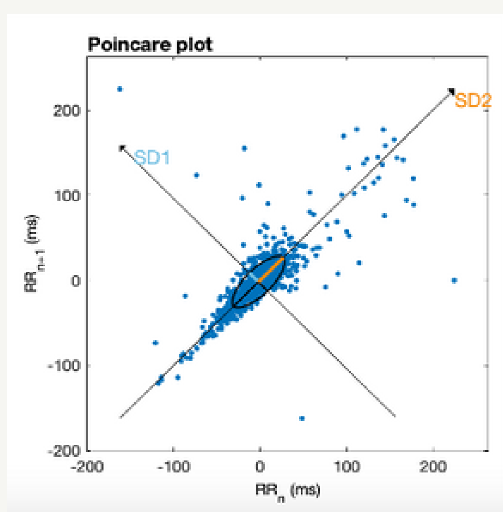

Figure 2. Scenario HRV in session 3

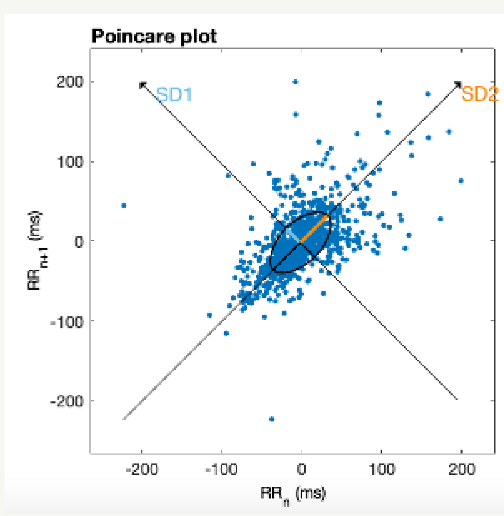

Figure 3. Post-scenario HRV in session 3

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[3] Graff, V. & Elkassabany, N. (2017). Music vs. midazolam during preoperative nerve block placement: a prospective, randomized controlled study. https://clinicaltrials.gov/ProvidedDocs/77/NCT03069677/Prot_SAP_000.pdf