

Stress Monitoring of Midwives using Wearable Technology during Obstetric and Neonatal Resuscitation Simulation Training

Background

High-fidelity simulation training improves the skills needed to manage complex, high-risk, and low-incidence obstetric and neonatal emergencies [1]. However, the stress experienced during simulation can impact learning experiences and satisfaction levels [2,3]. By incorporating a stress monitoring technique based on wearable technology, this study seeks to develop a system that can accurately assess and analyze the stress levels of midwives in real-time during simulations.

Aim(s)

The primary aim of this study was to monitor the stress levels of midwives during obstetric and neonatal resuscitation simulation training using an wearable technology [4], with a focus on assessing the impact of a brief debriefing interventions on the process. Additionally, this study aims to assess midwives' satisfaction with the training, providing valuable insights into their perceptions and experiences related to the simulation-based training and debriefing intervention.

Methods

A prospective quasi-experimental study was conducted with 12 midwives who participated in a simulation training at the Erasmus Brussels University of Applied Sciences and Arts (EhB) in March 2023. The midwives were given instructions to stay seated and at rest for a period of 30 minutes (T_0) before the simulation began. Prior to the start of the scenario, they were briefed about the specific scenario and the role they would be playing (T_1). During the debriefing phase, the midwives received a brief stress and satisfaction debriefing session in which stress was discussed (T_2). After the debriefing phase, participants were also asked to rest for 30 minutes (T_3). Midwives' physiological stress parameters [heart rate (HR), blood volume pulse (BVP), electrodermal activity (EDA), and skin temperature (Temp)] were assessed using an Empatica E4 wristband© continuously [4,5], but divided into time periods T_0 , T_1 , T_2 , and T_3 . Their psychological stress levels were assessed using the Short Stress State Questionnaire [6] at T_0 and T_3 time periods and, satisfaction was assessed using the Satisfaction with Simulation Experience Scale [2] at T_3 time period. Quantitative data were analysed using IBM SPSS 28.0 SPSS. Empatica E4 wristband data were processed using Python program©.

Results

This study found that the mean post-test score of the level of psychological stress was lower than that of the pre-test; however, there was no statistically significant difference between pre-test and post-test psychological stress scores ($p>0.05$). When comparing time periods, we observed that the median values of HR increased from T_0 to T_1 and decreased from T_1 to T_2 ($p<0.05$), while EDA increased from T_0 to T_1 and decreased from T_1 to T_2 ($p>0.05$). Concurrently with HR, BVP initially decreased and then increased. Temp first increased during simulation and then remained stable. Additionally, midwives were highly satisfied with the simulation-based training, including brief stress and satisfaction debriefing.

Discussion

Despite the lower post-test psychological stress scores, the lack of statistical significance suggests that the brief debriefing interventions may have contributed to stress reduction. The observed patterns in EDA, HR, and BVP parameters during different time periods provide valuable insights into the midwives' physiological responses to the simulation training. Furthermore, the high satisfaction reported by midwives indicates the value of a brief stress and satisfaction debriefing and the simulation-based training approach.

Implications and future perspectives

By incorporating a stress monitoring technique based on wearable technology during maternal and neonatal resuscitation simulation training holds promising implications for the field of midwifery. Further research in larger samples and diverse settings can explore the potential of real-time stress assessment to provide personalized feedback and tailored interventions, ultimately improving the overall well-being and effectiveness of midwives in high-stress obstetric health-care.

References

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