Journal of Nursing Informatics and AI in Global Practice and Research
Number 2, December 2024, Regional Government of Valencia Nursing Council (Spain)
https://www.journurs-cecova.com/genetic-assisted-profiling-in-clinical...

SHORT ARTICLE

Genetic-assisted profiling in clinical simulations

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INTRODUCTION

Simulation can accelerate the learning curve and increase retention of technical knowledge of techniques, procedures, and skills without the associated risks to using cadavers or on real patients. Differences in personality and behavioural responses makes people react to stressors differently, which leads to a variety of responses during these trainings. Despite these differences, simulation trainings are often standardised. If individual strengths and weaknesses could be predicted in advance, it could help to optimize training programs.

It is widely acknowledged that human behaviour is a result of both inherent genetic data as well as environmental influences that have shaped a person over the course of a lifetime (McGue and Gouchard, 1998). Stress responses are no different. Not only the responses to stress, but also resilience to stressors in first place is shown to be a combination of genetics and non-genetic factors such as age and upbringing. Specific genetic and physiological associations have been previously associated with personality traits like anxiety or impulsivity and fight or flight response (Kozlowska et al, 2015; Rech et al. 2019). Genetic differences have been shown to affect several education-related traits (Kong et al., 2018; Morris et al., 2020). While genetic data alone does not offer a definitive method for predicting individual behaviour, it may serve as an indicator for behavioural responses in high-stress environments.

Therefore, the objective of this proposed study is to investigate if there are genetic groups that correlate with personal strengths and weaknesses in the performance of nursing students in training simulations of an emergency situation.

METHODOLOGY

The performance of students during simulations will be graded in different variables related to the simulation. Measurements will only be taken in simulation exercises that involve high-stress emergency situations and choice making. Several different training exercises will be scored. Subsequently, genetic data of all students will be analysed using Single Nucleotide Polymorphism arrays, with a particular focus on markers identified in previous literature that are associated with behaviour or personality traits. Scores of the students during the exercises will be normalised and compared between genetic groups.

RESULTS

Information on genetic profiling as well as the scores during the simulation will be showcased per student in a dataset. Students with a certain genetic make-up might show differences in the measured variables related to the simulation performance.

DISCUSSION / CONCLUSION

As every year the cost of a genetic profiling gets lower and lower, the genetic approach could be used to develop a personalized training. The results from this experiment could help shape a new kind of training program in which genetic data is used to predict how a student will perform in simulations of life-or-death situations as already used in athletics training (Neureen et al. 2020) or detecting potential learning disabilities (Morris et al., 2020; Shero et al., 2021). Weaknesses could be given more attention in training, while strengths may need less. As previously mentioned, genetic background is only part of the factors affecting behaviour and personality. Environment plays a big role in shaping the personality traits of a person and affecting gene expression (Kong et al., 2018). Therefore, genetic data should never be solely relied upon, and assessments of strengths and weaknesses based on actual performance must also be analysed. Still, the results from this study can lay a foundation for a more personalised and effective approach to simulation trainings.

Again, the conclusions should be always supported with personality tests, and not just be relied on the genetic profiling. Genetic-based differences (if existent) could be overcome with training and will not lead to differences after the personalized training, as the personal behaviour and reactions in high-stress situations are difficult to model through regular training and simulations.

The use we propose here is to improve the training of future nurses in emergency situations, where the instinctive reactions can have a huge role in the decision-making process.

1. We propose the use for a more individualized approach of the simulations according to the profile of each student, with the aim of having a more effective training.
2. It will imply a genetic-based response to decision making in emergency situations, which can be predicted and therefore more emphasis will be put on the training process, either at an individual level and/or group level.
3. Knowing more factors that affect the response of the emergency personnel, we could implement a more individualized training and preparation that will end up in a better quality of treatments to the patients that might influence positively in the prognostic of the patients, which will lead to increased survival chances.

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