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A serious game to train patient safety outside the classroom: a pilot study of acceptability

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INTRODUCTION

Training in patient safety is imperative for front-line healthcare staff. Simulation is recommended¹ but is faculty-intensive, reaches a limited number of candidates per session and delivery remains fragmented.

'Serious games,' defined as 'a mental contest played with a computer in accordance with specific rules, that uses entertainment to further training, education, health, public policy, and strategic communication objectives',² may have a niche role as a training resource. Despite high development costs they are potentially cost-effective in the longer term; no faculty requirement and potential to reach many learners at minimal additional cost. The immediacy of feedback promotes achievement of learning outcomes and mitigates against knowledge decay.³ The literature reports few serious games for safety training of healthcare professionals. We performed a feasibility pilot of the serious game 'Air Medic Sky-1' (AMS-1) in a cohort of UK medical students. AMS-1 has previously been reviewed in comparison with an e-learning patient safety module,⁴ where it was found to be comparable with regard to knowledge acquisition and more engaging. We aim to determine the acceptability of training with such a game.

METHODS

AMS-1 (Patient Safety Centre, University Medical centre, Utrecht, Netherlands), is a PC-based interactive serious game incorporating a biofeedback (BF) device (Wild Divine, San Diego, California, USA) that attaches to users' fingers to detect heart rate variability and skin conductance. The game comprises three domains (see online supplementary video):

1. BF exercises in a virtual 'bio-dome'. Players influence events through control of their autonomic responses. This targets stress reduction, aiming to improve performance during crisis moments. Participants are required to accumulate points here before being permitted onto AMS-1.
2. Management of patients through interactive scenarios in a virtual hospital AMS-1. Participants 'graduate' by correctly managing increasingly complex cases.
3. Scenarios are interspersed by short videos delivered by patient safety experts; topics include stress management, teamwork, communication and so on.

Volunteers were recruited through email invitation to all final year medical students at Plymouth University Peninsula Schools of Medicine

and Dentistry, UK. Participants were asked to play the game for at least 10 min per day for 15 days, continued until they completed the final stage of AMS-1. For every session individuals' duration of play and time spent in each domain was recorded on USB sticks.

After conclusion of the study window, participants completed a debriefing questionnaire and were invited to voluntary focus group sessions.

RESULTS

Twenty-five students were recruited, 22 completed the questionnaire and 13 attended a focus group. Seventeen returned the USB sticks.

Median game play session duration was 36 min (12–67 min). [Table 1](#) shows durations of play within each domain.

Patient safety videos

Of the three domains, this area was frequently ranked lowest. Of the 797 videos commenced 52 % were terminated early. Comments were blandly positive but uninspiring: 'liked these'; 'good'.

BF exercises

In the questionnaire, the adjective 'frustrating' was most frequently chosen (68%) to best describe the biodome experience. In focus groups, this domain received the greatest amount of adverse comment, being described as 'frustrating', 'boring', 'pointless', 'unrealistic' or 'unhelpful'. Of the 858 sessions, 38% were played to completion. Fifty-five per cent scored the exercises as being 'not at all helpful' in assisting them in the AMS-1 domain. Despite this negative feedback 77% of questionnaire respondents were 'somewhat' or 'extremely' confident in their control of physiological stress response because of the BF exercises.

Managing patients on AMS-1

This domain consistently ranked highest. All save two participants spent far more time managing patients on AMS-1 than in other domains. Sixteen (77%) participants enjoyed managing patients on AMS-1 either 'somewhat' or 'a lot'. Nine (43%) described this section as 'fun', five (24%) 'frustrating', four (19%) 'challenging', two (10%) 'boring' and one (5%) 'stressful'. However, participants frequently criticised the game for a lack of realism and an unsystematic approach to clinical assessment, that is, not using the ABCDE approach to patient assessment.



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Table 1 Number of sessions and duration of play in each domain

	Number of sessions	Total time played (min)	Time spent playing AMS-1 (min)	Time watching videos (min)	Time spent with biofeedback (min)
Mean (SD)	9 (4)	311 (170)	179 (103)	47 (40)	85 (50)
Median (Range)	9 (1–15)	328 (12–727)	182 (6–379)	40 (0–174)	73 (6–174)

For one participant, apparent duration of game play was a single episode of 27 hours. This is assumed to have been an error, possibly due to the game being left open and unattended. This participant's data are excluded from summary statistics.

AMS-1, Air Medic Sky-1.

The game in general

The consensus view was that the AMS-1 domain didn't link back to the videos and BF sections: 'It seemed like two separate games'.

Seven participants commented that the concept of using games as a means of teaching patient safety 'had potential', although none considered this game to be of an acceptable standard.

Encouragingly participants commented on an increased awareness of stress levels following participation in the study: 'I take a minute to calm down. I am more mindful of the process'.

DISCUSSION

In a small cohort we have shown that senior UK medical students are prepared to engage in an evaluation process of learning via serious gaming. Participants played more than the minimum time requested but spent considerably less time training with BF or watching educational videos than they did managing simulated scenarios. Their completion rate for BF exercises and videos appears to be poor, and their feedback on these domains was lukewarm. Research has shown the length of an educational video to be the most significant factor in whether students engage with it, with engagement time being 6 min at best.⁵ In the context of an interactive game such as AMS-1 this may be much shorter, with students keen to continue with the interactive scenarios. It is possible that the low video completion rate is partially an error in data collection, as videos started but closed early as previously watched are included in these statistics. The BF equipment was unreliable, which likely compounded the frustrations with this domain.

As with the paper by Dankbaar,⁴ this pilot study uses medical students to evaluate a game originally designed for junior doctors. Junior doctors will have greater first-hand experience of working under pressure, coping with fatigue, stress and clinical decision-making. They may therefore have greater appreciation

of the video content and the importance of the lessons and skills which the game is attempting to convey. The fidelity and clinical realism of the game require substantial improvement, which may in turn improve satisfaction.

Our data suggest that AMS-1 in the current format has poor feasibility as a virtual platform for medical training, but with improved functionality and better alignment with the intended audience, the concept is promising.

Contributors CTW, TG and PK designed the study. The study has been implemented by CTW. CK analysed USB files to provide data spreadsheets. CTW and VKF analysed the results and wrote the manuscript. All authors contributed to refinement of the manuscript.

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Competing interests PK and CK were involved in designing the serious game Air Medic Sky-1. Other authors have no competing interest to declare.

Patient consent Obtained.

Ethics approval Plymouth University Medical and Dental School ethics committee.

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REFERENCES

- 1 The Department of Health (2008). *150 years of the annual report of the chief medical officer: on the state of public health*. London: Department of Health, 2008.
- 2 Zyda M. From visual simulation to virtual reality to games. *Computer* 2005;38:25–32.
- 3 Ulicsak M. Games in education: serious games. 2010:1–89 media.futurelab.org.uk/resources/documents/lit_reviews/Serious-Games (accessed on 31 Jan 2016).
- 4 Dankbaar ME, Richters O, Kalkman CJ, et al. Comparative effectiveness of a serious game and an e-module to support patient safety knowledge and awareness. *BMC Med Educ* 2017;17:30.
- 5 Guo PJ, Kim J, Robin R. How video production affects student engagement: an empirical study of mooc videos. *ACM Conference on Learning at Scale* 2014 <http://up.csail.mit.edu/other-pubs/las2014-pguo-engagement.pdf> (accessed 21 May 2017).