
ICU Volume 12 - Issue 2 - Summer 2012 - Cover Story

Assisting ICU Training Management With Virtual Worlds

Resource Difficulties in ICU Education

Conventional training methods for nurses involve many physical factors that place limits on potential class size (Sorce, Simone, and Madden 2010). Alternate training methods with lower physical requirements may support larger class sizes but, given the tactile quality of nurse training, are most appropriately applied to supplement conventional methods. Where the importance of physical factors is periphery, such alternate training methods can provide an important way of increasing classsize limits and therefore the rate of trained nurses entering the important field of critical care.

A major issue regarding ICU training is that the trainee can be released into a real-life intensive care scenario with sub-optimal preparation, ensuing anxiety, and some risk for management level nurses and for patient safety. This lack of preparation places a strain on the allocation of human and non-human resources to training, as students require greater levels of supervision. Such issues are a concern to ICU management, as they relate to nursing skill development and patient health outcomes. Nursing training is potentially dangerous for patients who are placed in the care of inexperienced staff (Morrison et al. 2001).

Virtual Worlds as a Training Resource Solution

Nurse training in computer-simulated virtual worlds has been considered a cost-effective complement to conventional nurse training, given that computing and network resources may be the only limiting factor to class sizes in such environments (Brown et al. 2012). What remains to be seen is whether these virtual world tools are as successful as physical-based simulations that are presently used in nurse training. While this question has not been answered definitively, early results are positive with regard to the training effects of virtual worlds on healthcare (Jarvis and Freitas 2009).

Interactive computer simulations can be used to augment resource intensive education and training that is expensive, repetitive in context and potentially dangerous when an insufficiently prepared student is deployed in a real-life environment. Critical care training also involves education on social situations, such as the development of specialised communication skills, which is not intrinsically dependent on actual physical resources. Training in these cases may have more cost-effective solutions in virtual worlds, assuming tactile simulation is not critical to that specific training scenario. Furthermore, such simulation technology frees up physical teaching resources (such as training manikins) by offering flexible, remote networked training solutions to critical care trainers and students alike.

The Case for Efficacy of Virtual World Training

Five virtual world educational capabilities have been identified that guide future research and development in the educational use of virtual worlds (Dalgarno 2010). These identified capabilities include:

- Facilitation of tasks that lead to enhanced spatial knowledge representation;
- Provision of greater opportunities for experiential learning;
- Increasing student motivation and engagement;
- Improving contextualisation of learning; and
- Provision of richer, more effective collaborative training.

These features align strongly with pedagogical requirements in critical care training, including making meaningful associations between patient and staff interactions to improve standards, safety and work flow in the busy and complex environment that is the ICU. Key requirements in ICU education, such as student engagement and encouragement of reflective learning, potentially match well with the capabilities of virtual worlds (Boulos, Hetherington and Wheeler 2007). Initial quantitative results show the superior capabilities of such virtual worlds in knowledge transfer in health training scenarios (Jarvis and Freitas 2009), or at least that they are equal to present physical methods (Dev et al. 2007). These results also cover teamwork collaboration scenarios, with positive results recorded for the training effect and subjective sense of teamwork and collaboration (Le Roy et al. 2008), which are key to critical care training and daily work.

Prototype ICU Handover Training Environment

The authors of this paper form part of a team that have developed a prototype ICU handover training environment in a socially interactive virtual world. Nurses in training can connect to this environment remotely via the Internet and engage in collaborative handover training classes.

Communication logs, real-time monitoring and interactivity through the environment provide educators with scope to virtually assess and mentor their students.

In this prototype study, the nursing handover is an activity requiring nurses for the shift to attend a meeting room and listen to a brief overview of the ICU and all the patients admitted. Key areas covered for each patient are diagnosis, current treatments used and any social or family issue of importance. This is followed by the allocation of an individual nurse to each patient, recognising different levels of acuity required with the patients and different levels of knowledge, experience and skills possessed by each nurse. Providing a match of the most appropriate nurse to care for each patient in specific shifts is an important factor in ICU management. Nurses then leave this room and walk to the bedside or patient area allocated to them to gain a more comprehensive handover of the patient, which includes a series of cross checks with life support equipment in use, drug administration schedules, note taking, ongoing treatments and care requirements. This prototype provides a simple but compelling scenario for students to practice with other students, in their own time, before they have to function in the real world. The research project is progressing through an evaluation stage at Austin Health, Melbourne, Australia, with promising initial results.

Conclusions, ICU Management Implications and Future Directions

Evidence from the literature indicates that virtual worlds should meet a number of key requirements in order to be appropriate for modern forms of education in intensive care nursing. Implications for training management in ICUs are many; technology is now mature enough to provide cost effective solutions. This study uses free Open Source software, and the only costs for development were for labour by digital content creators. The simulator can be hosted on the Internet as a "Cloud" solution, freeing up scheduling constraints, and releasing physical training room resources for other more advanced teaching classes. The solution is also very scalable, as multiple copies of the simulator can be cheaply created online, and may be offered as an online service to major healthcare providers.

Many new directions can also be investigated for such simulation technology. In particular, implementations on mobile devices can facilitate ad hoc social collaboration, to form even more flexible and immersive learning options, which are contemporary for the mindsets and behaviours of current and future students.

Published on : Sat, 14 Jul 2012