Scenario-based electronic learning: a viable educational method

Ricky Ellis is a senior faculty member with the DFB/RCSI partnership, a PHECC registered Facilitator and an Advanced Paramedic/Fire Officer at Dublin Fire Brigade and Emergency Ambulance Service; **Niamh Collins** is an emergency medicine consultant, Ireland.
Email for correspondence: rickyellis@eircom.net

Abstract

All prehospital practitioners should participate in the task of establishing a body of knowledge that relates specifically to prehospital care (Gregory, 2011). The rapid pace of change in prehospital knowledge and the release of new clinical practice guidelines would indicate that systems need to be developed to disseminate this knowledge effectively and efficiently. Electronic learning (e-learning) is one method. Prehospital personnel's reaction to electronic learning has not been widely evaluated. Aims: this article presents an overview of the lessons learnt through a structured evaluation of a pilot e-learning module which was delivered to advanced paramedics. Methods: A series of scenario-based educational modules encompassing recent changes in advanced paramedic clinical practice guidelines were developed. In February 2011, the pilot module was made available to 207 advanced paramedics in Ireland. A quantitative and qualitative assessment of this programme was performed. Results: during a four-week trial period, 51 out of 64 registered advanced paramedics who participated in the e-Learning programme, completed an extensive evaluation of the pilot module. The results indicate a strong positive response towards e-learning as a method of delivering learning to advanced paramedics. Discussion: e-learning is a medium set to gain popularity as a method of training in the future due to the ability to rapidly transfer new and updated clinical knowledge within a cohort of practitioners. The medium offers flexibility and cost efficiencies. Conclusion: e-learning has proved a successful tool for delivery of prehospital educational information. Practitioners are prepared to take responsibility for their own education and appreciate the ability to schedule their own learning time.

Key words
● E-learning ● Knowledge ● Prehospital ● Scenario-based

Accepted for publication 10 November 2011

E-learning will inevitably transform all forms of education and learning in the 21st century (Garrison and Anderson, 2003). We live in a time when medical education is not static and the only constant in healthcare is change (Harden, 2006). Access to high-quality training for graduates to satisfy the conditions attached to their professional accreditation has become a real issue (McAuliffe and Van Vaerenbergh, 2006). Ward (1997) emphasizes that computer-mediated learning can encourage high levels of engagement and motivation.

Harden (2002) dispels the myth that e-learning is just a passing fad and is not only about knowledge transfer. Across general education, there is a move toward embedding e-learning as a key element of the teaching and learning culture. Universities are aiming to provide students with e-learning resources that are engaging and which encourage the pursuit of higher learning (Manchester University, 2008). As clinical guidelines change, there is a clear requirement to use educational strategies that enable the effective rapid transmission of updates in knowledge or practice to practitioners.

The authors believe that e-learning can enable knowledge transfer in a time efficient manner and engage/interest the practitioner. Other factors for consideration when delivering an education programme is the ability of the programme to influence practice and its cost-effectiveness.

Prehospital care in Ireland

The establishment of the Prehospital Emergency Care Council (PHECC) in Ireland (S.I. No. 109/2000), with statutory responsibility to protect the public, represented a significant step forward in professionalisation of prehospital personnel in Ireland. PHECC protects the public by independently specifying, reviewing, maintaining and monitoring standards for the delivery of quality prehospital emergency care for people in Ireland (PHECC, 2005).

Internationally, PHECC's functions are unique; it is a standards, examining and accreditation body that publish clinical practice guidelines (CPGs). Its multi-role statutory functions have enabled rapid development in prehospital care by actively promoting and facilitating the move to a tertiary-based education system for prehospital practitioners.

The advanced paramedic (AP) is a protected clinical professional title in Irish legislation (S.I.

No. 139/2008; 166/2008) and is one of the newest statutorily registered healthcare professional groups serving the Irish public.

Advanced paramedics are licensed by the PHECC. The majority are employed by the Health Service Executive (HSE) and Dublin Fire Brigade (DFB), both of which provide statutory ambulance services in Ireland. They work under the direction of clinical practice guidelines issued by the Medical Advisory Group of PHECC.

Knowledge translation

When the Medical Advisory Group produce new recommendations for prehospital practice, there remains the issue of knowledge dissemination to practitioners in an effective and cost efficient manner. The term knowledge translation (KT) is increasing in importance and use in the fields of public health, medicine (NCDDR, 2005), and most readily appears in medical and healthcare literature and primarily pertains to the assessment, review, and use of scientific research.

KT involves end-users of high-quality information making decisions, solving problems, and using knowledge as practitioners and educators (Stetler, 1994). Traditional teaching methods—text books and classroom-based learning—take time to develop, are expensive and labour intensive.

Excessive circulars are often dismissed as they do not engage the practitioner's attention. Cost-effectiveness dictates that learning should occur at a time dictated by the learner; particularly when considering the shift worker. PHECC commissioned a pilot e-learning programme to meet the knowledge translation requirements of practitioners.

Aims

This article presents an overview of the lessons learnt through a structured evaluation of a pilot e-learning module which was delivered to advanced paramedics.

Methods

In 2009, PHECC approved the 3rd edition advanced paramedic CPGs which significantly expanded the APs scope of practice and increased the number of condition-specific CPGs to 72 in total. In an initiative designed to augment existing service-based training and as part of his masters of science in leadership and management development with the institute of leadership, RCSI, the author undertook a change project to introduce modularized scenario-based e-learning to advanced paramedics. A project team consisting of an emergency medicine consultant, an advanced paramedic, both with academic experience, and an IT professional was established.

To ensure compliance with the MSc change project outline plan and to create a defined study period, a timescale of one month was agreed. All registered advanced paramedics were invited to complete the pilot module and afterwards self-select to complete two separate online evaluation surveys. One evaluation investigated the advanced paramedic's reaction to the module content and the other evaluated e-learning as an educational medium.

The evaluation consisted of five-point Likert-scale style questions (quantitative) and a selection of open format (qualitative) response questions. All survey data were automatically extrapolated by the survey programme which presented results in percentages terms based on respondents question replies.

The areas to be focused on within the evaluation were identified by hosting a focus group meeting of a representative group of operational advanced paramedics. Six different service regions were represented. A semi-structured interview was conducted with the group who were invited to discuss e-learning from a practitioner/learners viewpoint. The discussion highlighted to the author the domains to be assessed as perceived value, relevance, ability to maintain interest, ease of use and aesthetics, and learning style.

The e-learning programme

A clinical scenario is presented to the practitioner and they follow the patient's journey throughout the programme. Each module has a set of clearly defined learning outcomes and a final self-assessment based on these learning outcomes (*Table 1*). Module one is a high-quality video-based scenario relating to a youth who fell from a height and crushed his leg in the tracks of an earthmover (*Figure 1*).

The module reviews case-related clinical information while actively promoting professional development subjects including reflective practice, critical appraisal and clinical decision-making. Each module is intended to portray everyday practice in a 'real-world' environment and follows the methodology of revising previously learnt material and imparting new and updated clinical information. This empowers the practitioner to deliver a higher level of care to the patient and aims to promote high-quality patient care.

Each module delivers high-quality video sequences featuring advanced paramedics from the ambulance and fire service working together. The 'real-world' scenarios are further enhanced by interviews with clinical experts who enhance the subject matter with supplementary information (*Figure 2*). The modules are anchored by an on-screen presenter who facilitates the learning in a similar way to a standard teacher (*Figure* 3). The modules promote active learning as the practitioner is urged to

Table 1. Learning domains

Patient assessment
'Clinical status' and the trauma primary and secondary surveys
'Revised trauma score' and 'markers of multi-system trauma'
The need for early transportation of the ill or injured patient

C-Spine immobilization
Sequential steps involved in making a clinical decision not to immobilize an injured patient's cervical spine
Steps involved in C-spine immobilization and extrication for adults

Crush injury
The difference between entrapment and crush injury, between crush injury, vascular injury and compartment syndrome
The CPG steps for the management of a crush injury and the rationale for each therapy listed
The indications for large volume fluid therapy for patients with crush injury

Pain management
The pain assessment and pharmacological agents for managing pain
Different presentations of pain and common causes
The importance of assessing for pain, treating it and re-evaluation following interventions
Emotional support for patients with pain
Non-pharmacological methods of treating pain

Paediatrics
The indications for fluid therapy in children
Assessing and managing pain in children
Steps in C-spine immobilization and extrication of children with potential spinal injury

Professional practice
Increasing familiarity with experiential learning and reflective practice
Promoting of positive behaviour change based on reflection on what has been learnt
Developing skills as a reflective practitioner
Incorporating critical appraisal into decision-making.

Figure 1. Scene from the pilot module

assume responsibility for their own learning and for the further research of those issues that are of most relevance or interest to them.

Study population

In February 2011, all 207 PHECC registered APs were invited to undertake the initial pilot module by email. Participation was voluntary, to be undertaken in the practitioner's own time and independent of their employing organization.

Results

During the four-week trial period, 64 registered practitioners completed the first e-learning module. Fifty-one advanced paramedics self-selected to evaluate the pilot module content and 44 self-selected to evaluate the learning object itself. Completion of the surveys was voluntary. Self-selection reduced selection bias and ensured a random sample in so far as possible. 51 responses to the content survey represents approximately one quarter of registered advanced paramedics in Ireland at the time the data was collected, therefore the data collected is significant and representative of the cohort population.

What follows is an overview of the result of the evaluation. Quantitative data is related in percentages relative to the number of survey respondents. To add further context, a small selection of the qualitative data has been selected by the author.

Perceived value

The subject matter was well received, with participants indicating improved understanding of reflective practice (84.8%), critical appraisal (78.3%), spinal injury rule out (84.7%), revised trauma score (86.9%), crush injury (91.1%), and pain management (72.6%). There was unanimous agreement that the programme benefited the participants (100%), further evidence of tangible value can be evidenced from a selection of answers given to open questions in this category:

- 'Great to see e-learning, let's hope we will have many more sessions like this.'
- 'It has made me want to do more of the same. I have revisited areas that I forgot I had covered.'
- 'More confident about crush type injury now, also nice to do some structured revision.'
- 'It is good in that it allows for learning without schedule, i.e. in own time.'

Relevance

Implicit in the development of education and training programmes is the expectation of change as an outcome or result (Caffarella, 2002). The respondents indicated that the information was presented at the correct clinical level (88.9%) and was relevant to their practice (93.4%). The opportunity to review foundation information was widely welcomed (93.3%). The project team was very pleased that 91.1% of participants indicated that they will change aspects of their practice due to the information received, a central objective of all clinical education. A minor negative reaction was observed and may have been due to the choice of subject matter (crush injury).

The development team decided during the planning stage that the relative rarity of this clinical event would be a valid reason to review clinical information and provide an appropriate initial subject matter for a new educational venture such as this. 93.3% of respondents agreed that the final test was appropriate to the programme. The module's success is evidenced by the fact that 95.6% indicated agreement that they would like to complete modules like this on a regular basis.

Ability to maintain interest

In this category, results revealed an interesting pattern. Receiving information in this manner was enjoyable for 68% of respondents, but 25.5% did not agree. The model kept most of the participants engaged (72.3%) and 66.5% expressed satisfaction with the amount of interactivity; however, a significant number were not engaged (28.1%) during the module and 21.9% were unhappy with the level of interactivity. There are many potential explanations for these less-positive responses; one interpretation being that the lack of engagement

Figure 2. Clinical expert

Figure 3. On-screen educational facilitator

was due to the inclusion of information which the respondents deemed to be too basic for the advanced paramedic level.

While the cohort expressed satisfaction with being able to review this material, it did not engage them and some expressed a request for an increase in the complexity of the information. Consider this selection of answers given to open questions in this category:

- 'Standard was appropriate in most places, some repetition'
- 'Advanced paramedics should really know this information already'
- 'Perhaps a more in-depth look at the reaction between myoglobin and the glomerlus would have been interesting, if not necessarily needed.'

The team is pleased with this feedback and are currently working towards increasing both the level of interactivity and the level of material complexity in future modules. Creating engaging education is a complex subject and a detailed description of each stage of this process would be outside the boundaries of this article and therefore inappropriate. The team employed an adaptive systems-based instructional design method (Molenda, 2003; Graffinger, 2008). This dynamic module development uses a feedback loop designed to ensure a better programme outcome.

The teams aim is that future module development will be responsive to practitioners' reaction to current output.

Ease of use and aesthetics

83% of respondents expressed satisfaction with the look and feel of the module with 74.4% liking the use of on-screen presenters. The team was delighted that 95.8% of participants felt that the learning interface was easy to use. 93.6% indicated satisfaction with case-based learning.

- 'Enjoyed it; it was interesting to do e-learning at my own pace and able to use it again for a reference'
- 'Excellent teaching and learning tool, really enjoy this type of learning'
- 'Excellent module held my attention throughout, very much enjoyed the exercise. Please follow this up more of same.'

Learning style

There was broad agreement (81.6%) that it was easy to learn material in this manner with (18.4%) indicating neutrality and no disagreement. 76.6% indicated that the technology was not a barrier to learning. Interestingly, Nobody indicated a difficulty learning this way but 14.9% felt that there was a significant technological barrier. Further studies in this area may be indicated. 83.6% expressed satisfaction with the 'one-to-one' nature of the programme; this fact validates the team's opinion that having on-screen presenters would create positivity and intimacy in the learning experience.

- 'I found it to be of great benefit as the one-to-one learning took away any distractions that others may invoke'.
- 'I really enjoyed it; it was very well presented and also very relevant'.

Reaction to e-learning

Colvin-Clark and Mayer (2003) argue that what really matters is not the mechanism of delivery but the instructional method chosen to put the learning point to the learner. In addition to capturing participant's response to the module content, the authors wanted to explore the reaction to the technological aspect of e-learning. The learning object review instrument (LORI) is a model used by educational designers and developers in summative evaluation of the quality and usefulness of learning objects. The author adapted the LORI assessment (Vargo et al, 2003) to develop a measurement tool to assess practitioners' reaction to e-learning itself.

The results from the pilot programme show that the learning object performed very strongly with the target cohort indicating high levels of success in all domains. 88.6% of respondents were satisfied with the medium's effectiveness as a learning tool and 86.4% were satisfied with the medium as a vehicle for attitudinal change. This positive impact can be identified by advanced paramedic's response to the open question 'Can you identify any personal benefit from undertaking this module?'

- 'I feel sometimes as an advanced paramedic you are very isolated in your decision-making process in real-time situations, versus paramedics who always have a colleague trained to their own level whom they can discuss options with. Yes, you may always discuss your thought process during a call with paramedic colleagues and or retrospectively with either paramedic or AP colleagues, but ultimately in real-time, the responsibility is with the AP. From this perspective I found it most useful to walk through this scenario, considering how I would have managed it *vs* how it was managed'.
- 'Yes, improved my background knowledge of crush injury and influenced my attitude to critical appraisal.'

Discussion

The available literature regarding e-learning indicates that it is a medium that is set to gain popularity as a method of training in the future. Hamtini (2008) informs that the use of online technology in the learning context is still in its infancy, but it is evolving rapidly. Technological advances have laid the foundation for a learning revolution that will clearly take place in the years ahead (Commission on Technology and Adult Learning, 2001).

Computer-based education has the potential to deliver knowledge and skills to learners that are comparable to levels of classroom-based courses (Moule et al, 2008). Consider the following comments:

- 'It helped me to focus in a different way than reading from the CPGs'
- 'It was a good module and encompassed a lot of learning objectives. I enjoyed it'
- 'Excellent module, just the right amount of student interaction. I have an improved understanding of critical appraisal and reflective practice'
- 'Good way of revising and re-enforcing CPGs, medication formulary, and updates to same.'

One important point to note is that e-learning alone cannot provide the answer to all learning situations; 31.9% of students were unsatisfied with the amount of interactivity or level of knowledge (11.1%) on offer. Some comments that reflect this issue:

- 'Paedi pain section could do with more paedi clinicians talking about assessment and pain relief techniques etc'
- 'Elements of basic training used valuable time which could be put to better use on upskilling'.

One fact that has become clear to the team is that all learners are individuals. Consider two opposing viewpoints when asked if the module relevant to your

practice as an AP?', 'No, I haven't seen a crush injury in over 10 years working in ambulance service'…and .... 'Crush injury is a relatively rare incident so it was good to go over it in more detail.

Another item that revealed itself was some practitioners preference for direct feedback and interaction with teaching staff...'a good way of keeping up to date with developments but should not replace formal training.' When asked if there was benefit in the experts opinion sections, one candidate replied absolutely there was, and continued to say that it would be a benefit if an AP could anonymously post a question to the expert and the answer shared with all APs. This issue could be solved by the addition of a blog type feature where participants can add comments or questions to generate professional debate. However, moderating comments and promoting sensible debate would be a key issue and require commitment after module release. It seems clear that students prefer a level of interaction with the educators.

A major strength of e-learning is its efficiency and its role in shortening the amount of time it takes to get workers up to speed on new products and processes (Commission on Technology and Adult Learning, 2001); as practice guidelines change into the future, e-learning content can be easily adjusted to maintain relevance (Colvin-Clark and Mayer, 2003). One evaluation question highlighted the requirement for more focused research about learning styles and preferences among prehospital practitioners. This question was placed to explore the theme that e-learning could challenge the classroom as the preferred learning space.

This question caused widespread ambiguity and completely inconclusive results; participants fell almost equally on both sides of the question with a significant number choosing to remain neutral. There are several interpretations that could be drawn from this. One assertion is that when considered in conjunction with the overall positive results related to learning in this environment it presents a positive argument in support of a combination of multi-media and face-to-face learning known as blended or hybrid learning which is more suited to teaching clinical skills due to the inclusion of observational elements (Knowles, 2005; Ruhe and Zumbo, 2009) as a successful learning strategy for prehospital practitioners.

The role of simulation

So far, the training of prehospital healthcare staff has primarily made use of basic simulation techniques in the classroom (Alinier, 2009). Clinical simulations are seen as being a valid educational resource to improve and reduce prehospital errors (Chen, 2009). Once a clinician has completed training, the required level of continuing education and training is often minimal and unstructured (Gaba, 2004). Knowles (2005) informs that the resource of highest value in education is the learner's experience. Gaba (2004) discusses the successful use of screen-based simulations to create an experience for the learner and informs that the key aims of simulation are to allow students to develop decision-making and critical-thinking skills in a non-threatening environment that replicates and/or amplifies real-life situations. Simulation can help to build someone's experience (Boyle et al, 2007; Alinier, 2009) and once undertaken, e-learning-based clinical simulations are repeatable. Chen (2009) highlights the benefit of this repeatability and relates that clinical performance improves substantially and confidence grows during re-simulation of the same scenarios and clinical practice in similar cases.

The results of the evaluation indicate a widespread satisfaction with the pilot module and show that advanced paramedics have a desire to engage with and absorb new and updated information that will benefit the patient in their care. It is clear that the practitioners wish to be challenged in their learning and enjoyed hearing expert's opinions which appeared to add a layer of knowledge to practitioners mental map of the clinical issue while also providing a clinical context to specific advice in CPGs. Consider the following comments 'I understand the reasons now for treating a crush injury the way you do', 'it gave crush injury and associated spinal and pain CPGs a frame of reference and a context'.

Continuous learning for advanced paramedics

Continuous professional development and lifelong systematic learning combine to meet the needs of patients and enables professionals to fulfil their potential (Guly, 2000). Becoming a professional is a process that develops, not only specific knowledge and technical skills, but also a sense of responsibility to self and others, duty of care, leadership (Trede, 2009). The concept of responsibility is central to professionalism. This project has directly offered Irish advanced paramedics an opportunity to demonstrate this professionalism through participation.

A 25% response rate to this voluntary programme within one month of being launched demonstrates their willingness to engage in self-directed education and strengthens the move towards professionalism by Irish prehospital practitioners. The survey results also indicate that the modules have been successful in achieving their aim of delivering education on the learner's terms; which is particularly important when the population are shift workers. Many responses highlighted the benefit derived from having the ability

determine the timing of the learning interaction.

- 'I find the one-on-one nature of the online programmes with the intermittent assessments most engaging—I would only open this programme when I am in the 'mood' to learn—which I suppose makes it easier also! The classroom is at someone else's discretion!'

Conclusion

Williams (2005) related that e-learning may be currently in use in prehospital but not formally documented. The data gathered during the evaluation of this project provides direct evidence that prehospital practitioners have responded positively to e-learning and adds to the body of knowledge regarding learning in the prehospital domain.

Case-based e-learning is very adaptable and has the advantage of being able to present a variety of instructional methods to accomplish learning at a time determined by the learner. A number of valuable lessons have been learnt in the process:

- E-learning is clearly a successful tool for delivery of prehospital information. Prehospital personnel are prepared to take responsibility for their own education and appreciate the ability to schedule their own learning time. This is evidenced by 25% of APs undertaking the module within one month of its launch with 93% appreciating the opportunity to review foundation information.
- E-learning has proved a suitable tool for the rapid and effective transfer of knowledge within a cohort of prehospital practitioners who clearly want to be challenged by e-learning and are requesting more interactivity. They also want their learning to be assessed with 93% indicating the importance of a final test after completion of the modules.

E-learning can influence behaviour and lead to positive improvements in clinical practice; 91.1% of respondents indicated that they intend to change aspects of their practice due to information contained in the module.

Influencing learning practices on a national scale was the project's desired outcome; a new method of receiving learning has been successfully introduced to a target cohort where 100% of self selecting survey respondents agreed that they have benefited from the information delivered and 95.6% expressing a desire to complete e-learning modules on a regular basis. Following delivery of all 5 planned modules a full report of the outcome from the combined evaluation results is planned. When produced, this will further add to the prehospital body of knowledge in this domain.

Acknowledgements

This project was ambitious in its scope and was successfully delivered only through the hard work and dedication of the members of the development team and other colleagues in Dillon Productions and PHECC. A special word of thanks to the members of the author's MSc faculty and the action learning set in the Institute of Leadership, RCSI for their advice and support during this project.

Alinier G (2009) Skills benefits of advanced simulation training. *Journal of Paramedic Practice* **1**(9): 369–75

Boyle M, Williams B, Burgess S (2007). Contemporary simulation education for undergraduate paramedic students. *EMJ* **24**(12): 854–7

Caffarella R (2002) *Planning programs for adult learners, A practical guide for educators trainers and staff developers*. 2nd edn. Josey Bass, San Fransisco

Chen P, Huan Y, Cheng H et al (2009) New simulation-based airway management training programme for junior physicians. *Medical Teacher* **31**: e338-44

Colvin-Clark R, Mayer RE (2003) *E-learning and the Science of Instruction. Proven Guidelines for Consumers and Developers of Multimedia Learning*. Pfieffer, San Fransisco

Commission on Technology and Adult Learning (2001) *A Vision of e-learning for America's Workforce*. http://tinyurl.com/7xovhfq (accessed 6 January 2012)

Gaba G (2004) *The future vision of simulation in health care. Quality Safety in Health Care*. http://tinyurl.com/7tt9geg (accessed 5 January 2012)

Garrison D, Anderson T (2003) *e-learning in the 21st Century A Framework for Research and Practice*. Open University, Netherlands

Grafinger DJ (1988) *Basics of Instructional Systems Development*. American Society for Training and Development, Alexandria,Virginia

Gregory P (2011) Why we need to define our role. *Journal of Paramedic Practice* **3**(1): 5

Guly HR (2000) Continuous Professional Development for Doctor in Acciden tand Emergency. *EMJ* **17**(12):

Hamtini T (2008) Evaluating e-learning Programs: An Adaptation of Kirkpatrick's Model to Accommodate e-learning Environments. *Journal of Computer Science* **4**(8): 693–8

Harden RM (2002) Myths and e-learning. *Medical Teacher* **24**(5): 469–72

Harden RM (2006) Trends and the future of postgraduate medical education. *EMJ* **23**(10): 798–802

Health Services Executive (2009) *Education Training and Research. Principles and Recommendations Education, Training and Research in the HSE*. Kildare, Ireland

Knowles MS (2005) *The Adult Learner. The definitive classic in adult education and human resource development*. 6th edn. Elsevier, CA

Manchester University (2007) *E-learning Strategy 2007–2009*. http://tinyurl.com/7korl7q (accessed 10 January 2012)

McAuliffe E, Van Vaerenbergh C (2006) *Guiding change in the Irish health system*. HSE Health Policy and Management Unit, Ireland

Molenda M (2003) *In Search of the Elusive ADDIE Model. Performance Improvement*. http://tinyurl.com/7kepofr (accessed 10 January 2012)

Moule P, Albarran JW, Bessant E et al (2008) A non-randomized comparison of e-learning and classroom delivery of basic life support with automated external defibrillator use: A pilot study. *International Journal of Nursing Practice* **14**(6): 427–34

National Center for the Dissemination of Disability Research. (2005) *Focus: Technical Brief*. http://tinyurl.com/6vhxj8j (accessed 10 January 2012)

Pre-Hospital Emergency Care Council (2009) *Clinical Practice Guidelines: For Pre-Hospital Emergency Care*. 3rd edn. Kildare, Ireland

Pre-Hospital Emergency Care Council (2011). *PHECC Voice*, Spring edition. http://tinyurl.com/72yvd3b (accessed 10 January 2012)

Pre-Hospital Emergency Care Council (2005) *Annual Report*. Kildare, Ireland. http://tinyurl.com/7qp78rw (accessed 10 January 2012

Ruhe V, Zumbo B (2009) *Evaluation in Distance Education and e-learning: The unfolding model*. Guildord Press, London

S.I No 109/2000 (2000) *The Pre-Hospital Emergency Care Council (Establishment)*. http://tinyurl.com/823l8su (accessed 10 January 2012)

S.I. No. 139/2008 (2008) *Recognition of Professional Qualifications (Directive 2005/36/Ec) Regulations*. http://tinyurl.com/7cq2xto (accessed 10 January 2012)

S.I. No. 166/2008 (2008) *Recognition of professional qualifications (health and social care professions) (directive 2005/36/Ec) regulations*. http://tinyurl.com/6swzlvs (accessed 10 January 2012)

Stetler CB (1994) Refinement of the Stetler/Marram model for application of research findings to practice. *Nursing Outlook* **42**: 15—25

Trede F (2009) Professionalism: Becoming professional in the 21st century. *JEPHC* **7**(4)

Vargo J, Nesbit J, Belfer K et al (2003) Learning Object Evaluation:Computer-mediated Collaboration and Inter-rater Reliability. *International Journal of Computers and Applications* **25**(3):

Ward R (1997) Active, collaborative and case-based learning with computer-based case scenarios. *Computers Education* **30**(1): 103–10

Williams B (2005) Case based learning—a review of the literature: is there scope for this educational paradigm in prehospital education? *Emergency Med Journal* **22**: 577–81

Key points

- Scenario based e-learning is a viable and effective tool for the continuous education of prehospital emergency care practitioners.
- Practitioners want high quality educational content which challenges them and maintains engagement during the learning cycle. Instructional design and teaching strategies are important elements in achieving learner engagement.
- Practitioners report that the e-learning experience can be improved by the addition of a contact facility where the learner interacts with others.
- Dialogue with others can support learning and may offset feelings of isolation that some types of learners experience during e-learning.
- Learning is well suited for large scale deployments allowing measured knowledge transfer to occur within a target population simultaneously.
- E-learning is an efficient methodology which contributes positively to improved work force competency.

Appendix 1. Evaluation of e-learning—medium

Learning object review instrument (n=44)	Unsuccessful	Slightly unsuccessful	Not Important	Slightly successful	Successful
Aesthetics: Quality, look and feel	0.00 %	2.30 %	0.00 %	31.80 %	65.90 %
Screen design: Intuitive layout	0.00 %	0.00 %	6.80 %	34.10 %	59.10 %
Information Delivery tool:	0.00 %	0.00 %	2.30 %	34.10 %	63.60 %
Learning tool: Mediums effectiveness	0.00 %	2.30 %	9.10 %	50.00 %	38.60 %
Motivation tool: Vehicle for attitudinal change	0.00 %	4.50 %	9.10 %	40.90 %	45.50 %
Ease of use: Progression through module	0.00 %	4.50 %	2.30 %	29.50 %	63.60 %
Interactivity As participant: (learner)	2.30 %	0.00 %	4.50 %	40.90 %	52.30 %
Reusability: For other students	0.00 %	4.50 %	9.10 %	20.50 %	65.90 %
Fit for purpose: Vehicle for case based review	0.00 %	2.30 %	11.40 %	27.30 %	59.10 %
Accessibility: Technical barriers to participation	0.00 %	6.80 %	9.10 %	31.80 %	52.30 %.

Appendix 2. Evaluation of e-learning—content

Overall module evaluation (n=51)	Strongly disagree	Disagree	Neither	Agree	Strongly agree
The objectives were clear to me	0.00%	2.20%	4.40%	75.60%	17.80%
The information presented was relevant to my practice	0.00%	0.00%	6.70%	66.70%	26.70%
The information was pitched at the correct clinical level for the advanced paramedic	2.20%	8.90%	0.00%	75.60%	13.30%
I will change aspects of my practice due to information contained in this module	0.00%	2.20%	6.70%	66.70%	24.40%
I appreciated the opportunity to review foundation information	0.00%	2.20%	4.40%	53.30%	40.00%
The final test was appropriate to the programme	0.00%	2.20%	4.40%	71.10%	22.20%
I benefited from the training	0.00%	0.00%	0.00%	60.90%	39.10%
I have an improved understanding of reflective practice	0.00%	0.00%	15.20%	69.60%	15.20%
I have an improved understanding of critical appraisal	0.00%	2.20%	19.60%	58.70%	19.60%
I have an improved understanding of spinal injury rule out	0.00%	2.20%	13.00%	71.70%	13.00%
I have an improved understanding of revised trauma score	0.00%	0.00%	13.00%	73.90%	13.00%
I have an improved understanding of crush injury	0.00%	6.70%	2.20%	60.00%	31.10
I have an improved understanding of pain management	0.00%	2.20%	15.20%	58.70%	23.90%
I would like to complete modules like this on a regular basis	0.00%	0.00%	4.30%	41.30%	54.30%
Having a final test is important	0.00%	0.00%	6.50%	58.70%	34.80%
The module kept me engaged	21.30%	6.40%	0.00%	57.40%	14.90%
I was satisfied with the amount of interactivity	17.00%	14.90%	10.60%	51.10%	6.40%
Receiving information in this manner was enjoyable	14.90%	10.60%	6.40%	48.90%	19.10%
I like case-based learning	0.00%	2.10%	4.30%	59.60%	34.00%
The online learning interface was easy to use	0.00%	2.10%	2.10%	68.10%	27.70%
I like the look and feel of this module	2.10%	6.40%	8.50%	66.00%	17.00%
I like the non-clinical on-screen presenters	0.00%	4.30%	21.30%	63.80%	10.60%
The technology was a significant barrier to learning	36.20%	40.40%	8.50%	10.60%	4.30
I like the 'one-to-one' nature of the programme	2.00%	2.00%	12.20%	71.40%	12.20%
Given the same material, I would learn more in a classroom environment	2.00%	28.60%	26.50%	32.70%	10.20%
It was easy to learn material presented like this	0.00%	0.00%	18.40%	65.30%	16.30%.

Correspondence

Journal of Paramedic Practice welcomes correspondence in response to articles published in the journal or on any issues related to prehospital practice. To express your views, please email the Editor, Sarah David.

Email: jpp@markallengroup.com

Write to: The Editor, Journal of Paramedic Practice, MA Healthcare Ltd, St Jude's Church, Dulwich Road, London SE24 0PB, UK