International Journal of Nursing Studies 57 (2016) 70–81

Contents lists available at ScienceDirect

International Journal of Nursing Studies

journal homepage: www.elsevier.com/ijns

Review

The effectiveness of Internet-based e-learning on clinician behaviour and patient outcomes: A systematic review

Peter M. Sinclair *, (Associate Professor) Ashley Kable, (Professor) Tracy Levett-Jones, Debbie Booth

University of Newcastle, Australia

ARTICLE INFO

Article history:
Received 1 August 2015
Received in revised form 25 January 2016
Accepted 26 January 2016

Keywords:
e-Learning
Systematic review
Education
Information communication technology
Health care professional

ABSTRACT

Background: The contemporary health workforce has a professional responsibility to maintain competency in practice. However, some difficulties exist with access to ongoing professional development opportunities, particularly for staff in rural and remote areas and those not enrolled in a formal programme of study. E-learning is at the nexus of overcoming these challenges. The benefits of e-learning have been reported in terms of increased accessibility to education, improved self-efficacy, knowledge generation, cost effectiveness, learner flexibility and interactivity. What is less clear, is whether improved self-efficacy or knowledge gained through e-learning influences healthcare professional behaviour or skill development, whether these changes are sustained, and whether these changes improve patient outcomes.

Objective: To identify, appraise and synthesise the best available evidence for the effectiveness of e-learning programmes on health care professional behaviour and patient outcomes.

Design: A systematic review of randomised controlled trials was conducted to assess the effectiveness of e-learning programmes on clinician behaviour and patient outcomes. Electronic databases including CINAHL, Embase, ERIC, MEDLINE, Mosby's Index, Scopus and Cochrane – CENTRAL were searched in July 2014 and again in July 2015.

Quality assessment and data extraction: Studies were reviewed and data extracted by two independent reviewers using the Joanna Briggs Institute standardised critical appraisal and data extraction instruments.

Data synthesis: Seven trials met the inclusion criteria for the analysis. Due to substantial instructional design, subject matter, study population, and methodological variation between the identified studies, statistical pooling was not possible and a meta-analysis could not be performed. Consequently, the findings of this systematic review are presented as a narrative review.

Results: The results suggest that e-learning was at least as effective as traditional learning approaches, and superior to no instruction at all in improving health care professional behaviour. There was variation in behavioural outcomes depending on the skill being taught, and the learning approach utilised. No papers were identified that reported the effectiveness of an e-learning programme on patient outcomes.

Conclusion: This review found insufficient evidence regarding the effectiveness of e-learning on healthcare professional behaviour or patient outcomes, consequently further

* Corresponding author at: School of Nursing & Midwifery, Faculty of Health & Medicine, University Drive, Richardson Wing, Callaghan 2308, Australia. Tel.: +61 2 4921 7436.
E-mail address: peter.sinclair@newcastle.edu.au (P.M. Sinclair).

http://dx.doi.org/10.1016/j.ijnurstu.2016.01.011
0020-7489/

research in this area is warranted. Future randomised controlled trials should adhere to the CONSORT reporting guidelines in order to improve the quality of reporting, to allow evaluation of the effectiveness of e-learning programmes on healthcare professional behaviour and patient outcomes.

What is already known about the topic?

- The use of e-learning continues to proliferate in healthcare professional education.
- e-Learning is at least as effective as traditional learning methods for knowledge acquisition and user satisfaction, however there is a need for ongoing rigorous research to evaluate behaviour change and patient outcomes.

What this paper adds

- There continues to be a lack of rigorously designed randomised controlled trials evaluating the effectiveness of e-learning on healthcare professional behaviour and patient outcomes.
- Further research is required to determine asynchronous e-learnings effectiveness on behaviour change using objective measurement scales.
- A need exists to develop and validate alternate objective measures that are informed by sound theoretical constructs to evaluate e-learning behavioural outcomes.

1. Introduction

Technological innovation has not only impacted social change in recent years but has been the prime driver of educational transformation (Garrison, 2011). The newest consumers of post-secondary education, the so-called 'digital natives', have come to expect education to be delivered in a way that offers increased usability and convenience (Palfrey and Gasser, 2013). Health care professionals (HCPs) in the clinical setting, particularly those in rural and remote communities, have similar expectations in regards to continuing professional development (Maloney et al., 2013; Sinclair and Levett-Jones, 2011; Wellard and Bethune, 2000). Today's health workforce has a professional responsibility to maintain competency in practice through achieving a minimum number of hours of continuing professional development each year (Sinclair et al., 2013). Consequently, HCPs seeking educational opportunities are reliant on sourcing these independently according to individual learning needs (Mills et al., 2011). However, difficulties exist with some health professionals' access to ongoing professional development, particularly those with limited opportunities for face-to-face education (Bennett et al., 2014; Lenthall et al., 2011) due to geographical isolation or for those not enrolled in a formal programme of study (Curran et al., 2006; Doorenbos et al., 2011). These issues challenge traditional methods of teaching delivery; and electronic learning (e-learning) is at the nexus of overcoming these challenges.

The term e-learning originated in the mid-1990s as the Internet began to gather momentum (Garrison, 2011). Electronic learning can be broadly defined as any type of educational media that is delivered in an electronic form (Clark and Mayer, 2011). Terms such as computer-assisted learning, online learning, web-based learning and e-learning are often used synonymously but all reflect information delivery via an electronic device. This broad definition allows for a gamut of multimedia to be used for the purpose of constructing, delivering and assessing knowledge learned. Multimedia typically used in e-learning ranges from the now archaic Compact Disc Read-Only Memory (CD-ROMs), to the simple Microsoft PowerPoint, or the more advanced and complex virtual worlds such a second life. Electronic learning can be delivered in asynchronous[1] or synchronous[2] formats, with the latter (for example interactive online lectures via platforms such as BlackboardCollaborate or WebEx) more commonly used in formal educational settings with set timetables of study (Garrison, 2011).

For the purpose of this review, e-learning is defined as any educational intervention that is mediated electronically via the Internet asynchronously. The distinction between synchronous and asynchronous delivery is important within the context of this review. HCPs seeking specific knowledge are reliant on sourcing information independently via the Internet, journals, textbooks or other colleagues. Alternatively, they can access asynchronous e-learning programmes that are available through established learning networks or affiliated professional organisations in order to meet individual learning needs and objectives (Melhuish and Falloon, 2010; Sinclair and Levett-Jones, 2011; Sinclair et al., 2014). Asynchronous e-learning is a learner-centred approach that affords the opportunity to engage in learning at a time and location that is convenient and enables the learner to balance professional development with personal and work commitments (Sinclair et al., 2014). These learning opportunities are self-directed and do not require a human to facilitate learning, rather, technology officiates/facilitates the learning process and, in the asynchronous e-learning context, the learner negotiates meaning independently (Melhuish and Falloon, 2010).

The measurement of learning outcomes from health-related e-learning research has focused on several domains

[1] A student centred e-learning experience that allows learning to occur at any time that is convenient to the learner and not governed by time, place, other learners or institutions.

[2] An e-learning experience that allows simultaneous interaction between students and/or educators.