

The development of a medication calculation competency and quality use of renal medicine e-learning program

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Abstract

Medication calculation and administration are commonly performed nursing tasks. A consequence of this frequency is the potential for a higher incidence of medication-related errors. One strategy to assess proficiency in medication calculation is an annual medication calculation competency quiz. Traditionally, these quizzes are done in paper form at an institutional level and require educators or managers to administer and mark the quiz manually by hand. This paper discusses the rationale, challenges and peer-review process associated with the development of an e-learning programme designed to assess proficiency in medication calculation and the quality use of renal medicines.

Keywords

Medication calculation, patient safety, quality use of medicines, kidney, e-learning.

Introduction

E-learning is a proven educational method in the nursing profession, which affords equitable and flexible delivery and assessment of content to the workforce, regardless of shift pattern or geographical location (Farrell, 2006; McKenzie & Murray, 2010; Sinclair *et al.*, 2011). It has been used widely in many specialist contexts from paediatrics (Lee & Lin, 2013) to mental health (Hugenholtz *et al.*, 2008). Historically, renal nurse educators have worked in isolation to develop educational materials to meet their own department's needs (Sinclair & Levett-Jones, 2011). While this is still evident in some health services, a group of educators from Australia and New Zealand have developed a suite of evidence-based, peer-reviewed e-learning programs to provide access to high-quality educational resources to the renal workforce and decrease the duplication of educator effort (see <http://nen.moodle.com.au/login/index.php>). One such programme that has been developed is a renal-specific medication quiz. This programme is a clear demonstration of how paper-based educational resources may be translated into an e-learning context.

The term 'quality use of medicines' (QUM) is used to describe safe and appropriate medication practices for health practitioners and consumers to ensure drug efficacy and patient safety (Wright, 2010). Medication administration is one of the most frequently performed tasks for nurses (Keohane *et al.*, 2008). Internationally, medication errors are the most commonly reported nursing error type (Weeks *et al.*, 2013). Locally, Australian medication incidents are estimated to occur one in every 10 medication events (Semple, 2008). Consequently, it is essential that a culture of medication and patient safety is

promoted, monitored and actively pursued. In Australia, the National Safety and Quality Health Service (NSQHS) Standards provides an overarching framework to ensure that the safety of patients is at the core of health care. NSQHS Standard 4 — Medication Safety, focuses on providing assurance that clinicians are competent to supply, dispense, administer and monitor the effects of medications (Australian Commission on Safety and Quality in Health Care, 2011). It is within this climate of medication safety where medication calculations are used to support clinical competence.

Current literature lacks a common definition of medication competence in nursing (Sulosaari *et al.*, 2011). It is acknowledged, however, that medication calculation proficiency is an integral component in maintaining patient safety (Evans, 2009). Employing mandatory medication calculation quizzes is one strategy that can be used to assess proficiency. Medication competence is also related to the clinical setting and in specialist areas such as dialysis and critical care, standard generalist medication quizzes are insufficient (Sulosaari *et al.*, 2011). The context of kidney disease is unique in that there are usually associated complex co-morbidities requiring many medications, most of which have decreased renal clearance and prolonged half-lives which require lower dosage and extended dosing intervals (Sinclair *et al.*, 2014). Therefore, medication competency quizzes should be tailored to practice contexts and examine nurses' ability to calculate dosages and apply the concept of quality use of medicines.

This paper profiles the development and peer review process of a renal-specific e-learning medication competency assessment programme for renal nurses across Australia and New Zealand.

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The medication calculation and quality use of renal medicines' e-learning program

This e-learning programme aims to facilitate a consistent approach to renal-specific mandatory medication calculation and QUM annual competency assessment in renal nurses. The learning resource provides a convenient alternative to paper assessments which will reduce the manual workload for educators, and affords asynchronous participation to suit the varied shift patterns nurses undertake.

The project commenced in June 2013 with an online search to establish if a similar resource already existed in the hope that it could be adapted for a renal-specific audience. Whilst some sites such as www.learningnurse.org have free online medication calculation quizzes available to the general public, and area health services have developed e-learning resources within their own jurisdiction, no renal-specific medication calculation quizzes that also covered the quality use of renal medicines were available commercially. Consequently, the project team commenced a process of identifying and engaging key stakeholders and area health services that were using renal-specific medication quizzes and sought permission to utilise questions with this project in order to minimise duplication of effort and increase the pool of available questions.

After this phase was completed the team began the process of collating and quality checking several hundred medication calculations and QUM questions. This was done in consultation with renal pharmacists and educators from tertiary referral renal departments in Australia and New Zealand. A peer-review process followed, involving five specialist renal nurse educators and pharmacists.

The programme consists of four pools of questions, with each pool containing 18 medication calculations and seven QUM multiple-choice questions related to renal-specific medications. Each learner is randomly assigned a pool of questions, and is assigned a different pool should they require another attempt. The most common medication calculation formulae are included as additional resources and participants are invited to review these prior to commencing the assessment. The learning management system (LMS) grades, records and reports the results electronically and a certificate of competency is issued when 100 % is achieved in the assessment.

Peer reviewing e-learning resources entails the reviewer sampling and scrutinising aspects of the resource such as navigation, interactivity, format, usability and currency (Ruiz *et al.*, 2007). Given this e-learning tool is intended for use in all renal departments across Australia and New Zealand, the e-learning peer-review process was essential to certify a quality resource that took into account regional variations in practice and met the assessment needs of renal departments (Barr, 2010; Ruiz *et al.*, 2007). The peer-review process in this project complemented the preliminary evaluation process, and supported the goal of ensuring a quality resource by involving a variety of personnel with various experience including renal nurse educators, pharmacists and experts in the domain of e-learning.

The peer-review process in e-learning — the challenge of regional practice variation

The first stage of the peer-review process was collating and analysing feedback that the reviewers were asked to provide following one or more attempts using the resource. It was noted that some questions had incorrect answers relating to medication calculations, or the answers for some of the QUM questions were ambiguous, with more than one correct answer plausible. Additionally, small formatting errors such as spelling and grammatical mistakes, or inappropriate graphics for the question's topic were identified.

Regional variation was the most significant issue across all reviewer feedback, with many suggestions for certain questions to be removed due to discrepancies between local policies.

For example, one reviewer commented:

"The question about there being an existing standing order for saline flushes for peripheral cannulas does not stand in our hospital; therefore, the saline flushes must be prescribed by a doctor. This question cannot be asked universally since all hospital policies will differ."

Another commented (relating to vascular access, which resulted in the removal of similar questions):

"... this again is individual policy driven and currently as clinically indicated now, not a specific time frame. If it's not clinically infected, don't change it! ... This is too specific a question, considering hospitals may change their time frames within policies and guidelines."

Given the errors noted and the regional variation in practice, the reviewers said they would not implement the resource in its current form. The team corrected errors and took care to modify or delete any questions that may have caused confusion due to regional practice variation. The revised programme was subsequently redistributed for a second review. The second iteration of the resource received significantly improved feedback. Some small formatting issues relating to answers and graphics were noted and all peer reviewers were satisfied, particularly given that issues related to regional variation had been addressed. Consequently, all reviewers agreed that the resource added value and benefit to their facility, and intended to employ the resource in their mandatory training curriculum.

For example, one reviewer commented:

"I am very impressed with this resource, especially as I was not a fan the first time round. I will definitely be using this for my staffs' annual medication test at the end of the year, or when made available. Thanks for letting me peer review!"

And another:

"I've completed the NEN Medication test following the improvements made, and I have to say, it is MUCH better than first time round. I like how it was a mixture of dry weight assessments, IV infusion rates, drug calculations and testing the staff member's knowledge of the state wide approach to priming and the 5 Medication Rights etc."

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The final stage of the evaluation process is to investigate user satisfaction. Following completion of the assessment, questions are asked to ascertain whether the user found the tool appropriate for their yearly, mandatory medication assessment. This is a work in progress, with feedback from participants expected over the coming year depending on where departments are in their mandatory education cycle. This type of evaluation and feedback is critically important to strengthen products and move forward in the direction of quality and success (Little, 2009).

Conclusion

Using e-learning as a delivery mode for mandatory medication calculation assessment reduces educator workload and affords equitable access to nurses regardless of geographical location or shift pattern. This programme offers a national and international approach to specialist workforce mandatory medication calculation competency assessment. It also aligns with contemporary educational initiatives and recommendations related to e-learning. This project has qualities that are duplicable in other contexts and it is hoped that sharing this experience may assist educators in other specialties to develop similar resources.

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