The development of an online quiz for drug calculations

assessment tool is the shift of responsibility for learning from the trainer to the learner. This has changed the culture within the trust from traditional ‘top-down’ reactive training to a more proactive approach that promotes individual accountability.

While the main focus of the quiz is developing drug calculation skills, it also facilitates the improvement of IT skills. This will be of benefit when the trust clinical information system is implemented.

Barriers to e-learning
The introduction of this new initiative has had its problems, however. The use of online facilities as an environment for learning is comparatively new, and this can make learners apprehensive as they are unsure about what to expect.

One of the principal differences between online learning and face-to-face tuition is the absence of non-verbal communication. This subconscious form of communication is a powerful tool in face-to-face learning. It has been suggested that ‘a knowledge of body language is vital to every teacher as this enables the teacher to “read” the students’ (Reece and Walker, 1994).

The e-learning environment may also be associated with unfamiliar emotions. The environment is unknown and aspects of openness and trust cannot always be easily ascertained. This is evident from the results so far. While the numbers of learners who have completed quizzes independently have been high, comparatively few have communicated via the message board.

Evaluation of the quiz
It was challenging to establish an effective method of evaluation. Short and long-term goals were set.

The short-term goals were:
● To integrate the online drug quiz into the existing drug administration study day;
● To disseminate information appropriate to staff groups in order to engage them in the learning process;
● To change the perception of IT and improve computer skills and usage;
● For staff to identify their own learning needs.

The long-term goals were:
● For the quiz to become a prerequisite for drug administration training;
● To improve drug calculation ability through self-directed study;
● To reduce the number of drug administration incidents relating to calculation errors.

Since implementing the quiz in February 2003 the formal evaluation feedback and anecdotal evidence from the clinical areas have been very positive. A total of 427 quizzes were completed in the period from February to November 2003 (Fig 1).

Learners’ quiz evaluations
Learners complete a trust evaluation form at the end of each training session. All evaluations are anonymous and typical comments include:
● ‘The drug quiz session in the computer room was refreshing and helped practically’;
● ‘The computer-based quiz is interactive and a good learning tool’;
● ‘The drug calculation session via the intranet was helpful. It gave me confidence in two areas of weakness’.

Tutors’ quiz evaluation
It is still too soon to assess trust-wide impact of the training via HIRS data, which analyses trends and patterns in incident reporting. However, anecdotal evidence taken from the study day has been very positive. Historically the drug calculation session has been very poorly received with learners’ needs remaining unmet, but the comments are now much more positive. The learners enjoy the computer aspect of the session and learn IT skills in addition to drug calculation skills.

Conclusion
The development and implementation of an online drug calculation quiz has been a positive step in the changing direction of education provision within the trust.

It has provided staff with 24-hour access to training, allowing them to identify and address their own learning needs in a safe environment. As a positive by-product of this approach, learners have increased their IT skills, which will aid preparation for the patient electronic records system.

However, it should not be assumed that this approach is a cure for poorly attended study sessions, or poorly performing staff. Nor should it be viewed as a cost-saving exercise. Hospitals adopting this approach must be conversant with both the advantages and barriers to e-learning. Hospital managers and educationists must promote an integrated approach that places equal emphasis on self-directed learning and face-to-face sessions. In this way the provision of effective education will lead to effective, safe practitioners.

Raised awareness of drug calculation errors and the provision of a practical tool to develop skills means the staff at South Manchester are focused on improving their calculation ability. Although the positive impact on staff and patients is tangible the cost benefits of such an approach may take some time to be realised.
Medication errors, always a focus for media attention, are of concern to the general public and medical practitioners alike. According to the Department of Health (2000) document An Organisation With a Memory 25 per cent of litigation claims relate to medication errors. This has prompted the government to set a target to reduce such errors by 40 per cent by 2005. Many errors are the result of incorrect drug calculation. With the increase in technology and the range of drugs available, the maths required is becoming more complex and critical (Weeks et al, 2000). The DoH (2000) acknowledges that ‘inaccuracies with calculations can put patients’ lives at risk’, yet there is no minimum maths qualification to enter nurse training. The standard of ‘nursing maths’ is therefore variable within each organisation, department, ward and shift.

Background
Within South Manchester University Hospitals NHS Trust there are approximately 10,000 medicines administered every day. The Hospital Incident Reporting System (HIRS) database has shown that a significant number of incidents have been related to drug administration, several being a direct result of a drug calculation error.

This information, together with ongoing evaluation of the trust’s training programme, highlighted the need for action. We decided to develop an educational tool that would address identified gaps in knowledge while being more accessible to clinical staff. Local clinical audit supported these conclusions.

Design and development
Having highlighted the main area of concern, the clinical tutors approached different departments within the trust for their perspective on what was required from the tool. The main requirements identified were that:
- Staff could access learning at any time of day;
- Staff could identify their own learning needs;
- It could be integrated as a pre-course assessment;
- It was easy to use, because a significant number of nursing staff had limited IT skills.

With these requirements in mind the development team designed a computer-based drug calculation self-assessment tool. This tool has been developed in-house and is located on the clinical skills intranet website. It includes:
- Several different multiple-choice quizzes;
- Quizzes for practice only;
- Quizzes may be submitted to the tutors for formal assessment;
- Department/specialty-specific elements;
- Drug-calculation formulas;
- Common drug calculations;
- Additional relevant supporting information.

Benefits of e-learning
We chose this approach as it has so many benefits for both the learners and the organisation:
- Learners have access to learning materials 24 hours a day, seven days a week;
- It can be accessed from anywhere in the trust;
- Self-identification of learning needs promotes independent learning;
- Learners are free from the time constraints associated with teaching sessions, enabling them to proceed at their own pace. This in itself may encourage a more reflective approach.
- An online learning environment can be less threatening than a face-to-face training session. E-learning is anonymous and can offer continuous training, free from interruption.

This gives the added advantage of eliminating problems that may arise as a result of cross-cultural differences in communication and word pronunciation.

In addition, the learners will have asynchronous access to trainers via a message board and can contact the trainers directly at any time of day or night. This will be particularly helpful for staff who are on night duty or working weekends.
A positive by-product of the introduction of this self-

Authors
Julie Gray, PGCE, BA, RGN, is professional clinical skills tutor; Carolyn Jackson, Med, CertEd, RGN, is information and technology clinical development trainer; both at South Manchester University Hospitals NHS Trust.

Abstract

This article describes the development and implementation of an online drug calculation quiz. The multiple-choice quiz was designed to help staff to identify their learning needs and reduce the incidence of medication errors. The system implemented shifted the responsibility of training from trainer to learner and so promoted individual accountability.

Keywords
Drug calculations; Self-assessment; E-learning; Medicine errors; Practice.

References
