Safer medicine administration through the use of e-learning

AUTHORS Caroline Hare, BPharm, is senior pharmacist medicines management education and training; Clare Davies, RGN, is clinical education adviser surgical directorate; Martin Shepherd, MSc, BPharm, is head of therapy and medicines management; all at Chesterfield Royal Hospital NHS Foundation Trust, Chesterfield.


The administration of medicines to patients in acute hospitals can generate significant clinical risk. Nurses who undertake this must be competent and confident to practise. This article describes the development and implementation of an e-learning programme to educate and assess nurses in safe drug administration practice.

In recent years the burden of risk generated in acute hospitals by inaccurate administration of medicines has come to be increasingly recognised. It can be argued that a watershed occurred in 2001 when a number of key events occurred. The death of a patient due to the inadvertent administration of vincristine via the intrathecal route prompted a range of activities coordinated at national level to improve the safety of patients prescribed intrathecal chemotherapy. In the same year, the Audit Commission published its report A Spoonful of Sugar into the management of medicines in hospitals in England and Wales. The Audit Commission stressed the need for hospitals to improve standards of medication safety and recommended that ‘monitoring of competencies in administration of medicines should be given a high priority’.

Background

In 2001 the government set up the National Patient Safety Agency (NPSA) to establish a unified mechanism across the NHS for the reporting and analysis of healthcare-related incidents. In 2005 the NPSA published the first results of incidents reported via its national reporting and learning system (NRLS) (NPSA, 2005). This report suggested that 10% of all untoward incidents reported across the NHS were medication related and the NPSA highlighted concern that ‘learning how to administer medicines is not well taught’.

The Chesterfield Royal Hospital NHS Foundation Trust has an established track record of effective clinical risk management. Integrated systems for reporting errors – including those relating to medicines – are long established.

During 2004 senior staff became aware of a rise in the number of significant clinical incidents associated with medicines that could not be accounted for by increases in baseline reporting. In response to this the trust’s pharmacy service undertook a survey of 100 randomly selected registered nursing staff using an internally designed questionnaire to gauge levels of medicines-related knowledge. The questionnaire included drug calculations, knowledge of basic pharmacology including interactions and contraindications and nurses’ awareness of hospital medicines policies. The survey confirmed significant shortcomings in the level of knowledge and awareness of nursing staff with regard to safe medication practice.

In response to this the trust considered the need to establish a formal education and competency assessment process for its nurses to provide

FIG 1. EXAMPLE OF A SYSTEM QUESTION

PALLIATIVE CARE PUMPS – CALCULATIONS

For the patient who has been prescribed a syringe pump containing

- Diamorphine 20mg
- Haloperidol 1.5mg
- Metoclopramide 40mg

Select the syringe that you will use for this pump from those shown below

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>10ml</td>
<td>10ml</td>
<td>20ml</td>
<td>20ml</td>
<td>30ml</td>
</tr>
<tr>
<td>luer slip</td>
<td>luer lock</td>
<td>luer slip</td>
<td>luer lock</td>
<td>luer lock</td>
</tr>
</tbody>
</table>

This article has been double-blind peer-reviewed.

For related articles on this subject and links to relevant websites see www.nursingtimes.net
assurance with regard to their clinical practice in administering medicines. The possibility of providing formal teaching to nurses on this subject was quickly discarded on the basis that staff could not be released from clinical duties for the requisite amount of time needed to teach the relevant subject matter.

In light of this, the development of an e-learning solution was proposed that would provide an education and competency assessment tool for medicines administration. Our aim was to produce an electronic learning system that would allow nurses to undertake a self-directed assessment of their knowledge of safe practice in drug administration. It was intended that the system should also be used to inform staff appraisal and development plans.

E-learning package

The potential benefits of e-learning systems have been well documented, especially regarding improved access for staff and independent learning (Gray, 2004).

We were aware that some organisations had developed similar systems but these were limited to specific areas of competency, particularly numerical skills that are needed to perform drug calculations. In light of our desire to create a more comprehensive package, we sought potential partners to assist in the development of the system. Using existing links to the University of Derby we established a working relationship with the University Centre for Interactive Assessment Development (CIAD). The university is at the forefront of online assessment and its experience in this area proved particularly attractive in assisting us with developing a product.

The content for the package was developed over a six-month period. It was the result of close collaboration between nurses engaged in practice development and educational work and the trust pharmacy department. This collaboration generated a specification for the package with the following characteristics:

- Password protected to individual nurses;
- Easily distributed and accessible across the trust intranet;
- Able to provide feedback to both users and mentors/line managers;
- Adaptable for future changes in nursing/medicines management practice;
- Able to be undertaken within defined time periods;
- Ability to suspend an assessment and return to the work at a later time;
- Able to provide additional supporting information in the context of questions asked and able to print this if required;
- Able to randomise questions of a similar type, particularly calculations questions, so that if a nurse revisited the site their understanding of underlying principles would be tested, rather than their memory of a particular answer;
- Inclusion of an element of negative/weighted scoring within each question to discourage guessing.

With regard to the ‘clinical’ content of the system, it was agreed that the package would consist of a core element and a series of ‘specialist’ sections related to specific areas of nursing practice. These were as follows:

- Core content – including medicines management policies and procedures, drug calculations, common practical problems such medication allergy, and common adverse reactions;
- Specialist sections dedicated to medicine, surgery, critical care, emergency care, paediatrics and maternity.

A key concern in the creation of the questions was to ensure that they reflected the practical problems that nurses were confronted with in their everyday practice (Fig 1, p25). Hence, many of the questions are based upon ‘realistic’ clinical scenarios extracted from clinical practice. Consideration was also given to the importance of addressing nurses’ awareness of policies relating to medicines management and how these should be implemented in practice.
Once the clinical content for the package had been created the authors worked closely with the University of Derby to refine technical aspects of the product.

At all stages in its development the product was shared widely among the trust’s senior nursing and pharmacy staff to ensure they fully supported its content and development.

Evaluation
Pilot assessments of the package were undertaken at periodic intervals to ensure that junior nurses were able to undertake the necessary assessments. In October 2005 the complete ‘core’ package was undertaken by 34 of the trust’s preceptorship nurses.

The results were that 75% (25) of the candidates scored above 60% overall (range 25–97%, median 65%). These scores may at first sight appear to be low but scores achieved in tests employing a system of negative marking are often lower than those in traditional-style examinations.

Median time taken to complete the module was 20.7 minutes (range 9.13–28.93 minutes) so all preceptees completed the package during the allocated 30 minutes.

Analysis of results broken down by question type (Fig 2) highlighted that the most poorly answered questions overall related to local policies and procedures for medicines management. This was as expected but because completing the package highlighted these policies to the preceptees taking part, it provided a formative as well as summative assessment.

Basic calculations, such as conversions of micrograms to milligrams, were answered less well than applied conversion questions such as ‘How many 0.125mg tablets would you administer for a dose of 500 micrograms?’ even though the underlying principles are the same (Fig 3).

A written questionnaire requesting qualitative feedback was completed by 32 of the 34 candidates. The responses to questions about ease of using the package were very encouraging (Fig 4). Individual comments about the style of the package were very useful and have been fed back to the programmers to help improve the system further.

All participants said they would like to use the system again and 91% said they would probably access the system in their own time. However, 9% said they would only use it again if they had protected time in work to do so.

Future development
There has been extensive debate in the trust with regard to the future use of the learning package. There is widespread agreement that the system will provide a significant resource for assessing and improving the knowledge of nurses at all levels within the hospital with regard to medicines administration.

There is, however, less certainty with regard to its use as a competency assessment tool and in particular whether or not it should be used as a determinant of nurses’ clinical practice, which would depend upon nurses’ relative success in completing the course.

The key question is what should be done when individuals fail to reach the agreed pass mark. Should those nurses no longer administer medicines? We anticipate that this debate will extend as the system enters wider use.

It is our expectation that the system will be utilised within all clinical specialties of the hospital as a tool for assessing and improving nurses’ knowledge with regard to medicines administration.

It is also being considered as a potential short-listing mechanism for nurses who are attending for job interviews.

Conclusion
We believe that we have created an easy-to-use, practically focused e-learning system in response to finding a significant shortfall in the knowledge, confidence and competence of nurses within our hospital to administer medicines safely.

This tool is acceptable to our nursing staff and is a significant asset for improving standards of care.

We anticipate that the e-learning system will become an integral part of nurse training and development within the hospital and will lead to significant reductions in medication related errors across the trust.

Furthermore, we anticipate the system and its supporting technology can be used for education and assessment in other critical areas of clinical practice such as blood transfusion and we hope to develop this idea over the coming year.