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Virtual Drug Round: Development and Next Steps

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Abstract

Internationally, nurses are responsible for the accurate administration of drugs to patients in their care, something that is vital to maintaining the safety and well being of patients. Whilst educational input to drug administration is provided, there remain a high number of errors in medicine calculations and delivery. To address these areas of concern different approaches to the development of knowledge and skills in medicine administration are being explored.

This paper discusses the development and proposed implementation of a virtual drug round (VDR) in a University in the United Kingdom that aims to support the safe administration of medicines. It reflects on the processes of developing the VDR in some detail and considers the implementation plan. Proposals for evaluation are also considered that will inform ongoing development and transferability.

Introduction

Internationally, nurses are responsible for the accurate administration of drugs to patients in their care, something that is vital to maintaining the safety and well-being of patients. To promote safe practice student nurses internationally receive education in the calculation and delivery of medicines and are often required to achieve professional competency in such skills (NMC 2010a, Australian Commission on Safety and Quality in Health Care 2009, World Alliance for Patient Safety 2009, Hughes 2008.) Despite educational input and testing, errors in drug administration delivery are recorded and it is felt that a number go un-reported (NPSA 2007, NRLS 2004.) This has led to an exploration of different approaches to educational provision that might enable the development of essential knowledge and skills for safe drug administration practice.

This paper discusses the implementation of a Virtual Drug Round (VDR) that aims to support the development of nurses' knowledge and skills for safe administration of medicines. It considers the relevant international background literature and policy including the importance of safe administration, the development of objective structured clinical examinations (OSCEs) and use of e-learning to support drug administration. Insight is given into the development of the VDR and its planned implementation, before reflecting on the next steps.

Background

Drug administration is a key part of the nurses' role, taking an estimated 40% of nursing time (Audit Commission 2001) and errors in the delivery of medicines are reported as a cause of many adverse care incidents (NPSA 2007 and 2009). Often these errors occur when human factors interact with complex systems for prescribing,

dispensing, administering and monitoring drugs. Whilst there is an increasing acceptance that weaknesses within healthcare systems need review to minimize errors and that the simplification and standardisation of systems can reduce errors (Henriksen et al. 2008), there is still a need to ensure staff have relevant education and understanding to support safe administration of medicines.

The OSCE offers one way for developing vital drug administration skills. Originally developed for the assessment of medical students in Dundee in the 1970s (Harden and Gleeson 1979), it spread beyond medical education to other health care professions including radiology (Marshall and Harris 2000), physiotherapy (Nayer 1993; Wessel et al. 2003), and nursing (McKnight et al. 1987; Ross et al. 1988; Alinier 2003). Contemporary literature suggests that the predominant strategy used to assess competency in skills environments in nurse education is now a modified form of OSCE within a simulated environment. It is suggested that this provides a valid and reliable tool for the assessment of clinical skills within a simulated environment (Nicol and Freeth 1998; Khattab and Rawlings 2001; Alinier, 2003; Major 2005). Conversely, concerns continue to be raised regarding resource implications, the lack of emphasis on holistic care delivery and its limited transferability to practice (Knight 2001; Rust 2001; Redfern et al. 2002; Rushforth 2007). In relation to the teaching, learning and assessment of drug administration, OSCEs and simulation are used in HEIs in relation to patient safety (Paparello et al. 2004), extended nurse prescribing (Franklin 2005) and medication calculations (Hutton et al. 2010). They have also been used as part of online electronically delivered OSCE assessment in radiotherapy (Palarm et al. 2003).

E-learning is used by a number of higher education institutions (HEIs) to support the provision of health care education. A recent survey of 25 HEIs in the United Kingdom (UK) revealed that 100% of institutions were using a virtual learning environment to support student learning. Interestingly, 68% (n=17) were using e-assessment and 60% (n=15) were providing access to multimedia resources such as simulations (Moule et al. 2010). Yet it is suggested that the provision of clinical skills through e-learning has been considered a challenging area and the effectiveness has been difficult to quantify (Gormley et al. 2009). Examples of successful use have included the delivery of resuscitation skills (Moule et al. 2008) and of clinical skills to undergraduate medical students, who displayed deep learning traits when using e-learning and performed better in subsequent OSCEs (Gormley et al. 2009). Further evidence from the field of medical education in Sweden also suggests virtual patient simulation used for learning and assessment supports learning (Botezatu et al., 2010a). In fact, Botezatu et al. (2010a) suggested that virtual patient simulation assessment results were consistently superior to those obtained with regular course assessment. Given these positive findings it was felt appropriate to develop a VDR to support student nurses' skills in the safe administration of medicines.

Development of the VDR

The VDR was developed in a University in the south-west of the UK. It is part of a wide e-learning development programme at the University that focuses on the use of virtual

simulation to support learning. The VDR focuses on developing safe practice in medicines administration and promoting awareness of safe practice and patient safety issues. Development of this pilot project was supported by a grant from the University e-learning centre and involved a variety of clinical, technical and academic staff with a range of experience. Staff from clinical areas had backgrounds in acute medicine, critical care and surgical nursing as well as pharmacy. The technical staff had a variety of experience in developing a range of e-learning tools. The academic staff included tutors from the pre- and post- registration nursing courses, and all branches of nursing and midwifery were represented. A working party was set up with regular meetings at which staff contributed to the development of the tool. This was especially important to ensure that the scenarios reflected current practice and were realistic (Botezatu et al., 2010b.) A core group of staff then went on to develop the learning objects and scenarios with regular reviews by other team members.

Within the UK undergraduate and diploma education student nurses undertake a three-year pre-registration programme. In each year they undertake a variety of theoretical and practice modules, each includes a requirement to attain knowledge and skills essential for registration. In Year 1 nursing students have theoretical and practical skills sessions that explore issues in medications administration, as well as undertaking supervised experience in placement.

From a practical perspective, large numbers of nursing and midwifery students (>750 per year located across three disparate campus sites) dictate that simulation time within the University is limited, restricted by time, space and geography. Virtual simulation is one answer to such pressures on resources (Cook and Triola 2009) and has been shown to have a significant role in many education courses (Ellaway et al. 2009.) Anecdotal feedback from students suggests that they would like more simulation time and do not have consistent opportunities to participate in medication administration in clinical placement due to a number of reasons. The Nursing and Midwifery Council (NMC) standards emphasise the importance of practice in all aspects of medications management and their standards require that students simulate advanced administration techniques such as patient group directives (PGD) (NMC 2010b.) The advantages of the VDR include enabling students to learn at their own pace, practice decision making skills in a safe environment and provide evidence of their learning, for example through assessment (Ellaway et al. 2009; Botezatu et al., 2010b).

Nursing students have practical assessments, OSCEs in administration of medication and are given step-by-step guidance in preparation for this. This tool is intended to support student learning for OSCEs and practice by enabling students to practise drug administration in a safe simulated environment at their convenience. Students will have an opportunity to follow the published safe practice guidance in preparation for OSCE assessment, based on the latest NMC guidance (2010a) so that they practice the correct procedure for drug administration. It is proposed that students will be introduced to the VDR after doing practical drug administration scenarios in clinical

skills sessions. They will access the VDR during the self-directed learning time in the weeks prior to the OSCE, to give them maximum opportunity to practice drug administration skills. They will be encouraged to explore all the scenarios and they will be able to revisit any scenario as many times as they wish. Students can print out a summary of their activity and can record this in their portfolio of achievement. This can also be used as evidence in their practice alongside skills competency documentation.

It is, however, recognised that there are many factors that can influence the likelihood of adverse drug administration incidents, despite nurses following the correct process of medication administration (Hughes 2008; Australian Commission on Safety and Quality in Health Care 2009; NRLS 2004). It would be unrealistic to provide scenarios with no reflection of real-life incidents, consequently common difficulties are also explored within the VDR including the most common adverse incidents recorded by the NPSA (2007): interruptions, omissions, incorrect prescriptions and incorrect documentation. The drug round allows the student to make mistakes, which are corrected by the virtual 'mentor' who will give appropriate feedback via the pathway responses. This reflects the experience that students will have when involved in drug rounds, however, the responses will emphasise the implications of incorrect decisions so that students are exposed to the reality of an adverse drug incident. This provides a safe learning environment in which students will not only learn about the correct procedures but also about the complexities of this aspect of nursing care. By following the 'incorrect' decision pathway students can learn about the consequences of their adverse medication incidents and learn to respond appropriately and safely. Students will be able to print out the pathway of decisions they have taken to see where they made correct and incorrect choices so that they can review their progress and important points of learning. As well as using the VDR in isolation, it may be used in peer groups or by facilitators to support ongoing education and maintenance of skills.

Implementation Plans

The VDR will be implemented in phases and currently it is part of the Year 1 nursing programme used to prepare students for their OSCE. This first phase is based on a small service user group in an in-hospital situation, where the highest levels of medication errors are recorded (NPSA 2007.) The tool is designed to allow student access through the internet when they need it, therefore it could be used to revisit administration techniques. Further development of the VDR in years two and three will build in more complex issues of medication administration in order to further promote safety in drug administration.

As well as practising the correct OSCE procedure, students will be encouraged to follow 'incorrect' pathways as discussed above. As the problems are based on real-life experiences it is hoped that this will enhance their experience and reflect situations that students may encounter in practice. Through the VDR the students should be equipped to deal with real life situations. It is anticipated that students will be able to use their printed off pathway to show progression, which could contribute to formative

assessment in the future. This could also be used as evidence of understanding in practice placement assessments.

Evaluation Strategy

As a pilot, the VDR will be evaluated to find out about the student experience and how they perceive it prepares them for their OSCE. Initially an informal evaluation will be solicited to establish general positive views and difficulties, employing an approach used by Paparella et al. (2004). A more formal evaluation is planned to include a questionnaire to all students and focus groups that will allow more in-depth discussion and exploration of student views. It would also be useful to establish if the educational provision has any impact on practice, and there is the potential to measure this through the achievement of OSCEs and to record knowledge attainment through pre- and post-testing as used previously (Moule et al. 2008). Additional data will be collected that records student use of the VDR. University ethics approval will be gained prior to any data collection. The findings will be used to inform further development of the VDR and ongoing use.

Conclusions and Next Steps

It is anticipated that the VDR will be a valuable learning tool that can be developed for use throughout the curriculum. Not only can more complex patient scenarios be explored in the future, but specific needs can be facilitated. An example in development is patient group direction (PGD) which legally student nurses cannot administer. The NMC (2010) essential skills clusters require student nurses to simulate PGD administration. This is where there is an agreed pre-prescribed drug that can be initiated by a nurse based on their assessment of a patient's condition (RCN 2006.) Student nurses need to demonstrate knowledge and use of this skill before qualification. The VDR is an ideal way of allowing students to gain knowledge and understanding of this essential nursing skill. Our evaluation of students and staff experience of the Year 1 VDR will inform any future developments.

References

Alinier, G. (2003) Nursing students' and lecturers' perspectives of objective structured clinical examination incorporating simulation, *Nurse Education Today*, 23, 6, pp. 419–426.

Audit Commission. (2001) *A Spoonful of Sugar: Medicines management in NHS hospitals*. Audit Commission, London. (accessed online) http://www.audit-commission.gov.uk/health/nationalstudies/other/Pages/aspoonfulofsugar_copy.aspx.

Australian Commission on Safety and Quality in Health Care. (2009) *National Medication Safety and Quality Scoping Study Committee Report* (accessed online) [http://www.health.gov.au/internet/safety/publishing.nsf/Content/com-pubs_NIMC/\\$File/25185-Report.pdf](http://www.health.gov.au/internet/safety/publishing.nsf/Content/com-pubs_NIMC/$File/25185-Report.pdf).

Botezatu, M., Hakan, H., Mesfin, K. T. and Uno, F. (2010a) Virtual patient simulation for learning and assessment: Superior results in comparison with regular course exams, *Medical Teacher*, 32, pp. 845–850.

Botezatu, M., Hult, H. and Fors, U. G. (2010b) Virtual patient simulation: what do students make of it? A focus group study, *BMC Med Educ*, 10: 91. (accessed online) <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3014956/pdf/1472-6920-10-91.pdf>.

Cook, D. A. and Triola, M. M. (2009) Virtual patients: a critical literature review and proposed next steps, *Medical Education*, 43, 4, pp. 303–311. (accessed online) <http://onlinelibrary.wiley.com.ezproxy.uwe.ac.uk/doi/10.1111/j.1365-2923.2008.03286.x/full>.

Ellaway, R. H., Poulton, T., Smothers, V. and Greene, P. (2009) Virtual patients come of age, *Medical Teacher*, 31, 8, pp. 683–684 (accessed online) <http://informahealthcare.com.ezproxy.uwe.ac.uk/doi/full/10.1080/01421590903124765>.

Franklin, P. (2005) OSCEs as a means of assessment for the practice of nurse prescribing, *Nurse Prescribing*, 3 (1), pp. 14–23.

Gormley, G., Collins, K., Boohan, M., Bickle, I. and Stevenson, M. (2009) Is there a place for e-learning in clinical skills? A survey of undergraduate medical students' experiences and attitudes, *Medical Teacher*, 31, e6–e12.

Harden, R. and Gleeson, F. (1979) Assessment of clinical competence using an objective structured clinical examination, *Medical Education*, 13, 1, pp. 41–54.

Hutton, M., Coben, D., Hall, C., Rowe, D., Sabin, M., Weeks, K. and Woolley, N. (2010) Numeracy for nursing, report of a pilot study to compare the outcomes of two practical simulation tools – An online medication dosage assessment and practical assessment in the style of objective structured clinical examination, *Nurse Education Today*, 30, pp. 608–614.

Henriksen, K., Dayton, E., Keyes, M. A., Carayon, P. and Hughes, R. G. (2008) Understanding Adverse Events: A Human Factors Framework, cited in Hughes, R. G., (Ed.) (2008) *Safety and Quality: An Evidence-Based Handbook for Nurses*, Agency for Healthcare Research and Quality (AHRQ), Rockville (MD), USA. (accessed online) <http://www.ahrq.gov/qual/nurseshdbk/>.

Khattab, A. D. and Rawlings, B. (2001) Assessing nurse practitioner students using a modified objective structured clinical examination (OSCE), *Nurse Education Today*, 21, pp. 541–550.

Knight, P. T. (2001) A Briefing on Key Concepts – Formative and Summative, Criterion & Norm Referenced Assessment, LTSN Generic Centre, http://www.heacademy.ac.uk/resources.asp?process=full_records§ion=generic&id=7. (accessed 24/01/11).

Major, D. A. (2005) OSCEs – seven years on the bandwagon: the progress of an objective structured clinical evaluation programme, *Nurse Education Today*, 25, 6, pp. 442–454.

Marshall, G. and Harris, P. (2000) A study of the role of an objective structured clinical examination (OSCE) in assessing clinical competence in third year student radiographers, *Radiography*, 6, 2, pp. 117–122.

McKnight, J., Rideout, E., Brown, B., Cileska, D., Patton, D., Rankin, J. and Woodward, C. (1987) The objective structured clinical examination: an alternative approach to assessing student clinical performance, *Journal of Nursing Education*, 26, 1, pp. 39–41.

Moule, P., Ward, R. and Lockyer, L. (2010) Issues with e-learning in nursing and health education in the UK: are new technologies being embraced in the teaching and learning environments? *Journal of Research in Nursing*, 16 (1), pp. 7–90.

Moule, P., Albarran, J., Bessant, E., Pollock, J. and Brownfield, C. (2008) A 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, pp. 427–434.

Nayer, M. (1993) An overview of the objective structured clinical examination, *Physiotherapy Canada*, 45, 3, pp. 171–178.

Nichol, M. and Freeth, D. (1998) Assessment of clinical skills: a new approach to an old problem, *Nurse Education Today*, 18, 8, pp. 601–609.

NMC. (2010a) Standards for medicines management, Nursing and Midwifery Council, UK <http://www.nmc-uk.org/Documents/Standards/nmcStandardsForMedicinesManagementBooklet.pdf>. (accessed 30/1/11).

NMC. (2010b) Standards for pre-registration nursing education. Annex 3: Essential skills clusters, <http://standards.nmc-uk.org/PreRegNursing/statutory/annexe/Pages/Annexe.aspx>. (accessed 10/1/2011).

NPSA. (2007) Safety in doses: improving the use of medicines in the NHS, National Patient Safety Agency UK, <http://www.nrls.npsa.nhs.uk/resources/patientsafety-topics/medication-safety>. (accessed 30/1/11).

NPSA. (2009) Safety in doses: improving the use of medicines in the NHS, National Patient Safety Agency UK, <http://www.nrls.npsa.nhs.uk/resources/patientsafety-topics/medication-safety>. (accessed 30/1/11).

National Reporting and Learning Service (NRLS). (2004) Seven steps to patient safety: full reference guide, National Patient Safety Agency, (accessed online) <http://www.nrls.npsa.nhs.uk/resources/collections/sevensteps-to-patient-safety/?entryid45=59787>.

Palarm, T. W., Griffiths, T. M. and Philips, R. (2003) The design, implementation and evaluation of electronic objective structured clinical examinations in diagnostic imaging: an 'action research' strategy, *Journal of Diagnostic Imaging and Radiography*, 5, 1, pp. 1–9.

Paparella, S. F., Mariani, B. A., Layton, K. and Carpenter, A. M. (2004) Patient Safety Simulation; learning about safety never seemed more fun, *Journal for Nurses in Staff Development*, 20, 6, pp. 247–252.

RCN. (2006) *Patient Group Directions: Guidance and information for nurses*, London: Royal College of Nursing.

Redfern, S., Norman, I., Calman, L., Watson, R. and Murrells, T. (2002) Assessing competence to practise in nursing: a review of the literature, *Research Papers in Education*, 17, 1, pp. 51–77.

Ross, M., Carroll, G., Knight, J., Chamberlain, M., Fothergill-Bourbonnais, F. and Linton, J. (1988) Using the OSCE to measure clinical skills performance in nursing, *Journal of Advanced Nursing*, 13, 1, pp. 45–56.

Rushforth, H. E. (2007) Objective structured clinical examination (OSCE): review of literature and implications for nurse education, *Nurse Education Today*, 27, 5, pp. 481–490.

Rust, C. (2001) *Basic Assessment Issues and Terminology*, The Higher Education Academy, http://www.heacademy.ac.uk/resources.asp?process=full_record§ion=generic&id=436. (accessed 25/01/11).

Wessel, J., Williams, R., Finch, E. and Gemus, M. (2003) Reliability and validity of an objective structured clinical examination for physical therapy students, *Journal of Allied Health*, 32, 4, pp. 266–269.

World Alliance for Patient Safety. (2009) *Patient Safety Curriculum Guide for Medical Schools*, WHO. (accessed online) http://www.who.int/patientsafety/information_centre/documents/who_ps_curriculum_summary.pdf.