Numeracy for Nursing: The case for a benchmark

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In this paper we outline and share examples of our work in progress on an inter-disciplinary project to develop a benchmark for a key aspect of numeracy for nursing, 'Medication Dosage Calculation: Benchmark Assessment for Nursing', funded by NHS Education Scotland (NES). The project is exploring the key issues associated with determining the achievement of competence in nursing numeracy. It provides a real opportunity to establish a UK (and potentially also international) benchmark for nursing competence in numeracy at point of registration.

Numeracy is a key skill for professional practice in nursing (Hutton, 1997). From September 2008 the body regulating the profession in the UK (the Nursing and Midwifery Council, NMC) will require nursing students to achieve 100% in a test of numeracy in practice (NMC, 2007a) before they will be allowed to register as nurses, yet there are currently no national standards for teaching and/or assessment of numeracy during pre-registration nurse training. Without such a standard, the measure of numerical competence is:

> ... in the eye of the recipient of evidence of that competence, be it Higher Education Institutions, Regulators, Employers or Service Users. (Hutton, 2004)

Medication errors[6] are an aspect of clinical governance which has been highlighted recently by the National Patient Safety Agency (NPSA) and this issue is currently targeted for remedial action (NPSA, 2006a, 2006b). The number of injuries and deaths that can be attributed to medication errors in the NHS is unknown but 9% of incidents reported to the NPSA in its pilot data audit involved medicines (NPSA, 2003); this is consistent with historical data but since calculation error is not separately identified we do not know how many of these were calculation errors. The Department of Health report on *Improving Medication Safety* (Smith, 2004) put some of the blame for medication errors on inadequacies in the education and training of both doctors and nurses. In Scotland, two recent reports, *Learning from Experience* (SEHD, 2003) and *Safe Today, Safer Tomorrow* (NHS/QIS, 2006), have focused on patient safety and risk

Notes

[6]. The NPSA has adopted the terminology of the US National Co-ordinating Council for Medication Error Reporting and Prevention: "A medication error is any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of health professional, patient or consumer." (Smith, 2004, p.20)

management, including medication error. The NPSA, in partnership with the *British Medical Journal* (BMJ) Publishing Group, has provided a standardised on-line educational package for junior doctors (NPSA, 2006a) but as yet nothing has been instigated for nurses.

While medication errors are multi-factorial, lack of competence in numerical calculation is often cited as a key area of concern, especially with respect to medication dosage calculation (Weeks, Lyne, & Torrance, 2000). Numeracy in the healthcare context is much broader than medication calculation, but this is its most visible and commonly cited example, and greater consistency in assessment would strengthen support for enhancement of learning and teaching approaches.

Employers are charged with reducing error rates year on year (Department of Health, 2001) and new nurses can expect employers to include mathematics assessment as part of the interview process and within their employment. Anecdotal evidence suggests that many NHS employers are not confident that newly qualified nurses have the numeracy skills required for safe practice and some employers impose their own tests of numerical competency when selecting for Staff Nurse posts. These locally constructed tests are in all probability neither reliable nor valid and *ad hoc* testing of this nature is unlikely to provide assurance of competence. Service Managers and Practice Development Leads have also identified numeracy development needs amongst registered staff, but, in the absence of a benchmark, or diagnostic assessment, it is often difficult to determine which skills require development, or when competence has been achieved.

A recent Commission for Healthcare Audit and Inspection report, *The Best Medicine. The management of medicines in acute and specialist trusts*[7] made the following recommendations, which would go some way to addressing this situation:

> We recommend that the National Prescribing Centre lead a national exercise to identify existing best practice and then develop tools to test the medicines-related competency of staff in areas of high risk. These tools should be suitable for assessing all professional groups involved in prescribing and handling medicines. Trusts should also identify areas of medicine that are not adequately covered on training courses for each professional group of staff and implement actions to address deficiencies. (Commission for Healthcare Audit and Inspection, 2007, p.20)

The Benchmark project

Against this background, following on from a review of relevant literature (Sabin, 2001) the recommendations in the consultation on Healthcare Numeracy (NES Numeracy Working Group, 2006)[8], NHS Education for Scotland (NES) has brought

[7] Authorities and trusts are the different types of organizations that run the NHS at a local level.

[8]. NES recommended:

1. A standardised suite of nationally recognised and validated Healthcare Numeracy provision that demonstrates sound academic progression and vocational relevance.
2. Development of national guidance and practice placement standards regarding numeracy learning.
3. Closer collaboration between Higher Education, Further Education and the service.
4. National on-line resources for learning, teaching and assessment of healthcare numeracy.
5. Development of a national multi-disciplinary benchmark assessment designed to determine competence achievement at the point of registration.
6. Once developed, the standard could be used as a benchmark for employment purposes.

together an interdisciplinary group of subject experts from across the UK to explore the key issues associated with determining achievement of competence in nursing numeracy. The project is entitled 'Medication Dosage Calculation: Benchmark Assessment for Nursing'. We are focusing on medication-related calculations because this is the most common exemplar for nursing numeracy. Furthermore, incorrect calculation of medication dosage can result in harm to patients and to the reputation of the profession.

The NMC requires universities to judge nursing students' mathematics ability at entry and at registration (NMC, 2004) and more recently, also at entry to branch (Adult, Child, Mental Health, and Learning Disability) (NMC, 2007c). We are focusing on proposing the establishment of a benchmark at entry to register because this is the point at which students become registered nurses, responsible for their professional practice within the NMC's regulatory framework.

Regulation: Nursing numeracy as an element of fitness to practise, fitness for purpose and fitness for award

The NMC has a clear and specific remit of public protection through professional regulation and uses its statutory control over the approval and monitoring of nursing education to ensure that appropriate professional standards are fostered amongst new practitioners and that achievement is determined through robust assessment. To that end, the NMC has established key competencies to be achieved at the end of the first 'common foundation year' at 'entry to branch' and at the end of the programme, on 'entry to the register'. Further, in identifying that entrants to pre-registration programmes require a foundation of literacy and numeracy skills from which to develop, for example, proficiency in communication and drug calculation skills relevant to professional requirements, the NMC has also set minimum entry requirements which must be met before applicants can begin their professional education. These requirements are outlined in the following sections.

Numeracy requirements on entry to pre-registration nursing programmes

The NMC identifies standards for both literacy and numeracy as specific components within their general entry requirements (NMC, 2004). In providing guidance to support this, the NMC suggest that evidence of literacy and numeracy may be deduced from academic or vocational qualifications, through evidence of key/core skills abilities, or through the approved educational institutions' own processes, which may include portfolios or tests for those without formal qualifications. NMC also states that educational institutions are additionally entitled to set their own specific educational entry requirements, which may be at a higher level than those required by the NMC. It is acknowledged that it would be regarded as best practice if all key stakeholders (educators, students, regulators, employers and the public) could agree on educational entry requirements for nursing. In the absence of such an agreement, the NMC regulatory standards place the onus for determining suitability for entry to programmes on programme providers (i.e., the Higher Education Institutions which provide pre-registration nurse education programmes).

(NES Numeracy Working Group, 2006).

Numeracy requirements within pre-registration nursing programmes: the assessment of health related numerical competence in the Essential Skills Clusters

Since the publication of the NMC *Standards of Proficiency for Pre-Registration Nursing Education Programmes* (NMC, 2004) and in response to concerns raised by registrants and within the media, the NMC has sought to strengthen the process by which the achievement of specific skills is determined at the point of registration. Recognising that skills are often not demonstrated in isolation but as composite activities, the NMC has characterised these as 'Essential Skills Clusters' (ESCs) and has consulted with UK stakeholders regarding their development (NMC, 2006). This consultation process culminated in the publication of NMC Circular 07/2007 (NMC, 2007c) which specifies the UK-wide generic skills (in 'care and compassion', 'communication', 'organisational aspects of care', 'infection prevention and control', 'nutrition and fluid maintenance', and 'medicines management') required to support the achievement of the existing NMC outcomes for entry to branch and the proficiencies for entry to the register. The ESCs are mandatory within the curriculum with effect from September 2008, but their interpretation is left to individual Higher Education Institutions (HEIs), as the NMC states:

> - Essential Skills Clusters must be integrated into existing approved pre- registration programmes in a way that they remain visible and identifiable. It will be for programme providers to determine how these are used, incorporated and assessed.
>
> - Providers approving new programmes (or re-approving existing programmes) must demonstrate the integration of ESCs into the curriculum and how they are to be used, incorporated and assessed. The application of the ESCs will be evaluated through ongoing NMC quality monitoring. (NMC, 2007b, p.3)

The requirements for pre-registration nursing programmes specify that at entry to branch, under the domain of 'care management', nursing students are required to demonstrate achievement of all 'common foundation' outcomes. These include demonstration of the "literacy, numeracy and computer skills needed to record, enter, store, retrieve and organise data essential for care delivery" (NMC, 2004, p.3).

Whilst there would appear to be an axiomatic relationship between numeracy achievement at the earlier stages (pre-programme and mid-programme) and achievement at point of entry to the register (award), there is presumably still the opportunity to improve skills from a low base during the programme of preparation. Therefore, the NMC's focus on public protection through regulation places the determination of numerical competence at point of entry to the register as the key measurement point for achievement of competencies, including numeracy, since lack of achievement at this stage would undermine the assurance which registration provides. At entry to register all nursing staff are required to demonstrate the achievement of all professional competencies in order to show their fitness to practise and fitness for award.

'Health related numerical assessments' are specified in the ESCs set out in NMC Circular 07/2007 (NMC, 2007c) and mapped against the Standards (NMC, 2007d). Annexe 1 to the Circular sets out the requirements for health related numerical assessments as follows:

> Summative health related numerical assessments are required to test skills identified (*) within the ESCs that encompass baseline assessment and calculations associated with medicines, nutrition, fluids and other areas requiring the use of numbers relevant to the field of practice:
>
> - For entry to the branch, programme providers will use the ESCs to inform the nature and content of the assessment, including whether to assess through simulation. They will determine their own pass mark and number of attempts.
>
> - For entry to the register, programme providers will use the ESCs to inform the nature and content of numerical assessment in the branch programme where a 100% pass mark is required and all assessment must take place in the practice setting. The number of attempts is to be determined by the education provider. (NMC, 2007b, pp.2-3)

The competencies required are set out in a series of statements in Annexe 2 to the Circular (NMC, 2007a). For example, under the ESC 'Medicines Management', it is stated that patients or clients "can trust a newly registered nurse to correctly and safely undertake medicines calculations" as follows: at entry to branch, s/he "Is competent in basic medicines calculations"; at entry to the register, s/he "Accurately calculates medicines frequently encountered within Branch". The associated "Indicative Content" is set out as: "Numeracy skills, drug calculations required to administer medicines safely via appropriate routes in Branch including specific requirements for children and other groups" (NMC, 2007a, p.25).

Strengths and limitations of the present regulatory framework with respect to numeracy

The increased level of specification of health related numerical assessments embodied in the new Essential Skills Clusters is welcome, as is the inclusion of 'nutrition, fluids and other areas requiring the use of numbers relevant to the field of practice' as well as medicines calculation. The focus upon medicines calculation within the ESCs reflects both its visibility as a form of embedded 'nursing numeracy' and its prominent media profile in relation to risk and public safety. In characterising the assessment of numeracy in terms of practice-based medication calculation, the NMC appears to be seeking to address the concerns of both those who view numeracy as entirely contextualised, and those who view it as a core skill *per se*, albeit in a nursing guise. The focus upon 'drugs frequently encountered' and 'via appropriate routes in the field of practice' is important, since this competence will apply across nursing branches as diverse as Mental Health and Children's Nursing. However, despite these improvements, the present dispensation has some fundamental limitations.

Firstly, health related numerical competence is not defined (although it is exemplified) by the NMC, an unfortunate omission given that numeracy is known to be a slippery and contested concept (Coben et al., 2003, p.9).

Secondly, the NMC acknowledges that: "The ESC skills statements have not been pre-tested for reliability or validity and may not be suitable for directly assessing competence". Programme providers are accordingly required "to determine and demonstrate how these are integrated, applied and assessed within local assessment schemes" (NMC, 2007b, p.3). This is problematic with respect to numeracy since we know that:

> the assessment of calculation ability has either been based upon an assumption that the results of medication-calculation tests will correlate neatly with actual ability in clinical practice, or that observation and assessment of episodes of clinical performance will be able to infer the required level of underpinning knowledge. Fixed-point competence assessment is unlikely, in itself, to be any more useful than an individual test score at encouraging or determining the creative application of calculation skills in practice. The literature suggests that neither approach has, in isolation, been able to identify or support students and practitioners who struggle with this area of practice. (Sabin, 2001, pp.7-8)

Thirdly, the NMC entry requirements allow for a determination of suitable numerical competence to be made from a number of forms of evidence, and individual Higher Education Institutions may apply different criteria in satisfying themselves about a student's numerical aptitude on entry. This has already led to wide variations in the interpretation and application of the NMC Standards, potentially based more upon student supply and demand than outcome analysis.

Crucially, the NMC requirement that nursing students must achieve a 100% pass in a test of drug calculations in practice in order to register as nurses is meaningless unless we know what is being assessed and to what standard. Uncontrolled testing will lead to each Higher Education Institution or practice area developing its own test, with no measures of reliability or validity; standards will be variable in the extreme. Furthermore, practice settings simply cannot guarantee that the student is exposed to the full range of medication dosage problems, for example, involving calculations of sub-, multiple- and unit-dose. We have to ask: 100% of what?

A benchmark assessment solution

Providing an authentic, but safe environment in which students may both practise and be tested on the skills required, and in which support for the development of these skills is incorporated, would seem to be a better way forward, with these skills specified in a benchmark assessment. Confidence that the nurses' educational programmes will equip them with the necessary competence for safe medications dosage calculation should be the key factor.

The benefits of establishing a suitable national benchmark are considerable. A robust statement of the competence in numeracy required of nurses would give programme providers a clear standard at which to aim. A benchmark standard of numeracy incorporated into the final assessment would ensure that nurse education was fit for purpose. Such a benchmark assessment would allow providers and nursing students to measure their progress towards the standard required for safe and effective practice as they progress from entry to branch to entry to register. A benchmark would also assure employers of registered nurses' competence with respect to numeracy and obviate the need for repeated testing of applicants for nursing jobs and nurses in service. If a specific numeracy competence standard were to be established at 'point of entry to the register', and robust tools developed to measure its achievement, then the relationship between that standard and levels of achievement, which might precede it at 'entry to branch' or 'entry to programme' could be determined and other benchmark measures subsequently established. Thus 'likelihood of success at entry to the register' could be calculated relative to 'level of achievement at point of entry', and this coefficient used to guide supportive intervention.

This further suggests that a test of ability to calculate drug dosages competently by the end of 'training' should be the culmination of a programme of education and formative assessment with suitable feedback to aid development, which begins at entry to the programme and is continuous throughout the three years of training.

How students are assessed against the standard and prepared for an assessment are also essential aspects of the benchmarking process and establishing a benchmark assessment would allow education providers to test out different approaches to supporting numeracy learning and teaching.

In the next section, we consider what such a benchmark assessment might look like and the principles that should inform its development.

Principles of adult learning and teaching

The teaching and assessment of numeracy for nursing should be consistent with research-based principles of adult learning and teaching in which we draw on constructivist and socio-cultural approaches (Coben, 2000; Tusting & Barton, 2006). These principles we characterise as follows:

- Learning is a purposeful, goal-directed activity building on prior knowledge and experience to shape and construct new knowledge and a social activity embedded in a particular culture and context.

- Effective learning requires that the learner understand not only the facts but the underlying principles, patterns and relationships acquired through the application of knowledge[9].

- Knowing when and how to apply what has been learned (procedural knowledge) is central to expertise, and can be acquired only through practice in an authentic environment.

- Teaching involves informed interpretations of, and responses to, learners' approaches to learning.

- Metacognitive strategies can be taught.

- Scaffolding instruction helps learners to develop their fluency, independence and range as they move from being a new learner to becoming an expert learner.

A modern conception of numeracy

Modern conceptions of numeracy stress the importance of effective use, not just knowledge and skills, and purpose, in making sense of use. The situatedness of numeracy, shaping its use and purpose, is stressed, as is critical engagement on the part of the numeracy 'agent', in this case, the nurse or student nurse (Coben et al., 2003;

[9] The assumption of the 'application' of knowledge is problematic. Engeström (Engeström, 2001) and others (FitzSimons & Coben, 2007; Kanes, 2003) have argued that knowledge is not simply 'applied', instead, locally 'new' knowledge is developed in ever-evolving workplace situations, drawing upon what has previously been learned but in creative ways appropriate to the context and situation at hand (Gail FitzSimons, private communication, 19 Sept., 2007).

Condelli et al., 2006). With this in mind, we have adopted the following working definition of what it means to be numerate:

> To be numerate means to be competent, confident, and comfortable with one's judgements on *whether* to use mathematics in a particular situation and if so, *what* mathematics to use, *how* to do it, *what degree of accuracy is appropriate*, and *what the answer means in relation to the context*. (Coben, 2000, p.35, *emphasis in the original*)

Teaching, learning and assessing numeracy for nursing

Integrating numeracy into healthcare education and training in order to support trainees before they join the profession presents challenges in that nursing lecturers may not recognize the numeracy in nursing or know how to teach it. At the same time, adult numeracy tutors are unlikely to know the numeracy requirements of the healthcare context; there is in any case a low base in terms of the numbers of trained, experienced adult numeracy tutors and numeracy has until recently been somewhat overshadowed by literacy in the Scottish 'adult literacies' field (Coben, 2005). We suggest that a team approach, with healthcare professionals and adult numeracy specialists working together on contextualised numeracy teaching and assessment, may offer a way forward, alongside the development of training, continuing professional development (CPD), teaching, learning and materials geared to healthcare professionals' numeracy needs.

Given the continued focus upon widening entry to the healthcare professions, and the impetus for adopting non-traditional routes, it has been argued that demanding minimum levels of numeracy, as determined by school qualifications, would impact greatly on recruitment, and indeed, could be prejudicial to many potentially competent staff (Hutton, 1998). Nonetheless, recent NMC consultation work on general entry requirements has focused upon a review of whether further guidance should be provided on minimum entry criteria, including numeracy standards. We suggest that a *formative* testing of numeracy skills at entry to programme would provide a baseline for developing competence. There is firm evidence that formative assessment improves learning (Black & Wiliam, 1998).

Nursing numeracy is strongly situated in the nursing/healthcare context and, as Williams and Wake point out, mathematical processes tend to become crystallised in 'black boxes' shaped by workplace cultures, with instruments, rules and divisions of labour tending to disguise or hide mathematics. They argue that training programmes need to be better aligned with the needs of students (Williams & Wake, 2007). In particular, nurses' skills need to be sufficiently robust to cope with the stress, anxiety and time pressures of nursing, given that nursing is safety-critical activity: they need to be numerate under pressure.

Teaching and assessment for numeracy in nursing should be able to generate: independence; good critical judgment (e.g., on how accurate to be, when to estimate, within what tolerance and why); proficiency in practice; and accountability to relevant stakeholders. Numeracy for nursing must have high use value *and* high exchange value (Coben, 2006). It must be integrative, i.e., it must incorporate the mathematical, cultural, social, emotional and personal aspects of each individual in a particular context (Maguire & O'Donoghue, 2003). Assessment for numeracy in nursing must be

formative (for effective learning) and summative (for accountability)[10] (Wiliam & Black, 1996).

The nursing profession must recognise the relative importance of numeracy in the whole context of practice in order to ensure safety and quality in such key aspects of nursing practice as: drug administration and prescribing; fluid balance calculation; support for patients' nutritional needs; calculation of intravenous fluid requirements/rates; calculations related to weight and body mass index (BMI); nursing administration; plotting and recording data; and understanding relevant research and evidence.

Good practice principles for numeracy benchmark assessment

We have developed the following research-based criteria for the features of an effective numeracy benchmark assessment tool. Such a tool should be reliable, valid and capable of recreating the complexity of nursing numeracy in an authentic assessment environment. Specifically, it should be:

- *Realistic:* Evidence-based literature in the field of nursing numeracy (Hutton, 1997; Weeks, 2001) strongly supports a realistic approach to the teaching and learning of calculation skills, which in turn deserve to be tested in an authentic environment. Questions should be derived from authentic settings. A computer based programme of simulated practice in drug calculations, formative testing, with feedback on the nature of errors made, has been shown to develop competency in medication dosage calculation, which can be also demonstrated in the clinical areas (Weeks, Lyne, & Torrance, 2000). Exposure of students to real-world situations is recommended (Weeks, 2001).

- *Appropriate:* The assessment tool should determine competence in the key elements of the required competence (OECD, 2005; Sabin, 2001).

- *Differentiated:* There should be an element of differentiation between the requirements for each of the branches of nursing (Hutton, 1997).

- *Consistent with adult numeracy principles:* The assessment should be consistent with the principles of adult numeracy learning teaching and assessment, having an enablement focus (Coben, 2000).

- *Diagnostic:* The assessment tool should provide a diagnostic element, identifying which area of competence has been achieved, and which requires further intervention (Black & Wiliam, 1998). Thus it should "provide information to be used by students and teachers that is used to modify the teaching and learning activities in which they are engaged in order better to meet student needs. In other words, assessment is used formatively to 'keep learning on track'". (Wiliam, 2006).

[10]. "An assessment is defined as serving a formative function when it elicits evidence that yields construct-referenced interpretations that form the basis for successful action in improving performance, whereas summative functions prioritise the consistency of meanings across contexts and individuals." (Wiliam & Black, 1996, p.537).

- *Transparent:* The assessment should be able to demonstrate a clear relationship between 'test' achievement and performance in the practice context (Weeks, Lyne, Mosely, & Torrance, 2001).

- *Well-structured:* The assessment tool should provide:

    - a unique set of questions with a consistent level of difficulty;

    - a structured range of complexity; and

    - the assessment should take place within a defined framework, at points by which students can be effectively prepared, while allowing time for supportive remediation. (Hodgen & Wiliam, 2006)

- *Easy to administer:* the assessment should provide the opportunity for rapid collation of results, error determination, diagnosis and feedback (Black & Wiliam, 1998).

Examples of assessment items

Examples of items from the exemplar assessment tool we have developed for this project are given below (*Figure 1*). The tool has been designed by Keith Weeks and Norman Woolley as part of the Authentic World® program. This program is based on a constructivist-centred design drawn from the work of Piaget (1983), Bruner (1975), and von Glasersfeld (1987). Its aim is to facilitate the students':

- visualisation or 'seeing' of the elements of the dosage calculation problem as manifested in clinical practice;

- mapping of these elements onto the word-based formulae and number-based equations used to solve the problem.

The constructivist education process forms part of a cognitive apprenticeship framework (Collins, Brown, & Newman, 1990). This framework:

- models the expert problem solving processes that may be obscured from students in the classroom and clinical settings;

- facilitates authentic diagnostic assessment of a student's dosage calculation ability using interactive representations of the syringes, etc., used to measure and administer medication dosages in clinical practice. (Weeks, 2007)

As a first step, we shall pilot the exemplar assessment tool to determine its validity and reliability.

Authentic World

NHS Education for Scotland

User Name **nefs07a102** Institute **NHS Education for Scotland** Log Out

Back to Menu

Question 5 of 30

Extract the relevant information from the prescription chart and the medication product label. Click NEXT when you are ready to administer the dose.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

			DATE
REGULAR PRESCRIPTION MEDICINES			ADMINISTRATION TIMES 06:00
MEDICINE (Approved Name) *Furosemide*		START DATE *18/6/2007*	-
DOSE *40mg*	ROUTE *ORAL*	SPECIAL INSTRUCTIONS -	-
DOCTOR'S SIGNATURE *Dr. Jones*	PHARMACY SUPPLY *A. Mann*		-

NEXT

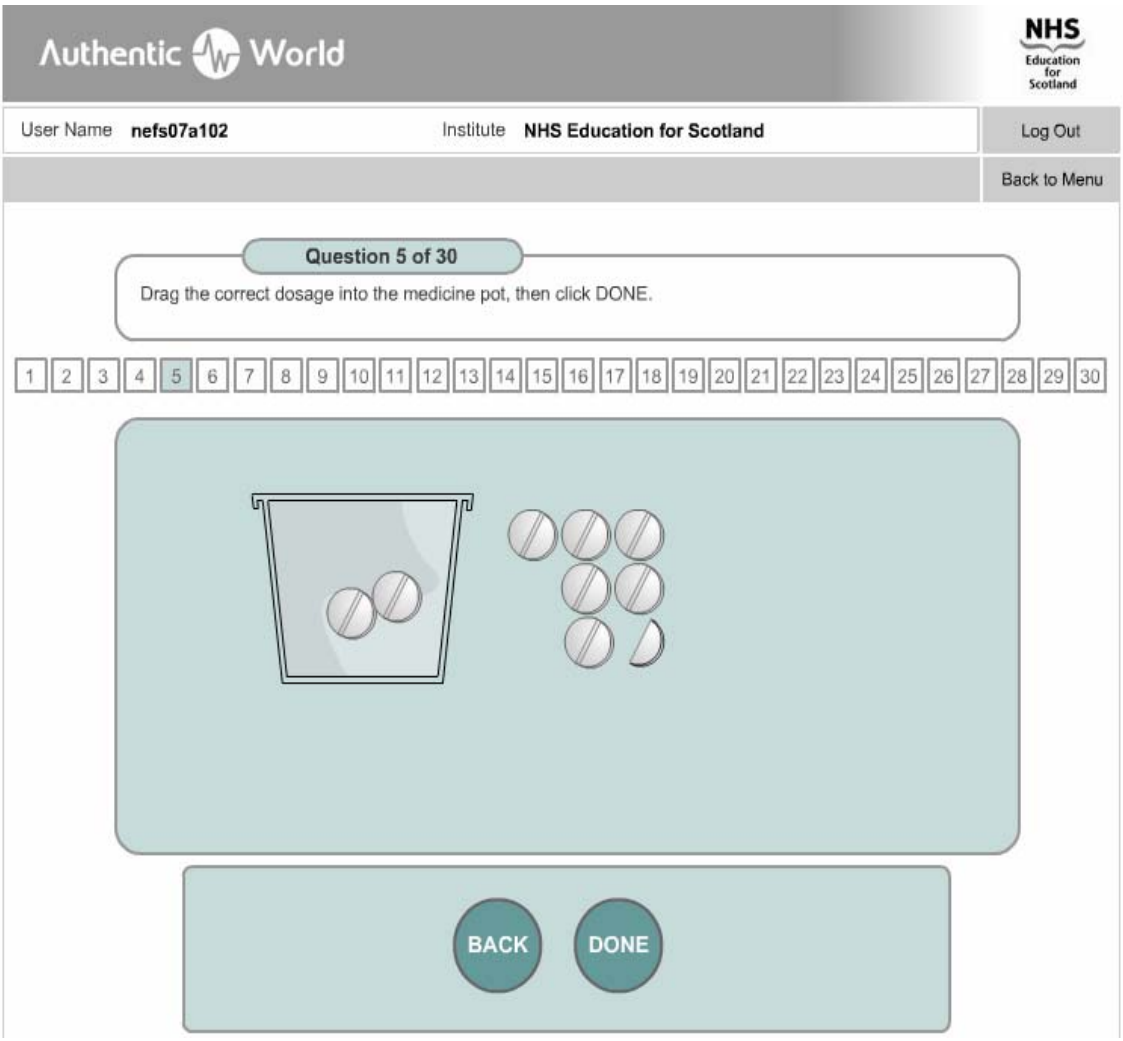

Figure 1: Examples of online assessment of numeracy for nursing from Authentic World®

Conclusion

We suggest that a benchmark for nursing numeracy urgently needs to be established in order to ensure consistency across education providers in meeting the requirements of all stakeholders, be they providers of education, the regulator, employers or the students themselves.

The benchmark needs to consider the levels of numeracy competence identified above and to include a strong element of process as well as outcome, based on available research evidence.

We are developing such a benchmark, together with its associated assessment tool, in our project for NHS Education Scotland, outlined above. To this end, we are working

collaboratively with stakeholders across the education and service sector in Scotland to pilot items on medication dosage calculation. In the process, we are also interrogating

and developing our theoretical understanding of numeracy learning and assessment for nursing.

This work moves NHS Scotland to the forefront of the nursing numeracy agenda and provides a real opportunity to establish a UK (and potentially also an international) benchmark for nursing competence in drug calculation at point of registration. Ultimately, such benchmarking is a matter for agreement by the profession; the Healthcare Commission's recommendations, if implemented, may expedite this at a multidisciplinary team (MDT) level. We hope our work will inform the debate and we look forward to reporting on the progress of the project at future conferences.

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