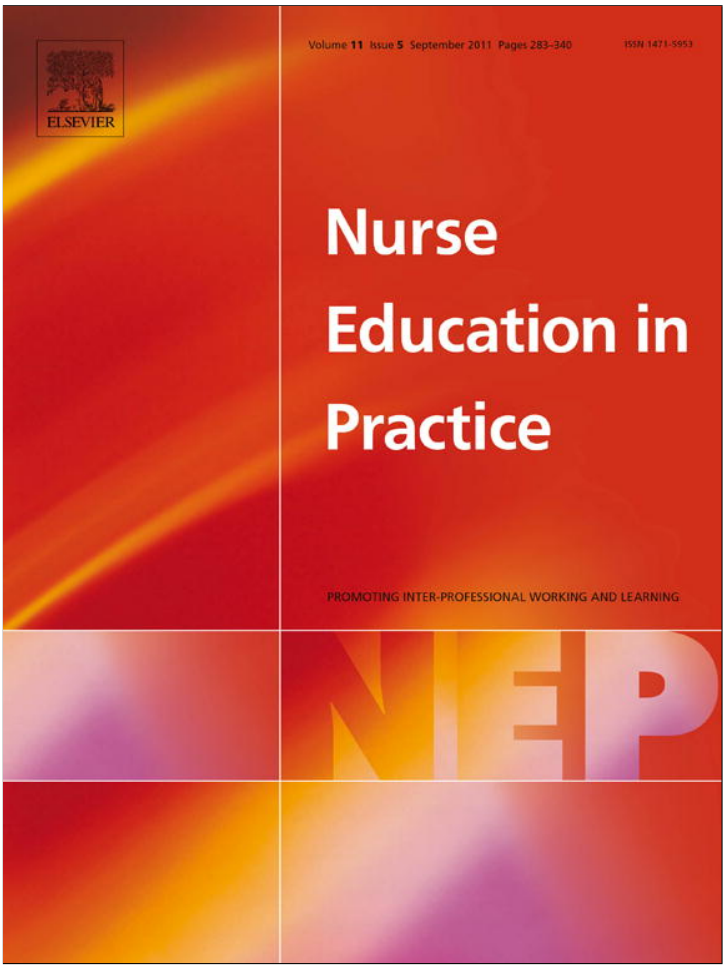

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Issues for Debate

Numeracy and nurse prescribing: Do the standards achieve their aim?

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ABSTRACT

The new standards of proficiency for Nurse and Midwife prescribers have been in place for 4 years and have provided a challenge for education providers and students alike. Many students find the pass mark of 100% for numeracy a frightening prospect, the way numeracy is assessed can vary across the higher education institutions adding to the complexity of the problem. Drug calculation remains a challenge for the nursing profession and the standards for numeracy assessment in nurse prescribing add more to the debate.

This is a paper for debate which has been written following my experience as a course leader for Independent and Supplementary Nurse Prescribing. It describes my understanding of working with the Standards of Proficiency for Nurse and Midwife Prescribers (NMC, 2006) which were introduced into this country in the same year that Independent Nurse Prescribers were given the right to prescribe any licensed drug from the British National Formulary within their scope of competence, with the exception of some controlled drugs (Beckwith and Franklin, 2007). It focuses on the requirement for students to achieve 100% in a numeracy assessment. For the purposes of this discussion the terms numeracy and drug calculation will be used interchangeably.

Numeracy in nursing has long been a subject of concern and the development of nurse prescribing over recent years has only added to this, the challenges of developing numerate safe prescribers impact on students, employers, regulatory bodies and the Higher Education Institutions, the methods used to achieve this continue to be debated.

Introduction

Over the past 20 years the prescribing rights of nurses in England has expanded and prescribing education has evolved. This is essential to ensure safe clinically effective and cost effective prescribing (DOH, 2000), for increasingly autonomous advanced nurses working in a variety of settings (Warburton and Kahn, 2007). The role of a nurse prescriber demands that there will be a greater number of drug calculations carried out by nurses and therefore the accuracy of nursing drug calculations is more important than ever, yet there is evidence that drug errors are increasing in the UK (Banning, 2006). Although many medication errors are unlikely to cause harm to patients an error may have fatal consequences (Hutton, 2003, NPSA, 2009). The aim is therefore to develop confident competent nurses who understand mathematical concepts, and acquire skills in order to consistently perform safe drug calculations within their clinical area.

Prior to 2006 education institutions were not required to assess the numeracy skills of prescribing students. The new standards have meant that all higher education institutions must examine the numeracy skills of their students undertaking the Independent and Supplementary Nurse Prescribing programme, however education institutions may choose how this is done. This can be undertaken within an OSCE examination, a portfolio or as part of a written examination; although the method of the assessment of numeracy must be clearly identified at the validation event by the Higher Education Institution, which is a conjoint approval process between them and the NMC and the Higher Education Institute (NMC, 2006).

There is no doubt that obtaining 100% accuracy in drug calculations is essential for safe prescribing but there is inconsistency across the nursing profession. At the point of registration nurses must have achieved 100% in numeracy assessment (NMC, 2007), Independent and Supplementary Nurse Prescribers must achieve 100%; however those nurses undertaking prescribing as part of the specialist practitioner qualification/specialist community public health nursing are required to understand numeracy but the NMC has not set a specific 100% standard for the assessment of numeracy (NMC, 2006). To add to the confusion individual Higher Education Institutions have set their own numeracy assessments for Independent and Supplementary Nurse Prescribers and it is quite feasible that Higher Education Institutions might set a minimal standard for numeracy assessment by allowing evidence of numeracy and drug calculation to be included

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solely in a portfolio to meet the 100% standard required. A student could potentially practice until perfect before including the evidence within the portfolio or find a more able individual to complete this element for them; is this a true test of ability and is it equitable? The result could mean that students with weak numeracy skills might pass one programme whilst a stronger candidate might struggle with a more difficult assessment strategy demanded by a different higher education institution (Warburton and Kahn, 2007). In my experience there is an increasing number of students self funding, in addition new ways of learning are being developed, distance learning and e-learning packages of study are being encouraged (DH, 2008) allowing students greater choice of education provider.

Problems relating to numeracy skill are not unique to educators of nurse prescribers; historically there have been concerns in relation to the minimum standard for a mathematics qualification to enter nursing, since 2008 applicants for pre-registration programmes must be able to accurately manipulate numbers as applied to volume, weight, and length (including, addition, subtraction, division, multiplication, use of decimals, fractions, and percentages) and be able to use a calculator (NMC, 2008).With no common method of testing ability it is difficult to compare ability in students in past studies, however the literature does suggest that there is a trend of poor numeracy skills in many nursing students (Jukes and Gilchrist, 2006).It will be interesting to see if these recent requirements will increase the competence of nurses in the future. Whether in pre-registration nursing or advance nursing practice the entry requirements and assessments are only part of the picture.

Teaching numeracy skill to nurses should be part of lifelong learning; skills need to be reinforced throughout a nursing career in the workplace as well as with in the Higher Education Institutions. This in itself poses a challenge for those teaching nursing. How well equipped are lecturers to teach the numeracy skills required and what is the correct level required to demonstrate competence?

Other factors contributing to medication errors

Medication errors are not solely down to lack of ability in numeracy skill. Hutton (1998) highlights that most medication errors are not made through miscalculation but are as a result of other factors which include misreading a prescription amount, the wrong preparation given at the wrong time or by the wrong route. Poor handwriting and misplaced or misinterpreted decimal points or zeros are a leading cause of miscalculation (Hutton, 2003, DOH, 2004).

Recent evidence suggests that medication incidents due to a wrong or unclear dose or strength of a medicine are the single largest type of incident reported (NPSA, 2009). Deciding on the dosing regime for a drug requires knowledge of the principles of pharmacology, understanding the half life of a drug is fundamental to understanding how often a drug needs to be taken to achieve a therapeutic level. Giving the wrong dosing schedule has been shown to cause harm to patients resulting in large payments for compensation (Dimond, 2008).

Dosing schedules and drug interactions are contained in the British National Formulary and therefore can be checked readily by the prescriber before issuing a prescription, helping to ensure correct dosing regimens. Nurses undertaking drug calculations can check their calculations using a calculator, however if there is a lack of understanding and skill in drug calculation this will transfer to the use of the calculator.

What is wrong with the current standards for assessment?

My experience to date indicates that many nurse prescribing students express anxiety because they are fearful of a requirement of 100% in an assessment. Within the institution in which I am employed the validated course includes a numeracy examination to ensure robust testing of numeracy. Students would find it easier to submit a portfolio with drug calculations in but would this be a rigorous, robust and valid assessment if we are truly assessing numeracy skill?

The anxiety experienced by some students may be linked to a perception of maths at school that can have a significant impact on nursing students ability years later (Wright, 2006) which would link to the concept that nurses are afraid that they will not become nurse prescribers because of poor maths skills (Chapman and Halley, 2007). It has become very evident that not only do students bring anxiety from past experience in to the classroom but also become anxious when they realise that there are a variety of ways of undertaking a drug calculation. Methods of drug calculations vary amongst groups of students and anxiety levels appear to increase if a fellow student tackles a calculation using a different method. There is reluctance to learn a new method which may add to the confusion and challenge in teaching numeracy skills to a group of students.

Glaister (2007) states that anxiety and a lack of confidence has been shown in the female population in relation to mathematics and given that the nursing profession is largely female and nursing incorporates mathematical skills consideration of this attitude is essential when considering learning outcomes related to mathematics. There are problems associated with basic mathematical skills including division, formula use and multiplication, decimals, fractions and percents as well as conceptualising the problem in order to set up the computation to provide the correct dose (Rainboth and Demasi, 2006). There is therefore a real challenge to improve the competence and confidence in the students undertaking the prescribing programme. Some students may have the mathematical skill but lack confidence for a variety of reasons related partially to past experiences, others may require teaching of basic mathematical skills and some students may require both teaching and strategies to boost confidence.

Nursing students are not alone in feeling anxious about mathematics, anxiety levels in trainee teachers were significantly reduced by undertaking a mathematics course prior to teaching, the course developed conceptual and procedural knowledge in order to make mathematical concepts more concrete and meaningful (Gresham, 2007).

A small study by Rainboth and Demasi (2006) demonstrated that medication calculation classes significantly improved the scores of students participating in an exam. This finding is supported by Chapman and Halley (2007) who demonstrated an increase in both confidence and competence amongst prescribing students who undertook a foundation in numeracy module. In contrast a surprise finding by Wright (2006) was that confidence levels in relation to maths did not statistically affect students' test scores, this finding may suggest that students have more maths ability than they perceive themselves to have but lack confidence in their ability.

Is this the whole picture?

In many cases drug calculations carried out when prescribing will be straightforward; most prescriptions are written in such a way that nurses could leave the pharmacist to undertake the calculation for doses and quantity of drugs to dispense. However is this appropriate in today's healthcare environment where nurse's work within a healthcare team? With multidisciplinary working it is important that nurses can calculate accurately as the responsibility for safe prescribing must be shared by all with individual professionals being accountable for their actions.

Independent and Supplementary Nurse Prescribers are only allowed to prescribe within their scope of competence therefore

they should be familiar with the dosing schedules for the drugs they prescribe and used to performing the calculations applicable to their area of practice. In the clinical setting nurses learn through experience the common doses for familiar drugs and recognise erroneous amounts (Hutton, 1998), allowing them to develop confidence and competence in their area of expertise, in addition when administering a drug many medications are now available in pre-packaged standard formulations which means less drug calculations may be required by nurses. There are of course exceptions to this for example, nurses working in neonatal nursing where complex calculations relating to surface area or body weight are common place. Some nurse prescribers may find that they undertake no drug calculations at all. For example a nurse treating hypertension could write a prescription for a Beta Blocker for 28 days, referring to The British National Formulary for the dose and allowing the pharmacist to calculate the number of tablets required. As the NMC (2006) requires that prescribing and administering of drugs be separated wherever possible, many prescribers will not administer the drugs they prescribe therefore calculating a dose to administer to a patient will not be undertaken by the prescriber. The benefit of separating the roles is that it provides a safety check for prescribers, there is the potential that nurses could find themselves undertaking all these roles in certain circumstances and may therefore be putting themselves at greater risk of making a medication error (Dopson, 2008). Nurse prescribers are vulnerable if they prescribe, dispense and administer a drug to an individual, as these 3 areas have all been identified as points where a medication error could happen (DOH, 2004); however there are more opportunities for error during medicine administration than during the prescribing or dispensing stages (NPSA, 2009). It is essential that although nurses may not be required to undertake the calculations they should be competent to do so especially as nurses may change their area of practice several times during their career.

Nurses are lifelong learners, skills in numeracy need to be transferable, with the development of advanced nursing practice it would seem sensible to also teach and assess numeracy in the clinical area throughout the nursing career to increase ability and prepare nurses not only to undertake the prescribing programme, but to be familiar with accurate drug calculations across a variety of settings. In the workplace students will be more at ease with their environment, learning in this way should have positive effects for the team of health professionals in the clinical setting with knowledge and skill being shared with others. It would develop skills in interpretation of clinical data and allow an understanding of the relationship between mathematics, concepts and clinical data which are all important components of accurate drug calculations (Weeks et al., 2000; Wright, 2004, and Wright, 2007). It would also mean that nurses would learn the calculations that relate to their area of clinical practice.

Summary

Clearly the public has a right to expect competence from any qualified healthcare professional, and be protected against unsafe practice. With this in mind would nurse prescribers, employers, the public and Higher Education Institutions benefit from a review of the way numeracy is taught and assessed within the prescribing programme by setting a bench mark for all, to provide equity and consistency in order that the public may be protected?

There are a generation of mature very experienced nurses that may have had little or no numeracy input for many years who could struggle to gain the skills required unless education and assessment is considered with a consistent approach within the workplace and the Higher Education Institutions. The public must be protected and drug errors reduced but there are issues for all professions involved with drug calculations. Would an inter professional approach be the way forward? Whilst the challenge for nurse educators continues to provide competent confident nurse prescribers perhaps it is time to examine numeracy education and assessment of all prescribers and consider whether a more consistent assessment strategy supported by continuing education in the clinical setting would go some way to not only reducing drug errors but increasing both the competence and confidence of all prescribers?

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