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Student experiences of medicines management training and education

Steve Hemingway, John Stephenson, Howard Allmark

Medicines management is described by the Medicines and Healthcare products Regulatory Agency (MHRA; www.mhra.gov.uk) as:

'The clinical, cost-effective and safe use of medicines to ensure patients get the maximum benefit they need, while at the same time minimising potential harm.'

Nurses are the largest workforce of health professionals involved in medicine management, and therefore have a significant role to play in the judicious use of medicines, as well as to minimize any adverse events that can potentially occur when people are prescribed and take medicines. The 1968 Medicines Act defined that doctors prescribed, pharmacists dispensed, and nurses administered medicines. However, this role has changed dramatically, with nurses and other non-medical practitioners able to prescribe medicines as part of their role (Davies, 2006; Hemingway and Ely, 2009). Therefore, the nurse's role in medicine management is much more wide-ranging than simply administration (White, 2004). A cause for concern is that evidence shows that sub-standard medicines management is costly. Davies et al (2006) and Pirmohamed et al (2004) have suggested that up to 6.5% of all patients admitted to hospital, and up to 9% of all patients staying in hospitals, experience medication-related harm. Many of these incidents are preventable, and create a further economic burden to the NHS. The National Patient Safety Agency (NPSA) (2007) in England estimates that preventable harm from medicines could cost in excess of £750 million every year, the prevention of which nurses play an important role. It is estimated that up to 40% of the nurse's inpatient time is spent on medicine-related activities (Armitage and Knapman, 2003).

The medicine management role for nurses: are they fit for practice?

The literature related to medicine-related activities undertaken by nurses identified some predictors that could contribute to drug administration errors and potential adverse reactions going undetected (Ito and Yamazumi, 2003; Department of Health (DH), 2004; Dickens et al, 2006). Service-user dissatisfaction with such interventions are also apparent where the knowledge-base, technical or interpersonal skills used have been criticized (Happell et al, 2002; Coombs et al, 2003; Gray et al, 2005). Reasons

Abstract

Nurses on registration are expected to have sufficient knowledge and skills in medicine management to practice safely and competently. This article reports on research involving midwifery and nursing students, who were asked to complete a questionnaire related to their experiences of medicines-related training and education, and how it prepared them for practice. The results showed an overall satisfaction with the pre-registration delivery, but differences emerged in the perceived efficacy of different educational strategies. Clinically-based and simulated aspects of the programme delivery were highly rated, with theoretical delivery scoring poorly in contrast. A stepped approach is suggested, with medicine course delivery needing to be strongly highlighted as a lead up to safe and competent nursing interventions when administering medication and all other related interventions. A grant from the innovation fund at the University of Huddersfield funded an evaluation of students' experiences of medicines management education and training using a self-administered questionnaire.

Key words: Medicines management ■ Medicines administration
■ Pharmacology ■ Student nurses ■ Student midwives
■ Statistical analysis

offered to explain the gap between practice and standards were a poor psychopharmacology knowledge-base of nurses undertaking medicine management activities (Latter et al, 2001; Happel et al, 2002; Morrison-Griffiths et al, 2002; Banning, 2004); and environmental and contextual factors that prevent the nurse being able to solely concentrate on the task of administration (Armitage and Knapman, 2003; Armitage, 2007; McBride-Henry and Foureur, 2007). Drug calculation difficulties were also apparent (Banning, 2004; Preston, 2004; Hutton et al, 2010). The identification of deficiencies in nurses' performance inevitably places some attention on the contribution of higher educational institutions (HEIs) involved in the preparation of pre-registration nurses to enhance the knowledge and skills of students on registration.

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Commentators have suggested that the rate of technological advances, including pharmacological innovation, places an even greater importance on the scientific knowledge-base of nurses involved in administering new drugs (Brady et al, 2007; Dilles et al, 2009; Hemingway and Ely, 2009; Hutton et al, 2010). However, pre-registration nursing programmes in the 1990s, during the Project 2000 period, placed greater emphasis on the behavioural rather than biological sciences (Latter et al, 2001; Morrison-Griffiths et al, 2002; Banning, 2004). There has been some reversal of that trend following the implementation of a more skills-based approach to nurse education with *Making a Difference* (DH, 1999). However, employers continue to report concerns about the scientific and intervention skills and knowledge, and understanding needed for clinical competence in medicines management.

Criticisms of educational provision include the use of traditional teaching methods to teach pharmacology as a science subject, which fails to relate biological and pharmacological theory to clinical settings (Jordan, 2002; Morrison-Griffiths et al, 2002; Banning, 2004; Turner et al, 2007, 2008), and an over-reliance on the continuous assessment of medicine management competencies by busy, possibly over-stretched, clinical mentors. There has also been a lack of agreement with regard to the emphasis that pharmacology should receive in the curriculum, and/or whether it should have a discrete identity (e.g. stand-alone module), or be integrated with other aspects of care delivery (Latter et al, 2001; Morrison-Griffiths et al, 2002; Banning, 2004).

It was therefore determined that an evaluation study aimed at pre-registration nursing and midwifery students was justified to address the lack of definitive guidance on effective education strategies for medicines management.

Research question

What is the experience of nurses who have undertaken medicines management education and training as part of an undergraduate diploma pre-registration programme?

Study objectives

- To compare the experiences of midwifery and nursing students in terms of the medicine management education content of their course
- To establish whether demographic variables—for example, age, gender, time in health care, context—have any effect on how students perceive such training
- To compare different educational strategies used in pharmacological and medicine management pre-registration nurse and midwifery training
- To explore the impact of medicine management content on student confidence to undertake medicine-related activities.

Methods

Design

A mixed-method approach was used, using a survey questionnaire containing closed and open response questions.

Sample

The sample under study comprised all student nurse and midwifery students who completed pre-registration training in September 2009, comprising adult, mental health, child and learning disabilities nursing branches. The total number of eligible students was 165.

Data collection

The 'Experience of Medicines Training: Self-Administered Questionnaire' was developed by the authors to address the objectives of the study. It was piloted with some student nurses to determine its face and content validity. The questionnaire was changed after evaluating the pilot exercise. The evaluation tool is a 12-item self-administered questionnaire developed for this study, containing open and closed questions. Specific questions related to pharmacological and medicine management educational content that the students would have experienced as a pre-registered student. The questionnaire consists of 10 closed-answer questions with spaces for comments in the last seven. This approach aimed to elicit students' comments to amplify and clarify the information sought by each closed-answer question. The comments allowed immediate responses and reflection on the training and experiences of the student nurses.

The questions sought information about background demographic response questions to different educational content they had experienced, and included a self-assessment of their confidence in administering medication. Questions 1–6 were general questions concerning the age, gender, training and intended future work of the respondents. These questions were included in order to identify any differences in perceptions of teaching methods between students of different demographic backgrounds. Questions 7 and 9 asked the respondents to rate the pharmacology and medicines management aspects of the course as to the relevance of training. Questions 8 and 10 asked respondents to rank the different strategies used in teaching those subjects for pharmacological knowledge and practical skills in medicines management interventions respectively, using a variant of the Likert scale technique. Question 11 was another Likert scale-type question asking respondents to rank educational strategies in medicines management, but including both knowledge and practical skills. Question 12 asked respondents to rate their confidence to competently and safely administer medicines. Questions 7–12 included space for open-ended comments.

Procedures

It was decided that data collection should take place once the student had completed all education sessions. An ideal time was at the end of course evaluation day. Therefore, three branches (adult, learning disability and mental health) were asked to complete the questionnaire on that day. Two branches (child and midwifery) were not accessed this way as ethical approval was not granted at the time of their last day in University; rather, they were sent questionnaires with stamped addressed envelopes to return to the researchers.

Ethics

Potential ethical dilemmas included potential coercion to participate, and students reporting positively because they did not want to criticize, or they liked the lecturers who delivered the medicines management content. Therefore, permission to undertake the study was sought, and after the authors had addressed any potential ethical concerns, was granted from the School Research Ethics Panel. An information sheet was provided explaining the research, and a consent form signed before the student undertook the research. All aspects of confidentiality were maintained throughout the study.

Sample characteristics

A total population of 165 nurse and midwifery students completed training in September 2009. Of these, 131 questionnaires were completed, representing a 79% response rate. Respondents comprised students from adult, mental health, learning disability and child nursing, and midwifery. The majority of respondents were from the adult nursing branch. Responses from child and midwifery students, obtained from returned postal questionnaires, were more limited than responses from other branches, which were obtained from questionnaires completed at the University.

Ninety percent of respondents were female. The students were mainly young, with 46.6% being 25 years or under, and 70.2% being 35 years or under. The median age group of respondents was 26–35 years. Most students had worked in health care for a short time (68.7% for 3–6 years), while some had up to 10 years' experience. Over half the students (51.9%) had worked as healthcare assistants (HCAs) during their training. Most respondents (83.2%) intended to work with hospital inpatients.

Statistical analysis

Statistical analysis was undertaken on the data using the statistical package PASW (Version 17). These analyses included:

- Comparative analyses of teaching methods and strategies based on mean rankings, and on a cluster analysis method
- Assessments relating to perception of subject relevance and teaching groups, based on median rankings
- Correlation analyses for subject relevance and confidence to administer medicines.

Comparative analysis of teaching methods and strategies

Mean ranks were calculated for each of the Pharmacology teaching methods (question 8); the Medicines Management methods (question 10); and the Skills strategies (question 11). These values were then assessed using Friedman's test to determine whether difference in mean ranks between teaching methods was significant. In the case of significant findings, Wilcoxon signed-rank tests were performed on each pair of methods as *post-hoc* tests to investigate the sources of any differences.

Hierarchical cluster analyses were also undertaken on the pharmacology and medicines management teaching methods, and on the skills strategies. Clusters were derived using the

single-linkage method, with dissimilarity calculated by the city-block metric. Using this technique, the proximity of one method or strategy to another is determined, based on a measure derived from every individual student's opinion of the two methods or strategies.

While both methods lead to the investigation of possible sub-groupings of teaching methods, the Wilcoxon tests group methods by mean perceived effectiveness, whereas the cluster analysis groups methods by overall similarity of responses.

Assessments relating to perception of subject relevance and teaching groups

Mann–Whitney U and Kruskal–Wallis tests were performed on responses relating to the relevance of pharmacology and medicines management to compare responses partitioned by: age group, gender, time in healthcare, HCA work in training, branch of training and intended clinical context. Both these tests are non-parametric tests, which test for a significant difference in the median ranks of two (Mann–Whitney U), or three or more (Kruskal–Wallis), sets of ranked data.

Assessment of correlation between subject relevance and confidence to administer medicines

The correlation between students' rankings for the relevance of pharmacology and the relevance of medicines management was assessed (using Spearman's rank correlation coefficient). The correlation between both subjects and the confidence to administer medication was also assessed. All correlations were assessed for statistical significance.

Results

Comparative analysis of teaching methods and strategies

The mean ranking awarded to each teaching method and strategies, and the overall ranking of each method and strategy, are summarized in *Tables 1–3*.

Significant differences existed between students' perceptions of the quality of pharmacology and medicines management teaching methods, and the quality of skills strategies, reflected by significant outcomes of the Friedman's test result obtained in each case. 'Practical' teaching methods and strategies (e.g. administration on placement, clinical skills) were generally ranked higher by nurses than 'theoretical' methods and those which do not involve direct exposure to a clinical situation (e.g. lectures, workbooks), with computer-based methods ranked lowest as a skill strategy. Furthermore, practically-based methods and strategies were rated as broadly similar to each other, in terms of mean ranking, as were non-practically-based methods.

For pharmacology and medicines management, findings of the Wilcoxon signed ranks tests generally reflected the magnitude of the differences between mean rankings. Hence for pharmacology, administration on placement was found to be significantly more effective than any other method. Simulation, workbooks and Nursing and Midwifery Council (NMC) portfolios were perceived to be

Table 1. Mean ranking of pharmacology teaching methods

Method	Mean rank	Method rank
Admin on placement	4.88 (most positive)	1
Simulation	3.86	2
Workbook	3.59	3
NMC portfolio	3.39	4
Study days	2.75	5
Lectures	2.53 (least positive)	6
Friedman's test for pharmacology teaching methods: $P < 0.001$		
NMC=Nursing and Midwifery Council		

Table 2. Mean ranking of medicines management teaching methods

Method	Mean rank	Method rank
Actual administration	5.04 (most positive)	1
Clinical Skills	3.78	2
Effectiveness of NMC competency	3.53	3=
OSCE	3.53	3=
Study days	2.76	5
Authentic World	2.35 (least positive)	6
Friedman's test for medicines management teaching methods: $P < 0.001$		
NMC=Nursing and Midwifery Council; OSCE=Observed Structured Clinical Examination		

Table 3. Mean ranking of skills strategies

Method	Mean rank	Strategy rank
MM module	4.11 (most positive)	1
Assessment of MM competency	3.89	2=
Observation of administration	3.89	2=
Pharmacology workbook	3.47	4
Written exam	3.08	5
Computer simulated programmes	2.55 (least positive)	6
Friedman's test for Skills strategies: $P < 0.001$		
MM=medicines management		

significantly more effective than study days or lectures, but not significantly different in efficacy from each other. Study days and lectures were also perceived to be not significantly different in effectiveness from each other. For medicines management, actual administration was perceived to be significantly more effective than any other method; whereas clinical skills, NMC and Observed Structured Clinical Examinations (OSCEs) were perceived to be significantly more effective than study days or Authentic World, but not significantly different in efficacy from each other. Study days and Authentic World were also perceived to be not significantly different in effectiveness from each other.

Assessment of skills strategies based on mean rankings was less conclusive, reflected in the closer mean ranking

scores for these methods. However, post-hoc testing found that computer simulation was significantly less effective than any other method. The separate medicines management module, 'Observation of Administration and Assessment of Medicines Management Competency', did not display any significant differences in effectiveness from each other. There was some evidence that all of these methods were perceived to be more effective than pharmacology workbooks (although the differences in efficacy were not statistically significant). All methods were perceived to be more effective than written examinations or computer simulation.

Cluster analysis undertaken on the pharmacology teaching methods showed the two highest-ranking teaching methods, administration on placement and simulation, to be ranked consistently in correlation by students. These methods could therefore be considered to comprise a single teaching method. Other pharmacology teaching methods were not ranked consistently in correlation by students.

Cluster analysis undertaken on the medicines management teaching methods showed that OSCE and clinical skills were consistently ranked in correlation by students. Study days were also found to be fairly consistently ranked with these two methods. Therefore, these three methods could be appropriately considered to form a single method. Other medicines management teaching methods were not ranked consistently in correlation by students. As a result, the interpretation of the cluster analysis for medicines management teaching methods is slightly different from the interpretation based on a comparison of mean ranks, in which the NMC was found to be more closely grouped with OSCE and clinical skills than with administration.

Cluster analysis undertaken on the skills strategies showed that 'Observation of Administration and Assessment of Medicines Management Competency' were consistently ranked in correlation by students, and could be appropriately considered to form a single method. Other skills strategies were not ranked consistently in relation to each other by students.

Assessments relating to perception of subject relevance and teaching groups

Analysis of the responses relating to the relevance of pharmacology content of pre-registration nurse training showed that the majority of respondents believed this to be relevant in preparing them for practice (83.7% responded 'relevant' or 'very relevant'). A similar proportion (84.7%) of respondents considered medicines management training to be relevant or very relevant to practice. Only three students thought that the pharmacology content was not relevant; however, all intended to work with inpatients.

Some variation in the opinion of the relevance of pharmacology and medicines management was observed across demographic attributes, length of time in health care, HCA work in training, branch of training, and intended clinical context. However, none of this variation was found to be statistically significant. Some limited evidence was found for a variation in the responses across age groups

given with regard to the efficacy of medicines management, with older students appearing to find it more valuable.

Further tests were undertaken to determine whether students' perceptions of the importance of a subject (pharmacology and medicines management) affected the ranking of methods within that subject. For pharmacology teaching methods, only the mean ranking of workbooks was significantly affected by the perceived relevance of pharmacology ($P=0.001$), based on an analysis of respondents who expressed an opinion relating to the relevance of pharmacology. Respondents who assessed pharmacology as 'not relevant', gave workbooks a mean ranking of 1.5, whereas respondents who assessed pharmacology as either 'partially relevant', 'relevant' or 'very relevant', gave workbooks a mean ranking of between 3.6 and 3.7. A minority of respondents assessed pharmacology as 'not relevant'. With these two categories, the mean ranking of workbooks was not significantly affected by the perceived relevance of pharmacology. This finding is in line with the findings for other teaching methods.

For medicines management teaching methods, the mean rankings of all educational strategies were unaffected by the perception of the importance of medicines management.

Assessment of correlation between subject relevance and confidence to administer medicines

The correlation between students' rankings for the relevance of pharmacology and the relevance of medicines management was found to be significant ($r_s=0.550$; $P<0.001$). Hence students generally found both subjects to be either relevant, or both to be non-relevant.

The correlation between both subjects and the confidence to administer medication was also assessed. Neither of these correlations was found to be significant at the 5% significance level. Therefore, there appears to be no association between confidence to administer medication and the perceived relevance of either pharmacology or medicines management.

Results from open-ended questions

In total, dearth of comments was actually received. No analysis was able to be made of the content, but they show some insight into the experiences and therefore reflections of the student sample. The comments for each question are presented below.

Question 7: Relevance of pharmacology training

Five comments were received for this question in total, with three students confirming an overall satisfaction with medicine management education and training, and appreciation of the training they experienced:

'A good start to practice and to prepare working out medications and also [which] medication did what. Very helpful for future career.'

'Helped me understand how to use BNF correctly and importance of drug calculations.'

One student intending to practice in the community found it:

'Very relevant to the course. Useful to community nursing.'

Two comments were more negative and seemingly critical of the theoretical training:

'Didn't have any formal pharmacology training—learned on placement relevant drugs, calculations, and use of Authentic World.'

Some thought the amount of training inadequate:

'The pharmacology we did do was very relevant but we only did a very small amount which I do not think was enough.'

Question 8: Educational strategies in pharmacology

Five comments were made in response to this question with contrasting answers. One student agreed with the effectiveness of applied learning in the clinical areas:

'I found I learnt more while on placement than in University doing theory.'

And others criticized the workbook, which is provided in the branch part of training to supplement university theory teaching and administering medicines in practice:

'Pharmacology workbook poor due to just filling in, no support given with them. Workbook format poor for learning and development.'

'Inadequate and a waste of time.'

In contrast, however, one student found the workbook useful:

'I personally need to keep on revisiting this on a regular basis and think it would have been beneficial to continue with this in final year.'

A final comment was on the quality of pharmacology teaching, for which lectures were considered 'inadequate and rushed'.

Question 9: Relevance of medicines management content

Five responses were received in answer to this question. One student was appreciative:

'Medication administration and management is an area of nursing where accountability is an important issue. I learnt how to manage medicines correctly and in line with NMC guidelines.'

However, another complained that training was limited to 'how to administer medication and how to check the prescription'. Two students emphasized the need to learn practical skills on placement.

Question 10: Educational strategies for practical skills

Three students responded to this question. One student was enthusiastic about the computer simulation:

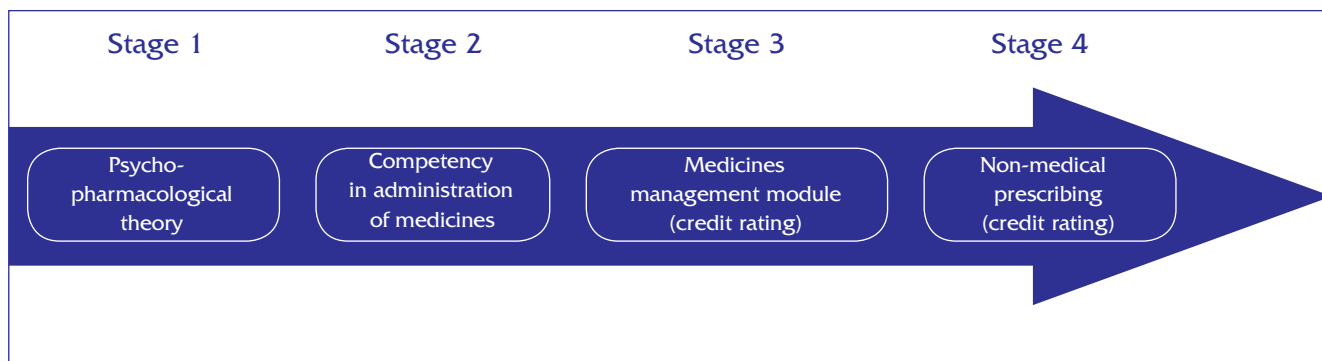


Figure 1. A stepped approach: connecting theory to practice

‘Authentic World is really good, but if we got stuck we were not offered help.’

Others complained that ‘access to computer simulations was limited or non-existent’. Two students also complained of the ‘lack of clinical study days’.

Question 11: Educational strategies to enhance skills and knowledge

Only one student commented on this question:

‘Workbooks and separate modules would be most effective in my opinion.’

Question 12: Confidence to competently and safely administer medication

Eight students responded to this question. While most students considered themselves confident, one student ‘did not feel competent in any area of medicine once qualified’, but another felt that the module adequately prepared him/her for the administration of medication in practice. Another student commented that:

‘Doing practice workbooks on the working out of medications helped for placement and the administration of medications on placement.’

A number of students stressed the importance of practical experience:

‘I am only confident now because my last placement was really good at teaching me and allowing me to complete medicine tasks fully. If it was not for this placement, I would not be confident at all as on the general wards staff do not encourage students to draw up medicines as there is not enough time.’

The need for future development was acknowledged:

‘I believe further confidence will be gained from working in clinical areas in the future.’

‘I still need to learn and will continue to learn throughout my first post.’

‘I think there is always that element of not being completely confident and this is developed in time and with practice.’

One student raised a healthy note of caution:

‘If I am to administer a medication I am not competent to administer, I will seek advice or guidance, rather than just giving it.’

A specialized point was raised by a student with regard to ‘the lack of specific information about administering depot medications’.

Limitations

Firstly, asking the students to complete the questionnaires on their last day at University may have made their answers open to bias. In this instance they were celebrating passing the course, and therefore may have answered more positively than if they had been asked at a later date. Nevertheless, the ‘in-house’ method as compared with the mailed questionnaire produced a more positive response to the data collection.

The evidence presented in this article is only a small snapshot of nurse and midwifery experiences at this University. Results from this study may have been influenced by the fact that the majority filled in the questionnaire on their final day of university and had already passed the course. Therefore, these students were more likely to provide positive statements. Another biasing variable may have been that the students were reluctant to include answers that criticized the lecturers who had taught the programme. Lastly, only a very small proportion of the participants provided responses to the invited comments section; hence, any conclusions from the analysis are primarily based on the quantitative findings. This could be the result of a fault in the research design where some individual interviews, for example, may have provided more meaningful content; thus balancing the quantitative with qualitative data.

Discussion

The findings from this survey indicated that overall, students were satisfied with the medicines management and pharmacological aspects of their pre-registration training. This differs from previous studies where nurses were shown to be dissatisfied with the training (Latter et al, 2001; Morrison-Griffiths et al, 2002; King, 2004). The majority (85%) of the sample was confident/very confident about administering medication at the time of registration. This does not directly transfer to safe practice,

but gives an indication that they felt they had experienced appropriate preparation.

No individual differences with regard to medicine management or pharmacology experience were found in either branch of nursing or midwifery (although the child and midwifery branch response was too small to be compared with others). Students' perceptions of the relevance of pharmacology and medicines management did not seem to be affected by any recorded demographic attributes (age, gender, time in healthcare, HCA work in training, branch of training and intended clinical practice). Perceptions of the relevance of pharmacology strongly correlated with perceptions of relevance of medicines management; however, neither was correlated with confidence to administer medication context as highlighted by the students' written feedback.

Perceptions of the relevance of pharmacology and medicines management did not seem to affect ranking of teaching methods. Practical methods generally ranked higher than theoretical methods. Not only were simulation and placement ranked highest in terms of all the pharmacological methods, the cluster analysis showed that they may be basically considered by the students to be a single entity. For medicines management, a similar effect was observed to that of OSCE, and clinical skills were essentially considered to be similar by the students. Observation of the administration of medicines, assessment of competency and the medicine management module are the most effective skills strategies, and also closely linked. Computer simulation, such as the Authentic World training package for medicine dose calculations, also scored poorly, but this may be because students in this sample only experienced this as a formative exercise. It will be interesting to note whether this changes in the future, as it has been introduced as a summative assessment and may replicate research of the positive outcomes for students undertaking the Authentic World assessment (Hutton et al, 2010).

The findings from the statistical analysis have implications for simplifying the assessment of teaching methods and strategies by identifying effective methods and finding groups of methods which can be considered as single blocks. For example, instead of having to think about which of the six methods are effective, they can be considered as five, or fewer 'method types'. This may indicate that the student nurse and/or midwife has a hierarchical perception of his/her learning needs.

The clinically-related experiences of the sample participants in this research is at the pinnacle, with the theoretical content not nearly as highly rated in terms of relevance and importance.

This also highlights the need to connect theory taught in HEIs to the practical application of medicines interventions in the clinical setting. Hemingway et al (2010) suggest a stepped approach as a way forward, although using mental health nursing as an exemplar, it could be replicated for all nursing branches and midwifery practice (Figure 1). The pre-registration and preceptorship stages in development encompass the first two stages of the 'skills escalator' programme. If the nurse is to go on to build competence

KEY POINTS

- Nurses on registration are expected to have sufficient knowledge and skill in medicines management to be able to practice safely and competently
- Midwife and nursing students were asked to complete a questionnaire related to their experiences of medicines-related training and education
- The results showed an overall satisfaction with the pre-registration delivery, but differences emerged in the perceived effectiveness of different educational strategies
- Clinically-based and simulated aspects of the programme delivery were highly rated
- The challenge for nurse educators is to make the theoretical component—e.g. pharmacology (the why)—of medicines management courses closely related to nursing interventions (the how)—e.g. administering prescribed drugs

and confidence in all aspects of medicines management, then an appropriate postgraduate course that furthered knowledge and expertise was the next step (Stage 3). Finally, if the nurse is to make the transition to prescribing medicines (Stage 4), then the suggested 'skills escalator' in Figure 1 may support development along a career-defined pathway. However, it is how Stage 1 (theory) is linked to clinical aspects such as administration competence that is the perturbing question.

The NMC (2008) states that administering medication is not purely a mechanistic task and 'knowing' is an important part of safety; making informed decisions is based on a knowledge base (Eisenhauer et al, 2007). A nurse's knowledge is correlated with clinical experience (Ndosi and Newell, 2009; Reid-Searl et al, 2010). The results reported in this article suggest that to engage the students in theoretical sessions, they need to be as clinically applied as possible. Previous criticisms of pre-registration delivery failing to link the theory of pharmacology to practice are reiterated in these findings (Jordan, 2002; Banning, 2004; Turner et al, 2007, 2008). The challenge is for the planning and delivery of course content to engage students and deliver clinically-relevant medicines management training. [BJN](#)

Conflict of interest: none

Taking into account the early piloting and this evaluative research, the School of Human and Health Science, University of Huddersfield, has continued to develop its use of Authentic World. Evaluation is continuous and supports its use as a valuable tool for learning and for summative assessment. We have therefore rebuilt our learning, teaching and assessment strategy for medicines management to include the embedding of Authentic World across all pre- and post-registration courses.

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