The effectiveness of simulation in preparing student nurses to competently measure blood pressure in the real-world environment: A comparison between New Zealand and the United Kingdom (pilot study).

Report to:

Ako Aotearoa, The National Centre for Tertiary Teaching Excellence, New Zealand
and
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Executive summary

This research report outlines the key findings of a collaborative pilot study between the School of Nursing, UCOL, New Zealand, and the Department of Nursing and Health Studies, University of Huddersfield, [UH] England, which sought to evaluate the effectiveness of simulation in the teaching of clinical skills to Year One nursing students. The clinical skill of blood pressure measurement was selected as the focus for the research project.

Comparisons were made between the teaching and learning approaches utilised by the two institutions in teaching blood pressure measurement; students were surveyed as to the effectiveness of the simulation sessions before and after their first clinical placement; and the clinical preceptors/mentors working with those students on that placement were surveyed about their evaluation of student preparation and performance.

The findings highlight the complexities of teaching blood pressure measurement. Both institutions used remarkably similar teaching approaches and resources, including the number of hours students spend in the clinical skills laboratory. The key difference was related to the timing of summative assessment of clinical skills competency – with UCOL conducting assessments prior to the student's first clinical placement, compared with UH, who conducted their summative assessment after the student's first clinical placement.

Students in both institutions reported feeling some degree of confidence and competence in blood pressure measurement following the simulation sessions, although confidence levels were slightly higher at UCOL. UCOL students reported practicing blood pressure measurement more often than their UH counterparts, although this may be due in part to the timing of the summative assessments. By the conclusion of their clinical placement, 99% of UCOL students and 100% of those at UH rated themselves as having a good understanding of the relationship between the theory and practice of blood pressure measurement, and felt confident in applying that theory to practice.

The nurses who worked alongside the students on their first clinical practice as mentors/preceptors considered that the majority of students (80% UCOL, 70% UH) were competent in blood pressure measurement. Surprisingly, considering the number of students they rated as being not yet competent, 75% of the UCOL and 96% of the UH mentors/preceptors considered the simulation sessions prepared the students effectively.

This research has demonstrated that simulation plays an important role in preparing students to competently measure blood pressure in real-world environments. It does raise questions however as to what should be expected of first year student nurses in relation to this skill, what degree of competency is realistic and achievable. It also raises questions about the timing of summative clinical skills assessment, and whether this should be conducted before or after students have completed their first clinical placement.

The use of simulation is becoming more widespread in undergraduate nursing education. It is important to not only answer the questions raised by this research, but also consider the implications of including simulated practice hours in the total of accumulated clinical hours each student must accumulate prior to the completion of their programme. Further consideration should also be given to identifying teaching and learning strategies that could be adopted to help overcome the anxiety students experience in relation to performing blood pressure measurement.

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The effectiveness of simulation in preparing student nurses to competently measure blood pressure in the real-world environment: A comparison between New Zealand and the United Kingdom.

Introduction

Simulation has become an integral part of health professional training and development, within both academic and health care settings. Simulation has been described as an educational technique that allows interactive and, at times, immersive activity by recreating all or part of a clinical experience without exposing patients to the associated risks; simulation imitates, but does not duplicate reality, allowing for experiential learning in a risk-free setting (Maran & Glavin, 2003).

Simulation sessions are designed to support practice application and consolidate the theory covered in the modules and courses. These sessions offer the opportunity to practice key skills and knowledge required of a healthcare practitioner in a safe learning environment. Simulation training is about practicing the skill; the doing.

The School of Nursing, Universal College of Learning (UCOL), Palmerston North, New Zealand (NZ) and the Department of Nursing and Health Studies, the University of Huddersfield (UH), United Kingdom (UK) endorse the use of simulation as a teaching and learning strategy to enable the linking of theory to practice, offering the student a realistic experience of a variety of educational experiences. However, although simulation training is now commonplace, the two institutions considered it timely to review the effectiveness of the simulation training they were currently using, as well as comparing and contrasting the respective approaches taken to teaching clinical skills. One clinical skill, blood pressure [BP] measurement[1], was selected for the purposes of this review.

Two research teams worked on this project, one based at UCOL and the other at UH. The members of the project teams were:

UCOL: Marian Bland (Research co-leader), Geraldine Clear, Faye Davenport, Susie le Page.

UH: Karen Ousey (Research co-leader), Angela Hope.

The study was conducted with Year One students enrolled in the UCOL Bachelor of Nursing [BN] programme, Palmerston North campus, and with students enrolled in the Diploma or Degree in Nursing Studies at the Department of Nursing and Health Studies, UH. Data for the study was collected over the period February - September 2009.

This report outlines a summary of the key findings of the research.

[1] *Blood pressure.* The force that blood exerts against the walls of the blood vessels. It is usually measured by indirect methods, using an inflatable cuff to temporarily occlude arterial blood flow through one of the limbs. Blood pressure may be measured either manually or electronically.

The research question and aims

The question that this evaluation sought to answer was:

How effective is simulation in preparing student nurses to competently measure blood pressure in the real-world environment?

The aims were to:

A. Compare and contrast the teaching and learning strategies used by the two Departments/Schools in the teaching of blood pressure measurement [BPM];

B. Identify students' experiences of teaching and learning in relation to BPM prior to, and then immediately after their first clinical placement;

C. Identify clinical mentors and nurse teachers' perceptions of whether students on their first clinical placement were able to competently measure blood pressure;

D. To explore the implications of the research findings for other clinical simulation teaching.

To answer the question, and meet the aims, a triangulated approach was taken, involving five discrete but inter-related components:

1. A review of the literature to identify best practice for taking and recording blood pressure;
2. A comparison of current teaching practices in each Department/School in relation to taking and recording blood pressures;
3. An evaluation of whether the procedure taught in each School is consistent with best practice recommendations for BPM;
4. An evaluation of students' perspectives of the effectiveness of the simulation taught prior to their first clinical placement, and their confidence/competence when performing this skill on their first clinical placement;
5. An evaluation of clinical mentors and nurse teachers' perspectives as to whether the students were able to confidently and competently perform BPM on their first clinical placement.

Simulation and BPM

BPM is considered a generic skill required in nursing, and a skill required by a range of health professionals, including nurses, for effective health assessment. Measuring BP using a manual method is a highly developed skill requiring considerable practice in order to achieve competence. The Australian Heart Foundation Guidelines for measuring BP (2008) were selected as the standard for evaluating the appropriateness of what is taught to students on this topic.

Deviations from the range of normal in BP readings can be indicators of such chronic conditions as coronary heart disease, diabetes and chronic kidney disease (Thornett, 2007), and acute conditions such as hypovolemic shock. This clearly identifies the importance of students possessing effective practical skills in the recording of BPs and an in-depth understanding of the underpinning knowledge base to be able to effectively interpret the recordings.

Simulated practice encompasses classroom learning followed by a hands-on learning opportunity based within the safe environment of a laboratory designed specifically to simulate a hospital ward or relevant health care setting. Binstadt et al. (2007) maintain that simulation permits learners to evaluate and treat high risk conditions without risking injury to a patient. Although Murray et al. (2008) and Lammers (2007) credit simulation with 'animating the curriculum' they recognise this approach has the potential to be resource intensive.

The use of simulated practice as a teaching and learning strategy within the education of health care professionals has been acknowledged by the Nursing and Midwifery Council in the UK as complementary to placement learning (NMC, 2007). Alinier et al. (2004), in their study of simulation in an undergraduate nursing curriculum, highlighted that it was essential to evaluate how effective the use of realistic simulation was as a teaching and learning strategy. They identified that although there had been no perceived difference in the level of confidence or perception of stress between the two groups of students studied, the limited period of exposure to simulation had a significant effect on the performance of the students. It had enabled students from the experimental group to improve their Objective Structured Clinical Examination [OSCE][2] performance by an additional 6.67% over the students from the control group.

Simulation as a teaching and learning strategy encompassing critical thinking is recognised within the nursing context as an essential component in developing nurse thinking in the present day (Distler, 2007). Indeed Nunn (2004) acknowledges that simulation offers tuition that is constructive, realistic and highly participatory whilst representing believable working environments. Nunn also notes the value of simulation has been acknowledged in non-health related professions, such as aviation and car manufacturing. Furthermore Roberts (2000) and Wong and Chung (2002) associate the use of simulation with higher order thinking, inclusive of concepts such as problem solving, decision making and diagnostic reasoning; whilst Haigh (2007) discusses the value of simulation to the students as being associated with the 'knowing why' and the inclusion of peers in the process for discussion purposes.

Simulation may be used as a learning and teaching strategy for a variety of clinical skills including the measurement and recording of blood pressure. Simulation is not a new phenomenon in clinical learning but it has gradually established a role in health care education, although Bradley (2006) claimed that there was limited research of sufficient quality to provide a robust evidence base. Baillie and Curzio (2009) explored first year student nurses' experiences of learning BPM, identifying human error as the main contributor to inaccurate recordings, with the emphasis placed upon the lack of training undertaken.

Nursing education – an overview

In NZ, a three-year fulltime BN programme leads to nursing registration, with graduates determining their practice specialty post-registration. Entry to the register is by degree only. In the UK students select a branch focus (adult, children, mental health, or learning disabilities) prior to the commencement of their three year programme. After completing a common first year, students then move into their chosen branch training for the remainder of their programme. Entry to the UK register is by degree or diploma.

[2] *OSCE:* A graded assessment where the student is required to demonstrate selected clinical competencies within a simulated environment.

The UK Nursing and Midwifery Council [NMC] and Nursing Council of New Zealand [NCNZ] stipulate that students must complete a minimum number of hours prior to registration. The NMC (2004) require 2,300 hours to be in theory and 2,300 to be in clinical practice. The NCNZ (2007a) does not specify the number of theory hours that are to be completed but students must complete a minimum of 1100 hours of clinical practice, and a Bachelor of Nursing degree. The NMC (2007a) permit up to 300 hours of simulated practice learning to be included in the students' total practice hours, but in NZ simulated practice hours cannot be included in the clinical practice hours total.

The Code of Conduct for Registered Nurses (NMC, 2008), and the Competencies for Registered Nurses (NCNZ, 2007b), seek to protect the health and safety of members of the public by providing mechanisms to ensure that health practitioners are competent and fit to practice their professions. As part of their clinical placements, nursing students are also working towards demonstrating the required competencies.

Registered nurses working in those clinical placement[3] settings ('mentors' in the UK, 'preceptors' [4] in NZ) play a major role in teaching the students, as well as assessing their clinical competence. Within the UK mentors are expected to spend 40% of their time working with students and to assess a range of competencies during the students' clinical placement. In 2007, it became a mandatory requirement that UK pre-registration students, undertaking an approved education programme, were assigned a mentor who works with them for the duration of each of their clinical placements (NMC, 2004). The NMC (2008) maintain that mentors should support students for several reasons:

- Provide support and guidance to the student when learning new skills or applying new knowledge;
- Act as a resource to the student to facilitate learning and professional growth;
- Directly manage the student's learning in practice to ensure public protection;
- Directly observe the student's practice, or use indirect observation where appropriate, (NMC, 2008, 3.2.4).

UCOL students undertaking their clinical placements are assigned a clinical preceptor, who is a registered nurse working in that agency. The student works under the direct supervision of the preceptor throughout their placement although the NCNZ has not mandated the percentage of time that must be spent working with the student. In addition, the student is also supported by a clinical lecturer from the School of Nursing. Year One nursing students at UCOL receive 30 hours direct support from the clinical lecturer during their six week placement, including tutorials and formative assessments. Although it is the clinical lecturer who ultimately accepts responsibility for signing off the student's competence, s/he will work closely with the preceptor to complete the summative assessment.

Support of students then, is a collaborative venture between the academic and practice areas ensuring that students develop the skills necessary to meet the required competencies and standards. The role of the mentor/preceptor in the clinical areas is vital to the students' development, enriching the learning experience; maintaining an

[3] *Clinical placement*: Student learning experience that occurs in an environment where health care is delivered.
[4] *Clinical mentor/preceptor*: A nurse employed by the health service provider who has completed training as a preceptor/mentor and who supervises the nursing practice of the student.

effective learning environment and allowing an understanding of the nature of nursing and the rationales underpinning their interventions (Ousey, 2009).

Research Design

Permission to conduct the study was obtained from the UCOL Research Committee, and the School's Research and Ethics Panel (SREP) at UH, and from the relevant agencies where students went on clinical placement. Details of the sampling, recruitment and informed consent processes are included in the outline of the research components that follows. All data for the various research components was collected in 2009.

Raw data obtained from the study components was stored in a locked cupboard in the Schools of Nursing at either UH or UCOL. All electronic data was stored on the relevant project leads computer, and the project leads were responsible for the safekeeping of all data. Only the project leads had access to all raw data during the study. Associate researchers had access to the raw data for those components of the study for which they had accepted responsibility and/or were actively involved. The raw data will be destroyed once the formal report has been accepted. All participants will be offered a summary of the findings.

The quantitative data from each component of the research was read by an optical reader, and qualitative data extracted manually by a research assistant. A comparison was made of the similarities and differences between the two Schools of Nursing, as well as a comparison of the BPM techniques taught to students with best practice.

The components that make up this over-arching proposal have elements in common, but have been detailed separately below to ensure the design component of each is explicit.

Part One: Teaching and learning strategies.

In this component of the research, attention was focused on specific aspects of the teaching and learning strategy related to the teaching of BPM.

An information sheet and survey form was distributed during March and April by the project leads to all nursing staff at UCOL (n=3) and UH (n=11) involved in the teaching[5] of BPM to Year One nursing students. Potential participants were asked to complete this survey, and return it in the internal mail system to the respective project leads, with a response rate of 100% at both institutions. Completion of the survey form was considered to indicate consent to participate in the study.

All the lecturers who participated in this research were registered nurses, with a nursing degree (most with Masters degrees). In addition, all but one held a formal teaching qualification. Experience of teaching students ranged from six to twenty three years.

[5] *Lecturer/teacher/tutor*: Registered nurse engaged in classroom and/or clinical skills laboratory teaching who is responsible for teaching students clinical skills and assessing their competency at those skills

The key teaching and assessment focus in relation to BPM at both UCOL and UH were:

- Identification of need for BPM
- Checking the equipment prior to use
- Preparation of patient, including explanation
- Identifying the correct limb for conducting the measurement
- Identifying the appropriate size cuff for the measurement
- Position of the limb
- Auscultation/palpation
- Identifying the Phase 1 - Phase 5 Korotkoff sounds
- Recording the BP and identifying whether further action should be taken.

The complexity of the teaching and learning approaches used in relation to BPM was such that an indepth analysis and comparison between the two institutions was not possible, and requires further, more focused research. The findings from this component of the research are therefore more general in nature, and limited to several key areas.

There were a number of common elements across the two programmes in the teaching of BPM. At both UCOL and UH, students are taught the underpinning anatomy/ physiology, and the process of BPM prior to beginning to practice the skill in the clinical skills laboratory (3.5 hours of theory at UCOL, 4 hours of theory at UH). Two hours of clinical skills laboratory time is scheduled at both UCOL and UH for the students to work in small groups with a lecturer practicing BPM. In addition, eight hours of scheduled practice time, with a lecturer present, are available to UCOL students to practice a range of clinical skills. During those sessions, students practice on each other. UH has high fidelity mannequins[6] available, but these are not used in BPM simulation, while UCOL does not currently have this equipment.

Students can continue to practice the skill through booking unsupervised sessions as many times as they wish prior to their practice placement/OSCE. During these additional sessions the students practice on each other; with staff members being available should they require some assistance. At UH, students are advised to restrict their total number of attempts at BPM on each other to limit the potential of arterial damage although the basis for this advice was unclear. UCOL students are encouraged to 'swop limbs' when they practice BPM, but no restrictions are placed on the total number of attempts available to them.

The student's clinical competency in BPM is summatively assessed through the OSCE, which is conducted in the skills laboratories. At UCOL, the OSCE occurs at the conclusion of the clinical skills paper, and students must pass this assessment to be able to go out onto clinical placement. UH students undertake the OSCE after their first clinical placement, and must pass in order to progress into their branch programme.

Throughout the theory and practical teaching of BPM, a variety of learning and teaching resources are used. In both UCOL and UH a virtual learning environment contains relevant information for the students to access (Moodle for UCOL, Blackboard for UH); indicative reading includes anatomy and physiology text books; nursing care text book; journal articles; videos demonstrating the application of the skill; interactive web based anatomy and physiology learning packages; sessions in the skills lab, including lecturer

[6] *High fidelity mannequin:* Full body mannequin, which can be programmed to simulate physiological conditions of various medical scenarios and responses to intervention (Hammond, 2004, Maran & Glavin, 2003).

demonstrations; observation of the student undertaking the skill by the lecturer and the use of a double headed stethoscope[7] to support the student when measuring BPs. While UCOL staff all reported that the staff:student ratio in the clinical skills lab was 1:10, staff at UH reported a ratio range of between 1:7 – 1:10.

The nursing lecturers at both institutions were mostly able to describe in some detail how the nursing component of BPM was taught (the resources used, the number of hours in the skills lab etc). However, their knowledge of what was taught in the anatomy/physiology sessions was generally limited or lacking. This is of concern because of the potential for overlapping/conflicting or incomplete information being given to students.

Part Two: Student perspectives

In this component of the project, an evaluation was undertaken of student's perspectives of the effectiveness of the BPM simulation prior to undertaking their first clinical placement, and then immediately after that placement.

All Year One nursing students at UCOL (Semester One intake, Palmerston North campus) and at UH (January intake) in class on a specific date(s) were surveyed. The first questionnaires were distributed between February and April, at the end of the scheduled teaching of the skills paper, but before students went on their first clinical placement. The second questionnaires were distributed to students immediately on their return to class following that placement (April - September).

An independent person, not directly associated with either School/Department of Nursing, met with students during scheduled classroom time to distribute the questionnaires. Potential participants were given written and verbal information about the study, and their questions answered to ensure they understood:

- the nature of the project
- any likely benefits or burdens
- how much and what was asked of them
- that they did not have to participate
- that they could withdraw from the project at any time without penalty
- how their privacy and confidentiality would be protected
- that they could receive feedback on the results of the project if they chose.

The survey questions were based on questionnaires adapted from the NMC/West Yorkshire Nursing Simulated Practice Pilot WYNSPP (NMC, 2007b) previously used at the UH, and were piloted with UCOL Year Two student nurses not eligible to participate in the research. No changes were made to the questionnaires following the pilot. Those who choose to participate in the study were asked to fill out the questionnaires at a time and place convenient to them, and then place the completed questionnaires in a specially marked box at a central location on each of the two campuses. Completed questionnaires were stored in a locked cupboard within the project leads office on their campus.

The response rates for these two questionnaires indicated a high level of student interest in this research, with a combined response rate of 76.5% to the first questionnaire, and 89.2% for the second.

[7] *Double-headed stethoscope*: A stethoscope that makes it possible for two people to listen to the blood pressure sounds at the same time.

Table One: Response rates, student questionnaires

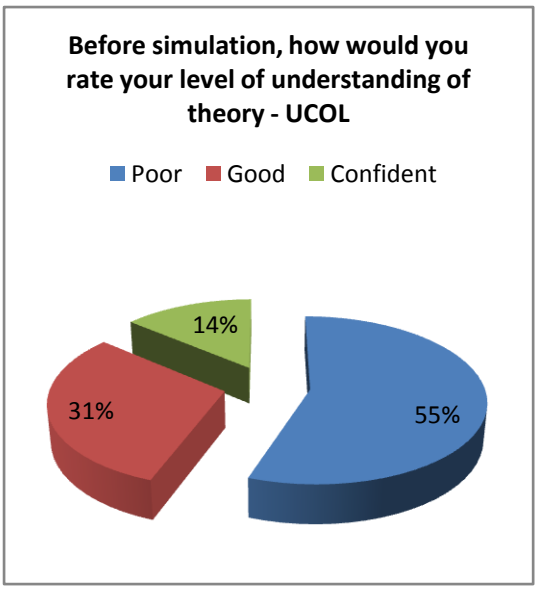
	Questionnaires distributed	Completed questionnaires returned	Response rate
UCOL			
Questionnaire # 1	60	52	86%
Questionnaire # 2	75	65	86%
UH			
Questionnaire #	55	36	65%
Questionnaire # 2	55	51	92%

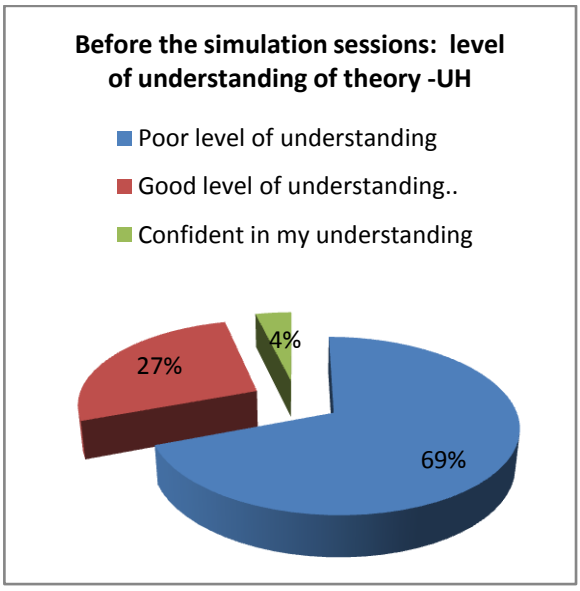
No attempt was made to match each student's first and second questionnaires. In addition, different numbers of responses were received at each institution for the first and second questionnaires. Therefore general comparisons only can be made when comparing responses between the questionnaires on each campus.

The majority of students had no previous experience of BPM. Just over a half of UH students (56%), and 29% of UCOL students had been employed in health related work before commencing their nursing training. Of those, 62% at UH and 11% at UCOL had previously undertaken BPM.

Prior to attending the simulation sessions 55% of UCOL and 69% of UH students rated themselves as having a poor level of understanding of theory underpinning the skill of BPM; with only 14% of UCOL and 4% of UH students rating themselves as being confident in their understanding (Figures 1 & 2).

Figures 1 & 2 – Students' self assessment of level of understanding of theory



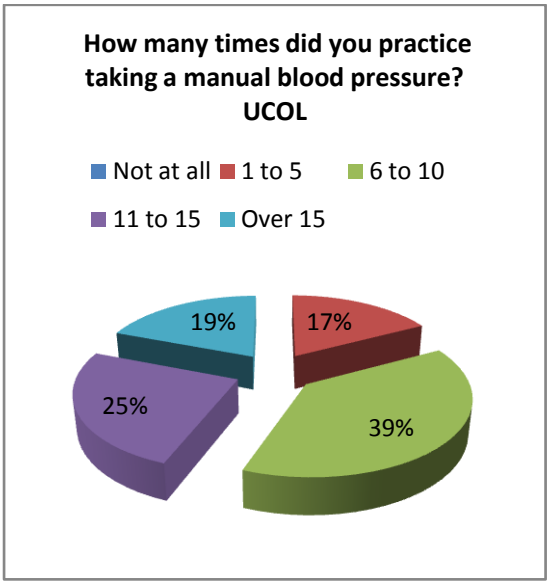


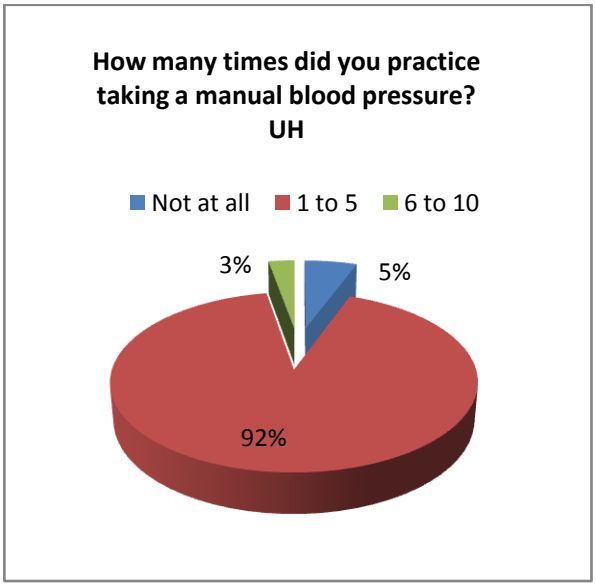
In relation to the level of understanding students had of the practical skills associated with BPM prior to the simulation session, 50% of UCOL and 53% of UH students rated their level of understanding as being poor.

Following the simulation sessions 88% of UCOL students and 63% of UH students reported feeling well prepared to undertake BPM, meaning 10% of UCOL and 37% of UH students did not feel well prepared. Unfortunately the questionnaire format did not offer students the opportunity to qualify their responses. By the conclusion of their first clinical placement however, 99% of UCOL and 100% of UH students stated that they now believed they had a good understanding of the relationship between theory and practice, and felt confident in the application of theory to practice.

During the simulation sessions students had the opportunity to practice the skills of measuring BPs both manually and electronically. Interestingly students at UCOL reported practicing taking manual blood pressures more often than their UH counterparts (73% of UCOL students reported practicing 6+ times, whereas the majority of UH students, 92%, practiced manual BPM between 1-5 times).

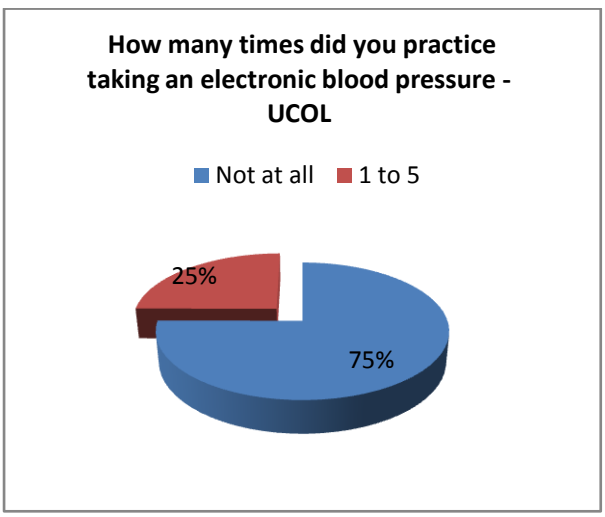
Figures 3 & 4 – Practicing manual BPM

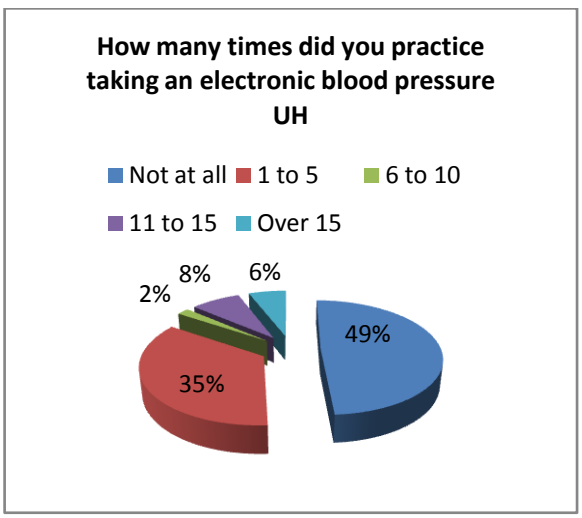




UCOL students were scheduled to undertake their OSCE assessment immediately after the completion of teaching for this paper, which may be one factor that contributed to the differences in practice rates. Fewer students (just 25% of UCOL and 51% of UH students) had practiced electronic BPM (Figures 5 & 6).

Figures 5 & 6 – Practicing electronic BPM.





During their first clinical placement 21% of UH students did not have the opportunity to measure BPs manually whereas 100% of UCOL students undertook manual BPM. In comparison 100% of UH but only 66% of UCOL students measured BPs electronically during their placement. This may be attributed to the type of clinical placement area the students were allocated to; UH students went to either an acute hospital or primary care placement whereas the majority of UCOL students went to residential aged care where electronic BPM would not be routinely undertaken. However when the students practiced BPM in the skills laboratories there was little evidence that the type of BPM selected (manual or electronic) was congruent with the type of measurement most commonly undertaken in their subsequent clinical practice. This is exemplified by the fact that UH students had very little experience of undertaking and practicing electronic BPM despite the fact they would be attending an acute placement area where this skill would be used.

It was interesting to note that five UCOL students commented they would have liked to be able to practice BPM on a range of patients of different ages, including older people, as they believed this would have better prepared them for BPM during their clinical placement. Thirty students (5 at UCOL, 25 at UH) identified that they would like to have more blood pressure measurement simulation sessions prior to attending the clinical practice areas to further develop their confidence and competence.

Despite the complexities associated with learning to do BPM, especially manual BPM, students felt empowered when they developed competency in this skill. One student commented that *'Learning to perform the blood pressure on a patient was fascinating and an empowering experience in the early steps of being a student nurse. I can't wait to use my new skill in the practicum'.*

Part Three: Clinician perspectives

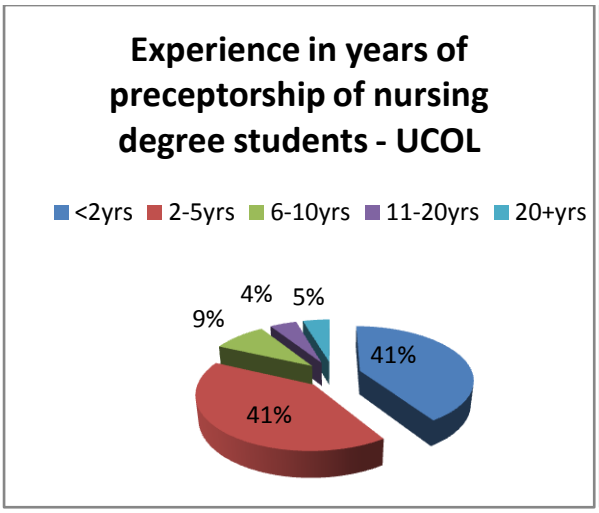
This last component of the project sought to establish the perspectives of clinical mentors and nurse teachers about the readiness of students to confidently and competently perform BPM on their first clinical placement. Upon completion of the first clinical placement for students, a survey form and information sheet was distributed by the researchers to the clinical mentors and nurse teachers/clinical lecturers who worked with the students. The project leads distributed these directly to the nurse teachers/clinical lecturers, and asked them to them to distribute surveys to the relevant clinical mentors/preceptors. Potential participants were asked to complete the anonymous survey, and return it in the pre-paid envelope provided. The completion of the survey form was considered to indicate consent to participate in the study.

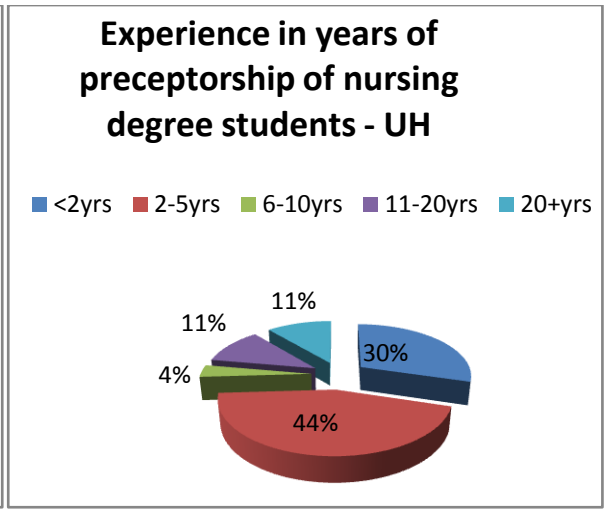
The roles of clinical lecturer (UCOL) and nurse teacher (UH) are very different in relation to their direct involvement in the student clinical experience, and as comparisons are unable to be made of their responses, their data has not been included in the report. Instead, attention is focused here on the responses of the clinical mentors/preceptors.

The response rate from clinical mentors/preceptors was disappointing, and may be due to the demands of the clinical area being such that completion of a survey form was not considered a priority. Of the 75 preceptor questionnaires distributed by UCOL, the response rate was 22 (29.3%) with a 30% response rate at UH (21 of the 70 mentor questionnaires distributed).

The experience of the respondents in relation to preceptoring nursing students was similar.

Figures 7 & 8 – Years of experience of preceptoring/mentoring

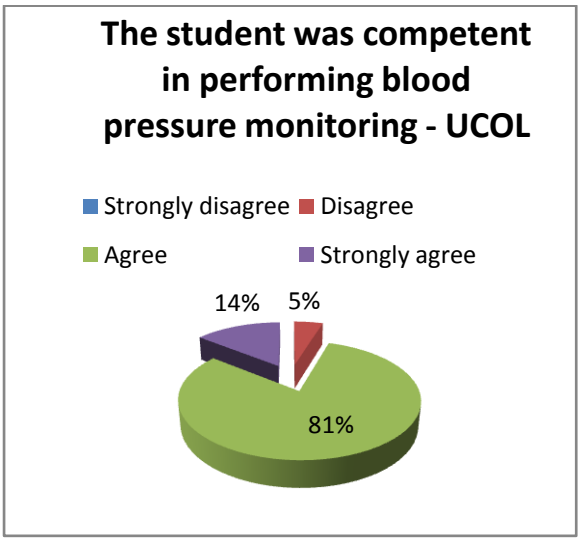


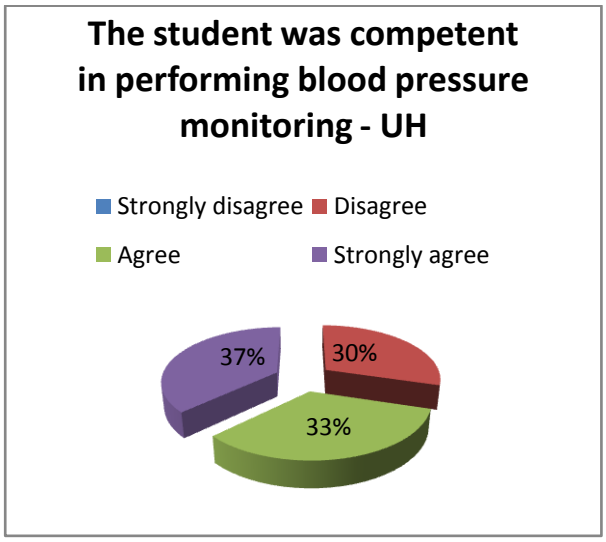


Although there were some very experienced preceptors/mentors among the respondents (18% for UCOL with 6+ years of experience, and 23% for UH), many of the preceptors had relatively limited experience in this role. For instance, 41% of the UCOL preceptors and 30% of the UH preceptors had less than 2 years experience.

Most preceptors/mentors (100% UCOL, 85% UH) considered that the students were able to prepare for, measure and record blood pressure. The students were also considered to have a good understanding of the relationship between theory and practice (86% agreement UCOL, 81% UH). As the following figures demonstrate, students' competence in performing BPM was also rated highly.

Figures 9 & 10 – Student competence in BPM





Almost 80% of the UCOL preceptors and 70% of UH mentors agreed or strongly agreed that the student was competent in BPM, with 20% and 30% of students respectively not considered competent. Most preceptors/mentors also agreed or strongly agreed that students understood the results of the BPM (87% UCOL, 78% at UH). Although preceptors/mentors identified that some students were unable to demonstrate competence in BPM, 75% of UCOL preceptors and 96% of UH mentors considered the simulation sessions prepared the students effectively. The rating from UH is surprising when they deemed 30% of the students as not being competent in BPM, and raises

questions about the criteria mentors/preceptors use to determine competence, and the extent of additional teaching that occurs during the clinical placement.

In the second student questionnaire, 100% of UCOL students, and 84% of UH students reported they were always supervised by a registered nurse when undertaking BPM. Surprisingly then, when the preceptors/mentors were asked if the student was always supervised by a registered nurse, 68% at UCOL, and 46% at UH reported they were not. The students who were not supervised every time, were reportedly supervised 'most times' (40% UCOL, 59% UH). One possible explanation for this finding may be that once the preceptor/mentor had confirmed the student was competent in BPM, they no longer felt it necessary to supervise the student on every single occasion they were performing this skill.

Implications for educational practice

The original aims of the research project have been used to frame the discussion of the findings and the implications for educational practice and further research.

A. *Compare and contrast the teaching and learning strategies used by the two Departments/Schools in the teaching of BPM*

Following data analysis it was apparent that the learning and teaching strategies, and associated resources, were similar between UCOL and UH in relation to teaching BPM. However, the complexity of teaching this skill was not fully captured in this pilot study, and further research is required to enable a detailed comparison and analysis.

Theory underpinning the skill of BPM was taught prior to practice in the skills laboratory. All students were supervised by a lecturer, generally on a 1:10 staff/student ratio while practicing the skill during simulation sessions, and all students were offered additional practice opportunities. Interestingly some of the lecturers were not fully conversant with the theory taught in the anatomy/physiology sessions which led to the potential for repetition, and/or conflicting or incomplete information being given to students. Arguably there is a need to develop clear guidance for lecturers as to the content of anatomy/physiology sessions that allows them to ensure skills session reinforce, rather than repeat, information previously given to students.

One major difference between the two institutions was that UH allowed for 300 hours of simulated practice to be included in the total clinical hours each student accumulated NMC (2006) whereas New Zealand has no allowance for simulated practice in accumulated clinical hours. The pressure educational institutes in both NZ and the UK are experiencing in accessing sufficient clinical placements for nursing students is such that further consideration of the role of simulated clinical hours in undergraduate nursing education is now urgent.

B. *Identify students' experiences of teaching and learning in relation to BPM prior to, and then immediately after their first clinical placement;*

From the data, students identified that they enjoyed and benefited from the simulation sessions and felt confident that they could link theory to practice. They highlighted that they would have liked the opportunity to practice for longer, and to practice on people of different ages, to further prepare them for the patients they would meet in the clinical areas. A large percentage of UH students stated that they did not feel prepared to undertake BPM on clinical placement. It would be beneficial to interview students either individually or as a group to understand their anxieties associated with undertaking BPM

in the clinical areas and to adapt the teaching and learning strategies, if necessary, to overcome these anxieties.

C. *Identify clinical mentors and nurse teachers' perceptions of whether students on their first clinical placement were able to competently measure blood pressure.*

The majority of preceptors/mentors were satisfied with the ability of the student to effectively undertake BPMl during their first clinical placement area. Student support in the clinical areas from their preceptors/mentors varied, with some students stating that their preceptors/mentors supervised them at all times doing BPM, in comparison with other students who stated that they were largely unsupervised when undertaking this skill.

It is important that preceptors/mentors are well prepared, and then receive regular updates to further their understanding of the collaborative nature of nurse education. Whilst it is mandatory in the UK for mentors to attend an update every year, it is not currently mandatory in NZ. There needs to be close partnership working between academia and clinical areas to ensure preceptors/mentors receive continued support from lecturers to develop the clinical skills of students in line with NCNZ and NMC competencies.

D. *To explore the implications of the research findings for other clinical simulation teaching.*

The teaching of clinical skills is far more complex than was first anticipated and more focussed research is required into the teaching and learning strategies used to develop the clinical skills of nurses.

The effectiveness of simulation in preparing the student nurse for their occupational role requires further exploration as does the extent to which mentors/preceptors value their role in preparing and supporting student nurses to undertake clinical skills. The replacement of some clinical hours with simulated hours in nurse education curricula, which would also reduce the demands on clinical areas, is currently the subject of intense international nursing discussion.

The key question that has arisen from this research, and which has implications for other clinical simulation teaching, relates to the anticipated outcomes of such teaching. Further consideration is required of the appropriate expectations of first year nursing students, and what degree of confidence/competence is achievable in the range of clinical skills they are taught. In addition, further exploration is required into the most appropriate timing of the OSCE following the teaching of clinical skills.

Conclusion

This pilot study has confirmed that the teaching and learning strategies, including simulation, used to educate Year One nursing skills in BPM are, in the mainly, generally effective in preparing students for the real-world environment. A number of areas for further research have also been identified.

Acknowledgements

The research team would like to acknowledge the generous support provided by Ako Aotearoa, National Centre for Tertiary Teaching Excellence, New Zealand, and the Yorkshire and Humber Strategic Health Authority, England. In addition, thanks are extended to the numerous students, mentors/preceptors and clinical teachers who participated in this research, and to Veronica Wilbourn for her contribution to data analysis.

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Appendix A: Information sheet and teaching inventory form – for UCOL staff teaching blood pressure measurement in BN502.

Simulation Evaluation

Information Sheet for staff teaching blood pressure measurement in BN502, and teaching inventory

The Research Project

The School of Nursing at UCOL and School of Human and Health Sciences at the University of Huddersfield, UK (UH), are inviting staff teaching blood pressure measurement in the BN502 paper this semester to participate in a study of their experiences. The project will explore the current teaching environment and processes that are employed to teach the skill of taking and recording blood pressures. It will also compare and contrast the similarities and differences in the teaching of this skill between the two institutions. In this component of the research, we are seeking to identify how blood pressure measurement is taught, and have developed a teaching inventory to try to capture this within its wider context. It is anticipated that completing the teaching inventory will take approximately 30 minutes.

This project will help us to evaluate our current teaching practices in relation to blood pressure measurement and will assist in identifying any changes that may be of benefit for future students.

Participation in the study is completely voluntary; you have the right to withdraw at any time, without any repercussions. You are also within your right to withdraw the information you provide at any time. In the future some of the information/results maybe also be used and published in academic journals.

The information you provide maybe quoted in the published results, however all information that may lead to your identification will be removed and a pseudonym will be used. All the information that is provided will be confidential, and any information that could lead to you being identified will be kept securely on UCOL and UH premises.

Simulation

Simulation has become an integral part of Health Professional training and development, both within the academic and health care areas settings. The UH and UCOL endorse the use of simulation as a teaching and learning strategy to enable the linking of theory to practice

offering the student a realistic experience of a variety of educational experiences. Simulation sessions are designed to support practice application and consolidate the theory covered on the modules and courses. These sessions offer the opportunity to practice key skills and knowledge required of a healthcare practitioner in a safe learning environment. Simulation training is about practicing the skill; the doing.

Being Involved

If you would like to be involved in this study, then please complete the attached teaching inventory, put it in the attached envelope, and into the internal mail. Completion of the teaching inventory is taken to infer your consent to participate in this research. If you require any further clarification please contact either Marian Bland –m.bland@ucol.nz or Geraldine Clear at g.clear@ucol.ac.nz.

Simulation Evaluation Research:

Teaching inventory form:

Please answer the following questions, (or as many of them as you can) – to enable us to evaluate the teaching and learning strategies associated with teaching blood pressure measurement in BN502. The questions relate just to the teaching of blood pressure measurement only, not the other clinical skills taught in this paper.

Your qualifications:	
Professional qualifications	
Formal qualifications, including teaching qualifications	
Years of clinical practice experience	
Which clinical practice area have you specialised in, eg medicine/surgery, operating theatre, community etc?	
Years of teaching experience	
Anatomy and physiology preparation for students	
When are the BN503 anatomy and physiology sessions relating to BPs taught in relation to when blood pressure measurement is taught in BN505?	
How much teaching time in BN503 is spent on the A & P relevant to blood pressure measurement?	
What resources do the BN503 teachers use to teach that anatomy and physiology? (eg textbooks, websites, student activities etc)	
Teaching blood pressures	
How many hours in total are allocated to formally teaching this skill: 1. In the classroom 2. In the clinical skills laboratory (excluding OSCE)	1. 2.

How many additional practice hours, supervised by a lecturer, are scheduled for each student?	
What is the staff/student ratio in the clinical lab sessions?	
How is student competence in measuring blood pressures assessed?	
Teaching resources	
What text(s) do students use for nursing skills?	
Do you direct students to any other resources in relation to blood pressure measurement , such as articles / websites/ videos or DVDs /CD Roms If yes, please provide details.	
Equipment available in the clinical skills lab(s)	
Are the students expected to provide any equipment themselves in relation to blood pressure measurement?	
Number of mercury sphygmomanometers per 20 students?	
Number of electronic blood pressure machines (dynamaps) per 20 students?	
What is the maintenance programme for this equipment?	
When was the equipment last calibrated?	
How would you describe the state of repair of the equipment?	
How many standard stethoscopes are available per 20 students?	
How many double stethoscopes are available per 20 students?	
What range of blood pressure cuff sizes are available?	
Use of mannequins	
Are mannequins used in the teaching/assessing of BP? If so, what type/make of mannequin is available, and in what capacity is it used?	

What technique is taught to the students in relation to blood pressure measurement		
	Manual blood pressure	**Electronic blood pressures (dynamap)**
Patient preparation – (relaxation period enforced, no talking enforced)		
Selection of limb		
Selection and positioning of cuff		
Posture of patient		
Limb position and support		
Position of manometer or dynamap in relation to the level of the heart		
Palpating brachial pulse		**n/a**
Palpating radial pulse		**n/a**
Number of mmHG cuff inflated to above palpated pressure		**n/a**
Stethoscope use – diaphragm or bell		**n/a**
Rate of deflation of cuff		**n/a**
Instructions for determining diastolic pressure (Korotkoff sounds)		**n/a**
Technique when bradycardia or arrhythmia present		
Indications and instructions for re-taking the blood pressure		
Prevention of nosocomial infections.		
Any other comments ?		

Thank you very much for taking the time to complete this inventory. Please put it in the envelope provided and place in the internal mail.

If you require any further clarification please contact either Marian Bland –m.bland@ucol.nz or Geraldine Clear at g.clear@ucol.ac.nz.

Appendix B: Student information sheet

Simulation Evaluation

Information Sheet for students

The Research Project

The School of Nursing at UCOL and School of Human and Health Sciences at the University of Huddersfield, UK (UH), are inviting Year One Bachelor of Nursing students who have undertaken simulation sessions regarding blood pressure monitoring to participate in a study of their experiences. The project will explore the current teaching environment and processes that are employed to teach the skill of taking and recording blood pressures. It will also compare and contrast the similarities and differences in the teaching of this skill between the two institutions.

This project will help us to evaluate our current teaching practices in relation to blood pressure measurement and will assist in identifying any changes that may be of benefit for future students.

Participation in the study is completely voluntary; you have the right to withdraw at any time, without any repercussions. You are also within your right to withdraw the information you provide at any time. In the future some of the information/results maybe also be used and published in academic journals.

The information you provide maybe quoted in the published results, however all information that may lead to your identification will be removed and a pseudonym will be used. All the information that is provided will be confidential, and any information that would lead to you being identified will be kept securely on UCOL and UH premises.

It is intended that 2 questionnaires will be offered to you for completion – this first one following teaching of blood pressure measurement, and the second on your return to class from your BN508 clinical placement.

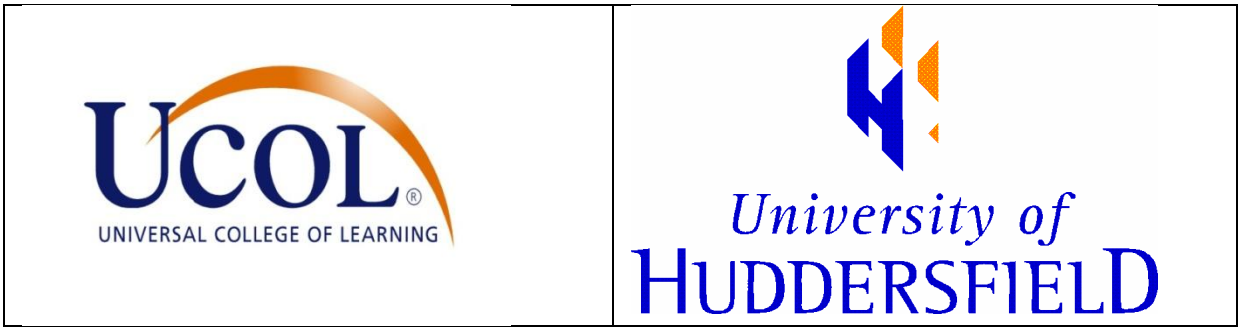
Simulation

Simulation has become an integral part of Health Professional training and development, both within the academic and health care areas settings. UH and UCOL endorse the use of simulation as a teaching and learning strategy to enable the linking of theory to practice offering the student a realistic experience of a variety of educational experiences. Simulation sessions are designed to support practice application and consolidate the theory covered on the modules and courses. These sessions offer the opportunity to practice key skills and knowledge required of a healthcare practitioner in a safe learning environment. Simulation training is about practicing the skill; the doing.

Being Involved

If you would like to be involved in this study please complete the attached questionnaire and post in the box marked 'simulation questionnaires' at the Student Resource Centre on the Palmerston North campus within the next week. Completion of the questionnaire is taken to infer your consent to participate in this research. If you require any further clarification please contact either Marian Bland –m.bland@ucol.nz or Geraldine Clear at g.clear@ucol.ac.nz.

Appendix C: Student questionnaire #1



Simulation Research. Student Questionnaire #1.

Thank for you helping us with this research project.

Section 1: Biography:

Instructions; Please use a ball point pen to complete this questionnaire. Please do not use a fountain or felt tipped pen as the ink may be seen on the other side of the paper. The questionnaire will be read by a computer scanner so please fill it in carefully, by placing an **X** in the appropriate box, keeping within the boundary or writing in the space provided.

1.

Were you employed in health related work (e.g. health care assistant) before starting your nursing programme?

Yes □ No □

If yes – did you record BP's? Yes □ No □

Section 2: Simulation:

1. Before the simulation sessions in BN502 , how would you rate your level of understanding of the theory of taking blood pressure
   - □ Poor level of understanding of the theory
   - □ Good level of understanding of theory
   - □ Confident in my understanding of theory and able to apply it in practice

2. Before the simulation sessions, how would you rate your level of understanding of the practical requirements for taking blood pressures?

□Poor level of understanding of the practical requirements

□Good level of understanding of the practical requirements but not yet competent in the application of associated practice/clinical skills

□Competent in the application of associated practice/clinical skills

□Confident and competent in the application of clinical skills which is supported by a good level of understanding of the associated theory

Thinking about the simulated learning sessions on blood pressure recording you undertook in BN502 please answer the following questions – based on your experience.

3. Had you undertaken simulated blood pressure measurement before these sessions?

Yes □ No □

If yes please give details below

4.
Have you ever undertaken a blood pressure recording in the clinical areas prior to simulation sessions? Yes □ No □

If yes please give details below

5. How would you rate your confidence level after the simulation experience undertaken in the skills laboratory?

□ No confidence at all

□ Some confidence but not yet competent

□ Quietly confident and I am able to perform competently with close supervision

□ I am confident and feel able to perform with minimal supervision

□ I am confident and competent in my clinical performance

6. How many times did you practice taking a manual blood pressure during the simulation session?

0 □ 1 -5 □ 6- 10 □ 11 -15 □over 15 □

7. When you were taking a manual blood pressure, did the lecturer ever listen to the blood pressure on a double-headed stethoscope?

Yes □ No □

8. Did having the lecturer listen with you make you feel more confident about interpreting the sounds?

N/A □ Yes □ No □

9. How many times did you practice taking an electronic blood pressure during the simulation session?

0 □ 1 -5 □ 6- 10 □ 11 -15 □over 15 □

For each of questions 10-18 please rate your agreement with the statement where

1 = strongly disagree (SD), 2= disagree (D) 3= agree (A) and 4= strongly agree (SA)

	1 (SD)	2 (D)	3 (A)	4 (SA)
10. I feel well prepared to perform the skill of blood pressure measurement and recording in practice	□	□	□	□
11. I have a good understanding of the relationship between theory and practice	□	□	□	□
12. I feel more confident in the application of theory in the clinical areas in relation to the taking and recording of blood pressures	□	□	□	□
13. My knowledge and understanding of the clinical equipment has increased	□	□	□	□
14. The facilitator in the simulation made me question what I do	□	□	□	□
15. I feel more able to develop my clinical skills in practice	□	□	□	□
16. I feel able to answer relevant questions asked by patients/clients	□	□	□	□
	1 (SD)	2 (D)	3 (A)	4 (SA)
17. I feel more anxious about undertaking new skills for the first time in clinical practice	□	□	□	□
18. I feel confident to tackle new skills in practice that I learnt in simulation	□	□	□	□

What did you expect to learn from the simulated blood pressure measurement experience in this paper? Were your expectations met?

If you have any further comments please write them in the box below.

Finally

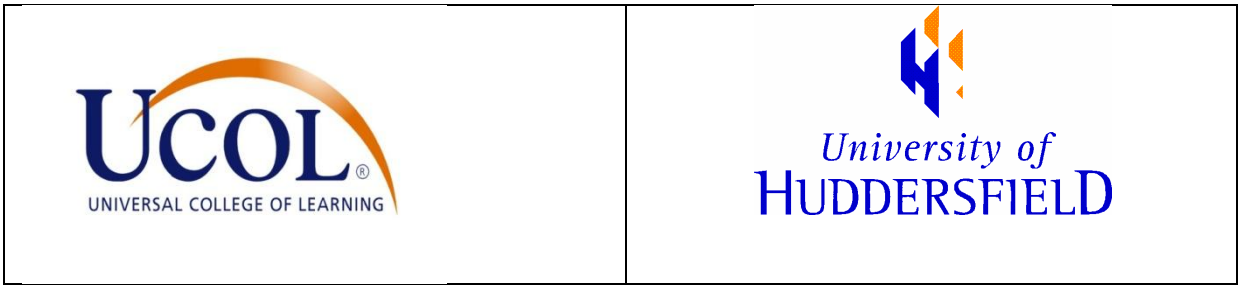
Have you any suggestions for how we could improve this simulation experience?

Thank you for taking the time to complete this questionnaire. Your contribution is much appreciated. Please place the completed questionnaire in the envelope provided and drop it off at the Student Resource Centre within the next week.

If you have any further questions, please contact either Marian Bland (ext 70423) or Geraldine Clear (ext 70403) at UCOL.

Evaluation form adapted from the NMC/ West Yorkshire Nursing Simulated Practice Pilot WYNSPP (2007b)

Appendix D: Student questionnaire #2



Simulation Research. Student Questionnaire #2

Thank for you agreeing to take part in this research project.

Section 1: Biography:

Instructions; Please use a ball point pen to complete the questionnaire. Please do not use a fountain or felt tipped pen as the ink may be seen on the other side of the paper. The questionnaire will be read by a computer scanner so please fill it in carefully, by placing an **X** in the appropriate box, keeping within the boundary or writing in the space provided.

1. Were you employed in health related work (e.g. Health care assistant) before starting your nursing programme?

Yes □ No □

If yes - How long for? 1 -5 □ 6- 10 □ 11 -15 □ over 15 □

Section 2: Simulation:

Thinking about the simulated learning sessions you undertook in relation to blood pressure recording and the experience you have now gained in the health care areas; please answer the following questions – based on your experience:

1. How would you rate your confidence level in blood pressure measurement and recording after this clinical experience?

□ No confidence at all

□ Some confidence but not yet competent

□ Quietly confident and I am able to perform competently with close supervision

□ I am confident and feel able to perform with minimal supervision

□ I am confident and competent in my clinical performance

2. How many times did they have the opportunity to take manual blood pressures during your placement?

0 □ 1 -5 □ 6- 10 □ 11 -15 □over 15 □

3. How many times did you have the opportunity to take blood pressures electronically during your placement?

0 □ 1 -5 □ 6- 10 □ 11 -15 □over 15 □

4. Were you supervised by a Registered Nurse when taking blood pressures? :

Never □ Once or twice □ Sometimes □ Every time □

5. What type of placement were you allocated –

Hospital setting □, Primary health care settings /agencies □ Nursing Home □

For each of questions 6 - 11 please rate your agreement with the statement where

1 = strongly disagree (SD), 2= disagree (D) 3= agree (A) and 4= strongly agree (SA)

	1 (SD)	2 (D)	3 (A)	4 (SA)
6. I have a good understanding of the relationship between theory and practice	□	□	□	□
7. I feel more confident in the application of theory in the clinical areas in relation to blood pressure measurement	□	□	□	□
8. My knowledge and understanding of the clinical equipment has increased	□	□	□	□
9. My mentor made me question what I did	□	□	□	□
10. I feel competent in undertaking the skill of blood pressure measurement and recording the results	□	□	□	□
11. I feel able to answer relevant questions asked by patients/clients	□	□	□	□

Did the simulation exercises in School prepare you effectively for undertaking blood pressure measurement in the clinical areas? Please explain

Please write any further comments in the box below

Have you any suggestions for how we could improve your blood pressure measurement simulation experience now that you have been out on clinical practice?

Thank you for taking the time to complete this questionnaire. Your contribution is much appreciated.

Please place the completed questionnaire in the envelope provided and drop it off at the Student Resource Centre within the next week.

If you have any further questions, please contact either Marian Bland (ext 70423) or Geraldine Clear (ext 70403) at UCOL.

Appendix E: Clinical teachers and clinical mentors – information sheet.

Simulation Evaluation

Information Sheet for clinical mentors/preceptors, and UCOL clinical staff working with BN508 students in 2009.

The Research Project

The School of Nursing at UCOL and School of Human and Health Sciences at the University of Huddersfield, UK (UH), are inviting clinical mentors/preceptors, and UCOL clinical staff working with BN508 students to participate in a research project related to the use of simulation as a teaching strategy. The project will explore the current teaching environment and processes that are employed to teach the skill of taking and recording blood pressures. It will also compare and contrast the similarities and differences in the teaching of this skill between the two institutions.

In this component of the research, we are seeking to evaluate how well students were prepared to perform blood pressure measurement when on clinical placement. The attached questionnaire should take about 10 minutes to complete. **Please complete one questionnaire for <u>each</u> of the students you have worked with during their first clinical placement**.

This project will help us to evaluate our current teaching practices in relation to blood pressure measurement and will assist in identifying any changes that may be of benefit for future students.

Participation in the study is completely voluntary; you have the right to withdraw at any time, without any repercussions. You also have the right to withdraw the information you provide at any time until data analysis commences. In the future some of the information/results maybe also be used and published in academic journals.

The information you provide maybe quoted in the published results, however all information that may lead to your identification will be removed and a pseudonym will be used. All the information that is provided will be confidential, and any information that could lead to you being identified will be kept securely on UCOL and UH premises.

Simulation

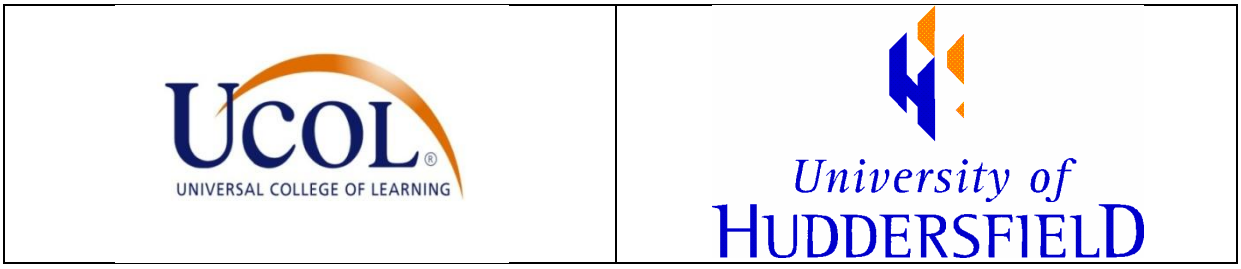
Simulation has become an integral part of Health Professional training and development, both within the academic and health care areas settings. UH and UCOL endorse the use of simulation as a teaching and learning strategy to enable the linking of theory to practice offering the student a realistic experience of a variety of educational experiences. Simulation sessions are designed to support practice application and consolidate the theory covered on the modules and courses. These sessions offer the opportunity to practice key skills and knowledge required of a healthcare practitioner in a safe learning environment. Simulation training is about practicing the skill; the doing.

Being Involved

If you would like to be involved in this study, then please complete the attached survey form, and send back to UCOL in the prepaid envelope supplied by **Monday 7th September**.

Completion and submission of the questionnaire will be considered to infer your consent to participate in this research. If you require any further clarification please contact either Marian Bland –m.bland@ucol.nz or Geraldine Clear at g.clear@ucol.ac.nz.

Appendix F: Clinical teachers and clinical mentors – questionnaire



Questionnaire for clinical mentors/preceptors and clinical lecturers

Section 1: Biography:

Instructions; Please use a ball point pen, please do not use a fountain or felt tipped pen as the ink may be seen on the other side of the paper. The questionnaire will be read by a computer scanner so please fill it in carefully, by placing an **X** in the appropriate box, keeping within the boundary or writing in the space provided.

Please complete **one questionnaire for each of the students** you have worked with during their first clinical placement.

1. Preceptors	1.Clinical Lecturers
How long have you been preceptoring Bachelor of Nursing Students? Less than 2 years □ 2-5 years □ 6-10 years □11- 20 years □ 20+years □	How long have you been working as a clinical lecturer with Bachelor of Nursing Students? Less than 2 years □ 2-5 years □ 6-10 years □11- 20 years □ 20+years □

Section 2: Simulation:

Each of the students has undertaken a period of learning relating to recording and interpreting blood pressure monitoring through simulation within the School of Nursing at UCOL.

How would you rate the student's confidence in undertaking the skill of blood pressure measurement? Please answer the following questions – based on your experience:

□ No confidence at all

□ Some confidence but not yet competent

□ Quietly confident and able to perform competently with close supervision

□ Confident and able to perform with minimal supervision

□ Confident and competent in clinical performance

Was the student always supervised by a Registered Nurse when doing blood pressure measurement BP?

Yes □ No □

If no, how often were they supervised by a Registered Nurse when doing blood pressure measurement?:

Never □ Once or twice □ Most times □ Every time □

Please comment on the supervision the students required in the box below.

For each of questions 1 -8 please rate your agreement with the statement where

1 = strongly disagree (SD), 2= disagree (D) 3= agree (A) and 4= strongly agree (SA)

	1 (SD)	2 (D)	3 (A)	4 (SA)
1. The student was able to prepare for and perform blood pressure recording in health care areas	□	□	□	□
2. The student had a sound understanding of the relationship between theory and practice	□	□	□	□
3. The student was confident in the application of theory in the clinical areas or expressed confidence	□	□	□	□
4. The student had a sound knowledge and understanding of the clinical equipment used	□	□	□	□
5. The student was able to ask questions relating to the recording and interpretation of BP monitoring	□	□	□	□
6. The student was competent in undertaking the skill of blood pressure measurement and associated documentation	□	□	□	□
7. The student understood the results of the measurement and was able to discuss actions that needed to be taken	□	□	□	□
8. The student was able to answer relevant questions asked by patients/clients	□	□	□	□

In your experience did the blood pressure simulation exercises in School prepare the students effectively for undertaking this skill in the clinical areas?

Yes □ No □

Please elaborate below:

Have you any suggestions for how we could improve the blood pressure simulation experience in preparation for practice?

Any other comments?

Please return your completed questionnaire in the self addressed envelope by **Monday 7th September.**

Many thanks for your help in this project. If you wish to discuss this please do not hesitate to contact either Marian Bland – m.bland@ucol.ac.nz or Geraldine Clear – g.clear@ucol.ac.nz .

Evaluation form adapted from the NMC/ West Yorkshire Nursing Simulated Practice Pilot WYNSPP (2007b)