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Mapping Skills and Competencies; Providing Access to Knowledge, Tools and Platforms; and Strengthening, Disseminating and Exploiting Success Outcomes for a Skilled Transatlantic eHealth Workforce

Case Study: Preparing Undergraduate and Postgraduate Nurses, Midwives and Allied Health Professionals to be Digitally Competent in Clinical Practice

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TITLE Preparing Undergraduate and Postgraduate Nurses, Midwives and Allied Health Professionals to be Digitally Competent in Clinical Practice

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ORGANIZATION

The Department of Nursing and Midwifery is one of the largest in the country offering undergraduate, postgraduate and professional continuing education (CE) for nurses (adult, child, mental health and learning disability) and midwives. The Department sits within the Faculty of Health and Wellbeing and students include those studying physiotherapy, occupational therapy, radiography, paramedic practice and social work. This case study accounts for over 2,500 students with 24/7 access to an online programme (Systems of eCare) extended across the course of study, having commenced in 2009.

BACKGROUND

The pervasive use of information and communications technology (ICT) in clinical and remote healthcare settings brings many challenges and new opportunities to all involved in healthcare, especially nurses, nurse leaders, nurse researchers and nurse educators. It also acts as a catalyst for needed changes in the curriculum to enable nurses to be fit for purpose having acquired the appropriate information skills, knowledge and attitudes. According to the Prime Minister's Commission on the Future of Nursing and Midwifery in England 2010, "*Making best use of technological advances is an increasingly important aspect of high quality care, including innovative 'remote care' approaches such as telenursing, as well as improving metrics. ... Starting in their initial education, nurses and midwives need a better understanding of and influence over the development of new technologies and informatics, including information and communications technology and remote care.*" [1].

A further key driver in terms of the United Kingdom's (UK) Higher Education development was that of widening the opportunity for independent study. The Department for Business, Innovation and Skills 'Higher Ambitions' stated, "*... the next phase of expansion in higher education will hinge on providing opportunities for different types of people to study in a wider range of ways than in the past. The focus will therefore be on a greater diversity of models of learning: part-time, work-based, foundation degrees, and studying whilst at home.*" [2].

The degree status of nurses today appears to have the effect of moving registered nurses (RNs) one-step further away from direct patient contact; the role is changing toward that of coordinating an unregistered workforce, for which information management is paramount to ensure safe and effective patient care.

In information terms, nurses and midwives are the professional groups who have the most interaction with patients, their relatives and friends. This places nurses and midwives in a unique role amongst clinicians as the vital element link in the information infrastructure within health care. Since the early 1980's, there have been many arguments forwarded that confirm the need to prepare clinicians to take an active role in the development and use of information and communications technology (ICT). An example is that of Berg [3] in 1982 when she said:

“The choice is there and the time to make the choice is now. The decision must be whether to act traditionally and have change thrust upon the profession [nursing] from the outside or to anticipate this revolution in nursing practice, familiarize nurses with it and prepare them to take an active part in the introduction of computers into the nursing community”.

It is clear that a decision was not made across the wider nursing bodies at the time and it is only now that the importance of informatics engagement by clinicians has come to the fore through the publication of the Five Year Forward View [4], aligned documents [5, 6] and Leading Change, Adding Value [7] the framework from Jane Cummings, Chief Nurse, National Health Service (NHS) England. It is acknowledged that there has been a plethora of suggestions for informatics competencies produced [8, 9] over the last 10-15 years but none have been widely adopted to meet health professionals' needs.

STATUS/CURRENT DEVELOPMENTS

The eHealth programme, entitled *Systems of eCare*, launched in September 2009 at Sheffield Hallam University. It is a wholly online course offered to nursing, midwifery and allied health professional students in the Faculty of Health and Wellbeing.

The key contextual objectives underpinning *Systems of eCare* are to ensure that students are able:

- to understand and improve, influence and use new technologies and informatics, including remote care
- to find the most reliable sources of information to support evidence based practice
- to guide patients through publicly available information sources
- to incorporate ICT into patient consultations
- to manage the clinician-patient relationship when the clinician is not physically in the same place as the patient
- to perform a quick and accurate data entry at the point of care
- to understand the legal and ethical issues associated with managing and sharing patient information
- to extract data to support decisions and monitor the outcomes of practice
- to understand the role of technology in the delivery and organisation of care
- to train other users such as patients and carers how to use relevant ICTs

The contextual objectives are divided into six units, which cover issues such as health information exchange, big data and population health, coding and classification, interoperability, information mapping, information intelligence, information management, telematics, pharmacogenomics, nano-technologies and robotics in health care. Each unit is routinely reviewed and updated every three months by knowledgeable Health Informatics (HI) experts to retain meaning and currency. Any significant policy change or innovative development is announced within 24 working hours for all cohorts.

It is recognised that there is a general paucity of HI teachers available to teach this key subject in every UK University. *Systems of eCare* overcomes this paucity through a one-stop-shop approach guided by experts in the HI field. *Systems of eCare* provides programme coordinators (those who staff and manage the entire undergraduate process) a robust solution which requires minimum effort on their behalf whilst meeting an

academic and professional education need. With the increased confidence and support through Systems of eCare, academic colleagues are now including a wider range of HI and telematics in their teaching.

Systems of eCare ‘docks’ alongside the current curriculum at points determined by the student's stage of learning; in this way, it does not require curriculum re-design. Systems of eCare is made up of a self-taught series of six sections, each section amounting to some 10 hours of study carried out online by the student. The intention being that a student completes one section per semester (where there are two semesters per year). At the end of each section, the student undertakes an online summative assessment, the result of which is contained in a printout which the student keeps in their portfolio. The printout can also be stored digitally if desired. The outcome from the section(s) is one of the topics discussed with the student during their regular personal tutor sessions.

ACTIVITIES/MEASURES

Table 1: Systems of eCare Learning Sections

Item and UG / PG Level	Section Title	Competencies
Section One (Level 4 / Level 7)	The Why, What and Where of eCare	<ul style="list-style-type: none"> • Understand the use of ICT in NHS England to support the management of care • Knowledge of the eHealth efforts underway in each of the four countries of the UK • Understanding of the issues being addressed by the Government's strategies and policies for ICT in health and social care • Reflected upon these issues as they affect the healthcare professional role • An initial understanding to information governance as it affects practice
Section Two (Level 4 / Level 7)	Profession Specific Information Governance	<ul style="list-style-type: none"> • Understand the term 'information governance' as it relates to patient / service user / client care • Understand the legislation and policies relating to information risk and safety management • Ability to reflect upon your responsibilities within an information governance framework • Ability to include all aspects of information governance in your practice
Section Three (Level 5 / Level7)	Information Systems	<ul style="list-style-type: none"> • Define what is meant by an 'information system' • Determine the elements that are included in the framework of information systems • Understand the way messages are shared between the Detailed Care Record (DCR) and the Summary Care Record (SCR). • Understand the role of the personal health record as given in the 2012 NHS Information Strategy • Demonstrate an understanding of System Security, System Integrity and System Archive
Section Four (Level 5 / Level 7)	Information Mapping	<ul style="list-style-type: none"> • Understand the link between information systems and data • Develop knowledge in coding, classification and terms for clinical health data

		<ul style="list-style-type: none"> • Explore information mapping in terms of evidence-based practice through to supporting decision-making • Consider what is meant by 'interoperability' in health information technology
Section Five (Level 6 / Level 7)	Information Intelligence	<ul style="list-style-type: none"> • Explore what is meant by big data, data warehousing and data sharing • Consider legal and ethical issues around information sharing in healthcare settings. • Determine how information can be used for functional intelligence in healthcare • Appraise the role of technology in remote care (telehealth/telecare) including mobile health (mHealth)
Section Six (Level 6 / Level 7)	Information Future	<ul style="list-style-type: none"> • Confirm your knowledge of ICT as it applies to healthcare at the point of transition into registered practise • Be aware of near future ICT developments that are intended to support care delivery in a variety of environments to include pharmacogenomics, nano-technologies and decision support – targeted healthcare, smart devices • Have an insight into the potential ICT developments in design for delivery in healthcare over the next five to ten years, such as robotics in health care • Understand your professional role as active participants in future ICT developments where benefit for patients/clients/service users is clear

CHANGES

Prior to the implementation of Systems of eCare, there was no provision for eHealth education in any health related course.

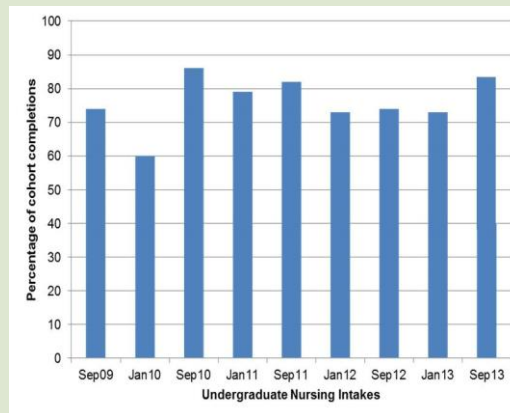
RESULTS

In September 2015, following an initial pilot to determine the validity of statements, a formal online evaluation survey using statements and Likert format response options commenced across the cohorts who had completed all six units. The following results are taken from the students’ anonymous evaluations for the September 2013 cohort (n=71) completing in September 2016 [10].

As Systems of eCare sat outside the main curriculum, a key question was asked to determine the students' view of where they saw the module in relation to their main course. 76% strongly agreed or agreed with the statement 'It is clear to me how Systems of eCare forms an integral part of my course' with 24% disagreeing or strongly disagreeing. 80% either strongly agreed or agreed that Systems of eCare was intellectually challenging, with 63% stating that they found the content and resources in Systems of eCare supported their learning in other modules and assignments. When asked whether the student has been able to apply the knowledge they gained through completing Systems of eCare in their practice 74% strongly agreed or agreed with 23% disagreeing or strongly disagreeing and 1% unanswered.

In response to the statement 'I found that being able to access the online materials at a time that was convenient to me helpful', 96% strongly agreed or agreed with 3% disagreeing or strongly disagreeing and 1% stating 'not applicable'.

Systems of eCare is optional and yet the rate of successful completion of all six units is considerably higher than might have been expected as shown in the figure below. The dates are the cohort start dates for their three-year undergraduate course.



Student completions of all six units

OUTLOOK/LESSONS LEARNT

From September 2018, Systems of eCare will be a fully integrated programme within the new integrated course.

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Case Study Checklists

Checklist of eHealth topics (competencies)	Apply? Yes/No	Describe how topic applies to your organization/case study
<i>Role of “Peopleware”</i> : human factors, awareness, satisfaction and acceptance of health IT, usability measurements, evaluation of health IT, communication, leadership, change management, ethics and IT and similar topics	Yes	<i>See table above and this is included in the central curriculum for student nurses, midwives and healthcare professionals.</i>
<i>Role of inter-professional approaches</i> : inter-professional versus mono-professional training and learning activities. What subjects lend themselves to inter-professional vs. mono-professional classes, learning environments and similar topics	Yes	<i>See table above</i>
<i>Role of healthcare data sciences</i> : data and information acquisition including documentation, data quality, data, information and knowledge management, data analysis and statistics, clinical decision making instruments, reporting and similar topics	Yes	<i>See table above</i>
<i>Fusion of medical technology & informatics</i> : software as a device, smart devices, automatic data acquisition via devices, risk and safety management	Yes	<i>See table above</i>
<i>Role of process and workflow management</i> : clinical and administrative processes, information continuity and information logistics, management	No	<i>Planned for postgraduate master’s programme in development.</i>

of processes, workflow management systems and similar topics		
<i>Role of ethics, legal and data protection issues:</i> ethics and IT, legal requirements, data protection and information self-determination, data safety and similar topics	Yes	See table above
<i>Role of learning and teaching:</i> learning techniques (“learn how to learn”), learning and teaching styles (online, blended, face-to-face), learning management, information management for learning and teaching and similar topics	Yes	See Systems of eCare information
<i>Role of management related topics in health informatics and IT:</i> principles of management, strategic management, stakeholder and change management, leadership, financial management, risk management, quality and safety management, resource planning and management and similar topics	No	This is included in the central curriculum for student nurses, midwives and healthcare professionals.
<i>Role of technology:</i> information and communication systems, telemedicine, telematics, assistive technologies, mHealth, life-cycle-management including systems development/engineering	Yes	See table above
<i>Role of consumers and populations:</i> consumer health informatics, public health informatics	Yes	See table above
<i>Role of Research:</i> information management in research, data analytics	Yes	See table above
<i>Role of interoperability:</i> systems integration, IT standards, terminologies and classifications	Yes	See table above

Checklist of eHealth topics (gaps and deficiencies)

Teaching the teachers: Are there any activities in your organisation to teach health IT/eHealth to teachers in healthcare?

Yes. Every student is assigned a personal tutor for the three/two years of their undergraduate programme. The personal tutor has timetabled sessions to meet with their students and carry out a progress review three times a year on a one-to-one basis with each assigned student. Prior to the progress review, the personal tutor receives an update of each of their students' Systems of eCare performance so that this can be discussed during the review. If more detailed access information is required, this can be requested by the personal tutor. In this way, the personal tutor is kept informed without having to carry out additional work, releasing them for the tutorial function rather than an administrative function. With the increased confidence and support through Systems of eCare, academic colleagues are now including a wider range of HI and telematics in their own teaching.

Supporting participatory design and acceptance testing/research: Are there any educational activities to teach or practice participatory design? Are there any activities including research in user acceptance testing and satisfaction measurement?

Yes, please see main case study.

Integrating eHealth/health informatics into traditional curricula: Are there any activities to include eHealth/health informatics into traditional curricula of physicians, nurses and other health professionals with direct patient care?

Yes, please see main case study. Additionally, eHealth attributes are included in the high fidelity simulation classes for all Faculty students.

Motivating clinicians and managers: Are there any incentives and opportunities for clinicians and healthcare managers to acquire and update digital eHealth/health informatics skills and knowledge?

No.

Engaging women: Are there any activities to attract female students in eHealth/health informatics or employ female health IT staff?

No.

Adjusting job descriptions and enable continuing education: Are there any activities to adjust job descriptions, e.g., for clinicians, that include health informatics competencies (also proper use of health IT/eHealth systems) and are there activities to support staff updating and upgrading their health IT related skills and knowledge? This topic is mainly related to provider organisation and also to IT vendors.

No, although a mandatory annual update for Information Governance is required for all National Health Service (NHS) employees.

Updating teaching and learning material: Are there any activities to ensure that the material is up-to-date and of high quality?

Yes. The programme is released sequentially and made up of six sections:

- The Where, Why, What and How of e-Care - Year One
- Information governance - Year One
- Information systems - Year Two
- Information mapping - Year Two
- Information intelligence - Year Three
- Information future - Year Three

For a three-year course, two sections are released each year. For a two-year course, three sections are released each year. These generally fit within the semester and main curriculum stage of learning.

Prior to the release of a section, the content is reviewed and updated in terms of the tutorial notes and the corresponding assets; the question pool is reviewed and amended with new questions being added as appropriate. In line with any teaching, the content expert is at the forefront of local, national and international developments in their field, in this instance HI/eHealth, and can synthesize new material for student consumption. As the content is built around an asset based model [11], this requires no expensive object updates.

Once the release occurs, all activity is monitored through the managed learning environment; this includes monthly access statistics down to individual student level; assessment attempts and overall performance of the course. The course tutor responds to student queries within 24 working hours whenever practicable.

Availability of courses including electronic courses: Are there any additional activities to improve the availability of courses such as implementation of new courses, new course formats that recognise previous experiences/training in particular for continuing education?

Yes. An integrated curriculum anticipated to start in September 2018. All Faculty of Health and Wellbeing Departments are developing the new curriculum with a revised Systems of eCare included along with key inspirational lectures.

Informal caregivers: Are there any educational activities to teach health IT usage to informal caregivers, e.g. for assistive technologies?

Yes, through research on dementia and robots [12].

Shortage of health informatics specialists: Are there any programmes to attract health informatics specialists?

No.

eHealth Budget: Does your organization, area or region have a dedicated budget set aside for eHealth/health informatics training, education or workforce development initiatives?

No.

eHealth Specialty Areas: Does your organization address any of these speciality settings/areas of training or outreach for eHealth education or workforce development: ambulatory care, social medicine, geriatric/ageing medicine, rehabilitation?

Yes.