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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: Integration of Health Informatics in Nursing Curriculum

VIA University College, Denmark

TITLE: Integration of Health Informatics in Nursing Curriculum

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ORGANIZATION
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BACKGROUND
The primary healthcare sector in Denmark has used electronic documentation since the start of 1990 [1]. While basic records go back to 1977, a detailed history was made available for all patient contacts in 2000. Electronic Patient Records (EPR) have been in use in Denmark since 2009 for documentation [2], and welfare technology, or technologies that increase the quality of life and/or efficiency of society, is widely used in the homecare sector [3, 4].

Denmark has a centralized computer database to which 98% of primary care physicians, all hospital physicians and all pharmacists now have access. Danish residents can gain access to their own records through a secure website. The website alerts the patient by email if a doctor, pharmacist or nurse views their records, and allows patients to make appointments, set end-of-life wishes and even email their doctor for advice on illnesses that do not require an office visit. The health care sector in Denmark is highly digital and the acquisition of digital skills among the workforce and students is required.

As part of the Strategy for Digital Welfare, the Government and Kommunernes Landsforening (KL), or local governments, agreed to a nationwide dissemination of new welfare technologies during the 2014 National Financial Agreement [5]. The objective of the agreement was to create quality gains for citizens and employees in their daily life and to save a minimum of 500 million in Danish Krone (DKK), roughly 677 million euros, within the municipalities by 2017. In connection with the dissemination of these technologies, KL was established as a program from 2014-2016 for the spread of welfare technology that has supported the municipalities in caring for their residents.

From 2014-2016, 88 municipalities have implemented the technologies laid out during the 2014 National Financial Agreement, which covers 95% of the population in the country. At the end of 2016, a final measurement focused on the implementation process and an analysis of the effects of implementation were presented and showed a range of quality gains for both citizens and employees. The data also showed improved economic potential for all municipalities [6].

STATUS/CURRENT DEVELOPMENTS
In 2017, a new curriculum for the bachelors programme integrated nursing informatics (NI) education activities into the nursing lessons. Today, 50% of informatics topics are integrated into curriculum, such as Telemedicine in the communications lessons, and an assessment of welfare technology in the lessons on elderly care. Currently, there is one teacher/professor at each campus who holds a Masters in Health Informatics (HI).

ACTIVITES/MEASURES

Table 1: **NI Curriculum for the Nursing Bachelors Programme at VIA University College, Campus Nord, Aarhus Denmark taught by Inge Madsen, RN., MS in Health informatics.**

The Bachelors Programme for Nurses is 3-5 years.

Please note that the following outcomes are extracts from the full description of the curriculum in order to describe the contexts of nursing informatics in the nursing curriculum done by the author.

SEMESTER 1. NI - integrated in the nursing lessons.
NI topics integrated in the nursing lessons: Human factors, awareness of IT use, acceptance of IT in health care, inter professional communication, documentations systems.

Learning Outcome: knowledge
The student:
- Analyzes and integrates knowledge forms to systematically observe, diagnose, evaluate, prioritize, intervene, evaluate, document, adjust and coordinate nursing to patient/citizen
- Describes knowledge about the profession's use of technology in care and treatment
- Analyzes knowledge of patient/citizen's goals and integrates this knowledge in nursing planning
- Describes knowledge about communication theories, communication methods and the importance of communication for dialogue and the creation of relationships

Learning Outcome: skills
The student:
- Performs nursing observation, assessment and nursing planning demonstrating cooperation with patients/citizens in stable care and treatment
- Illustrates patient/citizen involvement in organizing, evaluating, adjusting and documenting care
- Uses technologies in observation, assessment, planning and performance of care and treatment in relation to health challenges and disease contexts

Learning outcome: Competencies
The student:
- Demonstrates responsibility and keeps up to date on an understanding of and identification of own learning processes and development needs in relation to the theme of the semester
- Assumes responsibility for seeking, assessing and applying national and international practice, development and research knowledge in the argumentation and reflection on the theme of the semester

SEMESTER 2. NI - integrated into nursing lessons.
NI topics integrated into nursing lessons: Clinical and administrative processes, documentations systems, national health portals, clinical quality databases, clinical guidelines, telemedicine.

Learning Outcome: Knowledge
The student:
- Analyzes and integrates knowledge forms to systematically observe, diagnose, evaluate, prioritize, intervene, evaluate, document, adjust and coordinate patient/citizen care
- Argues for clinical decision making in stable and complex care and treatment courses across sectors

- Describes values, ethics, theories, concepts and methods in nursing
- Integrates knowledge about prevention, health promotion, rehabilitation and palliation in relation to the clinical outcome in stable and complex care and treatment
- Integrates knowledge about patient/citizen's goals in relation to clinical decision-making
- Describes cross-sectoral cooperation

Learning Outcome: Skills
The student:
- Uses clinical decision-making in interaction with patient/citizen to systematically observe, assess, prioritize, coordinate, evaluate and adjust nursing practices
- Uses nursing interventions in stable and complex care and treatment courses as well as in preventive and rehabilitative processes
- Connects patient/citizen involvement with organization, assessment, adjustment and documentation of care and treatment courses across organizations and professions
- Argues for drug handling within a framework order and framework organization in stable and complex care and treatment
- Argues with nursing sciences values, theories, concepts and methods
- Uses technologies in planning and performing care and treatment
- Performs situational communication in interaction with patient/citizen
- Conducts cross-sectoral cooperation in patient/citizen courses
- Uses relevant study and working methods to seek, evaluate and interpret empirical and theory as well taking part in innovative projects

Learning: Competencies
The student:
- Demonstrates responsibility and keeps up to date on an understanding and an identification of own learning processes and development needs in relation to the theme of the semester
- Assumes responsibility for seeking, assessing and applying national and international practice, development and research knowledge in the argumentation and reflection of the theme of the semester

SEMESTER 3. NI - integrated into nursing lessons.
NI topics integrated into nursing lessons: documentation, clinical decision making, ethics, inter- professional and inter-sectorial communication

Learning Outcome: Knowledge
The student:
- Reflects on pharmacology and medicine management within a framework order and framework organization in stable and complex care and treatment
- Reflects different forms of knowledge of systematic observation, diagnosis, assessment, prioritization, intervention, management, coordination, evaluation, documentation and adjustment of patient/citizen care at the individual and group levels
- Argues for clinical leadership, clinical decision-making and collaboration across professions, sectors, organizations, institutions and patient/citizen's homes
- Integrates knowledge about the organization of healthcare, the division of responsibilities and practices between sectors based on legal basis, ethical responsibility and social conditions in nursing
- Argues with the nursing sciences values, theories, concepts and methods

- Reflects on the professional use of technology in care, treatment and quality assurance
- Argue with knowledge about methods for quality assurance and quality development

Learning Outcome: Skills
The student:
- Uses clinical decision-making in interaction with patients/citizens to systematically observe, diagnose, evaluate, prioritize, lead, coordinate, evaluate, document and adjust nursing at the individual and group levels
- Integrates patient/citizen involvement in organizing, assessing, adjusting and documenting care and treatment courses across organizations and professions
- Uses nursing interventions in stable, acute and complex care and treatment courses as well as in health-promoting, preventive, rehabilitative and palliative care
- Assesses drug handling within a framework order and framework organization in stable and complex care and treatment courses and disseminates knowledge
- Uses clinical leadership of patient/citizen care and treatment courses in conjunction with professionals, taking into account quality assurance
- Uses professionally relevant information, communication and welfare technology in planning, execution and development of care and treatment, including considering patient/citizen's own resources
- Uses situational communication in interaction with patient/citizen in professional and inter-professional practice
- Reflects cross-sectoral cooperation in patient/citizen courses
- Uses and justifies methods and describes standards for quality assurance and quality development
- Uses relevant study and working methods to seek, evaluate and interpret empirical theory and research methods as well as participate in innovation and development work

Learning Outcome: Competencies
The student:
- Demonstrates responsibility and independence for quality development in clinical leadership, taking into account quality assurance and patient safety standards
- Demonstrates responsibility and keeps up to date on an understanding of and identification of own learning processes and development needs in relation to the theme of the semester
- Assumes responsibility for seeking, assessing and applying national and international practice, development and research knowledge in the argumentation and reflection of the theme of the semester

SEMESTER 4. NI - lessons facilitated by a professor with an MS in Health Informatics.
NI topics include: The meaning of the citizen patient, the health professionals' understanding of technology, Health (IT) literacy, the digital patient, Relational consequences of digitally mediated communication, Intercultural communication, the technological future of nursing care, Development and innovation in IT, Critical approaches to strategies and action plans and current developments in health technology, Assessment of welfare technology, systems integration, IT standards, terminologies and classification, structured data for reuse.

Learning Outcome: Knowledge
The student:

- Reflects on pharmacology and handling of medicine within a framework order and framework allocation in stable and complex care and treatment
- Reflects on forms of knowledge to systematically observe, diagnose, assess, prioritize, intervene, evaluate, document, adjust and coordinate nursing at individual, group and community levels
- Integrates knowledge about individual, social, cultural, international and ethical factors influencing human experiences and responses to health challenges and disease contexts
- Reflects on communication theories, methods, and the importance of communication in relation to dialogue and to establish relationships
- Reflects on educational interventions both in direct and digital contexts involving patient/citizen and relatives with respect for diversity
- Argues for clinical leadership, clinical decision-making and collaboration across professions, sectors, organizations, institutions as well as patient/citizen's homes
- Reflects on the values, theories, concepts and methods of nursing in relation to situational communication in interaction with patient/citizen, relatives and professionals in and across sectors
- Reflects on prevention, health promotion, rehabilitation and palliation in relation to clinical decision-making in stable and complex care and treatment

Learning Outcome: Skills

The student:

- Uses clinical decision-making in interaction with patients/citizens to systematically observe, diagnose, evaluate, prioritize, lead, coordinate, evaluate, document and adjust nursing
- Uses nursing interventions in stable, acute and complex care and treatment courses as well as in health-promoting, preventive, rehabilitative and palliative care
- Evaluates and communicates medication management within a framework order and framework delegation in stable and complex care and treatment
- Argues for guidance and teaching of patient/citizen, relatives, colleagues and educators
- Applies relevant national and international ethical codes and legislation in nursing situations characterized by various cultural and professional interests
- Assesses situational communication, guidance and counseling in interaction with patient/citizen in professional and cross-professional practice
- Uses nursing interventions that support patient/citizen in coping with their life situation in health challenges and illnesses of rehabilitation, palliative, health promotion and prevention
- Masters relevant work methods to seek, evaluate and interpret empirical theory and research methods and participate in innovation, development and research work

Learning Outcome: Competencies

The student:

- Uses professional, relevant technology, including ICT in the relevant context
- Demonstrates responsibility and keeps up to date on understanding and identification of own learning processes and development needs in relation to the theme of the semester
- Assumes responsibility for seeking, assessing and applying national and international practice, development and research knowledge in the argumentation and reflection tied to the theme of the semester

SEMESTER 5. NI - integrated in the nursing lessons

NI topics integrated in the nursing lessons: Principle of management, strategic management, leadership, quality and safety management, resource planning.

Learning Outcome: Knowledge

The student:

- Reflects on knowledge about health challenges and disease contexts in acute and complex care and treatment
- Integrates knowledge forms in systematic reflection on observation, diagnosis, assessment, prioritization, intervention, management, coordination, evaluation, documentation and adjustment of nursing care for patients/citizens in acute, critical and complex care and treatment
- Reflects on clinical leadership, clinical decision-making and collaboration across professions, sectors, organizations, institutions as well as the patient/citizen's home in relation to acute, critical and complex care and treatment
- Reflects on the organization of healthcare, the division of responsibilities and practices between sectors based on legal basis, ethical responsibility and societal and economic conditions
- Reflects on people's experiences and reactions, including existential, cultural and social challenges in acute, critical and complex care and treatment
- Reflects on prevention, health promotion, rehabilitation and palliation in relation to clinical decision-making cases in acute, critical and complex care and treatment
- Reflects on science theory and research methodology in quality, innovation, development and/or research

Learning Outcome: Skills

The student:

- Argues and communicates clinical decision-making based on systematic observation, diagnosis, assessment, prioritization, intervention, management, coordination, evaluation, documentation and adjustment of nursing in acute, critical and complex care and treatment courses, including preventive, rehabilitative and palliative processes
- Reflects on pharmacology and medicine management within a framework order and framework organization in acute, critical and complex care and treatment
- Reflects on the guidance, counseling and teaching of patients/citizens, relatives, colleagues and educators
- Reflects on cultural, international and ethical insight into care and treatment based on current code and legislation
- Reflects situational communication in interaction with patient/citizen and other professionals in different contexts
- Argues for methods and describes standards for quality assurance and quality development
- Masters relevant study and working methods to seek, evaluate and interpret empirical and theory as well as participate in innovation, development and/or research work

Learning Outcome: Competencies

The student:

- Evaluates clinical decision-making based on systematic observation, diagnosis, assessment, prioritization, management, coordination, evaluation, documentation and adjustment of nursing in stable, acute and complex care and treatment courses, including in preventive, rehabilitative and palliative processes

- Demonstrates independence in seeking, assessing and applying national and international practice, development and research knowledge in the argumentation and reflection of the theme of the semester
- Argues for the involvement of professionally relevant technology, including ICT in the relevant context
- Demonstrates accountability and keeps up to date on the understanding and identification of own development needs

SEMESTER 6. NI - integrated in the nursing lessons
Learning Outcome: Knowledge
The student:
- Reflects on dilemmas and ethical issues in nursing
- Has knowledge on and can understand innovation as a method of change of practice, and has knowledge of implementation methods in relation to specific target groups
- Has knowledge of methods and standards for quality assurance, patient safety and quality development and reflects on their use
- Has knowledge of the priorities of professional activities under the given framework conditions in the healthcare system

Learning Outcome: Skills
The student:
- Assesses and disseminates cultural, international and ethical insights into care and treatment based on current legislation

Learning Outcome: Competencies
The student:
- Independently manages organizing, assessing, adjusting and documenting care and treatment courses in collaboration with patient/citizen across sectors, organizations, and professions throughout the healthcare industry
- Independently takes responsibility for and manages clinical decision-making within a framework and organization, prescribes medicine in stable, acute and complex care and treatment courses and involves patient/citizen, relatives and other professionals
- Should be empathic, ethical and reflexive in nursing and patient/citizen situations characterized by different cultural, professional, political, economic and social perspectives, and intervenes within the framework of applicable code and legislation nationally and internationally
- Independently and patiently supports the patient/citizen and relatives in managing the individual's life situation in care and treatment, health challenges, rehabilitation, palliative, health promotion and prevention
- Independently manages clinical leadership to ensure and develop quality that supports patient and citizen-related coherence in a comprehensive healthcare system and in the patient's/citizen's homes
- Independently handles technologies in planning, execution and development of care
- Independently takes responsibility for and uses educational interventions in guidance, teaching and dissemination to patients/citizens, relatives and professionals
- Participates independently in situational communication in different contexts, including in a balanced, dialogue-based and value-creating relationship with citizens, patients, relatives and inter-professional partners

- Independently deals with interprofessional and cross-sectoral cooperation and, based on an overall perspective, supports the citizen/patient as a central and active player in the individual process
- Handles and assumes responsibility for quality assurance and quality development
- Demonstrates independence in seeking, assessing and applying national and international practice, development and research knowledge in the argumentation and reflection of the theme of the semester
- Demonstrates accountability and keeps up to date from an understanding and identification of own learning processes and developmental needs

SEMESTER 7. NI - Bachelor theses

NI topics: Information management in research, data analytics

Learning Outcome: Knowledge
The student should:
- Reflect on the values, theories, concepts and methods of the nursing profession
- Reflect on dilemmas and ethical issues in nursing
- Reflect on science theory, research methodology and models for evaluation, quality assurance and development and relates this knowledge to research and development work in professional practice

Learning Outcome: Skills
The student should:
- Assess and disseminate cultural, international and ethical insights into care and treatment based on current code and legislation

Learning Outcome: Competencies
The student should:
- Handle and integrate national and international practice, development and research knowledge in argumentation and reflection on nursing
- Handle and assume responsibility for quality assurance and quality development
- Handle and assume responsibility for seeking, assessing and interpreting empirical, theory and research methods, as well as participating in innovation, development and research
- Demonstrate autonomy in seeking, assessing and applying national and international practice, development and research knowledge in the argumentation and reflection of the theme of the semester

CHANGES
The professors teaching eHealth create a lesson description and literature list for NI education. There is still a need for more competencies among the teachers that do not have an advanced degree in HI.

The newly developed curriculum differs significantly from the previous one. The assessment of welfare technologies is a new competency area. This new approach integrates the NI competency areas with competencies within Nursing Research, QA and Healthcare Management in a stronger fashion. This approach includes the desire to better integrate NI into other major topics within nursing and into their daily work as nurses. This also requires the NI lecturers to make themselves more acquainted with nursing, and lecture NI from an application perspective, not from a technology point of view.

RESULTS

The new NI course design is set to take effect during the winter semester of 2017/2018. It provides an overview of the field and interlinks with other subjects from direct patient care and management. The course will demonstrate that NI goes far beyond mere technological topics and serves to establish innovative approaches in healthcare. In particular, it focuses on building and entertaining safe care networks and instruments to ensure that high quality is infused through information and knowledge management and clinical decision support systems (CDSS).

OUTLOOK/LESSONS LEARNT

Education in NI varies widely, even among teachers with the same degree. More consistency and more qualifications in NI for current and future professors are needed for this approach to be fully effective.

The ultimate goal of this new approach is to weave NI into other topics and transform it from an external add-on to an integral, organic part of the nursing professional. The intention is to motivate nurses to regard health IT/eHealth as part of their job and to be capable of using it in meaningful ways. Whether this can be achieved remains to be seen, and will be assessed in the next semesters and years to come. Regular evaluations are being planned to consider these aspects.

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