NURIC

Capacity building in Nursing Informatics Competencies for Nursing Students and Professionals to foster the digital transformation of health care

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WP2 – Involving Market Actors

D2.1 - Curriculum plan for vocational training in nursing informatics

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Abbreviations and Acronyms

CME	Continuing Medical Education
ECTS	European Credit Transfer System
EU	European Union
FTH	Frontal teaching hours -
GDPR	General Data Protection Regulation
LMS	Learning management system
OER	Open Educational Resources
PC	Project Coordinator
WP	Work Package

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Glossary

We should use a clear terminology regarding curriculum design within NURIC. Here is a suggestion:

Term	Meaning
Stakeholder	Group interested in the NURIC results and especially in the courses offered based on NURIC results. Including nurses and other participant groups, but also nursing management, accreditation & certification bodies, teachers, and external nursing informatics experts.
Topic	An area within nursing informatics that we identify as relevant to be included in NURIC courses.
Course	An umbrella term describing any course offered by a school or university\higher education institute.
Certificate course	A course offered by a school or higher education institute where participants get an official certificate upon successful completion. A certificate course can comprise one or several modules.
Curriculum	Overview on all (mandatory) modules and their name and Frontal teaching hours -FTH\ECTS credits of one course.
Module	A self-contained unit of study within an academic program or course. A module is designed to have pre-defined learning outcomes and are often structured around a specific topic. A module ends with an assessment, after which a number of credits (ECTS\FTH) is assigned.
Module description	In the context of the Bologna system, each module must have a module description that describes, among others, learning outcomes, credit allocation, entry requirements, and assessment of learning outcomes.
Nano course	A very short, focused course that is self-contained and addresses a specific topic. Nano-courses are typically much shorter than traditional modules, they focus on one topic (or sub-topic), they are delivered in flexible formats (often partly online), they often allow self-paced learning, and they may offer micro-credentials (nano-degrees) or digital badges upon their successful completion. Nano-courses are often used to complement more traditional modules within certificate courses.
Micro-credential	Certification or recognition of learning achievement that is smaller in scope and typically more focused than traditional academic degrees or certifications. A micro-

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	credential can be issued, for example, after successful participation in a nano course.
Syllabus	Structured outline on the content, learning objectives, and structure of a course. It typically includes information such as the course title, instructor's name, contact information, course description, learning objectives, required materials, schedule of topics or lessons, grading policies, assignments, assessments, and any other relevant details.
ECTS credits	ECTS = European Credit Transfer System. Under the ECTS system, each course or module is allocated a certain number of ECTS credits based on the workload required to complete it, including lectures, seminars, practice, self-study, and examinations. Typically, one ECTS credit represents 25-30 hours of student workload.
Level	Within NURIC, we want to distinguish three level of courses: ➢ Beginner ➢ Intermediate ➢ Advance
Resource	Within NURIC, a resource refers to teaching material such as videos, papers, chapters, podcasts etc. Teachers can use this material in their lectures.
Core studies\basic education	The basic nursing studies. In some countries, these are certificate studies in others (Israel) an academic studies (BA).
Specialization studies	Studies required for job assignments and promotion.
Certificate courses\CME	Courses aim to educate the nurse for additional skills\knowledge and are financially rewarded.
Nurse training	Training within the work environment as part of the ongoing work. Under the auspice of nursing schools or healthcare organizations; depending on the country.
Open Educational Resources (OER)	Resources that are offered free of charge.
Repository	Within NURIC, the repository refers to the technical collection of all NURIC resources.
Learning management system (LMS)	Application to organize learning processes, such as Moodle or OLAT.

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1. Context and objectives

The NURIC project aims to build a curriculum for nurse informatics programs that will enable nursing schools as well as healthcare organizations and ministries of health to better educate nurses and enhance the 21th century digital competencies of nursing professionals and extending their job opportunities to new jobs (such as digital nursing manager, advisors to digital health companies etc.).

The NURIC nursing informatics programs will be aligned with national developments; and skills matching with current and future job opportunities. The NURIC project involves stakeholders as well as national and international experts to develop a program that is aligned with current and future developments in the nurse informatics education and job requirements in the country.

This document summarizes the result of T2.1 'Stakeholder input and curriculum design', T2.2 'Develop Nursing Informatics curriculum' and T2.3 'Define the modules for the vocational training in Nursing Informatics for nurses' into one Deliverable.

The document therefore describes the methodology design for collecting the stakeholders' input that was integrated with international guidelines and literature review to serve as the basis for developing and describing the nurse informatics curriculum for the certificate courses, including the target group, their modules and their content, and the expected ECTS.

This deliverable serves as basis for developing the specific courses in WP3, especially T3.4 'Specify course design'.

The publication of this document fulfills MS3 'nursing informatics curriculum and module description for nano-courses and certificate courses in Kosovo and Israel is reader' that is due in Month 12.

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2. Methodology

The methodology of development of this Deliverable D2.1 was designed in four steps:

1. Stakeholders input in the pilot countries, Italy and from international experts.
2. Analysis of present education for nurses in the partner countries - Israel, Kosovo, Italy and German speaking countries.
3. Design of the nurse informatics curriculum based on the Literature review, position statements / documents of national / international organizations, outcome of the stakeholders' forum and partners' experience.
4. The curriculum design was validated using the DELPHI method.

2.1. Stakeholders input in the pilot countries and from international experts

Nursing informatics is an emerging field which requires the integration of technology and information management into professional nursing practice. The aim of the NURIC project is to develop several courses, designed as a collection of nano-courses to provide nursing students and professionals with a solid knowledge of nursing informatics that can be integrated in the current and future studies as well as nurses' professional development along their career. More specifically, within the project, WP2 is dedicated to defining the content of the courses. Therefore, a group of stakeholders was involved to identify the needs and gaps in the current knowledge of nursing informatics as well as the main areas of interest for the development of this field.

For the stakeholders input collection we developed a stepwise process (Figure 1). Each country used a slightly different process; Israel, used existing materials and HIT's experience from teaching health informatics to healthcare professionals and Pharma teams, while Italy and Kosovo used a literature review to build the curriculum skeleton to be discussed with the stakeholders.

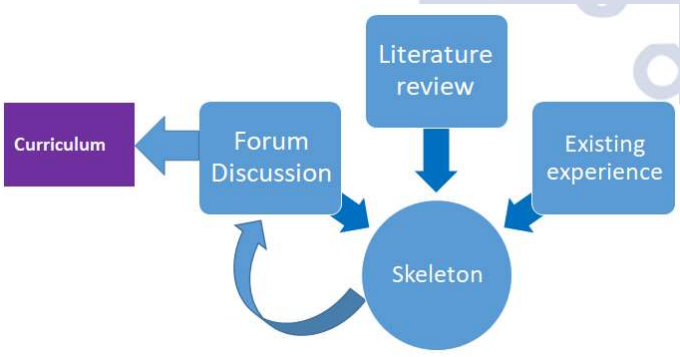

Figure 1. A stepwise process design for curriculum development

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After a first review of existing education programs in each country, we discussed with the stakeholder forum in each country their first input regarding their needs. The first inputs from Israel, Kosovo, and Italy were integrated into the interview guidelines that was used for stakeholders' input in each country and international experts (Appendix 1).

The stakeholders' interview discussed three main areas:

(1) Baseline and policy regarding the current knowledge of nurses, the role of the nurse (present and future) and the policy regarding nurse informatics education.
(2) The required content of training in nursing informatics.
(3) How they envision the implementation of nursing informatics in the nurse education and professional training.

In Israel, a forum was established by HIT to discuss the future education in nurse informatics. The forum members were: (1) Head of nursing school in Hillel Yaffe hospital - Prof Meirav Ben-Natan, (2) Head of Health-Hub ,Medical Technology, Innovation and research directorate of the Israeli MOH - Mrs. Rina Cezana, (3) Head of Nurse Specialization program at the Nursing directorate , MOH - Dr Rina Shimonov; (4) Head of Nursing certification Department, MOH - Dr Shirly Luz (5) Chair of the national committee for re-design of Nurse educational program (core studies, Bsc) and a senior lecturer in The Faculty of Social Welfare and Health Sciences Haifa University - Dr Einav Srulovich, (6) Head of nursing in Rambam medical center - Gila Hyams and (7) Prof. Gad Segal, MD. Head of Education authority at Sheba medical center represented in the NURIC consortium.

Overall, representatives from at least five stakeholder groups (education, innovation, education, politics, practice) were involved in this step.

The forum had group discussions followed by individual interviews by HIT according to the presented methodology.

In Italy, a specific forum was established by CNAI to discuss the future of nursing informatics at different levels. Regarding the stakeholders input a number of different actors were involved as follows:

- Federsanità (Lucia Mitello, Lead of Health professional forum
- University of Milano (Prof. Maura Lusignani)
- University of Milano Bicocca (Prof. Stefania Di Mauro)
- ICNP Center (Prof. Di Mauro – Lucilla Luzzi, M. Rossi)
- NOII Network (different nursing association presidents)
- Minister of Defense – Digital Health Unit led T.Col. Rosalba Bradde)
- Italian Nursing informatics group (Massimiliano Di Carlo, etc.)
- Different Association or group of citizens/patients (cittadinanzaattivà)
- Expert of the field from CNR (Prof. Rossi Mori)
- Vendors of SIS Informatics

with the aim to reach as specific agreement according to the aim of NURIC project.

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In Kosovo, some of the main stakeholders that ought to be consulted for the needs of this project were: University Clinical Center of Kosovo; The Kosova Chamber of Nurses; Ministry of Health for the Republic of Kosovo, VET institutions that offer nursing courses in the entire territory of the Republic of Kosovo Ferizaj Municipality Health Directorate; Higher Education Institutions. UNI has conducted a questionnaire with various nursing professionals and executives in order to better understand which are the teaching needs of this particular group.

Overall, representatives from at least five stakeholder groups (education, innovation, education, politics, practice) were involved in this step.

International forum: In a session, based on result of the above mentioned countries forums, being organized with experts from International Council of Nurses, European Federation of Nursing Association, HIMMS and European Forum of Nursing and Midwifery Association, four main challenges appeared:

1) A productive dialogue between technology company representatives and nursing professionals (both informaticists and expert nurse clinicians) is needed to address the longstanding issue of nurses' exclusion from all stages of healthcare technology development. Despite documentation in the literature over a decade ago, nurses continue to be overlooked in digital transformation efforts due to misconceptions about their knowledge or necessity in the process.
2) The need for further education in nursing informatics courses at different level is crucial to address the longstanding issue of nurses' exclusion from healthcare technology development and implementation.
3) The digital transformation of healthcare could be useful to establish a nursing care continuum by leveraging artificial intelligence, robotics, big data, and other tools that facilitate the exchange and archiving of relevant information while respecting privacy, which requires the development of a strategy that combines financial, organizational, human, and technological resources.
4) Regulatory compliance and standardization of competencies between countries.

As part of stakeholder involvement, the present education in nursing was analyzed from existing curriculum and discussions with experts:

In Israel, the analysis was based on the present published curriculum (BA), materials and discussions with MOH and Sheba education authority regarding CME and existing training.

In Kosovo, there is also published content from almost all of higher education institutions which also includes accreditation reports and subsequent comments from educational bodies regarding the compliance and quality of particular nursing programs in Kosovo.

In Italy, there is also published content from the Minister of Higher education and a specific number of contents from higher education institutions.

In German speaking countries, materials were provided by UMIT.

All findings of inputs from stakeholders and international experts are presented in chapter 3.

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2.2. Literature review and international nursing informatics guidelines

In parallel, a **rapid literature review analysis** aiming at exploring the field of nursing informatics was carried out. The review focused on identifying current trends, challenges, and advancements in nursing informatics as well as the role of important stakeholders.

In this analysis, as group we select documents from:

1. European federation of nursing associations (EFN)
2. World Health Organization (WHO)
3. World Health organization – European Region (WHO Europe)
4. European Union – European Commission (EU)
5. International Council of Nurses (ICN)
6. American Nursing informatics association (ANIA)
7. TIGER initiative – Himms
8. Finnish Nursing Association (FNA Ehealth)
9. Ireland Nursing & Midwifery Digital Health

The aim of this rapid review was to provide an overview of the policies, frameworks, white papers and position statements currently in place in different settings. The findings of this analysis provide a clear overview of the current and future developments in the field.

The findings of the review of literature and nursing informatics guidelines are presented in chapter 4.

2.3. International Delphi study

Inputs from international experts, as described above, were aggregated and used at secondary stage during a first round of Delphi based on stakeholders' input.

Once all country level forums were conducted, we started the two-round Delphi study to seek consensus among stakeholders on key elements of developing nano courses for micro-credentials.

The **first round** utilized an open-ended questionnaire to gather input from stakeholders on potential nano course themes and subthemes related to specific objectives. Responses were analyzed to identify commonalities and divergent perspectives.

In the **second round**, a structured questionnaire was distributed with themes and subthemes distilled from round one. Stakeholders were asked to rate their level of agreement using a 7-point Likert scale. This allowed us to quantitatively and assess consensus. Open-ended questions were also included to provide qualitative context and feedback. Results were analyzed to determine consensus levels based on predetermined thresholds.

Through this multi-stage Delphi approach, we achieved stakeholder agreement on appropriate nano course topics and learning outcomes to inform development of micro-credentials. Both quantitative and qualitative data provided nuanced understanding to guide next steps. The iterative process helped refine ideas and surface minority viewpoints to develop recommendations representing diverse approaches.

The findings of the Delphi study are presented in chapter 5.

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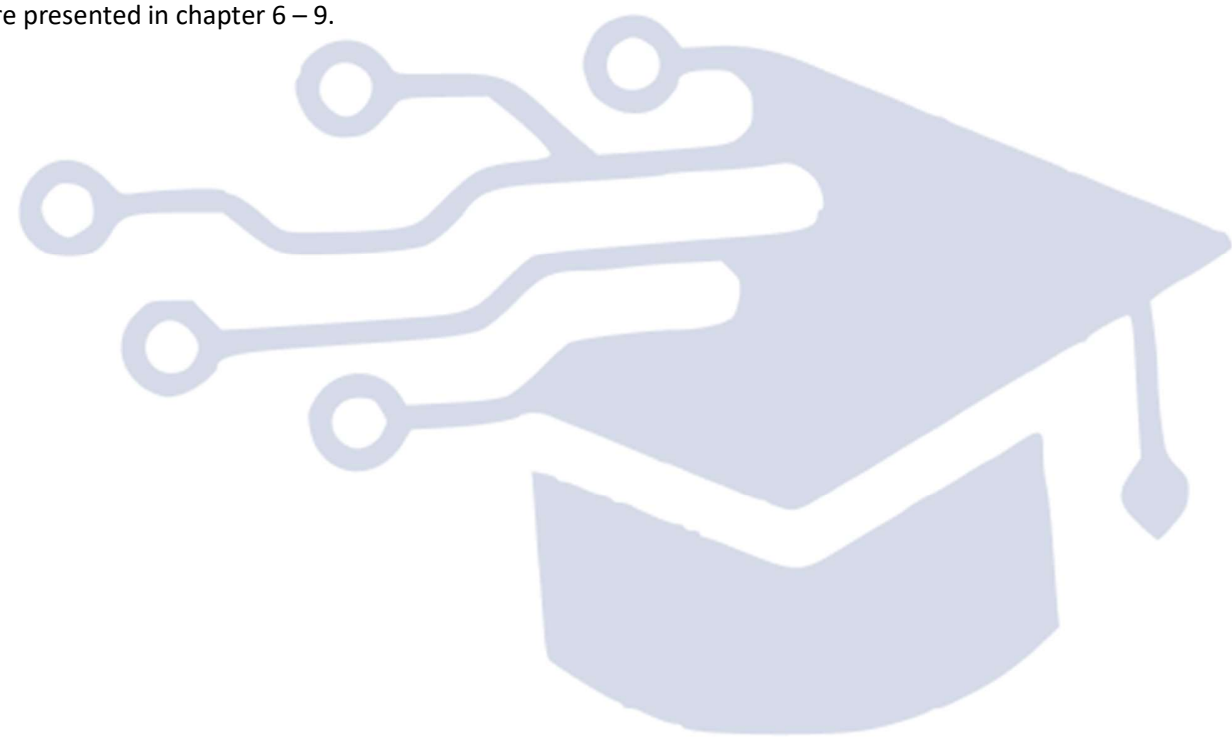
2.4. Design of the nursing informatics curriculum

The design of nurse informatics curriculum education was the result of the above process; integration between stakeholders' input, national and international benchmarks, partners experience from other educational programs, and literature reviews. The curriculum refers to all stages of the nurse professional development starting from the core studies of nurse certificate, CME, specialized nurses and higher academic degrees (MA, PhD).

The curriculum design in each pilot country was designed according to NURIC outcomes at the international level adapted to each pilot country according to the country needs and specifications.

The pilot curriculum in each pilot country was drawn from the country curriculum and will be presented in WP4.

The findings are presented in chapter 6 – 9.



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3. Stakeholders input in the pilot countries and from international experts

The curriculum design is a result of the above mentioned activities, including interviews with stakeholders, literature reviews, group discussions and Delphi with international experts.

The stakeholders input from interviews and groups discussions in each country are summarized:

3.1. Stakeholders input - Israel

(1) Baseline and policy regarding the current knowledge of nurses, the role of the nurse in the future and the policy regarding nurse informatics education

In Israel, the basic\core nursing education is a bachelor (BA) degree. The syllabus is determined by the Ministry of Health (MOH), the curriculum is developed by the nursing schools. The nurse is going through training sessions in the hospital or community care according to the specific needs of her job environment during the first weeks of her work and as needed (for example, technological tools implementation).

Promotion to head of shift requires special training according to the specific discipline (ER, Cardiology etc.). There are 26 disciplines of specialization each includes courses of 600 - 900 frontal teaching hours, learned 2 days\week during a period of 1 year. The syllabus is determined by the MOH.

In addition, there are certificate courses that the nurse is entitled to have. These courses can be submitted by professional\academic organization for approval to the MOH and finally approved by the ministry of Education.

The basic\core nursing education (BA) degree do not include nurse informatics. Therefore, these education programs are implemented as part of the CME and specialization studies during the nurse professional development. The need for nurse informatics education is recognized, and as a result, a national committee for re-design of Nurse educational program (BA) was established at the beginning of 2024. The goal is to change the basic program structure in a way that will address the challenges of the 21st century including nurse informatics and future technologies. *"Knowledge is power"* and the goal is to empower the nurse.

The national committee determine the content and recommend what should be the topics\structure of the program and therefore, the NURIC approach is aligned with the national committee approach and can provide syllabus to the recommended topics and program structure. The chair of the committee expressed interest in the NURIC project and would like to have the NURIC project materials once it reaches the stage of topic recommendations.

It should be noted that all interviewed stakeholders agreed that the nurse informatics should be part of the nurse education and furthermore, the nurse should have enough knowledge to become a team member in innovation processes in healthcare. The nurses may also become advisors for the relevant industry that develop technologies for nurses; this goal is also aligned with the NURIC approach.

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(2) Content of the CME training in nurse informatics

The future CME training in nursing informatics should include basic understanding on information technologies, telemedicine, basic infrastructure such as EHR, data context and usage such as quality measures. AI is recommended- first as a user and at a level that will enable the nurses to help design their work environment\tools

The level of education will endow the nurse better understanding on the advanced technology that is being implemented in healthcare and become a member in the decision-making teams that review, discuss the implement technological solutions. In Israel there is an experience in technology implementation for nurses, some of it is not used because it is not aligned with the nurse workflows and needs. Following this experience, the stakeholders believe that the nurse should be the one that provides the needs and requirements for teams that develop solutions for nurses. The nurse must understand the impact the data and the technology have on her\his clinical work and how it can be used to serve them in their daily work.

The stakeholders agree the nurses mast have a basic understanding of the digital environment in which they are working. As the nurse specialize in her work there is a need to educate her for understanding of her specialty domain.

Additional programs such as certificate programs will be encouraged by the MOH as well as higher education (MA\PhD) degrees in which courses in information technology, Electronic Health Records (EHR), data sharing\transfer, data privacy and security, E-Patient and how to use Artificial Intelligence (AI) can be implemented.

Sheba Education authority presented some additional contents which are aligned with the stakeholders inputs and the specific needs of Sheba beyond, Hospital at home, that will be part of the pilot, such as communication skills, competencies in tele-psychiatry, big data, risk management and training on specific platforms that are being implemented in Sheba medical center (for details see Appendix 2).

(3) Implementation of nurse informatics in the nurse core education and professional training

The first step in implementation of nurse informatics content will be via changing the core education program of nursing (BA). This change is expected within the next 3-4 years. Additional training will be implemented through CME\specialization program that is the common process of nurse training. Another channel for nurse informatics education can be through additional MA programs.

The stakeholders recommend educating nurses from the beginning of their studies at a basic level and encourage nurses who will work in technological disciplines (ER, Cardiology, etc.) to extend their nurse informatics training as they develop in their career.

The nurse informatics training must be part of the professional development of the nurse and therefore it requires financial incentives. Today there are 26 disciplines of specialization each includes a training of 600-900 frontal teaching hours, (2 days\week for 1 year). The syllabus includes technologies education according to each discipline and can be updated for each discipline as needed. In addition, the nurse can have certificate courses along their professional development of 4 points that are equal to 120 frontal teaching hours each (total 400-500 frontal teaching hours) these certificate courses are financially compensated (up to 3.8% of salary).

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One barrier that should be considered at the module's development within NURIC for this type of courses is that the Ministry of Education does not approve online courses for the certificate courses (400-500 frontal teaching hours) for financial compensation.

The barriers of implementation are mainly related to the lack of human resources that will train the next generation of nurses. NURIC train the trainer approach may help to address this challenge.

In 2018 a government decision, regarding educational programs aimed to develop educational programs that will educate the new generation of professionals that will lead the 21st century market need by integrating medical sciences and data sciences. This decision led to the development of the unique educational programs that combine data analysts with medical sciences, among them the Digital medical technologies BSc program in HIT. These programs can be adapted for nurses training. Among the planned programs, certificate programs, higher education programs and human resources training programs.

(4) Summary: Future nursing informatics education in Israel

In conclusion, the MOH and healthcare organizations in Israel reached a maturity level that leads to fundamental change in the nurse education programs. The NURIC goals and methodology is aligned with the strategic goals of the national plan and may be able to provide a useful platform for the future implementation of nurse informatics education in Israel. We will continue to work with the stakeholder forum (D2.5) to maximize the NURIC impact.

At present, a discussion with the stakeholders includes all dimensions of nurse education with short\medium and long term nurse informatics plan:

- In the short term, (1-2 years) the plan includes CME; that will be implemented in Sheba during the NURIC pilot.
- The medium-term plan, (3-5 years) will include an academic program; HIT is working with the nursing authority in the ministry of health to develop nurse informatics oriented program and developing master (MA) in nurse informatics.
- Long term plan (5-7 years) will include certificate courses; HIT will develop these courses with nursing schools. The basic\core nursing education (BA degree) is going through major revision in Israel. HIT will develop the nurse informatics courses with the committee. Implementing via NURIC train-the trainer will be done in Sheba nursing school and other nursing schools.

The pilot in Sheba will consider the stakeholders' input and identified trends in Israel and will further define the specific courses for the pilot.

The **NURIC pilot in Israel will include a certificate course of Telenursing ; Technology and Methods composed of** 11 nano-courses - 3 modules of data management and analytics, 2 modules of data security and data privacy, 1 module of soft skills, 4 modules of specific software and 1 module of Tele-psychiatry.

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3.2. Stakeholders input – Kosovo

(1) Introduction – Nursing Education in Kosovo

Nursing education in Kosovo operates within a regulatory framework designed to align with both national standards and international best practices. The Ministry of Education, Science, Technology, and Innovation (MESTI) oversees higher education institutions, ensuring the quality and compliance of nursing programs with the guidelines of the European Union (EU) and international health organizations. Central to this oversight is the Kosovo Accreditation Agency (KAA), which evaluates and accredits nursing curricula to ensure they meet EU directives and the principles of the Bologna Process.

Nursing programs in Kosovo are structured to follow the Bologna system, offering bachelor's and master's degrees, with a clear focus on achieving competencies required for professional practice across Europe. Upon graduation, nursing students are required to pass a licensing exam administered by the Kosovo Chamber of Nurses, which regulates professional standards and continuing education for nurses. Kosovo's nursing education is also guided by EU Directives on Professional Qualifications, which dictate the structure and outcomes of training, ensuring that graduates meet internationally recognized benchmarks. Furthermore, international standards set by the World Health Organization (WHO) and the International Council of Nurses (ICN) are integrated into the curriculum, ensuring that nurses are equipped with the knowledge and skills to deliver high-quality care in an increasingly digital and globalized healthcare environment.

This regulatory approach aims to prepare Kosovo's nursing workforce to meet both domestic and international healthcare demands, with a focus on ensuring that nurses can practice across borders and maintain professional development throughout their careers.

The Nursing Studies Program in Kosovo follows EU directives and international standards, which provide a strong base for incorporating nursing informatics. However, the curriculum does not sufficiently address nursing informatics, limiting students' exposure to essential skills like digital health literacy, data management, and the use of electronic health records (EHR). The lack of nursing informatics in the formal curriculum restricts healthcare professionals' ability to leverage technology for patient care. Kosovo's healthcare system needs a stronger emphasis on integrating informatics into nursing education to keep pace with global developments. Kosovo is working toward establishing a Health Information System (HIS) as part of its national strategy for digital public health. However, there are challenges in digital health deployment, with Kosovo being considered one of the weakest countries in this area. The HIS, when fully operational, will store and process all public healthcare data, making digital literacy for healthcare professionals, including nurses, an urgent priority. The Kosovo healthcare sector has yet to fully implement digital principles and tools. Past efforts, as highlighted in the presentation, failed to apply these principles effectively, indicating a significant gap in digital health preparedness. Kosovo faces a significant shortage of nurses, making it crucial for healthcare workers to manage their time and resources efficiently. Nursing informatics can alleviate this pressure by streamlining documentation, patient monitoring, and communication. The healthcare sector struggles with inefficient data management and communication systems. Integrating nursing informatics, particularly using EMRs and secure communication platforms, can improve collaboration among healthcare workers and reduce the administrative burden.

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To address the gaps identified in Kosovo's nursing informatics education and healthcare system, there is an urgent need to:

- Modernize nursing curricula to include nursing informatics, digital health, and AI;
- Provide professional development for current nurses to enhance their digital literacy and ability to use health information systems;
- Foster partnerships between Kosovo's academic institutions, international universities, and technology companies to support technological integration and innovative practices in healthcare;

By aligning Kosovo's nursing education and healthcare practices with international standards, the country can enhance the quality of healthcare services, address critical healthcare challenges, and ensure that nursing professionals are equipped to use modern digital tools to improve patient care outcomes.

(2) Stakeholders input in Kosovo

Survey respondents, consisting of healthcare professionals and academics, indicated a general lack of knowledge in nursing informatics. While some professionals are aware of the concept, the majority noted that they have limited understanding of its practical applications. This reflects a significant gap in both formal education and professional development in this field. The survey revealed that while certain digital tools are used in Kosovo's healthcare system, they are often limited to basic tasks. Many respondents indicated that electronic health records (EHR) and other digital management systems are either underdeveloped or inconsistently applied across different healthcare institutions. The respondents identified a clear need for formal training in nursing informatics.

The lack of professional development opportunities means that healthcare workers, especially nurses, are not equipped with the skills needed to effectively use modern health information systems and data management tools. Nursing informatics is not included in the formal nursing curriculum in Kosovo. Most healthcare professionals indicated they had not received any education or training on informatics during their nursing studies.

A recurring theme in the survey was the lack of infrastructure to support nursing informatics. Many respondents reported that their institutions lack the technological tools necessary for efficient data management and patient care, which limit their ability to adopt nursing informatics practices. Although Kosovo has begun implementing a national Health Information System (HIS), the survey revealed that many healthcare workers are not trained on how to use it effectively. This hinders the system's impact on improving patient care and data management.

Most respondents emphasized the importance of government support for the sustainable implementation of nursing informatics in Kosovo. They pointed to the need for policies that would promote digital healthcare initiatives and provide the necessary financial resources. Survey participants acknowledged that nursing informatics must be integrated into Kosovo's healthcare system to improve data management and patient outcomes. This integration would require collaboration between government agencies, healthcare providers, and educational institutions to develop a national strategy.

Based on the findings from the survey, the following recommendations are made to address the identified gaps in nursing informatics in Kosovo:

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- Introduce nursing informatics as a core subject in nursing programs across Kosovo to ensure that future healthcare workers are equipped with the necessary skills to work in a digital healthcare environment;
- Collaborate with international institutions through the Erasmus+ CBHE program to update the nursing curriculum and incorporate best practices in nursing informatics education;
- Provide ongoing training in nursing informatics for current healthcare professionals, with a focus on digital literacy, data management, and the effective use of electronic health records (EHR);
- Establish partnerships between healthcare institutions and educational providers to offer specialized courses on nursing informatics for nurses and healthcare managers;
- Invest in healthcare infrastructure to support the implementation of nursing informatics, including the expansion of the Health Information System (HIS) to all healthcare facilities;
- Ensure that healthcare workers receive training on the use of digital tools, including the HIS, to improve patient care and streamline data management processes.

The lack of formal education in this field, combined with underdeveloped infrastructure and limited training opportunities, presents major challenges to the adoption of modern healthcare technologies**.**

(3) Curriculum plan for nursing informatics implementation

The following courses are planned at Universum International College (UNI):

Spring semester 2025 – Bachelor of Nursing students

- Piloting of the **Introduction to Nursing Informatics module;**
- Semester-long course;
- 5 ECTS;
- Elective course.

Winter semester 2025/26

Introduction of 3-4 specialized modules:

- Telehealth;
- Electronic Health Records;
- New Technologies in Nursing Practice;
- AI in Nursing.

Module integration and certification development

- Official recognition of module integration into the curriculum;
- 4-5 modules integrated (mandatory or elective);
- Development of certification in Nursing Informatics;

Close coordination with CoC and CoN on accreditation and validation of courses for nursing professionals is planned.

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3.3. Stakeholders input- Italy

(1) Introduction – Nursing education in Italy

In Italy, in line with Bologna process, there are 3 level of nursing education (Bachelor's Degree in Nursing – 3 years, Master Degree in Nursing named "Magister Degree" that 2 years - Ph.D. level education (i.e Nursing and Public health or Nursing & midwifery) has a three years duration. Additionally, there are professional masters (1 year – 60 ECTS) after bachelor education or master degree education

The bachelor's degree has 180 academic credits (CFU=ECTS). A total number of 19 exams or more module examinations (multiple exams like research that include informatics, nursing and statistics) are scheduled providing 156 CFUs. The remaining academic credits are provided by clinical trainings, seminars, integrative activities chosen by students (i.e. stage) and the final exam, including the dissertation of an academic essay. The number of students per year admitted to the course is determined based on a national Ministry planning for this Degree.

The official language of the course is Italian. In some university (three universities in 2022) courses are taught in English. The Undergraduate Nursing Degree is the needed for academic title to be registered as RN by the Italian National Board of Nursing Profession.

In the National Decree that follow EU Directive 2013/55 that regulate Bachelor's in Nursing is compulsory at least 1 ECTS in informatics (1 Credit = 30 hours of work – 8/12 teaching hours).

The Master's Degree Course is organized in 4 semesters. The training activities are divided into basic, characteristic, related or supplementary training activities (to be chosen by the student), vocational training activities, activities aimed at the final exam.

The specific educational objectives are aimed at the knowledge of disciplines related to the disciplinary fields of Nursing Sciences, health planning and economics, Human and psycho-pedagogical sciences, Medical-surgical sciences, Prevention sciences and community intervention methodology, interdisciplinary and clinical sciences, Healthcare management, as well as professional training. In the national degree of institution of master degree, the student have to acquire also the capacity to recognized the needs of the community and the development of new methods of work organization, using technological and IT innovation, also with reference to forms of tele-assistance and tele-education, and the planning and organization of pedagogical and training interventions as well as the homogenization of operational standards to those of the European Union, like terminology. Usually, 2 credits in Informatics are compulsory for master students and a number of laboratory and seminar activities are in line. Every university in line with National Decree could provide different academic contents / program, and different modality of assessment and final evaluation.

A Doctoral Program only in Nursing does not exist in Italy. Exist specific pathway in nursing of several PhD Program like public health with pathway in nursing. The main aims to develop a comprehensive set of disciplinary and interdisciplinary skills useful for generating new knowledge, theories, methods, tools, and healthcare interventions in the field of nursing, also connected to nursing informatics. At Doctoral level, research oriented the activities are connected to research and statistics with the use of specific tools connect to this capacity.

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In Italy, continuing education in the health sector has been regulated for just over twenty years with the implementation of Legislative Decree at the end of 1999 where was establish the National Continuing Medical Education (CME) Program.

Responsible for this program is AGENAS, the Health Agency for Regional Services, which is responsible for the administrative management of the CME program and the support of the National Commission for Continuing Education. Usually, every nurse have to acquire 50 CME credits in 8 days/year – for this specific education.

One of the national objectives of this program is digital health and advanced computer science. Courses on IT should not be basic courses but should be advanced courses on scientific/technical aspects in healthcare.

With the program of Next Generation Europe, a large investment in IT will be dedicated. Specific courses at local level will be developed and in developing connected to use of new devices or technologies.

(2) Stakeholder input in Italy

As synthesis of the stakeholders' meetings, it is clear there is strong support for expanding nursing informatics educational opportunities in Italy. Developing courses at both the undergraduate and graduate levels, as well as continuing education and at local levels could help address the growing needs of nurses and the healthcare system.

Stakeholders emphasized the importance of ensuring any programs have rigorous competency frameworks and standards to truly prepare nurses. Certifications were proposed but no agreement in the model due lack of experience in Italy about it. Teaching clinical terminology systems like ICNP was also seen as valuable. It was agreed that courses need both an informatics and clinical focus, so lessons directly apply to patient care. Both academic and practice-based educators' involvement will be important. Flexibility and affordability were priorities to attract working nurses.

In addition to technology skills, programs need to stress how informatics impacts patient experience, privacy, and the nursing role. Human-centered design principles should be incorporated.

As opportunity use of Continuing education credits and relevance of this course for nurse recruitment or advancement were identified as incentives for participation. Alignment with Ministry of Health priority standards will also be crucial. Overall, developing nursing informatics education was viewed as an opportunity to strengthen the nursing workforce and better utilize technologies to advance care delivery. Stakeholder cooperation will be key to making high-quality programs a reality.

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3.4. Stakeholders input - International experts

Stakeholder input from international experts is crucial in shaping the field of nursing informatics, particularly through the collaborative efforts of nursing organizations such as the European Federation of Nurses Associations (EFN), the International Council of Nurses (ICN), European Forum of Nursing and Midwifery Association (EFNNMA) and the Healthcare Information and Management Systems Society (HIMSS), and various academic institutions.

These entities bring together a wealth of knowledge and diverse perspectives, which are essential for addressing the multifaceted challenges useful for NURIC project.

The EFN (and a number of National Association) provides a European perspective, advocating for policies that enhance the integration of informatics into nursing practice across EU member states. (Paul De Reave, SG).

The EFNMMA provide a perspective from WHO European Region country with different approach from Europe to The ICN, representing nurses worldwide, emphasizes global standards and competencies that ensure nurses are equipped to leverage informatics in improving patient care. (Karen Bjoro & Pamela Cipriano, ICN president).

HIMSS, with its focus on health information and technology and participation/aggregation of different perspective provides valuable insights into the latest advancements and best practices in the field (Lisa Duke, European coordinator).

Academic institutions play a pivotal role by conducting cutting-edge research, developing comprehensive curricula, and training the next generation of nurse informaticists (Jose Cobos Serrano, Spain).

By incorporating the expertise of international leaders, the field of nursing informatics can evolve to meet the dynamic needs of healthcare systems globally, ensuring that nurses are not only users but also innovators in the application of technology to enhance patient outcomes.

For the NURIC project we included international expert in different phases and especially at the end in the Delphi studies.

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4. Literature review and international nursing informatics guidelines

The increasing use of digital technology is rapidly changing healthcare systems, presenting a crucial opportunity to build a more equitable system. Nursing Informatics is essential to this process, as this discipline can ensure digital tools and strategies are designed to meet the needs of nurses and diverse patients and communities.

While the pursuit of profit and fragmented policies currently hinder the development of unified strategies for digital health, a diverse group of stakeholders at the European level are working to elevate the role of nurses in co-creating solutions. This collaborative effort is generating a growing number of documents, policy statements, and action plans that will form a strong foundation for progress.

By understanding and addressing the power dynamics within digital health, particularly in nursing, we can develop effective strategies to build a set of course and curricula aligned with need of patients and communities and that fit at best with nurses' approach.

This rapid literature review aims to summarize the key points, benefits, challenges, and recommendations outlined in the documents built from nursing organization that influence European and global levels.

As stated in chapter 3.4, a policy analysis of strategy and plan of international organizations and position statements of nursing associations was used to identify key themes and quantify frequently occurring concepts. Findings were synthesized to provide a comprehensive understanding of the position statement's content, context, and potential impact on nursing practice.

4.1. International recommendations on nursing informatics

After analysis conducted on website of organization as indicated, we selected the following position statements and plan/strategy with specific focus on “nursing informatics” or in “digital health”. We extracted specific data with respect to impact on nursing education.

Table 1 present the results, with indication of documents and specific Key Points and implication for nursing.

Table 1. Summary of key points and implications for nurse informatics from literature review

Documents/Positions	Key Points and implication for nursing
EFN Policy Statement on the European Health Data Space (EHDS)	• Active nurse involvement in design and implementation to ensure practicality and avoid increased workload. • Sufficient funding and resource allocation for infrastructure, training, and capacity building. • Harmonized data access approvals and ethical considerations across EU member states.

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Documents/Positions	Key Points and implication for nursing
EFN End-user Co-designing EU Digital Health Systems	• Improved EHR access for efficient patient care. • Prioritizing patient safety and empowerment in digitalization efforts. • Developing "fit-for-practice" solutions that reduce workload and improve care quality.
EFN Nurses' Digital Competencies	• Bridge the gap between digital advancements and practical application in nursing. • Integrate and upscale digital competency training in nursing education and lifelong learning programs. • Foster collaboration to define and share best practices for developing digital skills.
EFN Public Health Virtual Coaching	• Supporting personalized, preventative healthcare approaches. • Promoting multidisciplinary care within integrated health and social care systems. • Empowering individuals and communities to adopt healthier behaviors.
EFN Robotics in nursing	• Clear legal frameworks addressing liability and ethical considerations specific to healthcare robotics. • Continuous dialogue between the nursing profession and industry to ensure human-centered design. • Investment in research, innovation, and development of advanced robotics skills for nurses.
WHO Regional Digital Health Action Plan for the European Region 2023–2030	**Digital Health Literacy and Training** • Enhancing Digital Health Literacy: • Understanding importance electronic health records (EHRs), telemedicine platforms, and other digital health applications. • Patient-Centered Care • Empowerment through Digital Tools: • Enhanced Patient Interaction between nurses and patients, allowing for more personalized and efficient care. • Data-Driven Decision Making • Utilizing Health Data to identify trends, monitor patient progress, and adjust care plans accordingly.

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Documents/Positions	Key Points and implication for nursing
	• Evidence-Based Practice for digital health innovations into their clinical practice. • Building Networks with other healthcare professionals, IT specialists, and digital health experts to implement and optimize digital health solutions. • Knowledge Exchange: Participation in dialogue and knowledge exchange forums • Ethical and Equitable Care for Ensuring Equity: • Maintaining Trust and Privacy and building and maintaining patient trust in these technologies • Integration of Digital Health into Clinical Practice to adapt to new workflows and technologies, such as telehealth services, digital diagnostics, and automated care coordination tools. • Improving Health Outcomes through more accurate monitoring, timely interventions, and enhanced patient engagement.
Ehealth 2021 – Finnish nurses association	• Technology to Support Client/patients/ communities Involvement • Digital Services as Part of Nurses' Work • Safety and Ethics in the Digital Environment • Ethical competence involves acting morally and respecting client dignity. • Digital Health Services and Skills • IT skills and infrastructure to use digital services effectively. • Ongoing education and training in digital competencies are essential. • Management of Digital Health Services • Research and Development of Digital Health Services
DIGITALEUROPE Executive Council for Health's recommendations for EU digital health policy (2024-29)	• Enhanced Patient Care and Data-Driven Insights: Nurses can leverage data analytics to make informed decisions, personalize patient care, and improve health outcomes. • Telehealth: The promotion of telehealth can extend the reach of nursing services, allowing for remote monitoring and consultations, which is particularly beneficial in medical deserts and for home-bound patients.

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Documents/Positions	Key Points and implication for nursing
	• Digital Literacy: Emphasis on training programs will enhance nurses' digital health literacy, equipping them with skills to use new technologies effectively. • AI and Decision Support: AI tools can support nurses in diagnosing and managing complex conditions, reducing cognitive load and improving efficiency. • Optimized Workflows and resource management: Digital solutions can streamline administrative tasks, allowing nurses to focus more on direct patient care. • Public-Private Partnerships: Engagement in multi-stakeholder collaborations can provide nurses with access to the latest innovations and resources, fostering a more integrated approach to healthcare delivery. • Regulatory Compliance: Understanding and adhering to harmonized data protection and privacy regulations will be crucial for nurses, ensuring ethical and legal compliance in their practice.
ICN Digital health transformation and nursing practice	• Digital health for ICN position includes eHealth and extends to smart devices, IoT, robotics, AI, and big data analytics. Tt supports various health services like health promotion, disease prevention, diagnosis, management, rehabilitation, and palliative care. • Digital transformation in health requires not just technical advancements but also changes in attitudes, skills, and culture within the health workforce. • Nurses have play critical roles in direct care, system stewardship, information management, and knowledge brokering. • Challenges and Risks with Some digital health applications are not nurse-friendly and may impede care.
ICN - Digital health transformation and nursing practice	• Invest in comprehensive training programs to enhance digital literacy among nurses and midwives. • Integrate digital health competencies into nursing and midwifery curricula. • Ensure robust digital infrastructure to support the deployment of digital health technologies. • Address disparities in access to digital tools and resources.

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Documents/Positions	Key Points and implication for nursing
	• Regularly assess the effectiveness of the framework and update it to reflect emerging technologies and best practices. • Solicit ongoing feedback from healthcare professionals to refine and improve the framework. • Stakeholder Engagement among policymakers, healthcare providers, educational institutions, and technology developers to support the framework's implementation. • Engage patients in the development and evaluation of digital health initiatives to ensure they meet user needs.
All-Ireland Nursing & Midwifery Digital Health Capability Framework"	• Person-centered care: Digital health is seen as crucial for empowering patients, enabling personalized care, and improving access to services. • Data and Information Quality: Covers the skills required for accurate data capture, management, and interpretation, ensuring data quality and integrity throughout its lifecycle. • Information-enabled Care: Highlights the use of digital tools to enhance patient care, facilitate information sharing, and extend the reach of nursing and midwifery practice. • Technology: Focuses on understanding and utilizing appropriate technologies, troubleshooting technical issues, and contributing to digital health governance within organizations. **Capability Levels:** Each capability statement within the framework is categorized into three levels: • Formative: Represents individuals beginning to develop their digital health skills and understanding. • Intermediate: Indicates growing confidence and competence in utilizing digital health tools and concepts. • Proficient: Reflects individuals who demonstrate leadership and expertise in digital health, driving innovation and best practices.

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Documents/Positions	Key Points and implication for nursing
Technology Informatics Guiding Education Reform (TIGER) Initiative	• Nurses, making up the largest segment of the healthcare workforce, need to be proficient in informatics to leverage these technologies for better patient care. Integrating informatics competencies into nursing curricula. • Promoting the TIGER vision and advocating for its adoption. • Collaborating with industry to design user-friendly informatics tools. • Participating in national health IT initiatives.

Table 2. American Nursing Informatics Association (ANIA)

ANIA EHR Safety:	• ANIA supports the CNIO as an executive leader driving transformation through informatics. • Key responsibilities include strategic planning, evaluating infrastructure, educating leaders, participating in system improvements. • CNIOs should have advanced nursing degrees and informatics certificate.
ANIA CNIO Role:	• Presents a framework of 6 domains of EHR burden: Reimbursement, Regulatory, Quality, Usability, Interoperability, Self-Imposed. • Calls for a holistic approach to addressing burden across all domains. • Recommends stakeholders specify which domain(s) they are addressing in improvement efforts.
ANIA EHR Documentation Burden:	• Supports adoption of the ID as a unique identifier for nurses. • Recommends collaboration, privacy protections, education/training, and advocacy to support implementation. • Sees potential to enhance patient safety, nursing practice, and healthcare delivery.
ANIA - Unique Nursing Identifier:	• ANIA recommends organizations incorporate EHR safety into existing patient safety programs. • Use standardized reporting terms for EHR-related safety events.

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	• Make reporting easy for nurses and providers. • Ensure follow-up on reported issues. • Use tools like the SAFER Guides for self-assessment.

These results present a comprehensive overview of the evolving landscape of digital health, particularly focusing on the crucial role of nursing informatics in shaping an equitable and effective healthcare system. The information is presented through a collection of key policy statements, action plans, and recommendations from influential nursing organizations at European and global levels.

4.2. Implications for Nursing

Based on these results, we now present a detailed, synthesized conclusion of the key points and their implications for nursing:

1. Nurses as Key Drivers of Digital Transformation:

- Nurses are not just users of digital health technologies; they are essential contributors to their design, implementation, and evaluation.
- Active nurse involvement ensures that digital tools are practical, user-friendly, and tailored to the specific needs of diverse patients and communities.
- This active role requires a shift in mindset, recognizing nurses as leaders and innovators in digital health.

2. Essential Digital Competencies for Nurses:

- The rapid evolution of digital health necessitates continuous development of digital literacy among nurses.
- This includes proficiency in using electronic health records (EHRs), telehealth platforms, data analytics tools, and other emerging technologies.
- Integrating informatics competencies into nursing curricula and providing ongoing training opportunities are crucial.
- Establish 3 levels (Basic, intermediate, Advanced) to acquire different level of competence in the same fields.

3. Addressing Challenges and Ensuring Equitable Access:

- While digital health offers significant opportunities, it also presents challenges such as potential increase in workload, digital divide, and ethical concerns.
- Developing "fit-for-practice" solutions that streamline workflows and reduce administrative burden.
- Ensuring equitable access to digital tools and resources for all patients, regardless of socioeconomic background or geographical location.

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- Establishing clear legal frameworks addressing liability and ethical considerations, particularly in areas like robotics and AI.

4. Fostering Collaboration and Knowledge Exchange:

- Successful digital transformation requires collaboration among multiple stakeholders, including nurses, informatics professionals, policymakers, technology developers, and patients.
- Public-private partnerships can facilitate knowledge exchange, resource sharing, and the development of innovative solutions.
- Participation in national and international networks allows nurses to stay informed about best practices and contribute to global advancements in digital health.

5. Patient-Centered Care in a Digital Age:

- Digital health should ultimately enhance patient-centered care.
- Nurses play a vital role in empowering patients to understand and utilize digital tools for self-management and informed decision-making.
- Maintaining patient privacy and confidentiality remains paramount in the digital environment.

Conclusion from the literature review:

All the documents analyzed highlight a clear "call for action" for the nursing profession to embrace digital transformation as a means to build a more equitable, efficient, and patient-centered healthcare system.

By actively engaging in the development and implementation of digital health strategies, continuously enhancing their digital literacy, and advocating for ethical and equitable access to technology, nurses can play a pivotal role in shaping the future of healthcare.

One of the points that appears in all documents is the necessity of having different levels of competencies in the same topic. Usually these are Formative, Intermediate, Proficient/Advanced.

Nursing informatics plays a central role in digital health by helping to ensure technologies are designed and implemented in a way that supports safe, high-quality, patient-centered care.

As healthcare increasingly relies on digital tools, it is crucial that nurses have the necessary digital skills and leadership.

All the documents emphasize the need to integrate in nursing informatics competencies, especially into educational curricula to improve digital literacy from the start of training. Lifelong learning opportunities are also important for practicing nurses to continuously upgrade their skills.

While technologies promise benefits like improved access, engagement and outcomes, they also introduce challenges around workload, inequities and unintended consequences that nurses must help address. Ensuring solutions are user-friendly, clinically relevant and meet the diverse needs of patients is crucial. A number of issues appear especially connected to digital maturity of tools.

Nursing input is valued in all stages of digital health development, from requirements-setting to testing and evaluation, to optimize clinical usability and integration. Adopting human-centered design principles that prioritize the nursing perspective enhances the potential for technologies to improve care delivery.

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As data and analytics become more central to decision-making, nurses will play expanding roles in areas like surveillance, research and quality improvement through guidance on clinical meaning, protocols and organizational best practices.

It should be noted that with the increasing use of technology in healthcare, researchers have explored the privacy, security and ethical implications of nursing informatics. Studies have addressed issues such as privacy, patient confidentiality, security breaches, ethical use of technology, GDPR and the impact of artificial intelligence on nursing practice. Findings have highlighted the need for robust safeguards, policies and ethical guidelines to protect patient information and ensure responsible use of technology. These topics should be implemented considering international and national laws.

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5. International Delphi study

The Delphi study aimed to gather expert opinions on various features of nursing informatics education and practice. Participants were asked to respond to open-ended questions and rate the relevance of several topics focused on nursing informatics education.

A Delphi study is a structured communication technique that relies on a panel of experts. It is used to collect and distill the judgments of experts on a particular topic through a series of structured questionnaires and controlled opinion feedback.

This report aims to display the findings:

1) The first round of a Delphi study on nursing informatics.

2) The second round of final consensus Delphi study on nursing informatics.

5.1. First Round: Key findings

Methodology

The study employed a Delphi technique, that at first round which involves iterative rounds of questionnaires to achieve consensus among experts. In this first round, participants responded to open-ended questions and rated course topics on a 1 to 7 Likert scale where 1 is least important and 7 is most important.

A relevant number of experts on nursing informatics were included in the first round, conducted online through a Survey monkey tool.

The experts came from three main categories:

- Academics, experts in the field of informatics
- Primary European and Global Nursing and Health Informatics Association
- Informatics companies and vendors.

In Round 1, the experts provided valuable qualitative feedback on topics and quantitative ratings of educational priorities.

The following prominent themes emerged from the qualitative analysis that is follow analyzed, with specific table of synthesis:

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Current Obstacles in Nursing Informatics Development

Table 3. Obstacles in Nursing Informatics education development

Obstacle	Description
Lack of standardized education	Absence of a unified curriculum for nursing informatics across educational institutions
Insufficient expertise within faculties and schools	Shortage of qualified educators with both nursing and informatics backgrounds
Limited interprofessional collaboration	Inadequate/lack of cooperation between nursing, IT, and other healthcare disciplines
Integration challenges	Difficulties in incorporating informatics into existing nursing curricula
Technological barriers	Issues in accessing to up-to-date technologies and software in educational settings

Proposed Nursing Informatics Education Model

The experts agreed on the need for a structured education model with three levels:

A. **Basic:** IT foundation: basic knowledge for all nurses
B. **Intermediate:** IT advanced: Advanced knowledge for nurses in tech-heavy departments and specialties (i.e. simulation, intensive care)
C. **Proficient\advanced:** IT Specialized: expert knowledge for nurses in top position or the have specific work focus on IT.

The model should be flexible and not necessarily tied to specific academic degrees or organizational roles.

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Training Requirements

There was a consensus in the following main aspects:

- All nurses should receive basic training in nursing informatics.
- Nurses working in high-tech areas (e.g., ER, cardiology) should go through more advanced training and must demonstrate proficient ability to deal with rapid technological advance.
- Training should be integrated throughout the nursing curriculum and continue as part of professional development.

Pressing Needs in Nursing Informatics Education

Table 4. Main requirements for nurse informatics outcomes education program

Need	Description
Data analytics and interpretation	Proficiency in healthcare data analysis and subsequent reports (i.e. ability to produce report, analysis and projections about health care data in different settings)
Emerging technologies	Understanding of AI, machine learning, and their applications in healthcare settings
Ethics in digital health	Addressing ethical considerations in the use of health information technology (included correct management of data, GDPR, privacy)
EHR systems and interoperability	Proficiency in dealing with any electronic health record system
Telehealth and remote patient monitoring	Proficiency in providing care and support with a variety of different digital platforms

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Integration of Digital Health into Clinical Practice

Experts emphasized the importance of:

- Adapting to new workflows/workload and organizational settings incorporating digital tools
- Developing skills in telehealth service delivery
- Understanding digital diagnostics and their implications in practice
- Leveraging automated care coordination tools
- Balancing technology use with patient-centered care

Ethical Considerations in Nursing Informatics

Key ethical considerations identified include:

- Ensuring patient privacy in digital environments
- Maintaining data security in healthcare systems (risk assessment in terms of danger of linkage of data)
- Accountable use of patient information
- Addressing bias in AI and machine learning algorithms
- Balancing efficiency of technology with human touch in patient care

Course Topics Rated

The experts prioritized several topics based on emerging trends in health information systems. In line with NURIC's objective to develop a curated selection of courses, this list serves as an initial guide to the specific topics that will be included in the curriculum for all participants.

Table 5. Recommended topics for the nurse informatics curriculum

Rate	*Topic*
7.0	Healthcare Data Cybersecurity and Data Privacy
6.9	Electronic Health Records (EHR) Systems
6.8	Telehealth and Remote Patient Monitoring
6.7	Clinical Decision Support Systems
6.6	Healthcare Data Management and Analytics
6.5	Nursing Informatics Leadership and Management

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6.4	Artificial Intelligence and Machine Learning in Healthcare
6.3	Interoperability and Health Information Exchange
6.2	Mobile Health (mHealth) and Wearable Technologies
6.1	Nursing Informatics Research and Evidence-Based Practice
6.0	Ethics in Digital Health and Nursing Informatics
5.9	Data Analytics for Clinical Decision Making
5.8	Healthcare Information Systems Security
5.7	Nursing Documentation and Information Systems
5.6	Digital Health Technologies in Patient Care
5.5	Health Information Technology Project Management
5.4	Bioinformatics for Nursing Practice
5.3	Consumer Health Informatics
5.2	Nursing Process and Workflow Analysis
5.1	Healthcare Data Visualization and Reporting
5.0	Clinical Information Systems Implementation
4.9	Digital Health Literacy for Nurses
4.8	Nursing Informatics Standards and Terminology
4.7	Health Technology Assessment
4.6	Population Health Informatics

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4.5	Nursing Informatics in Patient Safety and Quality Improvement
4.4	Legal Aspects of Health Information Technology
4.3	Human-Computer Interaction in Healthcare
4.2	Nursing Informatics in Public Health
4.1	Data Mining in Healthcare
4.0	Emerging Technologies in Healthcare
3.9	Nursing Informatics in Clinical Research
3.8	Health Information Exchange and Interoperability
3.7	Nursing Informatics in Education
3.6	Clinical Terminology and Classification Systems
3.5	Healthcare IT Vendor Management
3.4	Nursing Informatics in Genomics and Precision Medicine
3.3	Social Media and Health Informatics
3.2	Virtual and Augmented Reality in Healthcare
3.1	Blockchain Technology in Healthcare

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Conclusion of first round

The first round of the Delphi study on nursing informatics has revealed several critical insights:

- **Education Model:** There is a clear need for a standardized, multi-level education model in nursing informatics. This model should cater to all nurses both at a basic level, with more advanced training for those in tech-heavy specialties.
- **Curriculum Focus:** Key areas of focus for nursing informatics education include data analytics, emerging technologies (AI, telehealth), ethics in digital health, and proficiency in EHR systems.
- **Integration of Digital Health:** The integration of digital health into clinical practice is seen as crucial, requiring nurses (as well to health care settings) to adopt and adapt new workflows / workload patterns and technologies while maintaining patient-centered care.
- **Ethical Considerations:** There is a strong emphasis on addressing ethical considerations in nursing informatics, particularly regarding patient privacy, data security, and the responsible use of health information technology.
- **Priority Topics:** The highest-rated course topics include cybersecurity, telehealth, clinical decision support systems, EHR systems, and healthcare data management and analytics.
- **Barriers to Overcome:** Key obstacles in the development of nursing informatics include
  a. lack of standardized education,
  b. insufficient faculty expertise,
  c. and challenges in integrating informatics into existing *curricula*.

These findings suggest a need for a comprehensive, ethics-focused nursing informatics curriculum development, which would equip nurses for the increasingly digital healthcare environment they are going to face in healthcare setting and in the community.

The curriculum should balance technical skills with critical thinking and ethical decision-making abilities. Furthermore, there is a clear call for increased resources and support for nursing informatics education, including faculty development and improved access to relevant technologies.

Data showed that despite the interest on the development of nursing informatics the patient remains at the center of nursing interest.

As the field of healthcare continues to evolve with technological advancements, it is crucial that nursing education keeps pace. The insights from this Delphi study provide a valuable foundation for developing robust nursing informatics programs that will equip nurses with the skills needed to thrive in the digital age of healthcare.

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5.2. Second Round: Key findings

This second section of report presents the findings from the second round of the Delphi study conducted under the NURIC project.

Building upon the insights gained from Round 1, Round 2 focused on achieving consensus among experts on the key elements necessary for creating effective and comprehensive nano courses. The study seeks to refine and validate the themes identified in the initial round, ensuring that the resulting curriculum aligns with the needs and expectations of stakeholders in the field of nursing informatics.

Methodology and Study Design

The Delphi technique employed in this study involves iterative rounds of questionnaires administered to a panel of experts to achieve consensus on specific topics. Round 2 utilized a structured questionnaire derived from the themes and topics identified in Round 1.

Participants: The same experts that have participated in Round 1 comprising academics, members of nursing and health informatics associations, and professionals from informatics companies participated at Round 2, in order to maintain the same panel to ensure consistency and continuity in responses, as requested by the methodology.

Data Collection : In Round 2, participants were presented with a structured questionnaire that included Likert scale ratings (1-7, with 7 indicating strong agreement) and opportunities for additional qualitative feedback. The questionnaire encompassed the main challenges, proposed education model, training requirements, pressing education needs, integration of digital health, ethical considerations, and specific course topics in nursing informatics.

Data Analysis: Responses were aggregated and analyzed to determine the level of consensus on each item. Mean ratings were calculated for each category, and qualitative feedback was categorized to identify common themes and suggestions.

Participation and Response Rate in the second round were: 100%

The following key results resulted from Round 2:

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Main Challenges in Nursing Informatics Education

The experts were asked to rate the significance of various challenges in nursing informatics education of first round in terms of importance. The results are summarized in Table 6 below.

Table 6. Main Challenges in Nursing Informatics Education

Challenge	Mean Rating (1-7)	Comments
Lack of standardized education	6.8	Emphasized the need for a unified curriculum across institutions.
Insufficient expertise within faculties and schools	6.5	Highlighted the shortage of qualified educators with both nursing and informatics expertise.
Integration challenges	6.4	Discussed difficulties in incorporating informatics into existing curricula.
Limited interprofessional collaboration	6.2	Noted the inadequate cooperation between nursing, IT, and other healthcare disciplines.
Technological barriers	5.9	Identified issues in accessing up-to-date technologies and software.
Additional Challenge Identified	**Mean Rating**	**Comments**
Lack of funding for nursing informatics programs	5.7	Raised concerns about insufficient financial support for program development.

Analysis of the above questionnaire highlighted the main challenges in nurse informatics education:

- **Lack of standardized education** remains the most significant challenge, indicating a pressing need for unified curricula across educational institutions.
- **Insufficient expertise** among faculty underscores the necessity for specialized training and development programs for educators in nursing informatics.
- **Technological barriers** scored lower but still represent a notable concern, highlighting issues in accessing up-to-date technologies and software.

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Proposed Education Model in Nursing Informatics

Experts evaluated the proposed three-tiered education model, which includes Basic, Intermediate, and Proficient levels. Table 7 presents the consensus on each tier.

Table 7. Proposed Education Model in Nursing Informatics

Education Model Tier	Description	Mean Rating (1-7)	Comments
Basic IT Foundation	Basic knowledge for all nurses	6.9	Agreed as essential to ensure all nurses have foundational informatics skills.
Intermediate IT Advanced	Advanced knowledge for nurses in tech-heavy specialties	6.7	Support for specialized training in areas like emergency and intensive care.
Proficient IT Specialized	Expert knowledge for nurses in top positions	6.3	Suggested defining competencies clearly for expert roles.

Analysis:

- All tiers received high ratings, reflecting strong agreement on the necessity of a structured, multi-level education model.
- **Basic IT Foundation** is crucial for all nurses, ensuring foundational understanding of informatics.
- **Proficient IT specialized** received slightly lower ratings, suggesting the need for clear competency definitions and alignment with professional development pathways.

Training Requirements in Nursing Informatics

Table 8 summarizes the consensus on training requirements for nursing informatics education.

Table 8. Training Requirements in Nursing Informatics

Training Requirement	Mean Rating (1-7)	Comments
Basic training for all nurses	6.8	Emphasized the universal need for foundational informatics training.
Advanced training for nurses in high-tech areas	6.6	Highlighted the importance of advanced skills for specialized clinical areas.
Integrated training throughout the nursing curriculum and professional development	6.5	Advocated for continuous education and integration of informatics throughout the career.

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Analysis:

- There is strong agreement on the necessity of **basic training** for all nurses, ensuring that every nursing professional has foundational informatics skills.
- **Advanced training** for those in high-tech areas remains essential, particularly for roles in emergency and intensive care settings where technological proficiency is critical.
- **Integrated training** throughout the curriculum emphasizes the importance of continuous education and adaptability in the rapidly evolving healthcare technology landscape.

Pressing Education Needs in Nursing Informatics

Table 9 outlines the pressing education needs as rated by the experts.

Table 9. Pressing Education Needs in Nursing Informatics

Education Need	Description	Mean Rating (1-7)	Comments
EHR systems and interoperability	Proficiency in managing electronic health records systems	6.8	Vital for efficient patient care and data management.
Data analytics and interpretation	Proficiency in healthcare data analysis and report generation	6.7	Essential for evidence-based practice and decision-making.
Ethics in digital health	Addressing ethical considerations, data management, GDPR, and privacy	6.7	Fundamental for maintaining trust and compliance in digital healthcare environments.
Telehealth and remote patient monitoring	Proficiency in providing care through digital platforms	6.6	Increasingly important due to the rise of remote healthcare services.
Emerging technologies	Understanding AI, machine learning, and their applications in healthcare	6.5	Critical for staying current with technological advancements.

Analysis:

- **EHR systems and interoperability** and **data analytics and interpretation** are identified as the most pressing needs, underscoring the critical role of data management in modern healthcare.
- **Ethics in digital health** remains a high priority, reflecting the ongoing importance of maintaining patient privacy and data security.

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- **Emerging technologies** such as AI and machine learning are essential areas that require sustained focus to prepare nurses for future advancements.

Integration of Digital Health into Clinical Practice

Experts rated the importance of various aspects related to the integration of digital health systems. The results are detailed in Table 10.

Table 10. Integrating Digital Health in Clinical Practice

Integration Aspect	Description	Mean Rating (1-7)	Comments
Human Relation & Informatics	Balancing technology use with patient-centered care	6.6	Stressed the importance of maintaining human interaction alongside digital tools.
Technology Skills Development	Developing skills in telehealth service delivery and digital diagnostics	6.5	Emphasized the need for specific technical skills to support digital health initiatives.
Transformational Change	Adapting to new workflows and organizational settings incorporating digital tools	6.4	Recognized as crucial for successful integration of digital health tools.
Care Management	Leveraging automated care and coordination tools	6.3	Highlighted the benefits and challenges of automated care coordination.

Analysis:

- **Transformational change** and **technology skills development** received high ratings, indicating the need for nurses to adapt to evolving digital workflows and enhance their technical competencies.
- **Human relation & informatics** highlights the importance of maintaining a balance between technological advancements and the human aspect of patient care, ensuring that patient-centered care remains paramount.

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Ethical Considerations in Nursing Informatics

The table below presents the consensus on key ethical considerations in nursing informatics.

Table 11. Ethical Considerations in Nursing Informatics

Ethical Consideration	Description	Mean Rating (1-7)	Comments
Privacy	Ensuring patient privacy in digital environments	6.9	Paramount for maintaining patient trust and complying with regulations.
Security	Maintaining data security in healthcare systems	6.8	Critical for protecting sensitive health information.
Health System	Balancing technology use with patient-centered care	6.5	Essential for integrating technology without compromising care quality.
Artificial Intelligence	Addressing bias in AI and machine learning algorithms	6.2	Important for ensuring fairness and accuracy in AI-driven healthcare solutions.

Analysis:

- **Privacy** and **security** are of utmost importance, reflecting the critical need to safeguard patient information in increasingly digital healthcare settings.
- **Artificial Intelligence** remains a significant ethical concern, particularly regarding bias and the responsible use of AI technologies.
- **Health system** emphasizes the importance of integrating technology without compromising the quality and personalization of patient care.

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Top 10 Course Topics in Nursing Informatics

Experts rated the importance of various course topics essential for nursing informatics education. The top 10 topics are presented in Table 12.

Table 12. Top 10 Nursing Informatics Course Topics

Course Topic	Mean Rating (1-7)	Comments
Healthcare Data Cybersecurity and Data Privacy	6.9	Highlighted as the top priority for ensuring data protection.
Electronic Health Records (EHR) Systems	6.8	Emphasized for its central role in patient data management.
Telehealth and Remote Patient Monitoring	6.7	Recognized for enabling access to care and remote patient management.
Clinical Decision Support Systems	6.6	Important for enhancing clinical decision-making through informatics tools.
Healthcare Data Management and Analytics	6.5	Essential for handling and interpreting healthcare data effectively.
Nursing Informatics Leadership and Management	6.4	Necessary for guiding informatics initiatives and leading teams.
Artificial Intelligence and Machine Learning in Healthcare	6.3	Important for integrating advanced technologies into healthcare practices.
Interoperability and Health Information Exchange	6.2	Critical for ensuring seamless data exchange across different health systems.
Mobile Health (mHealth) and Wearable Technologies	6.1	Recognized for its role in patient monitoring and health management.
Nursing Informatics Research and Evidence-Based Practice	6.0	Important for developing and implementing research-driven informatics solutions.

Analysis:

- **Healthcare Data Cybersecurity and Data Privacy** remains the top-rated topic, underscoring the critical importance of protecting patient information.
- **Electronic Health Records (EHR) Systems** and **Telehealth and Remote Patient Monitoring** are essential for modern nursing practices, reflecting the shift towards digital health solutions.
- **Artificial Intelligence and Machine Learning** is recognized as a vital area.

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5.3. Recommendations for Nursing Informatics courses

The findings from Round 2 of the Delphi study not only confirm but also expand upon the insights gained in Round 1, thereby establishing a solid groundwork for the development of nano courses in nursing informatics.

A prominent theme that emerged is the critical need for standardization and enhanced expertise within the field. The persistent lack of a unified educational framework and the scarcity of faculty members with specialized knowledge in both nursing and informatics underscore the urgency for establishing national and international curriculum standards. Additionally, comprehensive faculty development programs are essential to bridge the existing expertise gap, ensuring that educators are well-equipped to deliver high-quality informatics education.

Another significant insight pertains to the adoption of a structured education model. The consensus among experts regarding the three-tiered education model—comprising Basic, Intermediate, and Proficient levels—highlights the necessity for a systematic approach to informatics education. This model is designed to cater to varying levels of expertise and professional roles, ensuring that the curriculum is both inclusive and tailored to the diverse needs of nursing professionals. The high level of agreement on this model indicates strong support for a structured framework that can effectively guide the educational progression of nurses in informatics.

The study also emphasizes the importance of both basic and advanced training, integrated seamlessly into the nursing curriculum and extending into ongoing professional development. This dual focus reflects the dynamic nature of healthcare technology, which requires continuous learning and adaptability from nursing professionals. By embedding informatics training throughout the nursing education continuum, the curriculum can keep pace with technological advancements, thereby enhancing the competency and confidence of nurses in utilizing digital tools and systems.

Critical education needs that were identified in the study include data analytics, proficiency in Electronic Health Records (EHR) systems, and ethical considerations. These areas are deemed essential for preparing nurses to navigate the complexities of digital healthcare environments. Proficiency in data analytics and EHR systems is vital for effective patient care management and informed decision-making. Concurrently, understanding and addressing ethical considerations ensures that nurses can maintain patient privacy and data security, which are paramount in the digital age.

Successful integration of digital health tools into clinical practice requires more than just technological proficiency; it necessitates transformational changes in workflows and organizational structures. The study highlights the need for nurses to adapt to new workflows and develop specific technological skills to effectively incorporate digital tools into their practice. This integration is further supported by the development of telehealth skills and the ability to leverage automated care coordination tools, which are increasingly important in modern healthcare settings. Maintaining a balance between technological advancements and patient-centered care is crucial to ensure that the human aspect of nursing is not lost amidst the digital transformation.

Ethical imperatives, particularly concerning patient privacy and data security, emerged as non-negotiable aspects of nursing informatics. The study underscores the necessity for ongoing education and stringent ethical guidelines to address these concerns. As healthcare systems become more reliant on digital technologies, the ability to safeguard patient information and ensure ethical use of data

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becomes increasingly important. This focus on ethics not only builds trust between patients and healthcare providers but also ensures compliance with regulatory standards.

Finally, the prioritization of course topics aligns closely with the identified education needs, ensuring that the curriculum addresses the most critical areas of nursing informatics. Topics such as healthcare data cybersecurity, EHR systems, and telehealth remain at the forefront, reflecting their importance in contemporary nursing practice. By prioritizing these areas, the curriculum can effectively prepare nurses to meet the demands of a rapidly evolving healthcare landscape, ultimately enhancing the quality of patient care and supporting the broader objectives of the NURIC project.

In summary, the second round of the Delphi study has provided comprehensive insights that reinforce the foundational elements necessary for developing effective nano courses in nursing informatics. The emphasis on standardization, structured education models, continuous training, critical education needs, seamless digital health integration, and ethical considerations collectively offer a strategic roadmap for enhancing nursing informatics education. These findings will guide the NURIC consortium in creating a curriculum that not only addresses current challenges but also anticipates future developments in the field, ensuring that nursing professionals are well-prepared to thrive in a digitalized healthcare environment.

The Delphi study has not only validated but also significantly refined the initial findings from stakeholders' input offering a comprehensive and nuanced understanding of the essential elements required for developing nano courses in nursing informatics within the NURIC project. The consensus among experts unequivocally underscores the pressing need for standardized education frameworks, robust training programs, and a concentrated focus on pivotal areas such as data management, Electronic Health Record (EHR) systems, and ethical considerations. The consensus of experts provides a robust foundation for the NURIC consortium to develop impactful and relevant nano courses in nursing informatics. The insights garnered from experts highlight the essential components required to equip nursing professionals with the skills and knowledge necessary to excel in a digitalized healthcare environment.

In summary, the Delphi study provides a robust foundation for the NURIC consortium to develop impactful and relevant nano courses in nursing informatics. The insights garnered from experts highlight the essential components required to equip nursing professionals with the skills and knowledge necessary to excel in a digitalized healthcare environment. By addressing the identified challenges and focusing on critical educational needs, the NURIC project can significantly enhance the competencies of nursing professionals, ultimately leading to improved patient care and healthcare outcomes in the digital age.

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Recommendations for nursing informatics courses

Some recommendations are proposed, based on position statements analyses and Delphi study guide the development and implementation of nano courses in nursing informatics under the NURIC project:

Curriculum Development
To address the identified need for standardized education, it is imperative to establish a multi-level education model that encompasses Basic, Intermediate, and Proficient levels of nursing informatics training. This structured approach ensures that all nursing professionals receive a foundational understanding of informatics, while also providing advanced training for those specializing in tech-heavy areas. The curriculum should be aligned with both national and international standards to facilitate consistency and quality across educational institutions.

Faculty Development
Bridging the expertise gap among educators is crucial for the successful delivery of nursing informatics education. Investment in comprehensive faculty development programs is essential to equip educators with the necessary skills and knowledge in both nursing and informatics. This can be achieved through specialized training workshops, collaborative partnerships with informatics experts, and continuous professional development opportunities. Ensuring that faculty members are well-versed in the latest informatics trends and technologies will enhance the overall quality of education and mentorship provided to nursing students.

Resource Allocation
Securing adequate funding and resources is fundamental to the development and implementation of effective nursing informatics programs. This includes investing in up-to-date technological infrastructure, educational materials, and software tools essential for hands-on training. Additionally, allocating resources for research and development can foster innovation in curriculum design and instructional methodologies. Collaboration with nursing and healthcare organizations and informatics companies may provide additional funding streams and access to cutting-edge technologies.

Ethics Training
Incorporating comprehensive ethics training into the curriculum is paramount to address privacy, security, and the responsible use of emerging technologies like generative artificial intelligence and use AI in device and decision-making. Courses should cover topics such as data privacy laws (i.e., GDPR), ethical management of patient information, and the implications of artificial intelligence in healthcare. Ethical considerations should be integrated into all levels of the curriculum to ensure that nurses are equipped to handle complex ethical dilemmas in digital health environments effectively.

Practical Skills Development
Emphasizing hands-on training in data analytics, EHR systems (based on SNOMED CT funded by specific EU program and ICNP as terminology included for nursing and the only terminology recognized by WHO) and telehealth is essential for preparing nurses for real-world applications. Practical, experiential learning opportunities such as simulations, internships, and project-based assignments can enhance the

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applicability of theoretical knowledge. By fostering practical skills, the curriculum ensures that nurses can competently utilize informatics tools to improve patient care and operational efficiency.

Integration of Digital Health Tools
To facilitate the seamless integration of digital health tools into clinical practice, the curriculum should include training on adapting to new workflows and leveraging automated care coordination tools. Additionally, developing specific technological skills, such as telehealth service delivery and digital diagnostics, will enable nurses to effectively incorporate these tools into their practice. This integration should be supported by organizational training and change management strategies to ensure that digital health initiatives are successfully adopted at the institutional level.

Continuous Professional Development
Recognizing the rapid advancements in healthcare technology, the curriculum should support continuous professional development for nursing professionals. This can be achieved through offering advanced modules, certifications, and specialized training programs that allow nurses to stay current with emerging trends and technologies. Encouraging lifelong learning and adaptability will ensure that nursing professionals remain competent and confident in utilizing new informatics tools throughout their careers.

Ethical and Regulatory Compliance
Ensuring compliance with ethical standards and regulatory requirements is essential for maintaining the integrity of nursing informatics practices. The curriculum should include modules on regulatory compliance, risk management, and the ethical implications of informatics in healthcare. This focus will prepare nurses to uphold high standards of practice, protect patient rights, and contribute to the ethical advancement of healthcare informatics.

Interprofessional Collaboration
Fostering interprofessional collaboration is vital for the effective implementation of nursing informatics initiatives. The curriculum should encourage teamwork and communication skills that facilitate collaboration between nursing professionals, IT specialists, and other healthcare disciplines. Collaborative projects and interdisciplinary courses can enhance mutual understanding and cooperation, leading to more integrated and effective healthcare solutions.

Evaluation and Feedback Mechanisms
Implementing robust evaluation, assessment and feedback mechanisms is crucial for the continuous improvement of the nursing informatics curriculum. Regular assessments, surveys, and feedback sessions with both educators and students can provide valuable insights into the effectiveness of the training programs. Utilizing this feedback to make data-driven adjustments will ensure that the curriculum remains relevant, innovative, and aligned with the evolving needs of the healthcare sector.

These recommendations provide a strategic roadmap for the NURIC consortium to develop and implement nano courses in nursing informatics that are not only impactful and relevant but also adaptable to the rapidly changing landscape of digital healthcare. By focusing on standardized

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education, comprehensive training, ethical considerations, and practical skill development, the NURIC project can significantly enhance the competencies of nursing professionals, thereby contributing to improved patient care and healthcare outcomes in the digital age.

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6. Design of the nursing informatics curriculum

Based on literature review (chapter 4), stakeholder input via interviews and panels (chapter 3) followed by a Delphi study (chapter 5) that are described in detail in the NURIC WP2 document “Task 2.1 Stakeholder input and curriculum design”, the list of topics for nurse informatics education was created.

Using the implementation models and information regarding the education channels of nurses in each country the following decisions were made:

Design Decision 1:

In order to enable flexibility for course design at different stages of the nurse education along her professional development we designed different modules that can be integrated in different courses. Therefore, one nursing informatics topic can be spread among one or more modules, and one module can support one or more topics (see Figure 2).

Furthermore, the same topic can be thought at different levels according to the level of education as part of different courses. For example, the module of Healthcare Data Management and Analytics (data science, big data) can be part of a basic course at beginners' level or a more advanced course for specialization courses or MA course. Each will include different number of ECTS according to the recommended level of course

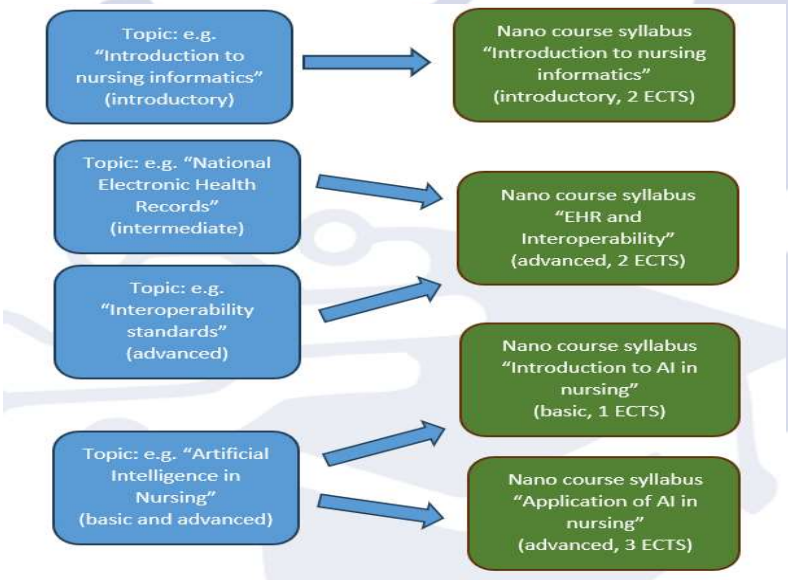

Figure 2. n:m-relation between topics (left) and modules (right)

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Design Decision 2:

The description of one module follows common academic standards for module description as described here and in the Appendix:

Each module is described by the following module description template:

- Module name
- Proposed range of ECTS
- Learning objective(s) (= intended learning outcome)
- Covered content
- Level (beginner/intermediate/advanced)
- Entry requirements (e.g., other modules that should be completed first)
- Recommendations on helpful resources (including link to NURIC repository)
- Recommendations on instructional design (online/f2f …)
- Recommendations on assessment, to ensure alignment with learning outcomes

Design Decision 3:

The NURIC repository will contain all modules description and courses design. The specific course implementation (e.g., specific timing and learning activities) will be defined by the individual instructor based on the NURIC materials (see Figure 3). "Green" are parts developed in NURIC. "Blue" are parts developed by local teachers.

This structure enables to use the NURIC materials according to country\organizational requirements and provides an infrastructure that develops and updated over time

Design decision 4:

We take into account the European guidelines for micro credentials (see https://education.ec.europa.eu/education-levels/higher-education/micro-credentials), to make sure NURIC certificates comply with these regulations and the curriculum design is aligned with the EU guidelines for micro credentials.

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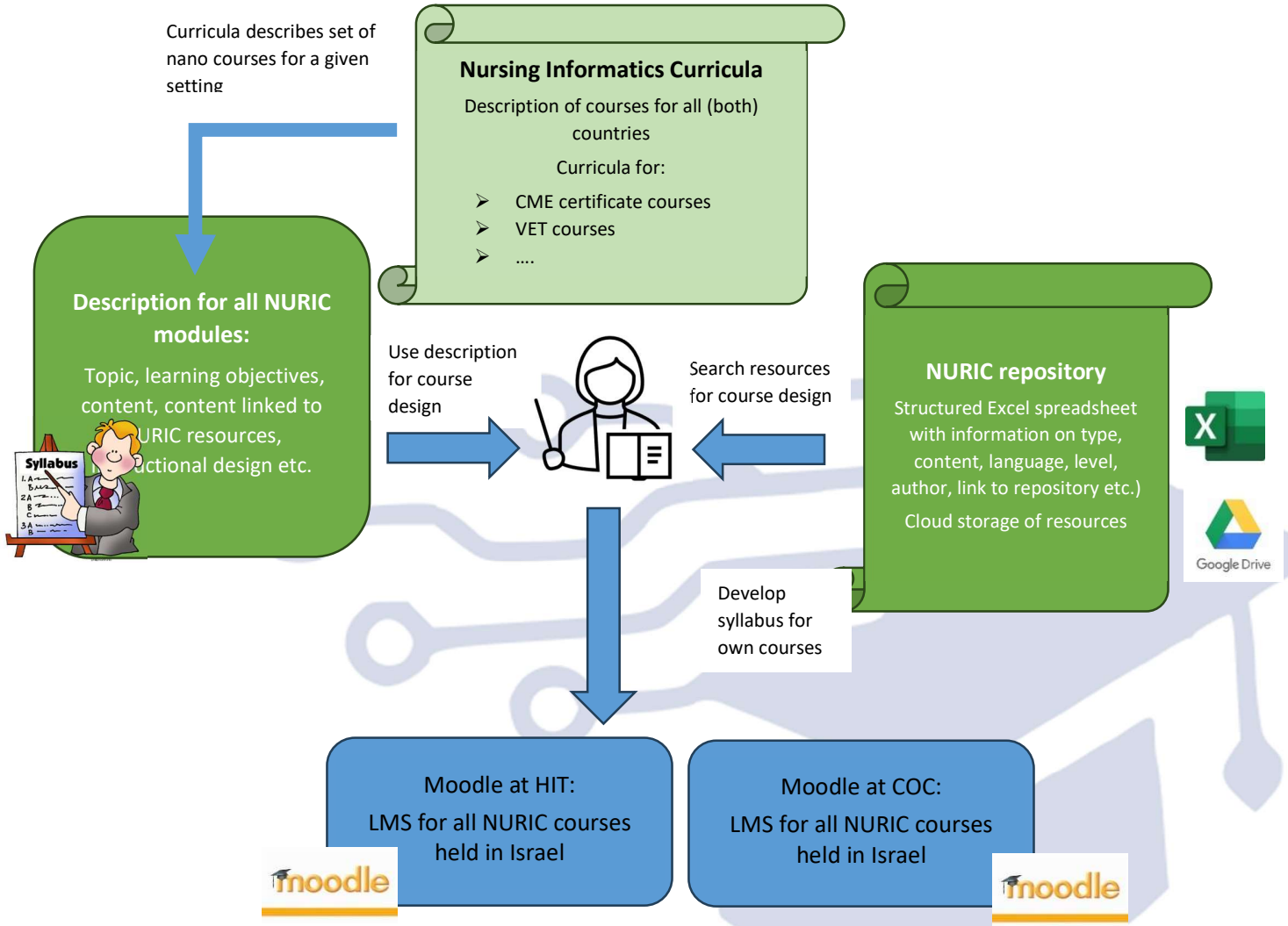

Figure 3. How NURIC Nursing Informatics curricula, NURIC course syllabus and NURIC repository can be used by instructors to build own courses

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7. Definition of NURIC modules

The stakeholders input T2.1 provided the recommended content for nursing informatics education and the implementation model.

The following modules were defined (Table 13) considering the content required for nurse informatics education at all levels; beginner, intermediate and advanced to enable development along the nurse career.

Some modules may be composed of several nano-courses\micro credentials as explained in chapter 6.

Table 13 includes frontal hours\ECTS as the basis of the course to enable the teachers in each institute\country and according to target audience of the students (nurses at BA\MA\PhD academic degree, CME etc.) to build their own teaching methods and adapt to accreditation model in different countries.

A recommendation for teaching methods and ECTS/ *FTH ("face to face teaching = frontal hours)* are included in the syllabus (chapters 8 and 9).

The detailed module description can be found in the appendix.

Proposed FTH "face to face teaching = frontal hours" and "overall workload (ECTS)". For detailed method, see chapter 6. The teachers can use either method to adjust the modules according to the accepted method in different countries (see Train the trainers Deliverables).

Table 13. Overview of NURIC modules.

Module number	**Title**	**Proposed FTH/ECTS teaching range**	**Level** (Beginner, Intermediate, Advanced)	**Plan to implement it within NURIC pilots in which countries:**	**Comment**
1	Nursing Informatics: history and evolution as a new specialty	2	Beginner	Kosovo,	
2	Electronic Health Records (EHR) System (provider oriented)	4	Beginner		As user
3	Electronic Health Records (EHR) System (patient oriented)	2	Beginner		As user
4	Electronic Health Records (EHR) System (national systems)	2	advanced		
5	Digital instruments for nursing assessment	4	Beginner		

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6	Healthcare Data Management and Analytics (data science, data mining, big data)	18 FTH (6X3)	Beginner	Planned for pilot in Israel	The module includes 3 nano-courses (8H each)
7	Clinical Decision Support Systems	2	intermediate		
8	Telehealth and Remote Patient Monitoring - general approach and methodology	8	Beginner	Kosovo	
9	Telemedicine platforms, ethics, technologies for tele-care monitoring and measuring	8	intermediate		
10	Mobile Health (mHealth) and Wearable Technologies	4	Beginner		
11	Interoperability and Health Information Exchange	2	advanced		
12	Nursing Informatics Leadership and Management	2	advanced		
13	Healthcare Data Cybersecurity and Data Privacy	16 FTH (2X8)	Beginner\intermediate	Planned for pilot in Israel	The module includes 2 nano-courses (8H each
14	Social Media and Digital Communication in Healthcare	2	Beginner		
15	Artificial Intelligence and Machine Learning in Healthcare	4	Intermediate\ advanced	Kosovo,	
16	Healthcare Technology Evaluation and Implementation	4	beginner		
17	Nursing Informatics Research and Evidence-Based Practice	4	Intermediate\ advanced		
18	User Experience (UX) Design for Healthcare Technologies	2	intermediate		UI\UX and interaction
19	Healthcare IT Project Management	24	advanced		
20	Population Health Informatics and Data-	12	intermediate		

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	Driven Decision Making and policy				
21	Clinical Imaging Informatics	4	advanced		
22	Healthcare Data Visualization and Reporting	4	advanced		
23	Healthcare IT Vendor Management and Procurement	2	intermediate		
24	Healthcare Data Standards	2	intermediate		
25	Nursing Informatics Education and Curriculum Development	2	advanced		
26	Healthcare Blockchain Applications	2	intermediate		
27	Digital Health Entrepreneurship and Innovation	2	beginner		
28	Co-creation	2	beginner		
29	Innovation and design thinking in healthcare	2	beginner		
30	Informatics for Quality Improvement and Patient Safety	4	intermediate		
31	Consumer Health Informatics and Patient Engagement	2	intermediate		
32	Health care Terminology (SNOMED)	2	beginner		
33	Nursing terminology (more used terminology ICNP – NNN)	4	intermediate		
34	Digital Pharmacy and nurses roles	4	intermediate		
35	Robotics in nursing	2	Intermediate		
36	Health Technology Assessment in nursing-quality measures	4	intermediate		
37	Specific tele-health software training	12 FTH 3X4	beginner	Israel	(Datos, Tyto, PROMS, ObGyn

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					US etc.) The module includes 4 nano-courses (3H each)
38	Remote care in medicine (acute and chronic care)	12	Competency Based Education		
39	Communication (both phone and video calls)-	12 FTH	soft skills	Israel	planned for the pilot in Israel
40	Tele-psychiatry - 1	8 FTH	beginners	Israel	planned for the pilot in Israel
41	Tele-psychiatry - 2	8 FTH	Competency Based Education		
42	Patient center care and integrated care	4	advanced		
43	Continuity of care and data sharing\transfer	4	advanced		
44	E-Patient and enhanced patient engagement.	2	intermediate		
45	Integration of Digital Health into Clinical Practice to adapt to new workflows and technologies,	4	intermediate		
46	Research and Development of Digital Health Services	2	advanced		
47	Regulation and ethics in digital health	4	intermediate		
48	Healthcare systems	4	Intermediate		

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8. Definition of courses

The courses are composed of several modules as defined in the modules table in chapter 7. The definition of courses provides recommendation for teachers\organizations how to build a course. The following courses are planned as pilots within NURIC and demonstrate how the modules are used in a course.

The modules are designed according to level of student using the expert recommended levels of beginner, intermediate and advances as defined in chapter 7 and according to the EQF level

The NURIC platform will be updated over time with new materials.

8.1. Course "Introduction to digital health for nurses" (Kosovo, EFQ level 3/4)

Course name	Introduction to digital health for nurses
Offering institution	COC, VET nursing school
Context	This course will be integrated into the informatics module in VET nursing curriculum at COC.
ECTS	3
Included modules (for module details, see appendix)	➢ Nursing informatics: history and evolution ➢ EHR systems (provider oriented)
Accreditation	Not needed, is part of informatics module in VET nursing curriculum
Certificate	Not needed

9.2 Course "Introduction to Nursing Informatics module" (Kosovo, EQF level 6)

Course name	Introduction to Nursing Informatics
Offering institution	UNI
Context	This course will be offered to BSc in Nursing students at UNI.
ECTS	5
Included modules (for module details, see appendix)	➢ Nursing informatics: history and evolution ➢ Healthcare Data Management and Analytics (data science, data mining, big data) ➢ Nursing Informatics Leadership and Management ➢ Nursing Informatics Research and Evidence Based Practice ➢ Nursing Informatics Education and Curriculum Development

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Accreditation	Not needed, the course will be offered by UNI
Certificate	Course certified issued by UNI

9.3 Course "Telehealth" (Kosovo, EQF level 6)

Course name	Telehealth
Offering institution	UNI
Context	This course will be offered to BSc in Nursing students at UNI.
ECTS	5
Included modules (for module details, see appendix)	➢ Telehealth and Remote Patient Monitoring - general approach and methodology ➢ Telemedicine platforms, ethics, technologies for tele-care monitoring and measuring ➢ Remote care in medicine (acute and chronic care) ➢ Tele-psychiatry – 1 ➢ Tele-psychiatry - 2
Accreditation	The course will be offered by UNI
Certificate	Course certified issued by UNI

9.4 Course "Electronic Health Records" (Kosovo, EQF level 6)

Course name	Electronic Health Records
Offering institution	UNI
Context	This course will be offered to BSc in Nursing students at UNI.
ECTS	5
Included modules (for module details, see appendix)	➢ Electronic Health Records (EHR) System (provider oriented) ➢ Electronic Health Records (EHR) System (patient oriented) ➢ Electronic Health Records (EHR) System (national systems)
Accreditation	Not needed, the course will be offered by UNI
Certificate	Course certified issued by UNI

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9.5 Course “New Technologies in Nursing Practice” (Kosovo, EQF level 6)

Course name	New Technologies in Nursing Practice
Offering institution	UNI
Context	This course will be offered to BSc in Nursing students at UNI.
ECTS	5
Included modules (for module details, see appendix)	➢ Digital instruments for nursing assessment ➢ Mobile Health (mHealth) and Wearable Technologies ➢ Clinical Imaging Informatics ➢ Robotics in Nursing ➢ Digital Health Entrepreneurship and Innovation
Accreditation	Not needed, the course will be offered by UNI
Certificate	Course certified issued by UNI

9.6 Course “Artificial Intelligence in Nursing” (Kosovo, EQF level 6)

Course name	Artificial Intelligence in Nursing
Offering institution	UNI
Context	This course will be offered to BSc in Nursing students at UNI.
ECTS	5
Included modules (for module details, see appendix)	➢ Artificial Intelligence and Machine Learning in Healthcare ➢ Nursing Informatics Research and Evidence-Based Practice ➢ Healthcare Data Visualization and Reporting ➢ Integration of Digital Health into Clinical Practice to adapt to new workflows and technologies
Accreditation	Not needed, the course will be offered by UNI
Certificate	Course certified issued by UNI

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9.7 Course "Telehealth – Technology and Methods" (Israel, EFQ level 5/6)

Course name	Telehealth – Technology and Methods
Offering institution	HIT
Context	This course will be implemented within the NURIC project as a pilot in Sheba.
ECTS	11
Included modules (for module details, see appendix)	➢ Healthcare data management and analytics (e.g. data science, data mining, Big Data) ➢ Specific software ➢ Cyber security ➢ Data privacy ➢ communication skills ➢ Telehealth Psychiatry
Accreditation	HIT
Certificate	CME certificate issued by HIT

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9. Description of NURIC modules

The NURIC modules follows academic requirements as described in chapter 6. Some examples that were developed by NURIC partners and will be partially implemented in the NURIC pilot are now presented in some detail.

9.1. Template for module description

Module name	
Level	*beginner/intermediate/advanced*
Covered content	*List max. 5 covered topics*
Recommended range of ECTS\Frontal Teaching Hours	
Learning objectives	*List max. 3 learning objectives*
Entry requirements	*List other modules or courses that should be attended before*
Recommendations for helpful resources	*Link to NURIC repository, use OER if possible*
Recommendations on instructional design	*Fully online, blended-learning, fully face-to-face* *With or without practical parts*
Recommendation on assessments	*Assessment types should mirror the learning objectives:* ❖ *Written exam (closed book)* ❖ *Written exam (open book): personal reflection, personal mind-map, literature work, etc.* ❖ *Oral exam* ❖ *Practical exam (e.g. project work)*
Comments	

9.2. Nursing Informatics: history and evolution

Module name	**Nursing Informatics: history and evolution as a new specialty**
Level	Beginner
Covered content	✓ Relevance of nurses for digitalization in health care ✓ Nursing informatics as a new nursing specialty ✓ History and evolution of nursing informatics ✓ Job positions within nursing informatics ✓ Topics covered by nursing informatics
Frontal hours	6

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Learning objectives	✓ Explain the relevance of digitalization in health care for nurses and the nursing profession ✓ Explain the new job opportunities within nursing informatics ✓ Explain the topics that are covered by the field of nursing informatics
Entry requirements	None
Recommendations for helpful resources	*Link to NURIC repository, use OER if possible*
Recommendations on instructional design	Blended-learning: 1. online phase with introductory reading 2. face-to-face phase 3. online phase for further reading and personal reflection
Recommendation on assessments	Written exam (open book): ❖ personal reflection on nursing informatics ❖ personal mind-map on readings
Comments	This module should be included as one of the first modules in any other course

9.3. Healthcare Data Management and Analytics (Module 6)

Module name	Healthcare Data Management and Analytics (data science, data mining, big data)
Level	Beginner
Covered content	✓ Types of data sets ✓ Preparing a dataset for analytics ✓ Introduction to big-data analysis
Frontal hours	18 hrs. in 3 nano courses (6 hours X 3 courses)
Learning objectives	✓ Explain differences between data sets ✓ Fix basic errors in data sets ✓ Explain principles of big-data analysis
Entry requirements	Basic course in epidemiology
Recommendations for helpful resources	*Link to NURIC repository*
Recommendations on instructional design	On-line learning
Recommendation on assessments	Written exam

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Comments	The content should be based on existing, real, datasets. Before and after being prepared for analysis.

9.4. Healthcare Data Cybersecurity and Data Privacy (Module 13)

Module name	Healthcare Data Cybersecurity and Data Privacy
Level	Beginner / Intermediate
Covered content	✓ Healthcare Data Cybersecurity ✓ Healthcare Data Privacy ✓ Country regulation ✓ international regulation
Frontal hours	16 FTH hours in two Nano courses (8 hours X 2 courses)
Learning objectives	✓ understand data privacy and data security basucs and relevance in the nurse work ✓ Train the nurse how to implement data security andprivacy regulation in routine work
Entry requirements	None
Recommendations for helpful resources	*Link to NURIC repository, use OER if possible*
Recommendations on instructional design	On-line learning
Recommendation on assessments	Written exam
Comments	The content should be based on, real scenarios and include trainin tasks that address real world needs

9.5. Communication (Module 39)

Module name	Communication (both phone and video calls)-
Level	Soft skills
Covered content	✓ Pitfalls in tele-communication, phone calls ✓ Pitfalls in tele-communication, video calls ✓ Pitfalls in tele-communication, combined presence and video calls ✓ Pitfalls in tele-communication, integrating family members
Frontal hours	12 hours
Learning objectives	✓ Describe and avoid Pitfalls in tele-communication, phone calls ✓ Describe and avoid Pitfalls in tele-communication, video calls

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	✓ Describe and avoid Pitfalls in tele-communication, combined presence and video calls ✓ Describe and avoid Pitfalls in tele-communication, integrating family members
Entry requirements	None
Recommendations for helpful resources	*Link to NURIC repository, use OER if possible*
Recommendations on instructional design	Simulative settings
Recommendation on assessments	OSCE
Comments	

9.6. Tele-Psychiatry (Module 40)

Module name	Tele-Psychiatry - 1
Level	Beginner
Covered content	✓ To be added by psychiatric nursing specialist
Frontal hours	8 hours
Learning objectives	✓ To be added by psychiatric nursing specialist
Entry requirements	Basic nursing courses in psychiatry
Recommendations for helpful resources	*Link to NURIC repository, use OER if possible*
Recommendations on instructional design	Blended-learning: 4. online phase with introductory reading 5. face-to-face phase 6. simulative training
Recommendation on assessments	OSCE
Comments	

9.7. Introduction to Nursing Informatics

Module name	**Introduction to Nursing Informatics**
Level of study	Bachelor

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Covered content	Principles of nursing informatics, robotic process automation (automation of repetitive administrative tasks) and management of data (where data is stored, how it is stored, ethical issues), ethical issues in informatics, basics of health information systems (medical software,patient portals) , introduction to telemedicine, and the informatics role in patient care.
Recommended range of ECTS	5
Learning objectives	Understand key concepts in nursing informatics. Analyze the role of informatics in improving patient care and outcomes. Identify ethical and privacy issues in nursing informatics. Apply data management techniques in a health care setting.
Entry requirements	Basic knowledge of health care systems and principles of patient care.
Recommendations forhelpful resources	American Nurses Association. (2022). Nursing informatics: Scope and standards of practice (2nd ed.)? Silver Spring, MD: ANA. McGonigle, D., & Mastrian, K. G. (2019 — as we know it is in the past) Nursing informatics and the foundation of knowledge (5th ed.) Jones & Bartlett Learning.
Recommendations on instructional design	Use case studies to illustrate practical applications. Include exercises with active tools in data management.Use group discussions to address ethical scenarios.
Recommendation on assessments	Written assessment on fundamental principles and ethical issues. Project assignment: analysis of a basic health information system.
Comments	Emphasize the greater importance of informatics to nursing practice in contemporary times.

9.8. Telehealth

Module name	**Telehealth**
Level of study	Bachelor
Covered content	Principles of telehealth, benefits and limitations, patient–provider communication, technology and software used in telehealth, regulatory and legal aspects, and impact on patient care, remote patient monitoring (RPM).
Recommended range of ECTS	5
Learning objectives	Describe the basic concepts of telehealth and its uses. Assess telehealth's impact on patient outcomes and accessibility. Develop competencies in using telecommunication tools and platforms.Identify the governance of such systems and safeguards for patients using them.
Entry requirements	Familiarity with the care of patients, and introductory informatics.

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Recommendations forhelpful resources	Weinstein, R. S., Lopez, A. M., & Barker, G. P. (2020). Telemedicine and telehealth: Principles, policies, performance, and pitfalls (2nd ed.). Cambridge University Press. World Health Organization. (2019). WHO guideline: Recommendationson digital interventions for health system strengthening. Geneva: WHO. [Available at WHO website].
Recommendations on instructional design	Simulated telehealth sessions for hands-on practice. Lectures on policy and regulatory considerations. Patient-case scenarios to discuss telehealth's practical implications.
Recommendation onassessments	Practical assessment: simulated telehealth consultation. Written reflection on challenges and benefits of telehealth.
Comments	Telehealth experience prepares students for remote health care delivery—an area of rapid growth.

9.9. Electronic Health Records

Module name	**Electronic Health Records**
Level of study	Bachelor
Covered content	Overview of EHR systems, data entry and retrieval, patient privacy and data security, interoperability, patient portals, and the impact of EHR on efficiency in healthcare.
Recommended range of ECTS	5
Learning objectives	Explain the components and architecture of EHRs. Describe the role of EHRs in patient safety and data management. Demonstrate ability to navigate and enter information in an EHR.
Entry requirements	Basic knowledge of nursing informatics.
Recommendations for helpful resources	Gartee, R., & Beal, S. (2021). Electronic health records: Understanding and using computerized medical records (5th ed.). Pearson. McBride, S., & Tietze, M. (2022). Nursing informatics for the advanced practice nurse: Patient safety, quality, outcomes, and interprofessionalism (3rd ed.). Springer Publishing.
Recommendations on instructional design	Practical experience using EHR simulations. Discussion: Patient Privacy Laws—HIPAA and GDPR. Case-based learning with simulated patient data.

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Recommendation on assessments	Practical examination using an EHR simulation software. Quiz on Legal and Security Principles of EHR.
Comments	Emphasize data accuracy, patient privacy, and the legal requirement inusing EHRs.

9.10. New Technologies in Nursing Practice

Module name	**New Technologies in Nursing Practice**
Level of study	Bachelor
Covered content	Introduction to emerging technologies, including wearable devices, mobile health applications, robotics in healthcare, health monitoring systems, and virtual reality in nursing education.
Recommended range of ECTS	5
Learning objectives	Evaluate the potential of new technologies in nursing care. Demonstrate knowledge of various digital tools and devices in patient care. Evaluate the ethical implications of using advanced technologies in healthcare.
Entry requirements	Background in basic health care technology and informatics.
Recommendations for helpful resources	Tan, J., & Payton, F. C. (2020). Healthcare information technology: Examining the impact on healthcare organizations (2nd ed.). Springer. DeNisco, S. M., & Barker, A. M. (2021). Advanced practice nursing: Essential knowledge for the profession (4th ed.). Jones & Bartlett Learning.
Recommendations on instructional design	Integrate case studies on the use of new technologies in healthcare. Hands-on demos of wearable health-tech devices. Group discussion of the ethical implications.
Recommendation on assessments	Case Study Analysis: The Impact of a Specific Technology. Presentation on future technology trends in nursing.
Comments	Encourage critical thinking about the impact of technology on patient care.

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9.11. Artificial Intelligence in Nursing

Module name	Artificial Intelligence in Nursing
Level of study	Bachelor
Covered content	Fundamentals of artificial intelligence in health care, AI support systems, virtual nursing assistants, robot nursing assistants and ethical implications of AI in nursing (bias and fairness, accuracy and reliability).
Recommended range of ECTS	5
Learning objectives	Describe the basics of AI and its application in nursing. Identify ethical issues arising from the use of AI in healthcare. Explore the possibilities of how AI can facilitate clinical decision-making.
Entry requirements	Knowledge of healthcare informatics and introductory patient care.
Recommendations for helpful resources	Dey, N., Borra, S., & Bhateja, V. (2021). AI in Healthcare: Industry and Academic Perspectives. Elsevier. American Nurses Association. (2022). Artificial intelligence in nursing practice: Implications for practice and education. ANA.
Recommendations on instructional design	Case studies in AI-assisted diagnostics and decision support. Hands-on workshops in data interpretation using AI tools. Ethical debates on AI in patient care.
Recommendation on assessments	Project: Analysis of an AI Application in Nursing. Written assignment on AI ethics in healthcare.
Comments	This module prepares students to work with AI tools and understand the ethical boundaries of AI in patient care.

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10. APPENDIX

10.1. Interview guidelines

The interview guidelines were developed by the partners following the first round of the focus group discussion with stakeholders and literature review. This skeleton was used by the partners for stakeholder input in chapter4

Baseline and policy

- Which is the current knowledge of nurses in the area of informatics?
- Do you see Nursing Informatics competencies as essential for the daily work of nurses?
- Is Nursing informatics formally integrated into nursing education? At what stage of education, [basic, experts, higher education], the nurse receive training\education in health informatics?
- At the MOH level, How important is IT knowledge perceived for the needs of nursing development
- Do you think all nurses should have the same education in nurse informatics? What are the; basic knowledge, expert nurses, in which domains?
- Do you expect a nurse to know how to use the existing infrastructure or to better understand the system and participate in further development of Nurse informatics tools?

Content

- What are the expectations regarding the best practices on teaching nursing informatics?
- Which skills the nurse needs to learn in order to manage her role in digital environment?
- What are some best practices that ought to be followed when it comes to nursing informatics?
- Soft skills- innovation, communication\negotiation , storytelling, creative thinking,
- Digital health-tools, bio-medical analytics? Mathematic and statistics, programing (Phyton, R) epidemiology, data warehouse, data analytics, AI, ML? Big Data?

Implementation

- What are the current obstacles in the development of nursing informatics? time? investment
- What are the current infrastructural and human capacities for the development of nursing informatics?
- What are the strengths, weaknesses, opportunities and threats (SWOT) when it comes to the implementation of nursing informatics education?
- NURIC project aim to provide nursing informatics program. How\will stakeholders will implementing this program, what are the barriers?
- How you see the ongoing educational program integrated in the professional life of the nurse?

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10.2. Sheba Medical center education program

Nurse Category\level	Needs	Category	Course type (workshop, program CME)
All graduates of academic nursing schools (future assimilation into pre-graduate studies)	Telehealth - general approach and methodology	Basic learning	Online nano-course: 2 lessons, 4 academic hours
	Remote care in medicine (acute and chronic care)	Competency Based Education	Workshop and simulation
	Data security and privacy (to be part of the pilot sessions)	Basic learning	Online nano-course: 2 lessons, 4 academic hours
	AI-based telehealth		Online nano-course: 2 lessons, 4 academic hours
Nurses engaged with tele-medicine programs	Medical data, EMR and Interoperability	Basic learning	Online nano-course: 2 lessons, 4 academic hours
	Communication (both phone and video calls) (to be part of the pilot sessions)	Soft skills	Workshop and simulation
	Specific platforms (Datos, Tyto, PROMS, ObGyn US etc.)	Digital skills	Online nano-course: 4 lessons, 8 academic hours (modular)
	Home (digital) visits – 1	Basic learning	Online Certificate-course: 4 lessons, 8 academic hours
	Home (digital) visits – 2	Competency Based Education	Workshop and simulation
	Remote patients monitoring and the deteriorating patient – 1	Basic learning	Online Certificate-course: 4 lessons, 8 academic hours
	Remote patients monitoring and the deteriorating patient – 2	Competency Based Education	Workshop and simulation
Nurses intending to engage basic and clinical research	Big data mining and basic analysis (to be part of the pilot sessions)	Basic learning	Online nano-course: 2 lessons, 4 academic hours
Nurses engaged with psychiatric tele-medicine programs	Tele-psychiatry - 1 (to be part of the pilot sessions)	Basic learning	Online nano-course: 2 lessons, 4 academic hours
	Tele-psychiatry – 2	Competency Based Education	Workshop and simulation
Nurses engaged with tele-obstetrics	Tele-obstetrics – 1	Basic learning	Online nano-course: 2 lessons, 4 academic hours
	Tele-obstetrics – 2	Competency Based Education	Workshop and simulation

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10.3. Overview of CoC Modules

Overview of CoC and NURIC Modules – Nursing Informatics

Modification of the ICT modules to the Curriculum for “Nursing” in CoC-Ferizaj (Kosovo).

ICT modules of the curriculum provided by CoC-Ferizaj	NURIC modules	LO (Learning Outcomes) of module	Description (Description)
" Information Technology " - Grade 10	**Nursing Informatics: history and evolution as a new specialty**	**LO7:** • Shows the application of computers in different field • Identifies the internal and external components of the personal computer • Describes the use of information technology in the field of health • Features skills for protective measures at work (ergonomics)	Marked points are selected LO by ICT curriculum which can be adapted to the “Nursing” module " **Nursing Informatics: history and evolution as a new specialty" -** NURIC. The first two points of the LO enable access to general computer concepts, specifically the basics of ICT. Then, the knowledge gained from the first two points enables easier access to the use of ICT in the field of health. Obviously, computer is already done necessity about this reason, also anatomical posture in front of the computer, the sitting position at the desk must be consider an important topic by both ICT teachers and Health professionals from anatomical side.
" Information Technology " – Grade 11	**Electronic Health Records (EHR) System (provider oriented)**	**LO1:** • Understanding the basis of the health database concepts	The NURIC module "**Electronic Health Records (EHR) System**

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		• Planning a simple base of health data • Designing a simple health database • Use of tools for the creation of database and management • Defining different search criteria **LO2:** • Selection of different functions in questionnaires • Applying the criteria complex in the questionnaire for obtaining diverse information • Presentation of the desired health data in database through the questionnaire using tools for selection and sorting **LO3:** • Choosing different views of a report • Designing different reports for extracting health information • Demonstration of form and report creation and modification	**(provider oriented)"** is suitable for the points that are marked in this part. Considering that in the current ICT curriculum it is the explanation of the basis of its data (MS ACCESS), we claim to fit some points in so the adapt a few points in, so that we facilitate health staff work in registration, management, search, sorting and filtering of health data.

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		• Demonstration of finalizing a basic the data for the patient	
" Information Technology " – Grade 12	Digital instruments for nursing assessment	• Open the web design application • • Open a website • Creates a new Web-page, which contains only one page, • Adds text to the page • Copy, Cut and Move the text	In progress... Pulse oximetry Thermometer digital Electrocardiogram Glucometer

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10.4. List of Tables

10.5. List of Figures

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