Article

ICNP® R&D Centre Ireland: Defining Requirements for an Intersectoral Digital Landscape

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Abstract: The apparent speed and impact of creating a global digital landscape for health and social care tells us that the health workforce is playing catch-up with eHealth national programmes. Locating how and where the profession of nursing fits with future models of health service delivery is critical to provide focused engagement for the populations they serve. In 2016, Dublin City University (DCU) School of Nursing and Human Sciences (SNHS) created a research and development centre for International Classification for Nursing Practice (ICNP®) in Ireland. This paper provides a summary of the first year of the centre's research, describing how the initial activities link to the development of global eHealth policy. A key aspect of service delivery relates to defining care requirements, specifically to support sustainable intersectoral healthcare. Considering how nursing-sensitive language (clinical terminology) is best mapped is necessary to articulate the care requirements and processes to achieve optimal patient outcome. The World Health Organisational Framework for Integrated Care provides a pathway for crystallising the steep learning curve that the profession has currently found itself situated in, to deliver on contemporary digital healthcare.

Keywords: ICNP®; nursing informatics; integrated care; eHealth; standardised; language

1. Introduction

Historically, nursing as a profession has provided a strong background in transitioning individual care for optimisation of patient safety. This paper reports on a research and development centre established in Ireland in 2016 which uses the International Classification for Nursing Practice (ICNP®) [1] and The World Health Organisational Framework for Integrated Care [2] to contribute to a national eHealth programme. As the largest stakeholder group in the delivery of healthcare, it is not surprising that the role of the nurse is integral and linked with patient safety and mortality [3]. It is perhaps anticipated that the focus in the evidence base for contemporary nursing research is well aligned with skill mix, work force planning, and quality metrics at a time when cost effectiveness is a priority and global workforce planning reports a potential shortfall of 9 million nurses and midwives by 2030 [4]. A search on the electronic databases using Cumulative Index of Nursing and Allied Health Literature (CINAHL) for peer reviewed articles using key words; skill mix, work force, or metrics provides 3302 results between the years January 2014 and December 2016. Thus, it is indicated that development of professional knowledge of service-related outcomes is required to provide much needed evidence to innovate and source solutions for effective and efficient service delivery.

Focusing on alternative approaches to support intersectoral care, as opposed to sustaining hospital-based disease-specific curative care models, is also important [5]. The deployment of alternative approaches to the existing silo-based and fragmented medical care process is progressing globally at different paces. Ireland has been slower to engage than other EU member states in eHealth transformation. The WHO describes the process as integrated care, a health "service which is managed and delivered so that people receive a continuum of health promotion, disease prevention, diagnosis and treatment, which is co-ordinated across the different levels and sites of care within and beyond the health sector and according to the needs of the life course of an individual" [5] (p. 2). The core message is that how nurses deliver health and social care needs to adapt to and align with the needs of the digital patient. This will ensure that core values are maintained and sustainability for the profession is upheld.

Nursing provides an integral element of the care process and so engagement with the transformational programmes seeing technology as an enabler to support new roles within practice is important. Informatics is a core vehicle to support and enable this change to happen. At times, it can act as a springboard for nursing to instigate, participate, and lead on eHealth transformation [6].

Ireland, as a late adopter in the deployment of eHealth initiatives, is on a rollercoaster ride of procurement, integrating technology and forecasting innovative care delivery managed through the Office of the Chief Information Officer (OCIO) in eHealth Ireland by 2020 [7]. A core aspect of the procurement process is selecting the most appropriate electronic care systems to match the identified and anticipated requirements, circumventing potential vendor lock-in and providing value for tax payers. Large deployment initiatives of regional or national software are, however, historically not without their challenges [8–11]. Previous studies highlight that system failures can be attributed to the gap between design and purpose, and report that the benefits often promised are variable in adoption uptake and use [8,12,13]. Thus, these studies provide scope for Ireland, as a late adopter, to reflect on lessons learned in other countries and identify issues of concern which may potentially lead to poor implementation practices.

Effective electronic communication is a core building block to facilitate integrated care. Access to integrated records is required to tackle the tsunami of chronic disease management and the associated issues evident in populations with co-morbidity and multi-morbidity [14]. Nurses (and allied healthcare professionals) need to be able to access and interpret timely health records across and between services to inform meaning and clinical decision-making while addressing the health and social care needs of the populations they serve. Core concepts relevant to delivery of care by the profession must be well-thought-out for inclusion in future integrated care records. For example, supporting and educating patients and families to make decisions and participate in their own care is a core time-consuming, nursing-sensitive intervention in a clinical encounter that needs to be stressed in reporting of care delivery. Other examples of concepts which are linked to the profession include assessment concepts and judgement terms relating to functional status, symptom management, and frailty [6,15].

There is an urgent need for countries to digress from medicalised models of care. It is estimated that more than 400 million people globally lack access to essential care [16]. Ireland as a country spends more proportionally on health than in any other EU country [17]. A core message initially conveyed by the Institute of Medicine, which continues to underpin national strategic plans, is the triple aim of care. Firstly, improving the experience of patient care, secondly, improving health of populations, and thirdly, reducing the per capita cost of healthcare [18]. Reflecting on the above provided the motivation to establish a dedicated ICNP Research and Development Centre (R&D) in SNHS in DCU in January 2016. What follows is a summarised account of activities completed in year one of the ICNP® R&D centre to instigate nursing informatics supporting and, where appropriate, leading on eHealth deployment in Ireland.

2. Materials and Methods

Making this transition from existing health and social care delivery practices to instigate eHealth Ireland requires cross functional teams with clinical and technical expertise to tackle the issues and challenges that lie ahead. The WHO advocates universal equitable quality and financially sustainable health and social care services, which are integrated [2,5]. For intersectoral integrated care systems to be realised, there is a need to bridge disciplinary boundaries between the clinical and technical domain. Described in the past as intertwined trajectories of technical and human practice, there is a need to understand those respective mutual influences which cross discipline-specific boundaries [19]. A core goal is to maximise return on investment, not only for the taxpayer, but also to ensure sustainability of the profession and to learn to inform future planned system development. The impact of digital health, the associated global trends with chronic disease, and the need to revise models of care for integration while delivering intersectoral care may not yet be crystallised for the profession, however, the progression and realization of these aims remains a concern for all.

This concern forms the rationale for establishing a research and development centre for informatics in 2016 in the SNHS in DCU. The school applied for and was successfully awarded accreditation by the International Council of Nurses (ICN) to set up a research and development centre for International Classification of Nursing Practice (ICNP®) [1], one of just 13 centres worldwide.

2.1. International Classification of Nursing Practice

Developed over a 25-year time frame, ICNP® is recognised as a formal terminology and a product of the International Council of Nurses [20]. Briefly, it provides a dictionary of over 4000 terms which are pre-coordinated concepts for diagnosis, outcomes, and interventions [21,22]. ICNP® is designed as a reference terminology and not an interface terminology designed for uptake and use in eHealth systems. This detail is important, because it distinguishes ICNP® from other standardised nursing languages designed initially for use with traditional paper-based documentation practices. ICNP® is also recognised by the WHO as a related classification to the Family of International Classifications [1]. To establish a platform to engage both technical and human practices on advancing integrated care agendas, the SNHS, DCU wished to create a place for scholarship where both technical and human practice issues could be considered and solutions sought. For this first year, we identified the following goals as part of the centre's development.

1.　Promote the use of ICNP equivalence tables with International Health Terminology Standards Development Organisation reference terminology (IHTSDO) [23] with national clinical programme objectives through the integrated services framework in the Office of the Chief Information Officer (OoCIO) [24].
2.　Act as the National Reference Centre for the SNOMED-CT® License for Terminology use in Ireland.
3.　Build on established relationships with existing ICNP accreditation centres and seek funding for future initiatives through research funding streams.
4.　Disseminate information on research activity, both nationally through the national nursing association and peer reviewed publications.
5.　Promote harmonisation with other standards-based concepts and terminology groups.

The centre devised a set of associated actions which were then used to guide the working group activity over the year. The stated value proposition for the centre was:

1.　To impact on existing fragmented national health services and strike a balance with powerful and affluent groups focusing on over-medicalised models of care.
2.　To represent the nurse practitioner and the service user as appropriate.

Reporting on progress made by the centre in 2016, we present each action identified in the results section as a background to describe the steps taken to complete these actions.

3. Results

Five specific action plans were created using a techno anthropology approach adapted from Botin Bertelsen and Nøhr [25]. These actions plans can be described as, (1) User group formation; (2) Research and development work plan; (3) Project management; (4) Education and training and (5) Dissemination. The five action plans were then linked to the centre's goals, as demonstrated in Figure 1, entitled "Action plan alignment to centre's goals to optimise tactical deliverables". Broadly speaking, the research activity formed six working groups which, for ease of reading, are presented in this paper under Action 1: user group formation. This will be followed by a brief summary of the additional research activity for Actions 2–6. Action 2 outlines the research design approach and the tools used to track decision-making within the centre in its first year. Action 3–6 provides a brief account of activity deliverables, project management and dissemination activity.
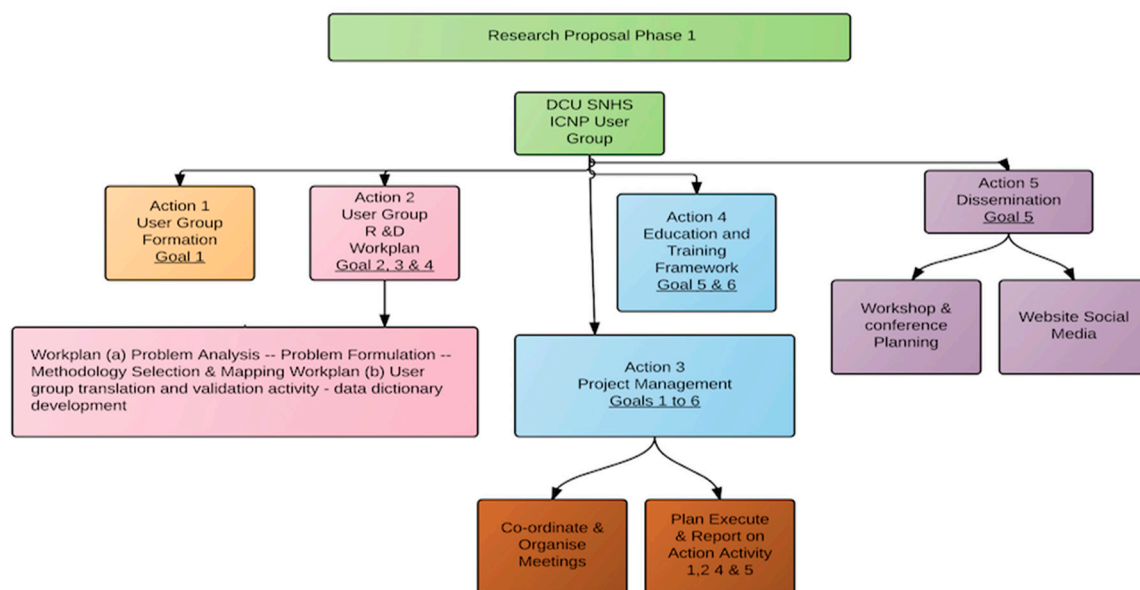

Figure 1. Action Plan Alignment to Centre's Goals.

3.1. Action 1: User Group Formation

Through discussion and existing online networks, a total of six working groups were established to focus on specific projects that presented challenges from both a technical and human practice (clinical) perspective. Three of these working groups delivered reports which are available to view on the centre's website [26]. Collectively, the six user groups created varied in size and formation, and presented to the centre a wide-ranging set of problems, queries, and activities. The connecting relationship between the centre's goals and the user group formation is presented in Table 1, with a summary of the related activities and deliverables completed within the individual groups. The group topics and related activities are then discussed in the proceeding section. Group 1 was primarily a technical group which focused on defining a high-level statement of requirements for data dictionary development. A data dictionary is a core requirement to achieve integrated care, as it defines core concepts and terminology that individuals use for co-production of care. Deliverables from this group included a draft interim report which signposted the reader to additional national related content on health informatics standards on data governance and management. Group activity included focused workshops and engagement with key stakeholders in the community to discuss inclusion of equity goals for marginalised groups. Group 1 links to Strategy 1 of the WHO integrated framework entitled "Empowering and engaging people and communities". Specifically, in 2016 the SNHS ICNP centre provided opportunities for skills and resource development to empower health services to deliver

on a number of core requirements on eHealth Ireland. This group also linked to Strategy 3 of the WHO framework for integrated care, in that it focused on reorienting the model of care by completing an early draft on "to be" requirements for a services-defined summary care record. This working group also aligned with the published EU report on big data in public health telemedicine and healthcare priorities with Recommendation 4, to support open data and data sharing a common framework needs to be established, and Recommendation 8, to develop standards in big data to simplify its application and improve interoperability [27] (p. 53). Further information is available on the published interim report on SNHS User Group Website [26].

Table 1. Connecting relationship between the SNHS ICNP® Centre goals and user group formation.

Goal	Group No.	Detail of Activity	Deliverable/Metric
Promote the use of ICNP equivalence tables with international health terminology standards and national clinical programmes objectives.	1	Phase one development of a national data dictionary platform. Bridging interdisciplinary gap between clinical and technical teams. Workshop with patient group representatives for knowledge transfer.	Development of use case report in line with national clinical programme objectives for integrated care eReferral, ePrescription and Discharge letter.
Act as a national reference centre for terminology use in Ireland.	2, 3, 5, 6	Readiness for engagement enhancement of clinical documentation practices to include clinical terminology and measure patient outcome. Implementation research and knowledge transfer on use of ICNP phase one.	Workshops developed on nursing informatics and use of ICNP delivered through National Nursing Agency. Clinical nurse specialist group formed in care of older person services.
Build on established relationships with existing ICNP® accreditation centres and seek funding for future initiatives.	2, 4, 5	Collaboration with ICNP® in Poland and ICN on eHealth Strategy agendas.	Contributed briefing documents to ICN strategic planning team Q3 and Q4. Collaboration ongoing with ICNP® Research proposal for funding completed.
Disseminate information on research activity.	All groups	Formal communication with core stakeholders. Linking with vendors on National Data Dictionary requirements.	Seven presentations Three reports published.
Promote harmonisation with other standards-based concepts and terminology groups.	4, 5	Collaboration with other major terminology groups in Ireland. Collaboration with national terminology release centre UK.	Mapping of nursing assessment documentation to ICNP® for inclusion in national data dictionary.

Group 2 was a clinically focused group of clinical nurse specialists (CNSp) working with older person services. The CNSp group was formed to tackle issues at a clinical level that could be addressed with support from the academic community to improve patient outcome or service delivery in line with national agendas. This group progressed to developing a number of small scale research and practice development initiatives using a bottom-up approach. The initiatives related to undergraduate resource enhancement, transitioning care and family support, complementary therapy interventions, tissue viability, infection control and wound management, stroke rehabilitation and patient information support. This working group aligned to a published EU report on big data in public health telemedicine and healthcare priorities, which indicates the need for engagement and the need for stimulating a continuous open dialogue with stakeholders and patient groups to exchange experiences and discuss how best to address challenges [27] (p. 55).

Group 3 and Group 6 related to education and training on health informatics and eHealth. In the summer of 2016, a student was recruited on successful completion of a health informatics module in the school to engage in a short undergraduate internship programme. Core deliverables on the internship was a set of resources on eHealth and its impact on future clinical practice for entry to practice nurses. Group 6 focused on developing training workshops and a postgraduate module on eHealth and health informatics. The website and resources aligned well to Strategy 5 of the WHO

integrated care framework, entitled "Creating an enabling environment: Focusing on bringing together multiple stakeholders for reform of health services and readying the workforce with health workforce training". The resources developed are also available to view from the centre's website [26].

Group 4 and Group 5 related to the mapping of concepts and terms with ICNP®. Phase one of this mapping exercise was completed in accordance with the centre's goals 2, 3 and 6, as indicated above in Section 2.1. In December of 2016, eHealth Ireland established its national centre for clinical terminologies, a core requirement to deliver integrated care. The SNHS ICNP User Group Centre applied for and was given a license to use SNOMEDCT®, a global standard reference terminology to support interoperability of electronic health records to achieve integrated care [23]. The R&D Centre was also listed on the National Reference Centre for SNOMEDCT® in Ireland. In Quarter 2 of 2017, the centre will commence work on the development of ICNP® equivalence tables with SNOMEDCT®, in line with national clinical programme objectives through the integrated services framework in OCIO directorate authority. This group work aligns with Strategy 3 of the WHO integrated care framework, to reorient to the model of care ensuring the systems designed are efficient and effective from the perspective of terminology mapping and facilitating intersectoral or integrated care platforms for shared care. It also aligns with the published EU report on big data in public health telemedicine and healthcare priorities with Recommendation 4, to support open data and data sharing, and Recommendation 8, to develop standards in big data to simplify its application and improve interoperability [27] (p. 53).

3.2. Action 2: Research and Development Work Plan

The centre used a techno-anthropological lens as a framework to guide the centre's development over the course of the year. This approach was adapted from Techno-Anthropology in Health Informatics Methodologies for Improving Human-Technology Relations [25]. The overarching method included a set of five action steps:

1. Interdisciplinary team involvement to be considered as appropriate
2. Problem Analysis
3. Problem Formulation
4. Selection of co- creators' users and actors
5. Selection of methods that can be used to predict the knowledge needed to solve the problem or attempt to do so [25] (p. 10).

This perspective provided an appropriate cyclical fit with the centre's goals and linked to Strategy 1, "Empowering and engaging people and communities", on the WHO integrated care framework. For example, in Group 1 and Group 2, the centre provided a protected space to create intertwined trajectories of technical and human practice to build mutual trust and respect while considering current and future challenges, as well as respective experiences and influences [19]. In a number of instances, the problems considered were complex and different tools were used at different times. One example is the use of the PESTLE analysis tool to track decision-making and assist in business plan development [28]. Six core questions that can be used in the PESTLE tool are presented in Table 2 relating to political, economic, cultural, technological, legislative, and environmental concerns.

Table 2. PESTLE Questions Used to Inform Decision-Making [28].

PESTLE Questions Used to Inform Decision-Making
What are the core political agendas in Ireland that can affect the centre's development?
What economic factors can impact the centre's development?
What cultural factors need to be considered by the centre?
What role has technology to play and what innovations can impact the centre's development?
What legislation can impact on the centre's development?
What are any environmental concerns that may impact the centre's development?

Applying these questions to the centre's business plan, Figure 2 presents a summary of the analysis responses to the questions completed and actions planned in Quarter 2 of 2016, entitled "Summary of Actions planned from PESTLE Analysis Tool exercise".

Figure 2. Summary of Actions Planned from PESTLE Analysis Tool Exercise.

3.3. Actions 3–6: Project Management, Educational Frameworks and Dissemination

Project management related initially to developing a physical space for the centre to operate from. Funding was provided by the National Nursing Agency (NNA) to ICN in Ireland, the Irish Nurses and Midwives Organisation (INMO), and matched supporting funds from the university in the form of a research equipment grant. Meetings were held quarterly with directors, and individual user groups met monthly in addition to collaborating online to meet targeted deliverables. Action 5, which related to educational and training frameworks, delivered a suite of learning objects over the year which are available to view online, on the centre's webpage. New dedicated modules for both undergraduate and postgraduate education on eHealth were developed and are now offered for the 2017 intake in Dublin City University. Feedback from students, one funded intern at undergraduate level and one postgraduate with an interest in terminology mapping was positive. As the centre is established to encourage scholarship, internships will be repeated again in 2017. Two PhD students are also engaged with informatics research and linked to the centre; their topics relate to falls risk reduction management and the development of a framework for a dashboard for nursing metrics in Ireland.

Dissemination on the centre's goals value proposition and planned activity was widespread. Seven presentations to key national stakeholder groups were completed over the year. The website was revised and updated to include a number of additional pages. Three reports were drafted and are available online to promote the centre's activity [26]. In addition, the director of the centre used social media as a promotions tool.

4. Discussion

At a societal level, the ubiquitous nature and impact of technology is evident both as an enabling and inhibiting force [29]. Discussion on the critical aspects of nursing requirements for integrated care needs careful consideration. For example, what are the essential interventions that the profession need to include in digital tools to make evident not only the contribution but the inherent values to support essential care? With an eye to the future, the profession must look beyond existing roles and infrastructure and see how nursing can adapt and evolve to support the digital patient, applying existing care processes in new environments with new tools to facilitate dynamic access to the most up-to-date information to inform care planning.

Since its inception in 2016, the incremental development of the ICNP® R&D centre has resulted in the provision of a dedicated facility to deliver phase one terminology services in Ireland. Although this has resulted in a number of tactical deliverables, such as use case diagrams and reports to inform future requirements particularly in relation to the eHealth Digital Service Infrastructure, it has not been without its challenges. The nurse-led user groups developed organically, with stakeholders presenting to the centre specific issues relating to planned service development. Much of the success of this venture is attributable to the respectful facilitation of the wide variety of views of user group members in relation to problem analysis and formulation (Sections 3.2 and 3.3 above). As a dedicated terminology centre, the facility provides a space for scholarship and reflection so that stakeholders can tease out the questions raised while accessing support for targeted solutions. The organisational function, project management and drafting of related reports in the centre have been provided primarily by the director of the centre. This has naturally limited the potential growth of the centre in its first year. To optimise return on investment, additional funding is planned in 2017 with additional staff recruitment scheduled. An administrative function, for example, is required to formalise infrastructure which will include an evaluation framework to measure impact on service provision. The centre is interested in evaluating and monitoring processes and as it develops services. External accountability from national bodies such as the eHealth Authority will inspect data and information governance processes. To successfully drive change and improve terminology services in Ireland, the ICNP® R&D Centre will also seek to qualitatively evaluate performance and practices with the established user groups. Initial evaluation in 2016 was positive and it is expected that evaluations of the centre will be performed annually. Our experience of using a techno-anthropological lens to enhance productivity in the centre has found that the formation of small user groups is preferable, as it facilitated more rapid group productivity and quick turnaround in decision-making. As relationships form and expertise grows, it is anticipated that some of the user groups will merge. Another measure of the success of the centre will be evident through a growing amount of research dissemination both nationally and internationally. Procurement of the national terminology license occurred later in the year than was originally anticipated, which hampered comprehensive mapping of the equivalence tables in 2016. Formal roles in terminology services are evolving in eHealth Ireland in Q1 of 2017, and so it is anticipated that the development of equivalence tables will progress at an accelerated rate and tactical deliverables will be published in the national data dictionary in 2017. National initiatives relating to cross border eHealth information services are currently underway with site visits to Brussels in Q1 of 2017. This collaboration relates to the national initiative to plan and deploy core and generic services for patient summary, medication records and ePrescription to the European Union member states by 2020.

5. Conclusions

The pace and speed of eHealth deployment to support intersectoral care is accelerating across EU member states, as increased investment in information technology is a stated priority in EU policy reports [27]. Supporting documentation from the WHO, such as the integrated care framework, provides a strong scaffold for the profession to work from [5]. At times, it has stressed the need for nursing to engage with informatics initiatives, and from the perspective of the ICNP User Group

in Ireland, it provides a supporting resource to springboard research and development clusters for nursing and midwifery to adopt and adapt over time.

The WHO framework for integrated care and the five core strategic drivers proved useful in the development of the DCU ICNP User Group. They can be used by the profession of nursing as a framework to instigate, participate, and lead out on important discussions on eHealth transformation in EU member states'. The context of health and social care with the escalating global demographic trend is a complex and multi-dimensional landscape that requires a measured insightful approach by the profession. With the available existing resources, the progress made by the SNHS ICNP User Group Centre in 2016 has been steady and progressive, and we look forward to cultivating scholarship within the centre and building on this initial foundation in the years to come.

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