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Nursing Informatics: Competency Challenges for Nursing Faculty

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Abstract. Nursing is the largest workforce in health care with nurses increasingly required to work with digital health technologies. However, despite the adoption of nursing informatics in Australia in the mid-1980s, nursing graduates are not being adequately equipped to use these technologies in a way that benefits the profession and improves patient care. Using a scoping review approach, this paper presents an analysis of contemporary published literature and describes the barriers to faculty engagement with digital health technologies in undergraduate nursing education. Thirty five articles were included and identified faculty lack of understanding of nursing informatics and resistance to technologies, limited infrastructure and expenditure, and limited educational resources and best practice recommendations as significant barriers to the integration of nursing informatics into undergraduate nursing curricula. Recommendations for faculty development will be explored.

Keywords. Nursing Informatics, Digital Health, Education, Nursing, Faculty, Technology Adoption Barriers

1. Introduction

Nursing informatics came to prominence in the 1970s, but computers were first introduced into nursing in the 1950s [1]. Subsequent advances in technologies resulted in rapid healthcare transformation aimed at improving patient safety. In response, informatics fields evolved, including nursing informatics, which linked technology with nursing. As the largest healthcare workforce [2], nurses have an integral role in digital health [3], using technologies, including: electronic health records (EHRs) [4], telenursing [5] and mobile applications [6]. Therefore, nurses must be digitally literate to function within contemporary healthcare [7], with acknowledgement that "the guiding principle for all learning and teaching strategies related to informatics and technology in health is that being technically competent is a fundamental element of caring" [8].

Due to the requirement for digital competency, nursing education has sought to embed nursing informatics into undergraduate nursing curricula, both in Australia [4,9] and globally [10-12]. Despite these efforts, undergraduate nursing students continue to

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be unprepared for the digital workforce, with barriers to digital competency, including poor digital literacy [13], limited access to digital technologies in laboratory and clinical settings [11], and a lack of nursing informatics in undergraduate nursing curricula [14]. In addition, faculty knowledge and understanding of digital health technologies has been identified as "the greatest block to incorporating technology into curricula" [11].

This paper provides an overview of contemporary published literature which describes the barriers to faculty use of nursing informatics in undergraduate nursing education. In addition, recommendations for faculty development are discussed.

2. Methods

This scoping review was conducted in adherence with the *JBI Manual for Evidence Synthesis: Scoping Reviews* [15] and the *PRISMA-ScR Checklist* [16], and emerged from a larger review of nursing informatics and undergraduate nursing curricula, developed as part of the requirement for a PhD. Scoping reviews are undertaken with the objective of providing an overview of existing evidence on the phenomenon of interest, mapping key concepts and defining working definitions [15].

Prior to the initial scoping review, an *a priori* protocol was developed and published [17]. The inclusion criteria were undergraduate nursing students (population), nursing informatics (concept) and education (context) published between 2015-2022. Searches across PubMed, ProQuest, CINAHL, Ovid and Scopus were undertaken using a string of key search terms, developed to reflect the key domains.

Covidence was used for duplicate removal, screening and data extraction. First round screening of titles and abstracts, including grey literature and bibliography sources, and second round screening of full text articles were reviewed by all the authors to achieve consensus. A data extraction template was used to collate data with a focus on sources addressing faculty knowledge, skills and attitudes to nursing informatics.

Absolute frequency counts, a form of descriptive statistics [18], were used to provide a summary of specific data points for interpretation of data. Qualitative content analysis, through decontextualisation, recontextualisation, categorisation and compilations to code and categorise data, was used to elicit meaning [19]. Research transparency was achieved through thick descriptions of data collection, extraction and analysis.

3. Results

A total of 3227 articles were retrieved with 53 articles included in the major review. Review of the extraction data, for the purpose of this scoping review, resulted in the inclusion of 35 articles with study settings including the United States of America (n=13), Australia (n=7), Canada (n=6), Israel (n=2), the United Kingdom (n=1), New Zealand (n=1), and Saudi Arabia (n=1). Some studies included multiple settings (n=5).

A range of digital technologies were described, including EHRs (n=15), handheld devices (n=4), barcoded medication administration systems (n=3), mobile applications (n=2), wearable devices (n=2), learning management systems (n=2), streamed, podcasted and vodcasted lectures (n=2), social media (n=1) and telehealth applications (n=1).

The articles addressed barriers to faculty knowledge, skills and attitudes regarding nursing informatics, including understanding of nursing informatics and technologies, infrastructure and expenditure, and educational resources and best practice.

3.1. Understanding of nursing informatics and technologies

A lack of understanding of nursing informatics emerged as a consistent theme [3,5,7,9,10,14,20-28], with Gonen et al. [10] noting that "the opposition to implementing informatics may also stem from a lack of understanding of how informatics can contribute to the quality of nurses' work". A link between this lack of knowledge and resistance to the use of technologies was also identified [14,22]. Causes of faculty resistance to technology, included discomfort with technology [21,24,29], generational resistance [30], stress [31,32] and negative attitudes to technology [26]. Learning and technology resistance theories [33-35] were applied in a number of studies [10,22,30,31,36] to explain faculty resistance to technology.

3.2 Infrastructure and expenditure

Issues with university infrastructure, including costs [10,30-32], a lack of technical support [6,21,23], poor internet connectivity [36] and limited access to EHRs [11,31,36], were identified as barriers to implementing nursing informatics into curricula. Wilbanks et al. [37] noted the cost prohibitive nature of educational EHRs, observing that those technologies based on clinical systems lacked the functionality required in educational settings; this was further complicated by a lack of the necessary infrastructure [22].

3.3 Educational resources and best practice

Embedding nursing informatics into curricula was recognised by faculty as a significant challenge due to a lack of clear definitions, with "the absence of a clear definition of mobile technology and its boundaries and where they lie in clinical nursing education" identified as a gap in the current body of knowledge [21]. A content rich curricula, a lack of best practice recommendations [10,30-32], and limited educational resources [27] further impeded integration of nursing informatics into education.

4. Discussion

The integration of nursing informatics into undergraduate nursing curricula and the concurrent challenges faced by nursing faculty are compounded by a number of issues. A lack of a clear and consistent taxonomy to describe informatics has resulted in "an expanding cloud of chaos" [38], with nursing informatics also struggling to define its body of knowledge [39]. Digital literacy rates of nursing students entering tertiary education are heightened by the lack of investment in literacy courses [40]. In addition, the lag in digital transformation in the tertiary sector [40] and lack of investment in EHR for nursing education [38], means that faculty who are wanting to keep pace with this rapidly developing technology are not being given access to authentic learning resources. Underpinning these issues is the lack of clarity on optimal pedagogical practice and the informatics concepts which should be part of curricula [27].

The evidence is clear, consistently noting a recurrence of the identified themes, over publications spanning more than seven years, which indicates the need for further research into facilitators for faculty engagement with nursing informatics is required.

5. Conclusions

As digital technologies have become the mainstay of global healthcare, the urgent need to prepare nursing graduates for a digital workforce has emerged. Despite the requirement for undergraduate nursing education to reflect the realities of clinical care, there remains resistance and confusion regarding nursing informatics and its place in the undergraduate curricula. This scoping review has identified some of the barriers to faculty engaging with nursing informatics, including limited understanding of nursing informatics, technology resistance and stress, and poor infrastructure. With the move to an increasingly digital workplace, nursing informatics must be considered as a key aspect of nursing care in the 21st century; only then, will nursing graduates be able to provide patient care outcomes the digital revolution promises.

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