

# Innovation in Applied Nursing Informatics



# NI2024

## Nursing Informatics

### Manchester UK

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# INNOVATION IN APPLIED NURSING INFORMATICS

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Internationally, health informatics is driven by developments in biomedical technologies and medical informatics research that are advancing in parallel and form one integrated world of information and communication media and result in massive amounts of health data. These components include genomics and precision medicine, machine learning, translational informatics, intelligent systems for clinicians and patients, mobile health applications, data-driven telecommunication and rehabilitative technology, sensors, intelligent home technology, EHR and patient-controlled data, and Internet of Things.

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# Preface

## Message from the NI2024 Scientific Programme Committee

On behalf of the Scientific Program Committee, welcome to the 16th International Congress on Nursing Informatics (NI2024). We would like to welcome all IMIA NI members, students, practitioners, industry partners and others interested in nursing and health informatics attending NI2024. NI2024 is the preeminent conference for IMIA NI and the leading scientific meeting for health and nursing informatics research and practice. This meeting is particularly special, as we celebrate the 40th anniversary of the establishment of IMIA NI, the Nursing Specialist Working Group for the International Medical Informatics Association. The theme for NI2024 is Innovation in Applied Nursing Informatics, highlighting the importance of ensuring that any innovations in the field are applied into health care settings. Given our focus on application of nursing informatics we have introduced a new type of presentation, the case study, for this year's conference. Case studies highlight how we can take evidence-based digital interventions into practice settings. The conference has also provided the opportunity for individuals to meet and learn from some of our pioneers in the field of informatics.

The Scientific Programme Committee was responsible for eliciting, evaluating and organising the NI2024 conference programme in line with the goals of IMIA NI. We received 408 submissions for papers, case studies, posters, panels, debates, workshops, technology demonstrations and pre-conference tutorials, from 27 countries. Each submission was reviewed by up to 3 reviewers, with feedback provided to authors. Every effort was made to ensure that we provided the opportunity for as many authors as possible to share their work given the constraints of the conference timetable. We have a total of 275 accepted submissions, the results of which are reflected in the Conference Programme and the Proceedings. The Proceedings contain open access full papers, case studies and posters indexed in MEDLINE. We have an exciting programme that includes 3 keynote speakers, a plenary panel, and a fireside chat with individuals early in their career in informatics.

Our keynote and plenary sessions cover topics such as artificial intelligence in nursing, leadership and the role of nursing informatics for sustainability. There are 22 paper/case study sessions with 88 papers and 24 case studies, 18 panel discussions, 16 workshops, 4 debates, 4 technology demonstration sessions with 16 technology demos, 6 tutorials and 2 poster sessions with 103 poster presentations to attend. We hope that attendees have the opportunity to learn from and network with others and find new ideas and ways innovate in their areas of practice and research. We are grateful to the members of the Scientific Programme Committee - Emma Collins, Karen Courtney, Angel Lu, Judy Murphy, Mustafa Ozkaynak, Laura-Maria Peltonen and Ann-Kristin Rotegård - for their support in organising the scientific programme. We are also indebted to members of the Local Organising Committee - Paula Anderson, Fran Beadle, Dorothy Bean, Kelly Calvert, Richard Cox, Claire Ford, Kumbi Kariwo, Fiona Mills, Sam Neville, Melanie Ruston, Chunhu Shi, Yimin Tang and Cristina Vasilica. The conference is being held at

the University of Manchester, UK and we hope that you find the time to enjoy the vibrant culture of the city while you are here.

Dawn Dowding and Leanne M. Currie  
Co-Chairs of the Scientific Programme Committee, NI2024

## About the Conference

As health information technology use becomes necessary for the provision of care globally, so does the need for a focus on its innovative use.

This book presents the proceedings of the 16th International Conference on Nursing Informatics, held in Manchester, England, in July 2024. This quadrennial international conference provides one of the most important opportunities for healthcare professionals from around the world to gather and exchange expertise in the research and practice of both basic and applied nursing informatics.

The theme of this 16th conference is Innovation in Applied Nursing Informatics. The book includes all full papers, as well as case studies and poster summaries from the conference. Submissions to the conference covered a range of themes such as: applied clinical informatics; education; global health; innovation and entrepreneurship; public health – population health; research and methods; and user-facing technologies. More specific topics included: generative AI; informatics integration in education; equity, diversity and inclusion; technological innovations; patient-centred care; data analytics; documentation burden; mobile health; and virtual care. These themes and topics highlight the diversity and breadth of research and innovation in the field of nursing informatics, emphasizing the integration of advanced technologies, the enhancement of education and professional development, and the ongoing efforts to improve patient care and health outcomes.

### Scientific Programme Committee

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## **Peer Reviewers**

Nearly 200 reviewers from around the world participated in the peer review process.

## **Sponsorship Partners**

### **Conference Host**

The conference was kindly hosted by the School of Health Sciences, University of Manchester, UK.

### **Sponsorship Partners**

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## **Submissions**

Number of submissions: 384

Number of accepted submissions: 275

These submissions may be broken down as follows:

Papers = 88

Case study = 24

Panels = 18

Debate = 4

Technology demo = 16

Workshop = 16

Pre-conference tutorial = 6

## **Authors**

Submitting authors are from: Australia, Brazil, Canada, China, Finland, France, Germany, Ghana, Hong Kong, Israel, Italy, Japan, Mexico, New Zealand, Nigeria, Norway, Oman, Portugal, Saudi Arabia, Slovenia, South Africa, South Korea, Switzerland, Taiwan, Turkey, United Kingdom, and the United States.

# AI and Big Data: Current and Future Nursing Practitioners' Views on Future of Healthcare Education Provision

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**Abstract.** Artificial Intelligence (AI) is defined as “the capacity of a computer, robot, programmed device, or software application to perform operations and tasks analogous to learning and decision making in humans, such as speech recognition or question answering. Chat Generative Pre-Trained Transformer (ChatGPT) represent an example of this promising technology as it is designed to communicate and interact with people similarly to a human being”. The introduction of any form of AI based technologies could be beneficial in nursing education and healthcare provision. A questionnaire co-created with ChatGPT was administered to nursing students, nurses and educators aiming at exploring how those technologies would impact on the world of healthcare and education. 176 participants were recruited. Data analysis showed that the perceived potential benefits of introducing AI include: improved quality of nursing care, of the diagnostic process and of job satisfaction. Conversely, some of the risks would be: limited opportunities to critical thinking and reduction of interaction and collaboration.

**Keywords.** Artificial Intelligence, ChatGPT, Nursing care, Big data, Education

## 1. Introduction

Artificial Intelligence (AI) is defined as “the capacity of a computer, robot, programmed device, or software application to perform operations and tasks analogous to learning and decision making in humans, such as speech recognition or question answering” [1]. So,

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AI would, to a certain extent, simulate human intelligence equipping machines with the ability to “think” and “act” like humans [2,3].

An AI chatbot is a type of chatbot that uses AI to converse with people and to respond to user queries in a human-like way [2,3]. Chat Generative Pre-Trained Transformer (ChatGPT) is a special chatbot released by its parent company OpenAI [4]. It is a system designed to communicate and interact with people in a similar way to a human. It is constantly learning and improving its abilities and it is capable of answering a variety of questions and/or provide several information [2,3].

The use of ChatGPT and other open AI based technologies could be beneficial in nursing education for instance in session planning, simulated scenario development, in providing additional opportunities to explore available resources for seminars delivery and or exam preparation [5–8]. Moreover, chatbots such as ChatGPT are currently implemented to boost student engagement, support group activities, produce interactive learning tools, and deliver swift feedback and assessment in Higher Education [7]. AI could be used to improve nursing school curriculum by analysing curricula available on the internet and by taking into due consideration students’ and staff’ feedback on their past teaching and learning experiences. According to a path analysis approach it may predict nursing students’ intent to use AI-based healthcare technologies [9].

However, the implementation of ChatGPT in education might pose several challenges and risks that need to be considered by both lecturers and students [7]. The misuse of this technology may prevent students’ from developing crucial skills, including writing [10]. Furthermore, students could potentially exploit ChatGPT to cheat on exams or could incur in plagiarism or generate inaccurate and incomplete data when writing reports [2,3,11,12]. Despite these concerns, students could be educated to use ChatGPT in a constructive and ethical manner [7].

AI could also be useful for healthcare provision since applicable for instance to the diagnostic and therapeutic process in various perspectives such as global and public health, patient monitoring, patient engagement and compliance, as well as administrative activities [13–19]. Similarly, to the Higher Education field, there could be some disadvantages following the introduction of AI in healthcare. Some disadvantages could be limited accuracy, bias and limitations of data, lack of context, limited engagement and no direct interaction with health professionals [14,20].

A recent study has shown that nurses have moderate perceptions and positive attitudes towards the use of AI. Notably, significant differences have been observed between nurses’ perceptions of AI based on gender and social status, as well as significant difference between nurses’ attitude toward AI, and age, qualifications, social status and years of experience [21].

This study aims at exploring nurses’, educators’ and students’ views on how ChatGPT could potentially impact the world of healthcare and education in the near future and the repercussion that this could have on the nurse-patient relationship.

## **2. Methods**

An observational study was conducted on a convenient sample of nursing students, nurses and educators voluntarily recruited in a Northern Italy University. An online questionnaire based among others on multiple choice and Likert-type questions was administered.

ChatGPT [4] was asked to create a questionnaire designed to explore the views of the participants on the use of AI. The authors then revised the proposed questionnaire and paraphrased some questions for clarity.

The study was approved by the Research Ethics Board of a Northern Italian University. Data were stored in an electronic spreadsheet and analysed with the statistical software Jamovi 2.3.18. Descriptive statistical calculations were performed such as: mean, standard deviation, frequencies and percentages. Analyses with ANOVA were performed to identify significant differences with a 95% CI. The internal consistency was calculated by using Cronbach's Alpha while the sample size was measured with the KMO.

### 3. Results

A total of 176 subjects responded, of whom 70.5% (n = 124) were female and 29.5% (n = 52) male. The most involved age class was comprised between 18 and 25 years old [36.9% (n = 65)] followed by 26 to 30 years old one [17.6% (n = 31)]. With regard to the role held, students from the Nursing degree program 37.5% (n = 66) were the most representative followed by nurses 32.4% (n = 57), Master's students 20.5% (n = 36), and nursing educators 6.3% (n = 11). 37% (n = 65) of the participating nurses held a non-university diploma, 33.1% (n = 57) a Bachelor's degree, 19.2% (n = 33) possessed a 1<sup>st</sup> level Master's degree 5.8% (n = 10) and the remainder of the sample held a Ph.D. and 2nd level Master's degree.

25.7% (n = 38) of the participants worked in the medical area, 14.9% (n = 22) were based in ICU, 12.8% (n = 19) were employed in A&E, 8.1% (n = 12) were in charge of the surgical area. 38.5% (n = 57) of the sample did not specify any clinical setting.

The instrument showed good internal consistency ( $\alpha = 0.852$ ) and an equally good sample size (KMO = 0.880) and the Bartlett's test of sphericity showed a p-value < 0.0001 (Chi square= 1316.140 and df=210) [22]. No changes in internal consistency reliability were found by excluding each item one by one.

50% to 60% of all respondents agreed on: the ethical implications that the use of AI might have on nursing, the positive impact of AI on nursing practice and their inclination on explaining the magnitude of AI implementation to nursing students.

Moreover, 60% to 70% of the respondents believe AI implementation would help in reducing healthcare expenditure, provide for equal gender opportunities in nursing, improve student-mentor relationship and finally make nursing education more inclusive. More than 70% of the sample size agreed on the positive role that AI may play in fulfilling individual training needs (73.0%), in improving the quality of care (80.0%) and the quality of nursing education (85.1%). Nursing practitioners agreed on the fact that nurses (86.8%) and educators (87.9%) should be educated on the use of such technologies (86.8%) and that they would be inclined to use them as well (89.7%).

The sample also expressed scepticism with very low levels of agreement when asked whether AI could lead to decreasing or increasing in the number of nursing staff (36.4%) or the replacement of staff in charge of nursing education (18.5%).

Nursing practitioners reported that AI could improve nursing care outcomes in 26.9% (n = 100) of cases, provide faster and more efficient care in 25.5% (n = 95), ensure improved accuracy in diagnosis in 22.6% (n = 84) and promote greater job satisfaction in 21.0% (n = 78). The sample listed the most suitable tasks that would benefit from the introduction of AI. In the first place, among those tasks, they indicated administrative

activities in 39.4% (n = 145), followed by patient monitoring in 28.8% (n = 106), patient education in 18.2% (n = 67) and support to the decision-making process in 12.2% (n = 45). Practitioners pointed out that there might be potential risks related to AI adoption in care which are: the decreased interaction between practitioners and patients in 30.4% (n = 115), misinterpretation of data and subsequent clinical errors in 25.9% (n = 98) and the limited capacity of the algorithm in 24.3% (n = 92). Nursing professionals also identified some of the obstacles that the current healthcare system may pose to the introduction of this technology. First of all, 31.8% (n = 55) of the respondents foresee resistance opposed by professionals as one of the major obstacles followed by a lack of financial resources in 30.1% (n = 52) of the sample and by technological limitations in the organisation in 20.8% (n = 36) of the participants. With regard to the use of AI in nursing education, the respondents considered the tool useful in simulations 40.1% (n = 144), in the presentation of teaching activities 28.4% (n = 102) and in the development of personalised learning 16.2% (n = 58). Once implemented, the potential risks or disadvantages of this technology in education were limited opportunities to use critical thinking in 31.3% (n = 101) for the respondents, the reduction of interaction and collaboration in 29.7% (n = 96) of the sample, the inaccuracies of algorithms in 22.9% (n = 74) and the reduction of educators 15.5% (n = 50). The obstacles perceived by the sample on the use of AI in education substantially overlap with those already described on the use of this technology in care.

#### 4. Conclusions

AI and Big Data are relatively new technology with potential revolutionary applications in nursing care and education. This study shows that these technologies are perceived as attractive and potentially beneficial by student nurses, nurses and nursing practitioners. The almost ubiquitous presence of those technologies in daily life has been impacting participants' life in many ways and promoting a positive perception of them. According to the participants, AI and in particular ChatGPT might bring, if implemented, several positive implications in nursing education and care. Participants foresee the opportunity to improve the effectiveness and efficacy of the diagnostic and therapeutic processes while ensuring a more personalized teaching and learning experience by equipping students and educators with state-of-the-art technologies, up-to-date teaching materials and ways of delivery. Nevertheless, respondents identified some negative aspects that might pose risks in building and maintaining a profitable nurse-patient relationship. In fact, AI might play a potentially disruptive role by reducing the amount of direct human interaction between nurses and patients. This could diminish the personal touch and empathy in care, which are fundamental components of a strong nurse-patient relationship.

This eventuality might also jeopardise students' ability to build such relationship. While the introduction of AI in Higher Education might represent an invaluable opportunity for taking the whole teaching and learning experience on a higher level the related implementation strategy must be carefully considered. In fact, students, if not adequately educated and supervised, might unethically use those systems and produce inaccurate reports and/or project works without paying the required attention and efforts. Thus, further studies would be recommended to delineate appropriate strategies and to promote the ethical use of those promising technologies in clinical settings and Higher Education.

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