Reflection of Artificial intelligence and robotics on Medical-Surgical Nursing practice: Egyptian experience

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Abstract: **Artificial intelligence and robotics have been emerging worldwide Recently Egypt experience is evolving as scientists in Mansoura University have proposed robots for isolation hospitals, the first author of this research have previously studied artificial intelligence in the form of mobile medical health application, Nursing students presented another experience at Ain Shams University as they proposed robot nurse to carry out primary nursing tasks. Aim: This study aimed to explore the potential impact of artificial intelligence and robotics on medical-surgical nursing practice from the point of view of both patients and nurses. Methods: Through four months, subjects of the study, 16 Patients and 20 medical surgical nursing practitioners were interviewed by the investigators using open-ended questions about their thoughts and opinions about the effects of AI and robotics on health care provision, focusing on medical-surgical nursing tasks. In addition, a qualitative descriptive analysis of their answers was done. Results: Answers of both patients and nurses are classified into four main themes: first: compassion and humanity of nurse practitioner versus AI and robot. Second: boundaries and constraints of AI and robotics. Third: Advantages of AI and robotics. Finally, the fourth theme was about ethical and social worries. Conclusion: This research provides current knowledge on patients' and nurses' opinions about the impact of AI and robotics, focusing on medical-surgical nursing practice. Contradicting the opinion of biomedical informatics professionals, patients and nurse practitioners found that the limitations of AI and robotics exceed their advantage. Further extensive studies are needed to present an in-depth understanding of the opinions of patients and nurses as well as other health care providers.**

Keywords: **Nursing, Medical-Surgical Nursing, Artificial Intelligence, AI, Robotics, Egypt.**

1. INTRODUCTION

Background:

Technology has evolved speedily in the last few decades allover the world. It introduced many benfits as well as drwbacks. Benfits include better research tools, improvement of life quality as well as easier accessibility to a lot of services and consumer needs (Stokes & Palmer, 2020)

Artificial intelligence (AI) is a branch off computer science that focuses on building machines that can perform tasks that typically need human intelligence, such as decision making, speech recognition, visual perception, and language translation (Lexico, 2019). AI health technologies (AIHTs) are becoming increasingly prevalent in clinical settings worldwide, and global spending on these technologies is predicted to exceed US $36 billion by 2025 (Robert, 2019). Given their potential to enhance workflows and guide clinical decision making, AIHTs are predicted to directly and indirectly transform the nursing profession in various ways.

Nurses are the largest group of health professionals, and they currently practice in diverse settings and roles across the 5 domains of nursing activity identified by the Registered Nurses' Association of Ontario (RNAO; ie, administration, education, clinical practice, policy, and research) (Registered Nurses' Association of Ontario; 2020). Within the nursing profession, the delivery of person- and family-centered compassionate care is a core and valued component of nursing theory and practice (Curtis, 2015) and is reflected in numerous nursing practice frameworks (Sharp, McAllister, Broadbent, 2016) Compassionate care helps nurses to shift their focus from simply completing tasks to engaging fully with patients by recognizing and responding to their individual needs, promoting well-being, and forming therapeutic relationships essential to effective care (Perez-Bret, Altisent & Rocafort, 2016)

Nurses have usually been regarded as clinicians that provide compassionate, safe, and empathetic health care (Nurses outpace other professions for honesty & ethics, 2018). Caring is a basic characteristic, expectation, and moral commitment of the nursing and caregiving occupations. As well as caring, nurses are anticipated to undertake ever-expanding duties and complex tasks. In part because of the increasing physical, intellectual and emotional demandingness, of nursing as well as technological developments, artificial intelligence (AI) and AI care robots are rapidly changing the healthcare landscape. As technology becomes more advanced, efficient, and economical, opportunities and pressure to introduce AI into nursing care will only increase (Stokes, F., & Palmer, A. (2020).

concerns have been raised that the use of robots in clinical practice is deceptive for some patients creates tension, infantilizes older adults (Clipper B, Batcheller J, Thomaz AL, Rozga, 2018)., and may promote culturally insensitive care(Yahia & Bayoumi, 2021) which could serve to weaken the therapeutic relationships among nurses and those they care for. Given these mixed findings, it is crucial that nurses understand the needs and preferences of residents, families, and caregivers before introducing SARs, and they must continuously monitor how the resident is responding to the robot. Clarifying expectations about robots has been suggested as a means of preventing deception(Archibald M, Barnard, 2018)

Egypt hit the AI and robotics practice by a group of Ain Shams university students from Faculty of Computers and Information designed Shams in an effort to serve up Egypt's healthcare sector. The idea for the robot stemmed from situations brought upon by the coronavirus pandemic, including the need to follow preventive measures. (Almasry alyoum, 2021)

The current version of the android performs numerous tasks, for instance taking medicines from the pharmacy delevering it to the patients' room, taking analysis samples from the patients' room to the lab, making video calls among patients and doctors and reading the uncomplicated conditions of a patient according to the monitor next to them," the young female told Xinhua.

Shams, the robot nurse, can similarly sterilize a corridor or rooms at a hospital and conduct a patient's initial diagnosis through questions and answers about temperature and symptoms,

Aim:

Biomedical information professionals debate the great advantage for application of AI and robotics in health care and a lot of tasks related to medical-surgical nursing practice such as monitoring and recording vital signs, hieght and weight, carry patient, present food and even the provision of patient education through smartphone health apps. On the other hand there is limited presentation of the opinions of health care consumers and providers. Therefore the investigators aimed at exploring potential impact of artificial intelegience and robotics on medical-surgical nursing practice according to the point of view of both patients and nurses.

Research design:

Qualitative research design were used in the current study. Qualitative research concentrations on obtaining data through open-ended and conversational communication. It focuses on what study subjects think as well as the reasons byond these opinions.

2. METHODS

One to one interview of 16 adult patient with various medical surgical disorders as well as 20 medical surgical nursing practioners were interviewed by the investigators using open ended questions about their thoughts and opinions about the

effects of AI and robotics on health care provision, focusing on medical-surgical nursing tasks. Each interview took 30 - 45 minutes, it was recorded after gaining participant consent to record. Afterward the investigator wrote down the transcript of the record.

The structured interview included five open-ended question to allow the study subjects to respond in more detail on the study topic. The participants were asked to provide any thoughts on the research topic. Descriptive qualitative data analysis were used to investigate these responses. Inductive thematic coding of the data was done. Responses were collated and the particpants' answers were read several times to achieve familiarization with the participant responses. An inductive coding process was laboring in which brief descriptive codes were applied to each comment. Numerous codes were applied to answeres with multiple meanings. Statements and codes were reviewed and compared to investigate similarities and differences. Codes were discussed by the investigator and subsequent revisions were made. First-order codes were grouped into second-order categories based on the shared aims of the meaning they provide to gain a descriptive summary of the responses.

3. RESULTS AND DISCUSSION

Participants data:

Figure (1) shows that the study sample consists of 16 patients and 20 medical-surgical nurse practitioner. Figure (2) shows that the nurses were 12 female and 8 male, while the patients were 7 female and 9 males.

The age range of the study group from 27 to 56, with mean age 43 SD$\pm$ 4
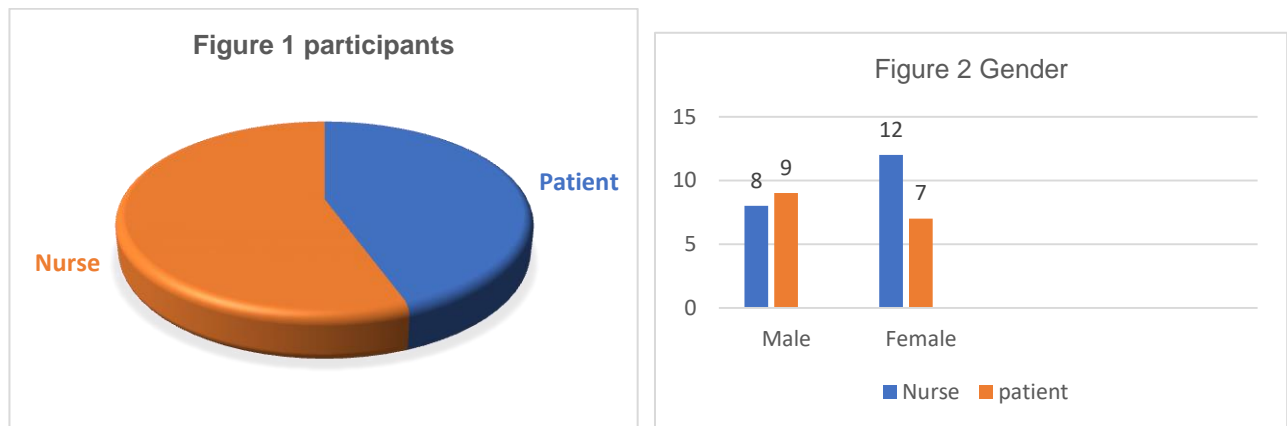
Qualitative data analysis:

Answers of both patients and nurses classified into four main themes:

I-Compassion and humanity of nurse practitioner versus AI and robot:

Both Nurses and patients addressed the issue of humanity as artificial devices and robots lack compassion and empathy, they focused on communication issue and inability to build theraputic relationship with a robot or any AI device. some of the answeres qouted belew.

"Robot can't detect patients' facial expression, empathy is human competency only" – Nurse

"how can a mashin reassure me when I have worries" – Patient

"I would never allow robot to touch me" – Patient

"Mashins can never understand human feelings" – Nurse

"smartphone apps are ok, but I still need the feeling of care and support by the doctors and nurses" -Patient

"If I know a robot will participate in my surgery, I will never do it" – Patient

II- boundries and constrains of AI and robotics:

Most of the respondant has skeptic attitude toward abilities of AI and robots. They also addressed technical issues in Egypt such as electerecity cut-off, poor internet. Nurses mentioned programing issues of such mashins, they expected programs to stop or corrupt which would affect patients' safety. The nurses also addressed the issue of biomedical engineers' shortage Some of the nurses qoutes are listed below:

"Mashin can never replace human, it could have errors or technical issues, we aleady suffer from technical issues in monitors and syrange pumps, we don't have enough engineers for maintenance for them, how can we add more mashins!!!!" - Nurse

"Robots!!! And then we have to communicate with those robots to gain and document patient data.. it's a joke .. and then nurses stop caring for the patient and care of robots who care about the patients.. robots can not replace us" – Nurse

As for patients most of their opinions regarding limitations of AI and Robots were anxiety and fear of their abilities to deal with human, some of the patients' responses are quated below:

"Robot… never, it may give me electric shock, it is a mashin working with electericity" – Patient

"Do you mean a robot will hold a syrange and stick me!!! I would rather stay ill forever than allowing this to happen" – patient

"Mashins corrupted all the time, how can I be sure the mashin is working well, it have no brain" - patient

III- Advanteges of AI and robotics:

Nurses addressed the issue of infection control as robots can serve patients in isolation and minimize nurses contact with them, they also mentioned the issue of carrying overweight and obese patients. Decrease nurses workload was also one of the advantages mentioned by nurses. As for patients they focuses on quick response and accurate reading of vital signs, some of the responses are qouted below:

"Robot would be great in isolation unites to decrease our contact with the patients and protect us" – Nurse

"I think AI will help us to focus on humanity and patient centered care while we delegate some tasks to those robots" – Nurse

"In the field of surgery robots do a great deal, assistive robot nurse is better than me I admit" - Nurse

"Technology is good, when I have a robot nurse, I will never call the nurse and wait for half an hour" – patient

"mobile health application helped me a lot especially the medication reminder" - patient

IV- Ethical and social worries:

Participants addressed the issues of patients' safety, confedentiality and social attitude of others.

"computers are hacked, what of this devices and robots was hacked and my confedential data become public!!" – patient

"what if these machins have camera to invade my privacy!!" – patient

"Robot nurse would be a toy for the visitors, not just children, adults can play with it and ruin it at the first day" - nurse

Limitations:

- The study subjects are relatively small and limited to one geographical area: Cairo, Egypt.

- The idea of AI and robotics still out of practice, so the participants opinion depend on perception not real life experience.

4. CONCLUSION

The current study provides current knowledge on patients and nurses opinions about the impact of AI and robotics with focus on medical surgical nursing practice. Contradicting the opinion of biomedical informatic professionals patients and nurse practitioners found the limitations of AI and robotics exceed their advantage. further extensive studies are needed to present in-depth understanding of the opinions of patients and nurses as well as other health care providers.

REFERENCES

[1] Almasry alyoum. 2021. Ain Shams University introduces robot nurse 'Shams'

[2] Blease C, Kaptchuk T, Bernstein M, Mandl K, Halamka J, DesRoches C. 2019. Artificial Intelligence and the Future of Primary Care: Exploratory Qualitative Study of UK General Practitioners' Views. J Med Internet Res 2019;21(3):e12802. URL: https://www.jmir.org/2019/3/e12802. DOI: 10.2196/12802

[3] Curtis K. Compassion is an essential component of good nursing care and can be conveyed through the smallest actions. Evid Based Nurs 2015 Jul;18(3):95. [CrossRef] [Medline]

[4] DOI: https://doi.org/10.53350/pjmhs211572001

[5] Ehsan A. Yahia, Magda M. Bayoumi. 2021. Effectiveness of using SOKARY Mobile Application on the compliance of patients with Type II diabetes: A quasi-experimental study. Pakistan Journal of Medical and Health sciences. Vol. 15, NO. 7, JUL 2021

[6] Erickson,H., Salzman-Erickson, M. (2016). Future challenges and artificial intelligence in nursing , Permanente Journal, 2 (3) 15-243. http://www.iflscience.com/technology/google-ai-creating-own-ai/

[7] Lexico. Artificial intelligence. Lexico US Dictionary. 2019.   URL: https://www.lexico.com/en/definition/artificial_intelligence [accessed 2020-08-31]

[8] Perez-Bret E, Altisent R, Rocafort J. Definition of compassion in healthcare: a systematic literature review. Int J Palliat Nurs 2016 Dec;22(12):599-606. [CrossRef] [Medline]

[9] Questionpro. 2021 available at: https://www.questionpro.com/blog/qualitative-research-methods/

[10] Registered Nurses' Association of Ontario. Professionalism in nursing. Toronto: Registered Nurses' Association of Ontario; 2007.   URL: https://rnao.ca/sites/rnao-ca/files/Professionalism_in_Nursing.pdf [accessed 2020-08-31]

[11] Robert N. How artificial intelligence is changing nursing. Nurs Manage 2019 Sep;50(9):30-39. [CrossRef] [Medline]

[12] Sharp S, McAllister M, Broadbent M. The vital blend of clinical competence and compassion: How patients experience person-centred care. Contemp Nurse 2016;52(2-3):300-312. [CrossRef] [Medline]

[13] Stokes, F., & Palmer, A. (2020). Artificial Intelligence and Robotics in Nursing: Ethics of Caring as a Guide to Dividing Tasks Between AI and Humans. *Nursing philosophy : an international journal for healthcare professionals*, *21*(4), e12306. https://doi.org/10.1111/nup.12306

[14] Xinhua. 2021. Feature: Egyptian college students create "robot nurse" to help medical teams during pandemics. Available at. http://www.xinhuanet.com/english/2021-08/12/c_1310121928.htm

[15] Clipper B, Batcheller J, Thomaz AL, Rozga A. Artificial Intelligence and Robotics: a nurse leader's primer. Nurse Leader 2018 Dec;16(6):379-384. [CrossRef]

[16] Archibald M, Barnard A. Futurism in nursing: technology, robotics and the fundamentals of care. J Clin Nurs 2018 Jun;27(11-12):2473-2480. [CrossRef] [Medline]