Artificial Intelligence Robotics Utilization in Relation to Wellbeing, Burnout and Stress among Operating Room Nurses

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Abstract: Background: Operating room nurses play a significant role in healthcare teams, so it is crucial to be able to effectively use technology and keep up with changes. Artificial intelligence has the ability to track a nurse's workload, increasing their wellbeing and recognize signs of burnout or stress. **Purpose:** To examine artificial intelligence robotics utilization in relation to wellbeing, burnout, and stress among operating room nurses. **Methods:** A descriptive, correlational research design was used among a purposive sample of 55nurses who are working at operating rooms in Ain Shams Specialized hospital. **Instruments:** Four instruments were used (Unified Theory of Acceptance and Use of Technology, Well-Being Index (WBI) survey, Job stress scale and The Maslach Burnout Inventory General Survey). **Results:** Among the studied nurses the level of the acceptance of robotics surgery was low (80 %), the well-being was low (60 %), the stress was moderate (90.9 %) and the burnout was moderate (54.5 %).**Conclusion:** There was a statistical significant correlation between acceptance and use of information with robotics surgery utilization, wellbeing among studied nurses as (p-value < 0.05) and there was no statistical significant correlation with stress and burnout among studied nurses as (p-value > 0.05). **Recommendations:** Training courses should be conducted for nursing staff in the operating room about the importance of using the artificial intelligence robotics. Awareness of nursing staff about the main technical problems of artificial intelligence robotics and the importance of regular maintenance in the operating rooms should be increased. Further research should be conducted on utilization of artificial intelligence robotics in nursing practice.

Keywords: Artificial Intelligence, Burnout, Robotics, Stress & Wellbeing.

Introduction

Operating room nurses, who are an important part of the professional healthcare team, must be able to use technology efficiently and stay up with changes. Innovations like artificial intelligence (AI) and intelligent robots have a real impact on nurses since they are changing the way they practice their profession and posing new obstacles (Clipper et al., 2018).

Artificial intelligence (AI) is a field of study and a collection of information science and analytics technologies that can solve complicated problems using data. The methods used to educate computers to learn, think, observe, infer, communicate, and make judgments similarly to or better than humans are collectively referred to as artificial intelligence (AI). The technologies that make up artificial intelligence (AI) serve a variety of purposes, depending on the task or issue at hand (Robert, 2019).

Today's hospitals should make the most of artificial intelligence (AI), a sophisticated technique that leverages data to make wise judgments. AI has a lot of potential for the healthcare sector, from cancer detection to better diagnostics to better patient monitoring. AI can also reduce human mistake, automate monotonous operations, design a workflow for healthcare professionals, and eliminate irritation (Bohr and Memarzadeh, 2020).

Operating rooms are special hospital departments where surgical interventions are performed, and sterility is highly important. The advancement of information technologies has allowed operating theaters, which have a multidisciplinary team of surgeons, anesthesiologists, nurses, technicians, and pharmacists, to provide patients with innovative methods of care. The

ability to use technology successfully and adapt to developments is essential for operating room nurses, who play a significant role in the professional healthcare team (Ergin et al., 2023).

The term "robotic surgery" describes surgical procedures carried out with a robot's aid. For robotic surgery, new concepts and more sophisticated models are developed every day. Dimensions have decreased, functionality has risen, and, most recently, the usage of the technology has been made easier with the support of three-dimensional images as robotic surgery technology has advanced (Bramhe and Pathak, 2023).

Robotic surgery has continuously advanced from minimally invasive surgery due to the utilization of technology like laparoscopy. To guarantee patient safety, perioperative nurses and other members of the surgical team must be informed about new technologies and instrumentation, as well as the procedures and difficulties associated with their usage. Modern surgery has undergone a new revolution with the advent of robotic surgery, which combines all the advantages of minimally invasive surgery with the advantages of image stability and third dimension (3D) resources, as well as the reduction of hand tremors in the operating room and instrument mobility, particularly in operative areas with more constrained spaces (Madhok et al.,2022).

In many nations, robotic surgery is becoming more and more common across surgical specialties. However, nurses working in this highly technical setting risk paying too much attention to the robot and losing sight of the patient (Redondo-Sáenz etal., 2023).

Because robotic surgical procedures call for sophisticated medical equipment, nurses must complete an

educational program to earn the needed certification. Learning the hardware and terminology used in robotic surgery is the first step in training; setting up the system is the second. A robotic surgery nurse's responsibility during the preoperative stage include system setup and control, patient placement and positioning, and team safety (Atkinson, 2019).

It is the nurse's duty to set up the system and assure continuity throughout the process in robotic surgery, an area where teamwork has a big impact on success. Examining the experiences of medical professionals in supporting the adaption of the use of robots in surgery is becoming increasingly relevant. There are no defined guidelines for preparing the nursing staff to convert a robotic surgery to an open surgery, which may be a major source of stress for nurses. As a result, potential pitfalls and blunders during the conversion may occur, but they have never been documented. The conflicts over space and the lack of a protocol with a hierarchy of responsibilities during this procedure are where the most errors occur. For these conversions to be precise, repeated simulations, stronger leadership, defining the tasks of each team member, and rearranging the operating room are all important for these conversions to be successful. Each staff member should be aware of their responsibilities in robotic surgeries and their involvement in case of an emergency (Gill and Randell ,2016).

Well-being is a complex concept, encompassing an individual's appraisal of physical, social, and psychological resources needed to meet a psychological, physical, or social challenge (Dodge at al., 2012). Positive emotions and moods, the absence of negative emotions, life satisfaction, fulfillment, and positive functioning are the components of physiological and psychological nurses' well-being (Boyle et al. 2019).

Burnout is a state of work-related mental tiredness. Burnout affects nurses more than other professions for a variety of reasons, including low compensation. A person who has put too much effort into job-related duties and finds themselves getting disenchanted and unable to completely engage with work is said to be burned out. (Dyrbye et al. 2019).

The reaction of people that occurs when work pressures are not matched with their knowledge, skills, or capacities which tests their coping strategies is known as work-related stress. Numerous problems that nurse faced made nursing a very difficult career. It encourages poor organizational performance, high staff turnover, illness, absenteeism, decreased care quality, higher health care expenses, and worse job satisfaction (Tsegaw et al., 2022). These consistent efforts improve the performance of the entire healthcare system. However, there is a lot of burnout and unhappiness among the healthcare workforce (Kelly and Hearld, 2020).

Rapid AI deployment may be linked to nursing stress, burnout, and professional physiological and psychological health, which is the unique issue. (Kikuchi, 2020). The way nurses spend their time providing patient care is evolving because to AI integrations. AI technology will complement nurses in their roles as information integrators, health coaches, and providers of human care, rather than replacing them (Robert, 2019).

In light of the quick changes in technology, law, and patient demands, healthcare institutions must act

quickly. Artificial intelligence can help with pro-active patient treatment, less risk in the future, and streamlined business operations. Cost, quality, and treatment outcomes are driving the adoption and utility of artificial intelligence technologies in healthcare, which will assist nurses in determining their stress and burnout levels and enhance their wellness (Bakthavatchalam et al., 2020).

As a result, AI has a direct impact on reducing nurses' stress and burnout. AI can help automate routine, repeatable tasks so you can deploy your human resources where they are most needed. Therefore, AI can provide to help address turn-over rates and help reduce stress, burnout and enhance nurses wellbeing (Tsegaw et al., 2022).

Significance of the study

Artificial intelligence and robot technologies are developing daily. Robot-assisted surgery has become more popular recently. Robot-assisted surgery has becoming more popular in hospitals because to factors including safety, advancements, and a decrease in the risk of infection during surgical procedures. Both in the operating room and during surgical procedures, robots support the surgeon. If nurses are to care for patients in surgeries using these technologies, they should be well-versed in both the technologies and the preparation procedure. It is expected of nurses to continually learning and updating their knowledge of this rapidly changing technology. To meet the demands of a changing world and deal with stress so, nurses can improve their wellness at work and reduce burnout, nurses are expected to adapt to change and transformation (zemmar., et al, 2020). Also, because Ain shams specialized hospital is first hospital in Egypt to use robotic surgery and the only hospital uses this technology and no one conduct the same research, so the current study conducted to examine artificial intelligence robotics utilization in relation to wellbeing, burnout, and stress among operating room nurses at Ain Shams Specialized hospital.

Purpose of the study

The purpose of this study was to examine artificial intelligence robotics utilization in relation to wellbeing, burnout, and stress among operating room nurses at Ain Shams Specialized hospital.

Research Question

1) What is the level of acceptance and use of information related to robotics surgery utilization among Operating Room Nurses at Ain Shams Specialized hospital?
2) What is the level of wellbeing among Operating Room Nurses at Ain Shams Specialized hospital?
3) What is the level of job related stress among Operating Room Nurses at Ain Shams Specialized hospital?
4) What is the level of burnout among Operating Room Nurses at Ain Shams Specialized hospital?
5) What is the relation among acceptance and use of information with robotics surgery utilization, wellbeing, burnout, and stress among operating room nurses at Ain Shams Specialized hospital?

Methods

Research Design:

A descriptive, correlational research design was used to meet the purpose of the current study.

Setting:

The study was conducted at operating rooms in Ain Shams specialized Hospital, Cairo, Egypt. Ain Shams Specialized hospital contains 15

operating rooms where different surgeries (general surgery, obstetric surgeries, urology surgeries, vascular surgeries, orthopedic surgeries and cosmetic surgeries) are conducted. In Ain Shams Specialized hospital 38 Robotic surgeries are performed in stomach, liver, colon, anus and pancreas.

Sample:

The sample size was calculated utilizing the G Power program, with a power of 0.95, alpha of 0.05, and a medium effect size. The minimum sample size required for Pearson correlation analysis was 55 participants. A purposive sample 55 nurses who are working at operating rooms in Ain Shams Specialized hospital with different educational qualifications agreed to participate in the study. As this is the only place in governmental hospitals in Egypt utilize robotic surgery. So, the sample included all the working nurses in the operating room from the previously mentioned setting selected.

Instruments:

Instrument one: Unified Theory of Acceptance and Use of Technology (UTAUT) survey:

It consisted of two parts as follows:
▪ **Part 1:** Personal characteristics data of nurses: It is a structured questionnaire designed by the investigator to obtain personal data about staff nurses age, gender, years of nursing experience, qualifications, unit of work, marital status, and residence".
▪ **Part 2:** Unified Theory of Acceptance and Use of Technology (UTAUT) survey: It is developed by Venkatesh et al. (2003). The UTAUT survey which was used in predicting the acceptance and use of

information includes 20 items divided in to 5 subscales (performance expectancy, effort expectancy, social influence, facilitating conditions, and behavioral intention) four items in each of them. Each item was rated using 7-points Likert scale (1=very strongly disagree and 7=very strongly agree).

Scoring system:
The total score of UTAUT survey ranged from 20 – 140. Scores from 20 – 85 indicated low level of acceptance and use of robotics surgery care. Scores from 86 – 105 indicted moderate level of acceptance and use of robotics surgery care. Scores from 106 – 140 Indicted high level of acceptance and use of robotics surgery care.

Instrument two: Well-Being Index (WBI) survey:

It was developed by Dyrbye, et al., (2019). It consists of nine items to measure nurses' wellness. The scale includes seven dichotomous items and two scale items. Seventh and ninth questions used a 7-point likert scale (1=very strongly disagree and 7=very strongly agree). Answers which were either strongly disagree or neutral were scored 1 and from agree to strongly agree scored 2.

Scoring system:
The total score of WBI survey ranged from 9– 18. Scores from 1 – 10 indicated a low level of nurses' wellbeing. Scores from 11 – 13 indicated a moderate level of nurses' wellbeing. Scores from 14 – 18 indicated a high level of nurses' wellbeing.

Instrument three: Job Stress Scale:

It was developed by Parker & DeCotiis (1983). It was used to measure job stress and includes thirteen items divided into two subscales job anxiety

(5 items) and time stress (8 items). The scale response is distributed between five-points Likert scale (1for no stress,2 for little stress,3 ,4 for quite bit of stress and 5 for a great deal of stress).

Scoring system:

The total score of Job stress scale ranged from 13– 65. Scores from 0 – 13 indicated absence of nurses' stress. Scores from 14 – 38 indicated a mild level of nurses' stress. Scores from 39–49 indicated a moderate level of nurses' stress. Scores from 50– 65 indicated a severe level of nurses' stress.

Instrument four: The Maslach Burnout Inventory General Survey (MBI-GS):

It was developed by Maslach et al., (1996) and includes 16 items to asses' burnout. It was divided into three subscales exhaustion (five items), cynicism (five items) and professional efficacy (six items) All items are scored on a seven-point scale, ranging from (0) to (6). (0 = never; 1 = A few times a year; 2 = Once a month or less; 3 = A few times a month; 4 = Once a week; 5 = A few times a week; 6 = Every day with high scores for exhaustion and cynicism suggesting high levels of burnout and high levels of professional efficacy (an inverted subscale) suggesting low levels of burnout.

Scoring system:

The total score of MBI-GS ranged from 0 – 96. Scores from 0 – 57 indicated a low level of nurses' burnout. Scores from 58 – 72 indicated a moderate level of nurses' burnout. Scores from 73 – 96 indicated a high level of nurses' burnout.

Validity and Reliability

The instruments of this study were tested for validity through the dissemination of the instruments to a panel of experts consisted of two professors and three assistant professors from nursing administration department and psychiatric nursing department. The study instruments were considered valid from the experts' view.

Reliability of instruments

In the current study reliability of research tools used in the Alpha Coefficient test (Chronbach alpha). The Unified Theory of Acceptance and Use of Technology (UTAUT) survey Cronbach's alpha was 0.70. Well-Being Index (WBI) Scale's Cronbach's alpha was 0.73. Job stress scale Cronbach's alpha was 0.74 and Maslach Burnout Inventory General Survey Cronbach's alpha was 0.87 which indicated that the measures were highly reliable for the study's objectives.

Ethical Consideration

After receiving the approval of the Faculty of Nursing Ethical and research committee (January 2023) no 919 from the selected hospital, the study was conducted. Data were then collected. The study participants were guaranteed confidentiality and anonymity of data collection. Participants were given the assurance that taking part was voluntary and that doing so would carry no risks. Prior to collecting data, consent forms were also gathered from each participant and a brief explanation of the study was given to each one.

Pilot study

A pilot study was performed on 5 nurses to assess the usefulness and applicability of the study instruments,

spot any issues, and determine how long it will take to complete the questionnaire in the study population. No questions were changed or clarified based on the findings of the pilot study, and they were all included in the study sample.

Data collection procedure

An official letter was submitted from the Dean of the Faculty of Nursing, Menoufia University to the director of Ain Shams Data were gathered via questionnaires after receiving an spproval official written consent from the selected hospital. The study included all nurses in the operating room at Ain Shams Specialized hospital. Each nurse was asked to respond to the four questionnaires which take between 3-5 minutes to be complete. Data collection took place in the morning, afternoon, and night shifts on average of five days per week for two months from March and June 2023.

Statistical analysis

Data were collected, tabulated, statistically analyzed using an IBM personal computer with Statistical Package of Social Science (SPSS) version 22 (SPSS, Inc, Chicago, Illinois, USA). Quantitative data were presented in the form of mean, standard deviation (SD), range, and qualitative data were presented in the form numbers and percentages. Shapiro- Wilk test was used to asses' distribution of data*Chi-square test ($\chi2$): was used to study association between two qualitative variables. Spearman' correlation is a test of significance used for correlation quantitative variables. P value of <0.05 was considered statistically significant.

Results

Table 1: shows that 50.9 % of the studied nurses were between 40 and 50

years, most of them 65.5 %were female. In terms of educational qualifications 72.7% had an associated degree in nursing, and 20 % had a bachelor's degree. As regards of work in hospital, 56.4 % of them had between 5 and 10 years, and 18.2 % had between 3 and 5 years.

Table 2: Illustrates studied nurses' acceptance and use of information categories with robotics surgery utilization. As shown in the table, the highest acceptance and use of information with robotics surgery utilization was related to social influence with mean percent (50.6%) and the lowest category was related to performance expectancy with mean percent (30.5%).

Figure 1: shows the acceptance and use of information level of the studied nurses with robotics surgery utilization. The figure illustrates that the acceptance level and use of information with robotics surgery utilization among the studied nurses was low (80 %).

Figure 2: shows the well-being levels among the studied nurses. The figure illustrates that the well-being level among the studied nurses was low (60 %).

Table 3: illustrates the level of stress total and subscale among the studied nurses. As shown in the table, the highest mean percent of stress subscale among the studied nurses was related to time stress (76%) and the lowest mean percent was related to job anxiety (75.3%).

Figure 3 shows the stress levels among the studied nurses. The figure illustrates that 90.9 % of the studied nurses had moderate. stress level

Table 4 illustrates levels of stress among the studied nurses. As shown in the table, the highest mean percent of burnout subscale among the studied nurses was related to professional

efficacy (80.8%) and the lowest mean percent was related to cynicism (70%).

Figure 4 shows the burnout levels among the studied nurses. The figure illustrates that the burnout level among the studied nurses was moderate (54.5 %).

Table 5 shows that there was a statistical significant correlation between acceptance and use of information with robotics surgery utilization, wellbeing among studied nurses as (p-value < 0.05). There was no statistical significant correlation between acceptance and use of information with robotics surgery utilization, stress and burnout among studied nurses as (p-value > 0.05).

Table 1: Demographic data of the studied nurses (N=55):

Studied variables	No.	%
Age / years		
25 - < 30	6	10.9
30 - < 40	14	25.5
40 - < 50	28	50.9
>50	7	12.7
Sex		
Male	19	34.5
Female	36	65.5
Educational qualification		
Associated degree in nursing	40	72.7
Bachelor's degree in nursing	11	20.0
Post graduate **studies**	4	7.30
Years of work in hospital		
1- <3 years	6	10.9
3 - <5 years	10	18.2
5 - <10 years	31	56.4
≥ 10 years	8	14.5

Table 2: Mean, mean % and ranking of acceptance and use of information categories with robotics surgery utilization among the studied nurses (N=55):

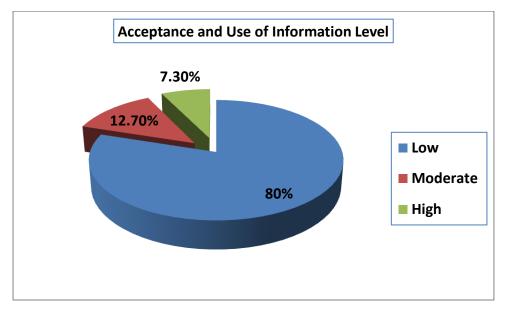| Acceptance and use of information categories	Mean	SD	Min	Max	Mean (%)	Ranking
Performance expectancy	9.16	7.47	4.00	30.0	30.5%	5
Effort expectancy	9.83	7.16	4.00	30.0	32.7%	4
Social influence	15.2	5.68	4.00	30.0	50.6%	1
Facilitating condition factors	10.8	4.86	4.00	30.0	36%	2
Behavioral intention	10.7	7.48	4.00	30.0	35.7%	3
Total	53.4	22.7	32.0	130.0	-	-

**Figure 1: Acceptance and use of information level with robotics surgery utilization
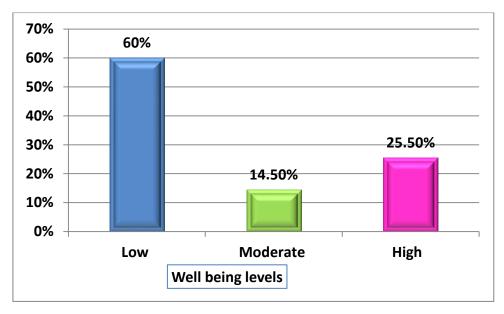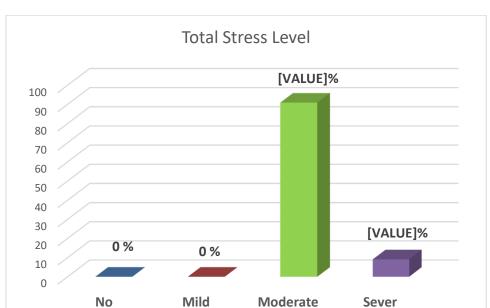among the studied nurses (N=55).**

Figure 2: Well-Being levels among the studied nurses (N=55).

**Table 3: Mean, mean % and ranking of stress and job anxiety and Ranking of the Influence of
Study Variables (N=55):**

Studied variables	Mean	SD	Min	Max	Mean (%)	Ranking
Job anxiety	14.3	1.66	11.0	19.0	75.3%	2
Time stress	26.6	3.66	21.0	35.0	76%	1
Total	43.9	4.23	33.0	4.23	-	-

Figure 3: Stress levels among the studied nurses (N=55)

Table (4): Mean, mean % and ranking of nurses' burnouts (N=55):

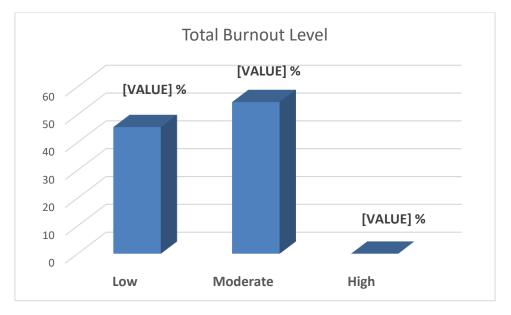| Burnout	Mean	SD	Min	Max	Mean (%)	Ranking
Exhaustion	18.0	3.27	13.0	23.0	78.3%	2
Cynicism	10.5	1.48	8.00	15.0	70%	3
Professional efficacy	29.1	4.67	24.0	36.0	80.8%	1
Total burnout	57.7	6.87	45.0	70.0	-	-

Figure 4: Total burnout level among the studied nurses (N=55)

**Table (5): Correlation between acceptance and use of information with robotics surgery
utilization and wellbeing, stress, and burnout among the studied nurses (N=55):**

Studied variables	Acceptance and utilization of robotics surgery	
	R	P value
Well-Being	0.389	**0.003***
Stress	-0.007	0.958
Burnout	0.130	0.346

Discussion

To meet the demands for assistance in caregiving, particularly for the elderly and people with disabilities, the subject of nursing robots is rapidly developing, Future advancements in theory and applications will be necessary for the use of robotics in nursing (Maibaum et al., 2022). Robotics in nursing practice continues to provide a challenge to its ethical use in order to ensure that healthcare robots perform in a safe, secure, competent, and empathetic manner. The permanent competency of robots, which is constantly taken into account with future regulations and principles, is crucial to their acceptance as partners in nursing. The two main categories were socially assistive robots and assistive robots (Pepito et al., 2020).

Incorporating robotics into nursing for nurses' entails making efforts to increase patient care quality and lessen workload. Robots may help patients maintain or treat their healthcare requirements, enhance their quality of life, or improve their physical capabilities (Lee et al., 2018). Robotics in Nursing is an interdisciplinary field that researches the development and use of robots that help and work alongside nurses in the nursing industry. Robotics in Nursing is an interdisciplinary field that researches the development of robots that support and interact with doctors, nurses, and other healthcare professionals in the real world (Persson et al., 2022).

Learning about robots in nursing is oriented towards improving nursing care (covering safety, functionalities, and impacts of robots, as well as how to use them), and it is also to suggest the appropriate robots for this goal, developing them in cooperation with engineers (Ohneberg et al., 2023). However, unlike engineers, nurses are not often taught to comprehend all systems and devices using mathematics and physics. By having a passion for engineering and constantly collaborating with engineers and engineering researchers, robots in nursing seeks to assist nurses in using robotics to give the most modern and efficient care to nursing patients (Soriano et al., 2022).

Regarding level of acceptance and use of information with robotics surgery utilization among operating room nurses, the present study illustrated that the highest mean of acceptance and use of information with robotics surgery utilization was related to social influence (15.2) and the lowest mean was related to performance expectancy (9.16). This may be due to the huge and powerful direction toward information technology and eastern society is challenged to provide high-quality care. This result contradicted with Benmessaoud (2011) who found that the highest percent of acceptance and robotics surgery was related to performance expectancy (37%) and the lowest mean was related to leadership (5%).

The current study revealed that the acceptance use of information level with robotics surgery utilization of robotics surgery among the studied nurses was low (80%). This may be due to that the apparatus had large size and needs too

much time for cleaning and sterilization also, nurses are lacking experience and training in dealing with robotic surgery. Moreover, surgeons prefer to convert to an open procedure with larger incisions. This was congruent with Ergin et al. (2023) who found that the majority of the participating nurses stated that they did not think that robots would take the place of nurses.

Regarding level of wellbeing among operating room nurses the present study illustrated that the well-being level among the studied nurses was low (60 %). This may be due to nurses' continuous fear from being replaced with robots and their role will be so limited. agreed with a study conducted by WanQing & LinYu (2022) which showed that artificial intelligence can reduce the psychological depression scores, which indicates that artificial intelligence promotes workers' mental health. However, the current study was opposite to Nazareno & Schiff (2021) who argued that automation complements "jobs that place a premium on creativity, flexibility, and abstract reasoning." If these perspectives are accurate, technological complementarity spells positive consequences for worker well-being. Also, Taylor (2021) who discovered that the study's participants' overall interpretation of wellbeing suggested that they were less likely to experience distress. Furthermore, a study conducted by WanQing & LinYu (2022) which showed that artificial intelligence can reduce the psychological depression scores.

Regarding the level of job-related stress among operating room nurses this study showed that the highest mean of stress subscale among the studied nurses was related to time stress (26.6) and the lowest mean was related to job anxiety (14.3). This could be due to that placing and adjusting the robot so that it is appropriately attached to the patient, and fighting the limitations that it poses on the angles from which the surgeon can

work can nearly double the length of an operation. This was contradicted with Cooper et al., (2021) who illustrated that nursing artificial intelligence is meant to reduce the burden, increase the nurse's efficiency, and save time. In clinical settings, this can be translated to less documentation and having instant notifications of patient deterioration.

On the other hand, results of the present study illustrated that the stress level among the studied nurses was moderate (90.9 %). This could be related to nurses' lack of time, training and experience to deal with robotic surgery and artificial intelligence as a whole which leads to elevated stress levels. This result agreed with Moloney et al., (2023) who discovered that there was an evidence that nurses experienced lack of education, training and information as barriers to their role which subsequently raised their stress levels. On the other hand, Wang et al. (2017) acknowledged that the use of assistive robotic systems could reduce worry, anxiety and stress, which could lead to a better relationship between relatives and care recipients.

Regarding the level of burnout among operating room nurses, the current study revealed that the highest mean of burnout subscale among the studied nurses was related to professional efficacy (29.1) and the lowest mean was related to cynicism (10.5). This may be related to lack of hospitals that use artificial intelligence which hinder nurses' training, so they are lacking professional efficacy. This result wasn't congruent with Sutrisno et al., (2023) who illustrated that the average score of the professional efficiency variable was 2.97, and the average score of the cynicism variable was 3.72.

The present study illustrated that the burnout level among the studied nurses was moderate (54.5 %). This could be due to major responsibilities that are placed on nurses' shoulders and work pressure that make them stressed all the time. This result was on the same line with Atachagua et al.,

(2022) who found that 63.4% of studied sample, which indicates that more than half of nurses present moderate symptoms. In addition to Qedair et al. (2022) who revealed that the majority of the participants had moderate burnout levels in each of burnout components, and 99.6% of them scored high in at least one of the three dimensions.

Regarding the correlation among AI utilization Nurses wellbeing, burnout and stress among operating room nurses the present study illustrated that there was a statistical significant correlation among acceptance and use of information with robotics surgery utilization and wellbeing among studied nurses as (p-value < 0.05) and there was no significant correlation among acceptance and use of information with robotics surgery utilization and stress and burnout among studied nurses as (p-value > 0.05). This may be due to good future expectations for artificial intelligence uses in nursing. This was congruent with Scoglio et al. (2019) who revealed that there was a positive impact of robotic surgery on wellbeing. The majority of studies focused on symptom reduction related to mood and positive quality of life changes after robot interactions.

Conclusion

The current study concluded that among the studied nurses the level of the acceptance and use of information with robotics surgery utilization was low (80 %), the well-being was low (60 %), the stress was moderate (90.9 %) & the burnout was moderate (54.5 %). There was a statistical significant correlation between acceptance and use of information with robotics surgery utilization and wellbeing among studied nurses as (p-value < 0.05). There was no statistically significant correlation between stress and burnout among studied nurses as (p-value > 0.05).

Recommendations

Conducting training courses for nursing staff in the operating room about the importance of using the artificial intelligence robotics is required. awareness of nursing staff about the main technical problems of artificial intelligence robotics and the importance of regular maintenance when using it in the operating rooms needs to be improved. Further researches should be conducted on nurses' utilization of artificial intelligence robotics.

References

Atachagua, N., Orihuela, O., Herrera, L., Auccahuasi, W., & Antezana, M. (2022). Analysis of the Professional Burnout Syndrome in Times of Pandemic by COVID-19, an Approach to Practice using Artificial Intelligence. CEUR Workshop Proceedings, 3269, 60-67.

Atkinson, R. (2019), "Robotics and the Future of Production and Wor", Information Technology and Innovation Foundation, , Washington D.C., https://itif.org/publications/2019/10/15/robotics-and-future-production-and-work .

Bakthavatchalam, B., Shaik, N., & Hussain, P. (2020). An artificial intelligence approach to predict the thermophysical properties of MWCNT nanofluids. Processes, 8(6), 693.

Bohr A and Memarzadeh,K (2020) The rise of artificial intelligence in healthcare applications. ElSeiver. 25–60. doi: 10.1016/B978-0-12-818438-7.00002-2

Boyle, C., Cole, S., Dutcher, J., Eisenberger, N., & Bower, J. (2019). Changes in eudaimonic well-being and the conserved transcriptional response to adversity in younger breast cancer survivors.

Psychoneuroendocrinology, 103, 173-179.

BramheS and PathakS(2023) Robotic Surgery: A Narrative Review.Cureus.cureus. 14(9): e29179. doi: 10.7759/cureus.29179.

Clipper,B., Batcheller.J ThomazA & RozgaA(2018) :Artificial Intelligence and Robotics: A Nurse Leader's Primer https://www.researchgate.net/publication/329346680_Artificial_Intelligence_and_Robotics_A_Nurse_Leader's_Primer.

Cooper, M. C., Herzig, A., Maffre, F., Maris, F., Perrotin, E., & Régnier, P. (2021). A lightweight epistemic logic and its application to planning. Artificial Intelligence, 298, 103437. https://doi.org/10.1016/j.artint.2020.103437

Dodge R, Daly A, Huyton J, Sanders L. The challenge of defining wellbeing. International Journal of Wellbeing. 2012;2(3):222–235. doi: 10.5502/ijw.v2i3.4.

Dyrbye LN, Shanafelt TD, Johnson PO, Johnson LA, Satele D, West CP. (2019) A cross-sectional study exploring the relationship between burnout, absenteeism, and job performance among American nurses. BMC Nurs. 2019; 18:57. doi: 10.1186/s12912-019-0382-7. [PMC free article] [PubMed] [CrossRef] [Google Scholar]

Ergin, E., Karaarslan, D., Şahan, S., & Bingöl, Ü. (2023). Can Artificial Intelligence and robotic nurses replace operating room nurses? the quasi-experimental research. Journal of Robotic Surgery, 17(4), 1847–1855. https://doi.org/10.1007/s11701-023-01592-0

Gill,A and Randell.R (2016). Robotic Surgery and Its Impact on Teamwork in the Operating TheatreJournal of Perioperative Practice 26(3):42-45 DOI:10.1177/175045891602600303

Kelly, R. J., & Hearld, L. R. (2020). Burnout and leadership style in behavioral health care: A literature review. The Journal of Behavioral Health Services and Research, 47(4), 581-600. https://doi.org/10.1007/s11414-019-09679-z

Kikuchi, R. (2020). Application of artificial intelligence technology in nursing studies: a systematic review. On-Line Journal of Nursing Informatics, 24(1).

Lee, J., Song, Y. A., Jung, J. Y., Kim, H. J., Kim, B. R., Do, H., & Lim, J. (2018). Nurses' needs for care robots in integrated nursing care services. Journal of Advanced Nursing, 74(9), 2094–2105. https://doi.org/10.1111/jan.13711

Madhok,B Nanayakkara,K and MahawarK(2022). Safety considerations in laparoscopic surgery: A narrative review. World J Gastrointest Endo14(1): 1–16. doi: 10.4253/wjge.v14.i1.1.

Maibaum, A., Bischof, A., Hergesell, J., & Lipp, B. (2022). A Critique of Robotics in health care. AI & SOCIETY, 37(2), 467–477. https://doi.org/10.1007/s00146-021-01206-z

Moloney, R., Coffey, A., Coffey, J. C., & Brien, B. O. (2023). Nurses' perceptions and experiences of Robotic Assisted Surgery (RAS): An Integrative Review. Nurse Education in Practice, 71, 103724. https://doi.org/10.1016/j.nepr.2023.103724

Ohneberg, C., Stöbich, N., Warmbein, A., Rathgeber, I., Mehler-Klamt, A. C., Fischer, U., & Eberl, I. (2023). Assistive Robotic Systems in nursing care: A scoping review.

BMC Nursing, 22(1). https://doi.org/10.1186/s12912-023-01230-y

Pepito, J. A., Ito, H., Betriana, F., Tanioka, T., & Locsin, R. C. (2020). Intelligent humanoid robots expressing artificial humanlike empathy in nursing situations. Nursing Philosophy, 21(4). https://doi.org/10.1111/nup.12318

Persson, M., Redmalm, D., & Iversen, C. (2021). Caregivers' use of robots and their effect on work environment – a scoping review. Journal of Technology in Human Services, 40(3), 251–277. https://doi.org/10.1080/15228835.2021.2000554

Qedair, J. T., Balubaid, R., Almadani, R., Ezzi, S., Qumosani, T., Zahid, R., & Alfayea, T. (2022). Prevalence and factors associated with burnout among nurses in Jeddah: A single-institution cross-sectional study. BMC Nursing, 21(1). https://doi.org/10.1186/s12912-022-01070-2

Redondo-Sáenz , D Cortés-Salas,C and Parrales-Mora(2023)., Perioperative Nursing Role in Robotic Surgery: An Integrative Review. J Perianesth Nurs. 38(4):636-641. doi: 10.1016/j.jopan.2022.11.001 .

Robert, N(2019)., How artificial intelligence is changing nursing.Nurs Manage. 2019 50(9): 30–39. doi: 10.1097/01.NUMA.0000578988.56622.21

Scoglio, A. A., Reilly, E. D., Gorman, J. A., & Drebing, C. E. (2019). Use of social robots in Mental Health and well-being research: Systematic Review. Journal of Medical Internet Research, 21(7). https://doi.org/10.2196/13322

Soriano, G. P., Yasuhara, Y., Ito, H., Matsumoto, K., Osaka, K., Kai, Y., Locsin, R., Schoenhofer, S., & Tanioka, T. (2022). Robots and robotics in nursing. Healthcare, 10(8), 1571. https://doi.org/10.3390/healthcare10081571

Sutrisno, S., Khairina, N., Syah, R. B., Eftekhari-Zadeh, E., & Amiri, S. (2023). Improved artificial neural network with high precision for predicting burnout among managers and employees of start-ups during COVID-19 pandemic. Electronics, 12(5), 1109. https://doi.org/10.3390/electronics12051109

Tsegaw,S., Getachew,Y., and Tegegne, B. (2022). Determinants of Work-Related Stress Among Nurses Working in Private and Public Hospitals in Dessie City, 2021: Comparative Cross-Sectional StudyPsychol Res Behav Manag. 2022; 15: 1823–1835. doi: 10.2147/PRBM.S372882

Wang, X. V., Wang, L., Mohammed, A., & Givehchi, M. (2017). Ubiquitous manufacturing system based on Cloud: A robotics application. Robotics and Computer-Integrated Manufacturing, 45, 116-125.