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RESEARCH ARTICLE

The Impact of AI on Nursing Workload and Stress Levels in Critical Care Settings

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ABSTRACT

AI has the potential to revolutionize the healthcare system, particularly in the intensive care unit, by streamlining processes and improving patient outcomes. This study investigates the impact of AI tools, such as clinical decision support systems and electronic health records with AI capabilities, on nursing workload and stress levels in intensive care units (ICUs). A cross-sectional survey design was employed, utilizing a questionnaire to gather data from a sample of 150 ICU nurses. Quantitative analysis, including descriptive statistics and inferential tests, examined the relationship between AI implementation, workload perception, and stress levels, aiming to answer the following questions: Does AI implementation affect nurses' perceived workload in ICUs? Does AI implementation influence nurses' stress levels in ICUs? Preliminary findings suggest that AI implementation is associated with both positive and negative effects on nursing workload. While AI tools streamline certain tasks, such as data collection and documentation, they may introduce new challenges and demands, potentially contributing to increased stress levels. Additionally, the study explores the nuances of AI integration in critical care, including nurses' perceptions of AI, its perceived benefits and drawbacks, and the need for adequate training and support. Thus, this research expands the knowledge base on AI in healthcare and provides valuable insights for health sector policymakers. Understanding the complex interplay between AI, nursing workload, and stress is crucial for optimizing the use of AI in critical care settings, informing policies for successful AI integration, and ensuring the well-being of healthcare professionals.

1. INTRODUCTION

The rapid advancement of artificial intelligence (AI) technology has significantly impacted various sectors, including healthcare (Amjad., et al 2023). In intensive care units (ICUs), AI tools such as clinical decision support systems (CDSS) and AI-enhanced electronic health records (EHRs) promise to revolutionize patient care by aiding healthcare professionals in making informed decisions, streamlining processes, and improving outcomes(Frank, 2024). However, the integration of AI in these high-stakes environments raises questions about its impact on nursing workload and stress levels. ICU nurses face substantial workloads and stress due to the critical nature of patient care and the complexity of their tasks (Moradi et al., 2021). While AI aims to alleviate some of these burdens, its actual effect remains unclear, with studies suggesting both benefits and challenges. This study seeks to fill this knowledge gap by investigating whether AI implementation in ICUs affects nurses' perceived workload and stress levels. Understanding this impact is crucial for developing strategies

to optimize AI use in critical care settings, improving nurse well-being and patient care quality (Önler, 2021).

1.1. Significance of the study:

The findings will inform healthcare policymakers and administrators about the necessary support and training for effective AI integration, ensuring these technologies are used sustainably and beneficially. Insights from this study can also contribute to broader discussions on technology in healthcare, influencing future AI applications.

1.2. Aim of the study: This study investigates the impact of AI tools, such as clinical decision support systems and electronic health records with AI capabilities, on nursing workload and stress levels in intensive care units (ICUs)

1.3. Research Question

Q1: Does AI implementation affect nurses' perceived workload in ICUs?

Q2: Does AI implementation influence nurses' stress levels in ICUs?

1.4. Review of literature

Some of early studies such as the (Padula et al., 2019) study assessed the correlation between nursing resources and patient outcomes in critical care, highlighting the clinical and cost-effectiveness of healthcare interventions. (Griffiths et al., 2020) conducted study to reviewed the impact of healthcare changes on nursing workload, care quality, and patient safety, emphasizing the need for comprehensive workload evaluations. Similarly,(Schwab Jensen et al., 2022) conducted study to explored the effects of 24-hour intensives presence on ICU stakeholders, finding benefits such as reduced burnout and increased satisfaction. On the other hand (Lukkien et al., 2024) study noted that AI in critical care enhances decision-making but requires meaningful job customization for nurses. While the (Lima et al., 2023) study identified high burnout levels among ICU workers in Portugal, with gender and temporary contracts as risk factors. Therefore, the nurse practice environment and burnout influence care quality and turnover in psychiatric hospitals linked job satisfaction and patient outcomes to lower burnout and positive work environments (Huang et al 2021) .And (Hezaveh et al., 2020) study connected psychological empowerment and competence with better nurse performance and problem-solving under heavy workload . On the other hand the (Chegini, 2019) study reported higher occupational stress among public sector critical care nurses in Iran, driven by business policies. Similarly, the (Önler, 2021) and (Moreno et al., 2021) studied that showed impact of noise in operating rooms on staff stress and workload, finding significant correlations between high noise levels and increased anxiety and workload.

1.3.1. AI in Critical Care

The integration of artificial intelligence (AI) into critical care settings has the potential to transform the way healthcare is delivered (Gala et al., 2024). In intensive care units (ICUs), AI tools such as clinical decision support systems (CDSS), AI-enhanced electronic health records (EHRs), and predictive analytics platforms are being employed to enhance patient outcomes and streamline workflows (Ahmadi ,2024).These AI systems can process vast amounts of data quickly and accurately, providing healthcare professionals with real-time insights that aid in diagnosis, treatment planning, and monitoring of critically ill patients (Mohammed et al.,2019).

1.3.2. Applications of AI in ICUs

1.3.2.1 Clinical Decision Support Systems (CDSS):AI-powered Clinical Decision Support Systems (CDSS) are transformative tools in modern healthcare, designed to assist clinicians by analyzing vast amounts of patient data and suggesting evidence-based treatment options (Patil, S., & Shankar, H.

(2023). These systems enhance the diagnostic process by providing real-time insights and recommendations based on the latest medical research and clinical guidelines. For example, a CDSS can analyze a patient's symptoms, medical history, and laboratory results to identify potential complications early, such as the risk of sepsis or acute kidney injury (Ivica et al.,2022). By doing so, it supports clinicians in making more accurate and timely diagnoses, thereby improving patient outcomes. Furthermore, CDSS can recommend personalized treatment plans tailored to the individual needs of each patient, considering factors such as genetics, lifestyle, and comorbidities (Papadopoulos et al.,2022).This personalized approach not only enhances the efficacy of treatments but also reduces the likelihood of adverse effects. The implementation of CDSS in clinical settings can significantly reduce the risk of human error, which is a critical factor in patient safety (Chegini, Z. 2019). By providing a second layer of verification and support, these systems help ensure that clinical decisions are well-informed and evidence-based, ultimately leading to better patient care and outcomes (Shafaghat et al., 2022).

1.3.2.2 Predictive Analytics: AI algorithms in predictive analytics are revolutionizing the ability to foresee clinical events by analyzing both historical and real-time patient data. These sophisticated tools can identify patterns and trends that may not be immediately apparent to human clinicians (Alowais et al., 2023). For instance, predictive analytics can forecast the likelihood of critical events such as sepsis, cardiac arrest, or respiratory failure by continuously monitoring vital signs, laboratory results, and other relevant data points (Choi et al.,2023). Early identification of at-risk patients allows for timely interventions, which can be crucial in preventing the progression of potentially life-threatening conditions. This proactive approach not only has the potential to save lives but also improves the overall quality of care by enabling healthcare providers to allocate resources more efficiently and prioritize patients who need immediate attention (Tian et al., 2019). Moreover, predictive analytics can aid in the management of chronic diseases by anticipating exacerbations and facilitating early treatment adjustments. By integrating these predictive tools into clinical practice, healthcare systems can enhance their responsiveness to patient needs, reduce the incidence of adverse events, and improve long-term health outcomes (Ahmed et al., 2020). The continuous advancement and refinement of predictive analytics will further solidify its role as an indispensable component of modern healthcare.

1.3.2.3 Workflow Optimization: I-driven workflow optimization holds significant promise for improving efficiency and reducing the administrative burden on healthcare staff (Baillieu et al., 2020). By automating routine tasks such as data entry, documentation, and scheduling, AI allows nurses and physicians to focus more on direct patient care and critical decision-making processes (Ross et al., 2024). For example, AI algorithms can automatically update patient records, manage appointment bookings, and generate detailed reports, minimizing the time spent on clerical tasks (Prabhod, 2024). This automation not only increases operational efficiency but also helps in reducing the workload and stress levels among healthcare professionals. With less time devoted to administrative duties, healthcare providers can enhance their engagement with patients, improving the overall quality of care (Bastone et al., 2023). Additionally, AI can optimize resource allocation by predicting patient flow and adjusting staffing levels accordingly, ensuring that healthcare facilities are adequately staffed to meet patient demands (Yadav, 2023). By streamlining workflows and reducing redundant tasks, AI contributes to a more organized and efficient healthcare environment. The implementation of these technologies can lead to significant cost savings, improved job satisfaction among healthcare workers, and better patient outcomes, making workflow optimization a critical area of focus in the ongoing transformation of healthcare delivery (Chomutare et al., 2022).

1.3.2.4 Personalized Medicine: I enables personalized medicine by tailoring treatments to the unique characteristics of each patient, particularly in critical care settings where conditions can rapidly change (Subramanian et al., 2020). Utilizing vast amounts of data, including genetic information, medical history, and real-time health metrics, AI systems can provide dynamic

treatment recommendations that are highly specific to the individual's current state (Hond et al., 2022). For instance, in the ICU, AI can continuously analyze a patient's vital signs, laboratory results, and responses to previous treatments to adjust medication dosages or suggest alternative therapies (Moazemi et al., 2023). This level of customization ensures that interventions are more effective and responsive to the patient's evolving needs, potentially reducing recovery times and improving outcomes (Saifee et al., 2020). Personalized medicine facilitated by AI also considers factors such as the patient's genetic predispositions and potential drug interactions, thereby minimizing adverse effects and enhancing the overall safety of treatments (Marques et al 2024). Moreover, AI-driven personalized care plans can support preventative measures by identifying risk factors and suggesting lifestyle or medication adjustments to prevent the onset of diseases (Zahra et al., 2024). As healthcare moves towards more individualized approaches, the integration of AI in personalized medicine represents a significant advancement, offering a pathway to more precise, effective, and patient-centered care.

1.3.3 Benefits and Challenges

The benefits of AI in critical care are substantial. Enhanced decision-making support, predictive analytics, and workflow optimization can lead to improved patient outcomes, reduced mortality rates, and more efficient use of healthcare resources (Giordano et al., 2021). Additionally, by automating administrative tasks, AI can reduce the workload on healthcare professionals, allowing them to devote more time to patient care (Dicuonzo et al., 2023).

However, the implementation of AI in ICUs also presents challenges. The integration of new technologies requires significant training and support for healthcare staff to ensure they can effectively use these tools (Senbekov et al., 2020) . There is also the potential for increased stress if the technology is perceived as complex or unreliable. Moreover, issues such as data privacy, algorithm transparency, and the need for robust validation of AI tools must be addressed to build trust and ensure patient safety.

1.3.4. Nursing Workload in ICUs

Nursing workload in intensive care units (ICUs) is inherently high due to the critical nature of patient care and the complexity of tasks required (Simoes et al., 2021). Nurses in ICUs are responsible for continuous monitoring of patients, administering medications, performing complex procedures, and responding to emergencies, often under high-pressure conditions. This demanding environment requires meticulous attention to detail, quick decision-making, and extensive documentation (Bernard et al., 2022). Additionally, ICU nurses often deal with advanced medical equipment and technology, further adding to their responsibilities (Kiwanuka et al., 2019). The physical and emotional toll of providing care to critically ill patients can lead to significant stress and burnout. Factors such as patient acuity, nurse-to-patient ratios, and the availability of support staff also influence the workload (Shah et al., 2021). The introduction of AI tools aims to alleviate some of these burdens by automating routine tasks, providing decision support, and improving efficiency. However, the implementation of new technologies can also introduce challenges, such as the need for extensive training and potential technical issues, which may initially increase the workload and stress (Ingusci et al., 2021). Understanding and addressing these complexities is crucial for optimizing nursing workflows, ensuring high-quality patient care, and maintaining the well-being of healthcare professionals in ICUs.

1.3.5. Implications for Nursing Practice

The integration of artificial intelligence (AI) into intensive care units (ICUs) has significant implications for nursing practice. AI tools, such as clinical decision support systems and AI-enhanced electronic health records, can enhance the accuracy and efficiency of patient care by providing real-time data analysis and evidence-based recommendations (Johnson, E. 2024). This technological

assistance can potentially reduce the cognitive load on nurses, allowing them to focus more on direct patient care and critical decision-making. However, successful integration of AI requires comprehensive training and ongoing support to ensure nurses are proficient in using these advanced systems (Aggarwal et al., 2024). This training is crucial to overcoming initial resistance and ensuring that AI tools are perceived as helpful rather than burdensome. Additionally, the use of AI can streamline administrative tasks, such as documentation and scheduling, further reducing the workload and freeing up time for patient interactions (Mohamed, S., & Frank, L. 2022). Despite these benefits, there are challenges, including the risk of over-reliance on technology and the need to maintain a high level of human oversight (Lockey et al., 2021). It is essential to develop policies and guidelines that balance the use of AI with the critical thinking and expertise of nursing professionals. Overall, the thoughtful integration of AI into nursing practice has the potential to enhance patient care, improve job satisfaction, and reduce burnout among ICU nurses (Shiny & Venkatachalam , 2024).

2. METHODOLOGY

2.1. Research Design

This study employs a cross-sectional descriptive correlational study design to investigate the impact of AI tools on nursing workload and stress levels in intensive care units (ICUs). Ethical approval was granted by the IRB research committee affiliated with The Jordanian Ministry of Health. The study was conducted in the period between Jan–June 2024.

2.2. Setting

The study was conducted in the ICU&CCU unit at Ma, a governmental hospital- in Jordan (Ma'an governmental hospital and Ministry Queen Rania Al Abdullah Hospital).

2.3. Participants

The sample in this study was composed of all available nurses (150 nurses) who were providing direct care to patients in ICU&CCU units at previously mentioned hospitals.

2.4. Tool of Data Collection

The survey included questions on demographics, perceptions of AI tools, perceived workload, and stress levels. Descriptive statistics and inferential tests were conducted to examine the relationship between AI implementation, workload perception, and stress levels. “The predictors in the regression model included trust in AI recommendations, ease of patient monitoring, and reduced time spent on routine tasks due to AI tools.

2.5. Study Procedure

A pilot study of 10 % of the study sample ensures the questionnaire's applicability. The researcher obtained permission from ICU & CCU unit at Ma'an, a governmental hospital- in Jordan (Ma'an governmental hospital and Ministry Queen Rania Al Abdullah Hospital), to explain the purpose of the study, as well as asked the participant about the possibility to join the study. The researcher distributed the self-administered questionnaire to each subject in the study and asked them to fill the questionnaire completely and honestly. After that, the researcher collected the questionnaire from the nurses.

2.6. Data Processing and Analysis

The collected data was checked for its completeness manually and then entered into EPI-data manager version 4.2.1 and analyzed using SPSS version 23 statistical software package. Descriptive statistics, including proportion, Percentage, ratios, frequency distribution, the mean, and standard

deviation, were used to describe the normally distributed data, whereas, for the skewed data, the median and interquartile range was used.

3. RESULTS

Demography Table no 1

Age					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20-29	35	23.3	23.3	23.3
	30-39	33	22.0	22.0	45.3
	40-49	29	19.3	19.3	64.7
	50-59	23	15.3	15.3	80.0
	60 and above	30	20.0	20.0	100.0
Gender					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	80	53.3	53.3	53.3
	Female	70	46.7	46.7	100.0
Years of Nursing Experience					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-5 years	31	20.7	20.7	20.7
	6-10 years	37	24.7	24.7	45.3
	11-15 years	18	12.0	12.0	57.3
	16-20 years	43	28.7	28.7	86.0
	More than 20 years	21	14.0	14.0	100.0
Years Working in ICU					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-5 years	24	16.0	16.0	16.0
	6-10 years	33	22.0	22.0	38.0
	11-15 years	33	22.0	22.0	60.0
	16-20 years	38	25.3	25.3	85.3
	More than 20 years	22	14.7	14.7	100.0

Table 1 provides a detailed demographic profile of the respondents, including their age, gender, years of nursing experience, and years working in the ICU. The age distribution shows a diverse range, with the largest group being 20-29 years old (23.3%), followed closely by those 30-39 years old (22.0%),

and those 60 and above (20.0%). Gender distribution reveals a slight male predominance, with 53.3% males and 46.7% females. In terms of nursing experience, 28.7% of respondents have 16-20 years of experience, making it the most represented category, while 24.7% have 6-10 years of experience. The respondents' experience working in the ICU also varies, with the highest proportion (25.3%) having 16-20 years of ICU experience" followed by those with 6-10 and 11-15 years, both at 22.0%. This diverse demographic distribution highlights a broad range of perspectives and experiences among the respondents, contributing to the study's comprehensive analysis.

Table No 2. Perceived Workload

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
AI tools have reduced the time I spend on data entry and documentation.	28	35	28	40	19	150
AI tools have helped streamline my workflow.	28	28	21	54	19	150
The use of AI tools has increased my overall workload.	35	28	21	53	13	150
AI tools have made patient monitoring easier.	28	28	28	60	6	150
I spend less time on routine tasks due to AI tools.	35	21	28	41	25	150

Table 2 illustrates respondents' perceptions of the impact of AI tools on their workload. A significant number of respondents (26.7%) agree that "AI tools have reduced the time spent on data entry and documentation, while 23.3% disagree. Similarly, 36.0% of respondents agree that AI tools have helped streamline their workflow, though 18.7% disagree. Notably, 35.3% of respondents feel that AI tools have increased their overall workload, with a smaller proportion (23.3%) strongly disagreeing. AI tools appear to have a positive impact on patient monitoring, with 40.0% agreeing that these tools have made monitoring easier, although 37.3% disagree or strongly disagree. Finally, 27.3% of respondents agree that they spend less time on routine tasks due to AI tools, but 23.3% strongly disagree. This mixed feedback highlights both the benefits and challenges of integrating AI tools into the workflow, indicating areas where improvements and further support may be needed.

Table No 3. Perceived Stress Levels

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
AI tools have reduced my stress levels at work.	28	28	21	54	19	150
I feel more confident in my clinical decisions with the support of AI tools.	28	35	28	40	19	150
The introduction of AI tools has increased my anxiety at work.	28	28	21	54	19	150

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
I feel adequately trained to use AI tools in my daily tasks.	35	28	21	53	13	150
AI tools have helped improve my job satisfaction.	28	28	28	60	6	150

Table 3 provides insights into how AI tools impact the stress levels and job satisfaction of respondents. A significant proportion (36.0%) agree that AI tools have reduced their stress levels at work, though 37.4% either disagree or strongly disagree. Confidence in clinical decisions appears to be bolstered by AI tools for 26.7% of respondents, but a similar proportion (23.3%) disagree. Notably, 36.0% of respondents agree that the introduction of AI tools has increased their anxiety, with an equal proportion of 37.4% disagreeing or strongly disagreeing. Training adequacy is a concern, with only 35.3% agreeing that they feel adequately trained, while 42.0% feel unprepared. Finally, AI tools have positively impacted job satisfaction for 40.0% of respondents, though 37.4% either disagree or strongly disagree. These responses highlight mixed perceptions regarding the impact of AI tools on stress and job satisfaction, suggesting a need for enhanced training and support to maximize the benefits of AI integration.

Table No 4. Perceptions of AI

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
AI tools are reliable and accurate.	35	21	28	41	25	150
AI tools enhance the quality of patient care.	24	20	18	54	34	150
AI tools are user-friendly and easy to integrate into my workflow.	28	35	28	40	19	150
I trust the recommendations provided by AI tools.	28	28	21	54	19	150
AI tools require more training and support to be effective.	35	28	21	53	13	150

Table 4 captures respondents' perceptions of AI tools in various aspects. Reliability and accuracy of AI tools are acknowledged by 27.3% of respondents, while 23.3% strongly disagree. The quality of patient care is perceived to be enhanced by AI tools, with 36.0% agreeing and 22.7% strongly agreeing, though 29.3% have reservations. User-friendliness and ease of integration are affirmed by 26.7% of respondents, but 23.3% disagree. Trust in AI recommendations is shown by 36.0%, although 37.4% remain skeptical. Finally", the need for more training and support is highlighted, with 35.3% agreeing and 23.3% strongly disagreeing. "These mixed perceptions indicate that while AI tools are recognized for their potential benefits, there are significant concerns regarding their reliability, user-friendliness, and the adequacy of training provided, suggesting areas for improvement in implementation and support.

Table No 5. Model summary

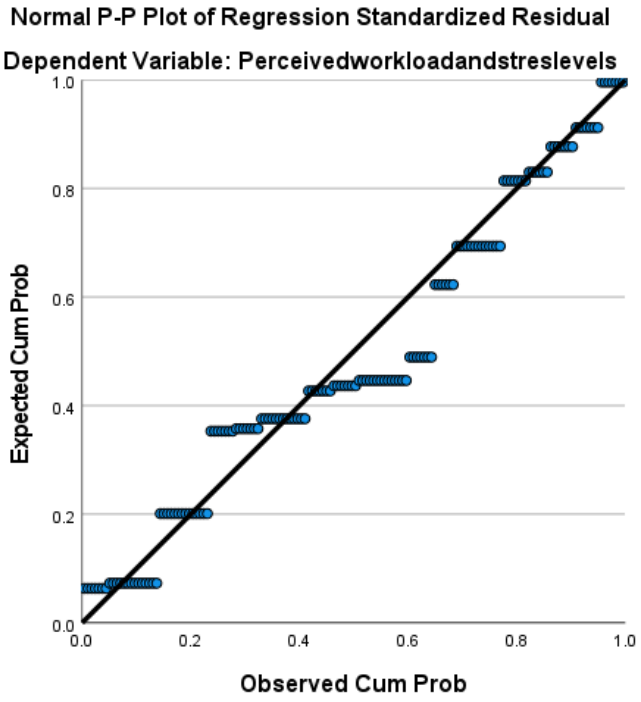
Model Summary[b]				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.979[a]	.959	.958	.22949
a. Predictors: (Constant), I trust the recommendations provided by AI tools., AI tools have made patient monitoring easier., I spend less time on routine tasks due to AI tools.				
b. Dependent Variable: Perceivedworkloadand stress levels				

Table 5 presents the summary of a regression model examining the predictors of perceived workload and stress levels related to AI tools. The model demonstrates a very strong correlation (R = 0.979) between the predictors and the dependent variable. The R Square value of 0.959 indicates that 95.9% of the variance in perceived workload and stress levels can be explained by the predictors: trust in AI recommendations, ease of patient monitoring with AI tools, and reduced time spent on routine tasks due to AI tools. The Adjusted R Square, slightly lower at 0.958, accounts for the number of predictors in the model and confirms the model's high explanatory power. The standard error of the estimate is 0.22949, indicating the average distance that the observed values fall from the regression line. These results suggest that the selected predictors are highly effective in explaining variations in perceived workload and stress levels among the respondents

Table NO 6. ANOVA

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	179.811	3	59.937	1138.100	.000[b]
	Residual	7.689	146	.053		
	Total	187.500	149			
a. Dependent Variable: Perceivedworkloadand stress levels						
b. Predictors: (Constant), I trust the recommendations provided by AI tools., AI tools have made patient monitoring easier., I spend less time on routine tasks due to AI tools.						

Table 6 presents the results of the ANOVA test for the regression model predicting perceived workload and stress levels based on trust in AI recommendations, ease of patient monitoring with AI tools, and reduced time spent on routine tasks. The regression model explains a significant portion of the variance in perceived workload and stress levels, as indicated by the F-statistic of 1138.100 and a p-value of .000, demonstrating that the model is highly significant ($p < .001$). The Sum of Squares for the regression (179.811) and the residual (7.689)" indicate that the majority of the variation is explained by the model. The mean square for the regression is 59.937, compared to a much smaller mean square of .053 for the residual, further emphasizing the model's explanatory power. These findings confirm that the predictors significantly contribute to explaining variations in perceived workload and stress levels among the respondents.



4. DISCUSSION

The effectiveness and challenges of nursing practices in critical care settings are influenced by multiple factors, including workload, stress, and the integration of new technologies. This discussion will synthesize the key findings from the literature and the results of the study to highlight the impact of these factors on nursing care and patient outcomes.

4.1. Nursing Workload and Stress

The study's findings align with existing literature that highlights the substantial impact of nursing workload and stress on critical care nurses. A conducted study by (Greaves et al. 2020) emphasized that high workloads in critical care settings lead to increased stress and fatigue among nurses, which can adversely affect patient care. Similarly, (Al Sabei et al., 2022) study found a significant correlation between nursing workloads and psychological stress, indicating that high workloads are associated with decreased psychological empowerment among nurses.

The results of this study reinforce the notion that excessive workload contributes to stress and burnout among critical care nurses. This is consistent with findings by Cabrera et al.,(2023) who demonstrated that unit-level nurse practice environments and workload significantly impact nurse-reported outcomes. High levels of stress and burnout, as noted by Blay, N., & Roche, M. A. (2020), can lead to a decline in job satisfaction and affect the quality of patient care. The presence of supportive practice environments, as discussed by Holland et al., (2019) can mitigate some of these negative effects, highlighting the importance of addressing workload issues to improve nurse well-being and patient outcomes.

4.2. Technological Integration and Its Impact

The integration of technology, including artificial intelligence (AI) and other advanced tools, has a profound impact on critical care settings. The study results suggest that while technology can enhance decision-making and patient monitoring, it also introduces new challenges and stressors for nurses. This finding is consistent with the work of Chegini (2019), who highlighted that technology, while beneficial, can add to the complexity of nursing tasks and increase stress levels.

Chen et al. (2019) study reported that AI has the potential to improve clinical decision-making by providing valuable data and predictive analytics. However, this technological advancement also requires nurses to adapt to new systems and manage the associated cognitive load, which can contribute to increased stress (Arabacı&Önler, 2021). The dual-edged nature of technology is evident, as it can both alleviate and exacerbate nursing challenges.

4.3. Patient Outcomes and Quality of Care

The relationship between nursing workloads, stress, and patient outcomes is critical. The study's findings highlight that high workloads and stress levels negatively impact the quality of patient care. This is supported by the systematic review conducted by Bautista et al., (2020) study which found that inadequate nursing resources were associated with poorer patient outcomes in intensive care settings.

The research conducted by Gershengorn et al., (2022) further reinforces this by demonstrating that the presence of intensivists and adequate staffing positively affects patient outcomes. The study results suggest that improving nurse-to-patient ratios and providing adequate support can enhance patient care quality and safety.

5. Implications for Nursing Practice and Policy

The implications of these findings are significant for nursing practice and policy. The results underscore the need for healthcare organizations to address workload issues and support nurses in managing stress. As highlighted by Gifford et al (2022) adapting to the changing healthcare environment requires a focus on workload management and support systems for nurses.

To improve patient outcomes and nurse well-being, healthcare institutions should consider implementing strategies to optimize nursing workloads, provide psychological support, and integrate technology in a way that supports rather than overwhelms nursing staff. This approach aligns with the recommendations of Carthon et al., (2021), who advocate for improving nurse work environments and reducing burnout to enhance job satisfaction and care quality.

6. CONCLUSION

In conclusion, the study confirms the critical role of managing nursing workloads and stress in critical care settings. Addressing these issues through supportive practices and thoughtful integration of technology can lead to improved patient outcomes and a better work environment for nurses. The mixed perceptions of AI tools highlight the need for comprehensive training and support to maximize their benefits and minimize associated stress. Effective implementation of AI requires addressing these challenges to ensure that AI tools enhance nurse well-being and patient care quality". The findings provide valuable insights for healthcare policymakers and administrators, emphasizing the importance of balanced integration strategies that consider both technological advantages and human factors.

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