



Letter to Editor

Leveraging Artificial Intelligence to Enhance Nursing Workflow in Endoscopy Units

Ribwar Arsalan Mohammed¹,, Sirwan Khalid Ahmed^{1,*},, Abdulqadir J. Nashwan²,

¹ College of Nursing, University of Raparin, Rania, Sulaymaniyah, Kurdistan Region, 46012, Iraq

² Department of Nursing, Hazm Mebaireek General Hospital, Hamad Medical Corporation, Doha, Qatar

ARTICLE INFO

Article History

Received 20 Feb 2025
Revised 17 Mar 2025
Accepted 15 Apr 2025
Published 13 May 2025

Keywords

Artificial intelligence
Endoscopy
Nursing workflow
Patient care
optimization



ABSTRACT

This paper explores the potential of Artificial Intelligence (AI), including natural language processing (NLP), computer vision, and robotics, to transform nursing workflow in endoscopy units. AI technologies offer numerous advantages, including predictive analytics for efficient scheduling and resource allocation, real-time decision support during procedures, and enhanced diagnostic accuracy through image analysis. Additionally, AI simplifies administrative tasks such as patient scheduling and medical documentation, improving operational efficiency and patient safety. Despite these benefits, challenges related to data privacy, algorithm accuracy, and ethical considerations must be addressed. Effective AI integration requires interdisciplinary collaboration, continuous education for nurses, and robust governance frameworks to ensure responsible and ethical use. Addressing these challenges will enable AI to profoundly impact nursing workflows, significantly enhance patient care, and reshape the operational future of endoscopy units.

Dear Editor,

Endoscopy units are dynamic clinical environments that require seamless coordination and efficient workflow management to ensure high-quality patient care. Nurses in these units play important roles, such as managing patient flow, preparing treatments, participating in endoscopic inspections, and providing post-procedural care [1]. Traditional workflows, however, face challenges due to increasing patient volumes and pervasive staff shortages in healthcare settings, which strain current manual workflows, reduce time available for patient-centered care, and elevate the risk of procedural delays and staff burnout. The emergence of AI provides a unique opportunity to revolutionize nurse workflow in endoscopy units [2]. By using AI-driven solutions, these units can improve processes, streamline workflows, quality control, and ultimately enhance patient outcomes [3–8]. This paper aims to explore the potential of AI in optimizing nurse workflow in endoscopy units. It will discuss the advantages of AI, address relevant challenges, and propose strategies for the successful integration of AI technologies into clinical practice.

The integration of AI in endoscopy units offers several advantages for improving nursing workflow and patient care [9]. One notable benefit is the use of machine learning algorithms, which analyze large amounts of historical data to accurately predict patient demand. These predictions help endoscopy units effectively manage scheduling to ensure optimal use of resources and personnel. Additionally, AI-powered decision support systems play a crucial role as essential resources for nurses, providing immediate and up-to-date guidance during endoscopic procedures. These technologies assist in instrument selection, lesion diagnosis, and provide valuable information about treatment procedures, thus improving overall care quality [3]. Furthermore, AI-powered image analysis technologies are vital for improving diagnostic accuracy and speeding up lesion discovery [10]. AI-powered image analysis improves diagnostic precision; nonetheless, it is critical to acknowledge that despite FDA approvals such as Olympus CADDIE™ (2024), these systems still encounter challenges, such as potential false positives and variability in diagnostic performance across lesion types [11]. By automating endoscopic image analysis, these systems enhance diagnostic precision and optimize procedural workflows, resulting in reduced procedure durations and increased patient throughput. The integration of AI technology in endoscopy units not

*Corresponding author. Email: sirwan.k.ahmed@gmail.com

only enhances operational efficiency but also promotes advancements in patient care, underscoring its significance in modern healthcare environments.

Integrating AI technologies has the potential to significantly enhance the efficiency of endoscopic units by automating administrative tasks [2]. Specifically, AI systems can expedite pre-procedure preparation by streamlining patient scheduling, generating consent forms, and documenting comprehensive medical information. Through advanced NLP techniques, these AI solutions can effectively extract relevant information from electronic health records (EHRs) and other clinical documentation systems [2,12]. However, limitations persist regarding NLP efficacy in managing multilingual datasets and ambiguous medical terminologies, underscoring the need for continuous refinement and contextual training of these systems [9,12–14]. The acquired data can then be used to complete pre-procedure checklists, ensuring that all essential procedures are systematically addressed before medical operations commence. Furthermore, the utilization of AI-powered predictive analytics enables endoscopy units to optimize resource allocation and anticipate equipment requirements based on historical data and operational complexities. This proactive approach not only facilitates prompt access to necessary resources but also reduces procedural delays, thereby enhancing operational efficiency. Additionally, AI algorithms can detect contraindications or hazards by analyzing patient data. This empowers healthcare providers to proactively address any issues and enhance patient safety during endoscopic treatments. By seamlessly integrating AI technology, endoscopic units can improve their efficiency and effectiveness in pre-procedure preparation, leading to enhanced patient outcomes and improved healthcare delivery [2,3]. AI has the potential to greatly assist nurses during endoscopic operations by offering real-time decision support and procedural advice. AI-powered image analysis algorithms can analyze endoscopic images or films, helping nurses identify, describe, and accurately locate lesions. Moreover, AI-powered robotics platforms can automate repetitive tasks like tissue sample or mucosal resection, enabling nurses to concentrate on crucial aspects of patient care. By complementing nurses' abilities, AI can enhance procedural efficiency, reduce error rates, fewer documentation errors, and improve patient safety [13,15].

After endoscopic procedures, the use of AI technologies shows potential for improving post-procedure care and follow-up, which, in turn, enhances communication and ensures consistent treatment. AI-powered communication platforms can be employed to provide personalized post-procedure instructions, medication reminders, and follow-up appointments to patients [16]. This promotes adherence to treatment plans and facilitates optimal recovery. Additionally, integrating AI-enabled telemedicine systems can streamline virtual consultations between nurses and patients, allowing for prompt assessment of post-procedure difficulties or concerns. Consequently, this can lead to increased patient satisfaction and reduced utilization of healthcare resources [17].

The integration of AI into the optimization of nursing workflow presents challenges and considerations, despite its potential benefits [9]. These concerns include data privacy, security, regulatory compliance, algorithm accuracy, bias, and interpretability. Ethical dilemmas associated with the adoption of AI in endoscopy units should also be considered, such as excessive reliance on technology, erosion of clinical autonomy, and disparities in access to AI-powered therapies. Furthermore, it is crucial to emphasize the importance of continuous education and training for nurses to effectively use AI tools in clinical practice. To effectively integrate AI into nursing workflow optimization, collaboration among nurses, endoscopists, technologists, and data scientists is necessary. This collaboration will help develop AI solutions that address the unique requirements and operational processes of endoscopy units. In addition, comprehensive governance frameworks should be established to ensure the responsible and ethical use of AI. This includes considering algorithm transparency, accountability, and patient consent. It is critical to continuously assess and validate AI algorithms for performance monitoring, bias mitigation, and upholding clinical significance. Ensuring diversity in AI training datasets and actively mitigating algorithmic bias is essential to achieve equitable healthcare outcomes [9].

For practical AI integration, healthcare institutions can develop and implement structured pilot programs to test AI tools in specific clinical contexts, such as endoscopy units. These pilot initiatives should involve cross-functional teams, including nurses, IT professionals, and AI developers, to ensure clinical relevance and operational feasibility. Institutions should also establish strategic collaborations with reputable AI vendors to co-design solutions that address real-world nursing challenges. Equally important is the creation of comprehensive AI literacy programs, customized for nursing staff, that go beyond technical training to include ethical considerations, data interpretation, and workflow integration. These educational initiatives can be embedded within continuing professional development (CPD) curricula to foster long-term competency and engagement in AI-assisted care delivery.

In conclusion, the potential of AI to optimize nursing workflow in endoscopy units is significant. By utilizing AI technologies, these units can streamline processes, improve efficiency, and enhance patient outcomes. However, challenges related to data privacy, algorithm accuracy, and ethical considerations must be addressed to ensure the responsible and effective use of AI in nursing workflow optimization. Through interdisciplinary collaboration, strong governance frameworks, and continual evaluation, we can harness the transformative power of AI to optimize nursing workflow, elevate patient care, and shape the future of endoscopy units. Future research should focus on evaluating the efficacy of AI solutions across diverse endoscopy environments, ensuring broad applicability and sustained improvements in patient care.

Funding

The authors had no institutional or sponsor backing.

Conflicts Of Interest

The author's disclosure statement confirms the absence of any conflicts of interest.

Acknowledgment

The authors extend appreciation to the institution for their unwavering support and encouragement during the course of this research.

References

- [1] S.K. Tewani, G.C. Tannous, M.W. Stier, E. Natal, J. Vicari, Improving and Driving Efficiency in Your Endoscopy Unit in the 21st Century, *Clin Gastroenterol Hepatol* 20 (2022) 2680–2683.
- [2] D. Lee, S.N. Yoon, Application of artificial intelligence-based technologies in the healthcare industry: Opportunities and challenges, *Int J Environ Res Public Health* 18 (2021) 271.
- [3] Y. Song, X. Mao, X. Zhou, S. He, Y. Chen, L. Zhang, S. Xu, L. Yan, S. Tang, L. Ye, Use of artificial intelligence to improve the quality control of gastrointestinal endoscopy, *Front Med* 8 (2021) 709347.
- [4] S.K. Ahmed, The Impact of ChatGPT on the Nursing Profession: Revolutionizing Patient Care and Education, *Ann Biomed Eng* (2023). <https://doi.org/10.1007/s10439-023-03262-6>.
- [5] O. Olorunfemi, P.C. Ogwu, Harnessing AI in nursing care: Strategies to improve patient outcomes and overcome data privacy challenges, *Digit Med* 11 (2025). https://journals.lww.com/dm/fulltext/2025/03000/harnessing_ai_in_nursing_care__strategies_to.3.aspx.
- [6] B. Hill, A. Wamburu, F. Clarke, Technological advancements in endoscopy and their impact on gastrointestinal nursing, *Gastrointest Nurs* 22 (2024) S29–S34. <https://doi.org/10.12968/gasn.2024.0058>.
- [7] C. Xu, Y. Zhu, L. Wu, H. Yu, J. Liu, F. Zhou, Q. Xiong, S. Wang, S. Cui, X. Huang, A. Yin, T. Xu, S. Lei, Z. Xia, Evaluating the effect of an artificial intelligence system on the anesthesia quality control during gastrointestinal endoscopy with sedation: a randomized controlled trial, *BMC Anesthesiol* 22 (2022) 313. <https://doi.org/10.1186/s12871-022-01796-1>.
- [8] L.B. Mahoney, H. Jeannie S., L. Jenifer R., C.M. and Walsh, Pediatric endoscopy: how can we improve patient outcomes and ensure best practices?, *Expert Rev Gastroenterol Hepatol* 18 (2024) 89–102. <https://doi.org/10.1080/17474124.2024.2328229>.
- [9] S.K. Ahmed, Artificial intelligence in nursing: Current trends, possibilities and pitfalls, *J Med Surgery, Public Heal* 3 (2024) 100072.
- [10] T.M. Berzin, E.J. Topol, Adding artificial intelligence to gastrointestinal endoscopy, *Lancet* 395 (2020) 485.
- [11] OLYMPUS, First Cloud-Based AI Endoscopy System for Colonoscopy Receives FDA Clearance, *Www.Olympusamerica.Com* (2024). <https://www.olympusamerica.com/press-release/2024-09-05/first-cloud-based-ai-endoscopy-system-colonoscopy-receives-fda-clearance> (accessed May 9, 2025).
- [12] A.J. Nashwan, A. Abujaber, S.K. Ahmed, Charting the Future: The Role of AI in Transforming Nursing Documentation, *Cureus* 16 (2024) e57304. <https://doi.org/10.7759/cureus.57304>.
- [13] A. Bracken, C. Reilly, A. Feeley, E. Sheehan, K. Merghani, I. Feeley, Artificial Intelligence (AI) – Powered Documentation Systems in Healthcare: A Systematic Review, *J Med Syst* 49 (2025) 28. <https://doi.org/10.1007/s10916-025-02157-4>.
- [14] A. El-Sayed, S. Salman, L. Alrubaiy, The adoption of artificial intelligence assisted endoscopy in the Middle East: challenges and future potential., *Transl Gastroenterol Hepatol* 8 (2023) 42. <https://doi.org/10.21037/tgh-23-37>.
- [15] B.K. Baurasien, H.S. Alareefi, Diyanah Bander Almutairi, Maserah Mubrad Alanazi, Aseel Hasson Alhasson, A.D. Alshahrani, S.A. Almansour, Z.A. Alshagag, K.M. Alqattan, H.M. Alotaibi, Medical Errors and Patient Safety: Strategies for Reducing Errors Using Artificial Intelligence, *Int J Health Sci (Qassim)* 7 (2023) 3471–3487. <https://doi.org/10.53730/ijhs.v7nS1.15143>.
- [16] K.A. Baker, NEW TECHNOLOGY IN GASTROENTEROLOGY PRACTICE, *Gastroenterol Nurs* 45 (2022) 298–299.
- [17] A. Haleem, M. Javaid, R.P. Singh, R. Suman, Telemedicine for healthcare: Capabilities, features, barriers, and applications., *Sensors Int* 2 (2021) 100117. <https://doi.org/10.1016/j.sintl.2021.100117>.