

Healthcare Systems at the Intersection of Just Culture and Artificial Intelligence: Emerging Challenges for Nursing Management

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Abstract: The integration of Artificial Intelligence (AI) into healthcare presents both opportunities and challenges for maintaining a Just Culture as a framework that promotes patient safety through non-punitive learning from errors while ensuring accountability for reckless or wilful misconduct. This commentary aims to explore how AI can be aligned with the principles of a Just Culture to strengthen fairness, transparency, and continuous learning in nursing practice and management. The interconnection between AI and a Just Culture has been discussed through the lenses of transformational change; ethical, educational, and professional challenges; ethical and regulatory guidance; implications for research and nursing management. It has been concluded that when implemented thoughtfully, AI can reinforce a Just Culture by supporting transparent, evidence-based decision-making and promoting organizational learning. Conversely, inadequate governance or poor communication about AI's capabilities and limitations may erode trust and diminish staff engagement. Nurse managers are pivotal in mediating this balance ensuring that AI technologies are used responsibly, staff are educated on ethical and professional implications, and that systems are designed to enhance, rather than undermine human judgment and accountability. A well-governed integration of AI within a Just Culture can thus promote fairness, improve safety outcomes, and sustain a learning-oriented healthcare environment. This commentary can enhance our understanding and clarify how nurse managers can actively shape the integration of AI through the lens of a Just Culture.

Keywords: Artificial Intelligence, AI, governance, just culture, nursing management, patient safety

Introduction

Healthcare systems are increasingly shaped by two transformative forces: the advancement of Just Culture as a paradigm for accountability and patient safety, and the integration of Artificial Intelligence (AI) into clinical and managerial processes. Both developments carry significant implications for nursing practice and management. Their intersection offers insight into how safety, responsibility, and innovation can be aligned within contemporary healthcare. For instance, a review of AI applications in clinical risk management documented that AI can successfully detect clinical-data anomalies and support proactive risk identification, which reinforce safety-oriented care and contribute to error prevention and organizational learning.¹ In a nursing-focused context, the importance of data-centric AI and responsible AI design that emphasizes data quality, fairness, transparency, and human-centered domain expertise have been highlighted.²

Just Culture provides a balanced framework for accountability by recognizing that most adverse events arise from system weaknesses rather than individual failings, while reserving accountability for reckless or intentional misconduct.^{3–5} Encouraging error reporting without the fear of punitive action promotes learning and transparency and links patient safety initiatives to the broader safety culture of healthcare organizations.⁶ For nursing management, this requires cultivating environments where fairness and organizational learning are prioritized while appropriate individual accountability is preserved.

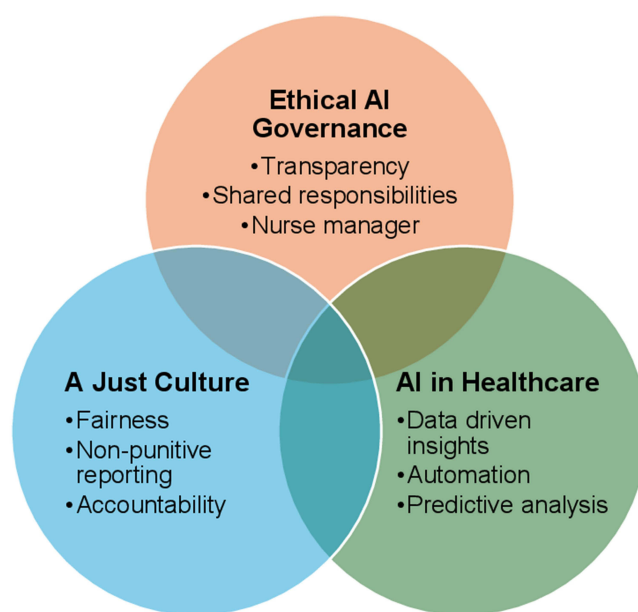


Figure 1 Intersection of a Just Culture and Artificial Intelligence.

Several safety and organizational theories support these principles. *Reason's Swiss Cheese Model* shows how multiple system defenses can fail in sequence, explaining why most adverse events stem from system-level weaknesses.⁷ *High Reliability Organization theory* emphasizes resilience and constant vigilance, values reinforced by a Just Culture that promotes error reporting and learning.⁸ As a pillar of a *positive safety culture*, a Just Culture aligns organizational values and behaviors with the prioritization of safety.⁹ Ethical grounding is provided by *restorative justice theory*, which seeks to repair harm while maintaining accountability.¹⁰ Human factors and systems engineering approaches, such as the *SEIPS model*, offer practical methods for analyzing and redesigning work systems to operationalize these principles.¹¹ These theoretical foundations can provide a conceptual bridge for integrating AI into nursing practice in ways that reinforce fairness, transparency, and continuous learning.

Despite growing interest in AI in healthcare, there is limited understanding of how AI adoption intersects with a Just culture. Also, existing literature has largely focused either on the technical capabilities of AI or on the general principles of a Just Culture, without examining their combined implications for nursing management. Therefore, this commentary aims to explore how AI can be aligned with the principles of a Just Culture to strengthen fairness, transparency, and continuous learning in nursing practice and management. To inform this commentary, a broad, exploratory literature search across PubMed (including MEDLINE), Scopus, Embase, and CINAHL with no time limitations was performed. It aimed to identify and include empirical studies, conceptual papers, and reviews addressing the intersection of AI, patient safety, and a Just Culture in healthcare. While it is not a systematic review, this structured scoping approach ensured inclusion of recent empirical insights to contextualize the commentary's discussion. The discussion has been organized and classified to AI as a catalyst for transformation; ethical, educational, and professional challenges; ethical and regulatory guidance; implications for research and nursing management. Figure 1 summarizes how a Just Culture and AI have been integrated.

Artificial Intelligence as a Catalyst for Transformation

AI simulates human intelligence through perception, reasoning, learning, and decision-making. Subfields including machine learning (ML), deep learning (DL), and natural language processing (NLP) enable the analysis of large datasets and automation of complex cognitive tasks.¹² AI is emerging as a transformative tool for clinical decision support, workflow optimization, and patient monitoring in nursing. McGrow¹³ describes this evolution as a journey “from data to

wisdom,” in which AI converts vast data streams into actionable insights that enhance nursing practice while posing ethical, educational, and professional challenges.

Viewed through the lens of a Just Culture, AI introduces both opportunities and tensions. It can strengthen patient safety by providing objective error detection, supporting organizational learning, and identifying system weaknesses.¹⁴ In nursing, AI-driven perception, reasoning, and learning can inform error reporting and root-cause analysis while maintaining a Just Culture principles of fairness and accountability. Examples include AI-based clinical decision support systems that offer recommendations while preserving human discretion¹⁵ and AI-powered early warning tools that reduce variability in care and improve outcomes without assigning individual blame.¹⁶ Such applications foster shared accountability and open discussion, aligning with a Just Culture’s non-punitive approach to learning from mistakes.^{17,18} AI can support nursing care by enhancing decision-making, streamlining workflows, and monitoring patients in real time. It improves patient safety by objectively flagging errors and revealing system gaps that inform organizational learning. Its ability to detect patterns can strengthen error reporting and root-cause analysis while preserving fairness and accountability. By reducing care variation and improving outcomes without placing blame on individuals, AI promotes shared responsibility and open reflection, reinforcing a Just Culture’s non-punitive approach.

Ethical, Educational, and Professional Challenges

AI offers substantial potential to improve patient safety and operational efficiency, yet it introduces ethical, educational, and professional challenges that require deliberate governance. Certain AI models, particularly those employing complex “black box” algorithms, lack transparency in their decision-making processes. When adverse events occur, this opacity complicates the attribution of responsibility, creating uncertainty regarding whether accountability rests with individual clinicians, the care team, or the organization.^{19,20} Such ambiguity has the potential to undermine both confidence in AI technologies and the organizational culture of accountability that supports a Just Culture.

For example, Hildt¹⁹ reports that insufficient explainability limits clinicians’ ability to evaluate algorithmic recommendations, constrains shared decision-making with patients, and increases the likelihood of over-reliance on machine outputs. Even when diagnostic accuracy improves, clinicians may feel compelled to accept recommendations they cannot fully interpret, producing tension between professional judgment and technological authority. Freyer et al,²¹ in a systematic review of explainability in AI decision-support systems, similarly conclude that inadequate transparency erodes clinician trust and generates legal and ethical uncertainty concerning responsibility for adverse outcomes. They emphasize that explainability is not merely a technical enhancement but an ethical prerequisite for informed consent, clinician oversight, and equitable clinical decision-making.

Beyond explainability, additional ethical concerns include data privacy, informed consent, and the risk of algorithmic bias when AI outputs influence clinical judgments.^{2,21,22} Educational implications are equally significant. Nurses and nurse managers require competencies in data interpretation, critical appraisal of AI-generated insights, and recognition of bias to ensure that technological tools support, rather than supplant, professional reasoning.^{22,23} Professionally, AI adoption can restructure decision-making hierarchies and clinical roles, necessitating clear organizational policies to preserve nursing autonomy and sustain shared accountability.²³

Accordingly, AI functions simultaneously as an enabler and a potential disruptor of a Just Culture. Although it can provide objective data to support consistent incident analysis, accountability may become misaligned if responsibility shifts disproportionately to individuals or the healthcare system without transparent justification.²⁰ Nurse managers, play a critical role in establishing governance structures, staff training, and ethical guidelines that safeguard fairness, openness, and continuous learning while ensuring that AI deployment reinforces professional responsibility. Educational preparation is essential, as nurses and nurse managers need skills in interpreting data, evaluating AI outputs, and recognizing potential bias in clinical judgment. Since AI can both support and challenge a Just Culture, nurse managers should create governance structures, training programs, and ethical safeguards that promote fairness, transparency, and continuous learning while ensuring that AI strengthens professional responsibility.

Ethical and Regulatory Guidance

Ethical governance frameworks are essential for guiding the adoption of AI responsibly. Floridi et al,²⁴ through the AI4People initiative, highlight transparency, fairness, accountability, and human oversight as critical principles for a “good AI society.” These principles are particularly salient in nursing, where human judgment and compassion remain central to care.

Regulatory frameworks reinforce these imperatives. The European AI Act classifies health-related AI systems as “high risk,” mandating strict requirements for safety, transparency, and governance.²⁵ For nursing management, this entails not only compliance with external regulations but also the creation of internal policies that integrate ethical principles with clinical practice. Implementing AI requires organizational structures and processes that support safe practices, continuous improvement, and clear procedures for addressing AI-related errors.¹⁷ Questions about whether AI should remain a support tool or act autonomously underscore the need for precise legal guidance.²⁶ Regulation should play a key role, along with compliance with external standards and internal policies that embed ethical principles in clinical routines. For safe AI use, organizational structures should support ongoing learning and provide clear processes for managing and learning from AI-related errors.

Implications for Research and Nursing Management

The intersection of a Just Culture and AI presents both a challenge and an opportunity for nursing management. Just Culture provides the conceptual framework for balanced accountability and organizational learning, while AI introduces advanced analytic capabilities that can enhance patient safety, clinical decision-making, and health care service efficiency. Successful integration requires leadership that aligns technological adoption with the professional values and regulatory standards fundamental to nursing practice. A Just Culture’s emphasis on justice, transparency, and systemic thinking rather than blaming individuals aligns with moderate realism epistemology that attempts to balance objective, evidence-based decision-making with contextual awareness, showing that AI use need not ignore human and social values.²⁷

Nurse managers are pivotal in this process. They should critically evaluate the technical performance of AI systems, ensure alignment with ethical guidelines and emerging regulations such as the European AI Act, and embed these tools within a culture of fairness and transparency. Education and workforce development are essential: nurses need sustained preparation in digital literacy, evaluation of AI outputs, and ethical reasoning to engage confidently with decision-support technologies. Management strategies should also address staff concerns regarding surveillance or diminished autonomy through clear communication, participatory planning, and reinforcement of professional judgment.

A robust learning culture remains central to this effort. Incident reporting and review mechanisms should accommodate AI-related events without punitive consequences and should distinguish among human error, system failure, and reckless behavior to preserve trust in both technology and organizational processes. Interdisciplinary collaboration with clinicians, technologists, ethicists, and patients is required to ensure that AI tools are contextually appropriate and ethically sound. Future research should examine AI’s impact on patient safety, reporting practices, workforce well-being, and organizational culture, while also analyzing implementation processes and clinical outcomes. Particular attention should be given to the role of nurse managers in guiding adoption, ensuring ethical use, supporting staff, and fostering a culture of safety and learning.

Conclusion

The convergence of a Just Culture and AI represents a pivotal development in nursing management. By fostering fairness, advancing digital competence, and insisting on transparent evaluation, nurse managers can guide AI implementation in a manner that enhances patient safety while protecting professional integrity and public trust. Sustainable progress will depend on evidence-based adoption supported by strong managerial leadership.

This commentary can improve our understanding and articulate how nurse managers can actively shape AI integration through a Just Culture lens. Accordingly, specific managerial responsibilities can be fostering transparent communication about AI’s limitations, establishing governance structures that preserve human accountability, and embedding ethical and educational supports for staff. The adoption of AI as a transformational change process requires deliberate leadership to safeguard patient care, enhance trust, and provide opportunities for learning while leveraging AI in healthcare.

Nurse managers should operationalize these principles by implementing concrete, system-level strategies such as the establishment of AI governance committees responsible for defining clear protocols, monitoring AI outputs, evaluating errors, and ensuring accountability. They need to integrate AI-generated insights with clinical judgment, promote open discussion about near-misses and foster a learning-oriented environment to build trust and mitigate staff resistance. However, limited resources, time constraints, and nurses' scepticism should be addressed through ongoing education and the active engagement of nurses in the AI use process.

Abbreviations

AI, Artificial Intelligence; WHO, World Health Organization; ML, Machine Learning; DL, Deep Learning; NLP, Natural Language Processing.

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