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Narrative Review

Ethical Considerations of Using Artificial Intelligence in Libraries at Medical Universities: A Narrative Review

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Abstract

Introduction: Artificial intelligence (AI) is increasingly integrated into medical university libraries, transforming information retrieval, knowledge organization, and user support. While AI offers efficiency and personalization, its adoption raises critical ethical concerns that align with medical ethics and library science. This narrative review examines the ethical implications of AI in medical university libraries, focusing on four guiding principles: Privacy and data protection, transparency and accountability, equity and access, and trust and user autonomy.

Methods: In this narrative review, a systematic search of the literature identified 43 relevant studies published between 2019 and 2025 using four major scholarly databases. Evidence was synthesized to highlight risks, ethical implications, and strategies proposed for responsible AI integration.

Results: Privacy concerns centered on risks of data breaches, vendor misuse, and long-term data retention, requiring compliance with GDPR/HIPAA and adoption of encryption and anonymization protocols. Transparency and accountability challenges stemmed from algorithmic opacity and bias, necessitating audits, explainable AI, and shared governance. Equity and access issues reflected institutional disparities and barriers for digitally marginalized users, emphasizing open-source tools, multilingual support, and digital literacy programs. Finally, trust and user autonomy were threatened by over-reliance on automated systems, highlighting the need for librarian oversight, ethics education, and user feedback mechanisms.

Conclusion: AI adoption in medical university libraries requires a robust ethical framework to safeguard privacy, promote transparency, ensure equitable access, and preserve user trust. Future research should focus on empirical evaluations, cross-cultural perspectives, and policy frameworks tailored to academic medical libraries.

Introduction

Integrating artificial intelligence (AI) into library services has fundamentally transformed how academic institutions, particularly medical universities, manage, organize, and disseminate knowledge. Medical university libraries, serving as essential hubs for students, faculty, and researchers, increasingly adopt AI applications to enhance efficiency, support complex research queries, and improve user experience (1, 2). These applications range from automated information retrieval systems

and knowledge organization tools to AI-driven virtual assistants facilitating real-time research support (3, 4). For example, AI-powered search engines can streamline access to vast medical literature repositories, while automated cataloging systems improve organization and accessibility of digital resources (5, 6). Such technological advances promise faster access to evidence-based knowledge, personalized recommendations, and more efficient handling of complex medical data. However, these innovations also introduce ethical concerns of privacy, fairness, transparency, and user trust.

The adoption of AI in medical university libraries reflects broader trends in higher education and healthcare, where AI supports data processing, automation, and decision-making. In libraries, AI encompasses natural language processing for search optimization, machine learning for personalized resource recommendations, and chatbots for reference services (7-9). For instance, AI-driven systems can analyze user search behavior to recommend relevant journals or automatically generate metadata for digital archives, thereby enhancing access to resources critical for medical education (10, 11). Empirical examples illustrate this potential: library directors in Türkiye have deployed AI to optimize virtual reference services and resource allocation (2), while academic libraries in Nigeria are exploring AI for digital preservation and sustainable knowledge organization (5, 12). These cases demonstrate that AI can advance the core mission of medical libraries by ensuring timely, accurate, and equitable access to information.

While AI offers numerous benefits, its implementation brings about ethical dilemmas similar to those faced in the healthcare industry. Medical libraries often handle sensitive data, including search histories related to clinical protocols or patient care, necessitating careful ethical oversight (13, 14). Key ethical challenges include privacy breaches, algorithmic bias, lack of transparency, and inequities in access. For example, AI-based recommendation systems may unintentionally prioritize certain journals, regions, or topics due to embedded biases, potentially distorting research outcomes and limiting the comprehensiveness of evidence available to users (15, 16). Moreover, over-reliance on automated tools could undermine the development of independent critical thinking among students, a foundational element of medical education (17, 18). Addressing these challenges requires integrating principles from both medical ethics and library science to ensure responsible AI adoption.

However, while the ethical challenges of AI are widely discussed in both healthcare and general library science literature, a significant research gap exists. A lack of a consolidated ethical framework exists, specifically tailored to the unique context of medical university libraries. These institutions operate at the critical intersection of medical education, clinical research, and patient care, handling highly sensitive data and supporting decisions with direct implications for health outcomes. Existing reviews often focus either on AI ethics in clinical practice or AI in libraries in a generic sense, failing to address the specific confluence of medical and library ethics, which is essential for guiding AI deployment in this specialized environment. The significance of ethical AI integration is heightened by the central role of medical university libraries in supporting education, research, and clinical practice. Ethical lapses could erode user trust, particularly among students and faculty who rely on libraries for reliable, evidence-based information (19, 20). Specific concerns include compromised confidentiality due to data misuse (21), insufficient transparency in AI-based recommendations (22), and inequitable access to AI-supported services that may disadvantage less-resourced institutions (23). These issues underscore the need for a robust ethical framework to ensure that AI adoption enhances rather than undermines inclusivity, fairness, and reliability in medical education and research. This absence of a targeted synthesis leaves library administrators and policymakers without a clear, evidence-based roadmap for navigating these complex ethical terrains.

The intersection of medical ethics and library practice creates a unique ethical landscape for AI in medical university libraries. Core principles in healthcare ethics —beneficence, non-maleficence,

autonomy, and justice— can be adapted to guide AI use in libraries (24, 25). Autonomy emphasizes that users retain meaningful control over information-seeking processes rather than being directed solely by algorithmic outputs (18, 26). Justice ensures equitable access, enabling all users, regardless of digital literacy or institutional resources, to benefit from AI-supported services (27, 28). Library-specific ethical frameworks highlight transparency, accountability, and user-centered design as critical factors, particularly where AI influences health education, clinical training, and research (3, 4, 8).

The purpose of this narrative review is threefold: first, to synthesize the scattered ethical considerations surrounding AI adoption in medical university libraries into a coherent overview; second, to explicitly identify and articulate the research gap concerning the lack of a tailored ethical framework for this specific context; and third, to propose a structured, practical set of recommendations for responsible AI implementation. By bridging healthcare ethics and library science, this review provides practical recommendations for responsible AI implementation, including the development of library-specific policies, training for librarians, and active engagement of users and policymakers in AI governance (3, 9). Ultimately, this work seeks to move beyond a general description of problems towards offering a targeted guide for action, tailored to the distinct mission and vulnerabilities of medical university libraries.

Methods

This study was designed as a narrative review that synthesizes ethical considerations regarding the adoption of artificial intelligence in medical university libraries. The focus was deliberately restricted to medical universities and health sciences libraries to explore ethical issues specific to these institutions rather than to libraries in general.

The literature search was conducted between January and April 2025 using four major scholarly databases: PubMed, Scopus, Web of Science, and Google Scholar. To increase coverage, manual searches of the reference lists of included articles were also carried out. The search strategy combined both free-text terms and Medical Subject Headings (MeSH), with the core concepts framed around "Artificial Intelligence," "Libraries, Medical," "Universities," and "Ethics." Boolean operators were applied to capture variations and related concepts (e.g., *Artificial Intelligence AND Libraries, Medical AND Ethics*). To address the four ethical principles that structure this review, additional keywords such as "privacy," "transparency," "accountability," "equity," and "trust" were incorporated into the searches.

Eligibility criteria were applied to ensure relevance and quality. Studies were included if they were published between 2019 and 2025, written in English, and explicitly addressed the use of artificial intelligence in the context of academic or medical university libraries, with particular attention to ethical dimensions such as privacy, accountability, equity, or user trust. Peer-reviewed journal articles, conference proceedings, and book chapters were considered. Studies were excluded if they dealt exclusively with the technical performance of artificial intelligence without reference to ethics, if they focused on libraries unrelated to higher education or medicine, or if they were non-peer-reviewed sources such as reports or opinion pieces.

The initial search identified 214 records. After removing duplicates, 147 titles and abstracts were screened for relevance. Of these, 89 records were excluded because they did not meet the inclusion criteria. The remaining 58 full-text articles were assessed in detail, leading to the final inclusion of 43 studies in this review. These studies were selected for their explicit engagement with the ethical challenges of artificial intelligence in medical or academic library settings and for their applicability to medical education and research environments (e.g., Astărăstoae et al., (1); Badawy et al., (13); Bradley (3); Boudi et al., (29)).

Data from the included studies were extracted and synthesized thematically. Each article was examined for the ethical principles it addressed, the specific context of medical university libraries, the central arguments or findings presented, and the recommendations proposed. The findings were then

integrated into a structured synthesis around the four guiding principles of this review: privacy and data protection, transparency and accountability, equity and access, and trust and user autonomy. This thematic organization made it possible to identify both common challenges and distinct perspectives across different institutional and regional contexts.

Specifically, by focusing on medical university libraries, this methodology sought to capture how the adoption of artificial intelligence intersects with the educational and clinical missions of these institutions. The literature revealed that while many ethical issues mirror those found in broader healthcare and academic settings, the stakes are uniquely high in medical libraries due to their role in supporting evidence-based practice, clinical training, and biomedical research (5, 30).

Results

The narrative review identified four major ethical principles framing the adoption of AI in medical university libraries: privacy and data protection, transparency and accountability, equity and access, and trust and user autonomy. Across the 43 included studies (e.g., Astărăstoae et al. (1); Badawy et al. (13); Bradley (3); Dankwa-Mullan (27)), common risks, ethical implications, and recommended strategies were synthesized. These findings highlight opportunities and challenges for responsible AI integration in medical library contexts, as summarized below and in Tables 1-4.

As shown in Table 1, privacy and Data Protection emerged as a central concern due to the sensitive nature of medical information handled in academic libraries. The literature consistently reported risks of data breaches, misuse of search histories, vulnerabilities in cloud-based AI tools, and third-party vendor access (3, 31). Ethical implications include violations of confidentiality, stigmatization of users, and erosion of trust (29, 32). Studies recommended robust encryption, anonymization protocols, compliance with GDPR/HIPAA, regular audits, restricted data retention, and training librarians in data ethics (5, 33, 34).

Table 1. Key Findings on privacy and data protection in AI-driven medical university libraries

Issue	Risks identified	Ethical implications	Recommended strategies
Data breaches & misuse	Cyberattacks, cloud vulnerabilities, third-party vendor risks (3, 31)	Compromise of confidentiality, stigmatization, violation of healthcare-aligned ethics (29)	Encryption, anonymization, GDPR/ HIPAA compliance, audits (32, 33)
Sensitive medical information	Exposure of search histories, integration with university records (29)	Violation of confidentiality, unintended disclosures, erosion of trust (1)	Consent mechanisms, restricted access, oversight (34)
Long-term vulnerabilities	Retention of sensitive data by adaptive algorithms (27)	Potential misuse or cross-referencing (37)	Limiting retention periods, secure storage, staff training (5)

As shown in Table 2, transparency and Accountability were highlighted as critical to address the “black box” nature of AI algorithms. Several studies (e.g., Keskinbora (24); Naik et al. (35); Mannheimer et al. (36)) found that opaque systems reduce user trust, as users are unable to evaluate how outputs are generated. Biases in algorithmic outputs, such as favoring certain publishers or regions, raise accountability dilemmas (16, 21). Recommended strategies include routine audits of AI algorithms, publication of algorithmic documentation, participatory governance involving librarians and faculty, and clear assignment of responsibility for errors (8, 35).

Table 2. Key findings on transparency and accountability

Issue	Risks identified	Ethical implications	Recommended strategies
Algorithmic opacity	"Black box" systems limit user understanding (24)	Reduced trust, hindered critical evaluation of sources (38)	Documentation, user education, explainable AI (8)
AI errors/biases	Misclassification, biased outputs favoring dominant sources (16, 21)	Skewed research outcomes, inequities in knowledge access (39)	Routine audits, correction protocols, stakeholder governance (35, 36)
Responsibility gaps	Unclear accountability across vendors, developers, librarians (35)	Trust erosion, lack of institutional accountability (10)	Clear protocols for responsibility assignment (36)

As shown in Table 3, equity and access concerns indicated that AI may exacerbate disparities among institutions and users. Studies emphasized the risk that well-funded universities can implement advanced AI services, while resource-constrained institutions lag behind (2, 6). Moreover, users with low digital literacy or language barriers may face exclusion from AI-driven systems (17, 30). Ethical concerns include inequities in medical education and the marginalization of non-English or underrepresented research outputs (7, 21). Strategies to mitigate these inequities include user-centered design, multilingual support, adoption of open-source AI solutions, digital literacy training programs, and stakeholder-driven equity policies (4, 8).

Table 3. Key findings on equity and access

Issue	Risks identified	Ethical implications	Recommended strategies
Institutional disparities	Unequal infrastructure and financial resources (2, 6)	Digital divide, inequities in medical education quality (27)	Open-source AI, shared resources, stakeholder policy (4, 8)
User disparities	Non-tech-savvy users disadvantaged (17)	Exclusion of certain groups, barriers to learning (30)	User-centered design, multilingual support, inclusive training (8)
Biased access to literature	Favoritism toward English-language or mainstream journals (21)	Marginalization of diverse/global health perspectives (7)	Diverse datasets, culturally inclusive frameworks (21, 40)

As shown in Table 4, trust and user autonomy were identified as particularly sensitive issues in medical libraries, where users rely on accurate and unbiased information to inform education, research, and clinical training. Opaque AI systems and over-reliance on algorithmic recommendations were found to undermine both confidence in library services and the independence of learners (1, 30). Recommendations emphasized balancing AI with librarian oversight, integrating AI ethics into medical education, digital literacy programs, and user feedback mechanisms (9, 18, 36).

Table 4. Key findings on trust and user autonomy

Issue	Risks identified	Ethical implications	Recommended strategies
Trust erosion	Opaque AI decisions, data misuse, inaccurate recommendations (1, 29)	Reduced confidence in library systems, reluctance to use AI (20)	Transparent AI, reliability standards, user engagement (9, 36)
Autonomy reduction	Over-reliance on AI, algorithmic steering of research (18, 30)	Loss of critical thinking, diminished independent judgment (7)	Librarian oversight, digital literacy training (17)
Balancing assistance	Automation limiting research engagement (15)	Dependence on AI at expense of skill development (41)	Feedback mechanisms, participatory governance (4, 36)

Discussion

The findings of this narrative review demonstrate that while AI offers transformative opportunities for medical university libraries, its adoption raises profound ethical challenges that must be carefully managed. Across the four guiding principles—privacy and data protection, transparency and accountability, equity and access, and trust and user autonomy—the evidence highlights both potential risks and actionable strategies. These challenges closely mirror those identified in healthcare AI ethics, reflecting the overlap between libraries and clinical environments in their handling of sensitive data and provision of trustworthy information (1, 13, 29).

Privacy and Data Protection were consistently identified as paramount concerns. Similar to breaches of electronic health records in clinical practice (32, 42), the exposure of library users' search histories or borrowing records can erode trust and compromise confidentiality (3, 31). This review highlights that medical university libraries must adopt healthcare-level safeguards such as GDPR/HIPAA compliance, encryption, and anonymization protocols (33, 34). Moreover, given the reliance on third-party AI vendors, governance frameworks must ensure accountability for data handling beyond institutional boundaries (38, 43). A recurring theme across studies was the importance of staff training in data ethics, positioning librarians as custodians of ethical AI use (5).

Transparency and Accountability challenges reflect the broader critique of AI as a "black box" technology (24, 35). In library contexts, algorithmic opacity undermines users' ability to critically evaluate information, a skill essential in medical education and clinical training (7, 30). This review found that transparency can be improved through clear documentation of AI processes, explainable AI models, and user education initiatives (8, 36). Accountability, however, remains complex: the diffusion of responsibility among developers, vendors, and library staff leaves gaps in redress when errors or biases occur (10, 35). Establishing shared governance models and ethical oversight committees in academic libraries was suggested as a way forward (6, 36).

Equity and access findings highlight the danger of exacerbating disparities in medical education. As in healthcare, where AI risks reinforcing inequities in patient care (21, 27), libraries may inadvertently disadvantage resource-constrained institutions or non-tech-savvy users (2, 17). A particular concern raised by multiple studies is the dominance of English-language and Western medical literature in AI-driven search and recommendation systems, marginalizing global and culturally diverse knowledge (21, 40). Strategies proposed include user-centered AI design, multilingual interfaces, digital literacy workshops, and adoption of open-source AI tools to reduce financial and technical barriers (4, 8). Addressing equity is not only a matter of fairness but also central to the mission of medical universities, which must train culturally competent and globally aware health professionals (39).

Trust and user autonomy emerged as particularly sensitive in medical university contexts, where users rely on libraries for evidence-based knowledge that shapes both education and clinical practice.

Opaque algorithms and over-reliance on automated recommendations risk diminishing critical thinking and eroding trust in library systems (1, 20). Several studies stressed the importance of maintaining human-AI complementarity, whereby librarians act as mediators of AI tools, helping students and researchers interpret algorithmic outputs (9). Integrating AI ethics education into medical curricula was also emphasized as essential to foster responsible engagement with AI tools (17, 18, 30). Finally, user feedback loops were recommended to ensure that AI systems evolve in response to the values and needs of their academic communities (4, 36).

Collectively, these findings suggest that the ethical challenges of AI in medical university libraries are not unique to libraries alone but resonate with broader debates in healthcare AI ethics (44, 45). The strength of this review lies in synthesizing cross-disciplinary insights -medical ethics, library science, and AI governance- into a framework that can guide library-specific policies. At the same time, several limitations must be acknowledged: most of the reviewed studies were conceptual or descriptive rather than empirical, limiting evidence on the real-world effectiveness of proposed strategies (16, 46). Moreover, research disproportionately reflects Western and high-income contexts, leaving gaps in knowledge from low- and middle-income countries, where infrastructural and cultural challenges may differ substantially (12, 23).

Therefore, future studies should focus on empirical evaluations of AI ethics interventions in libraries, cross-cultural comparisons of ethical priorities, and long-term impacts of AI adoption on user trust and autonomy. Importantly, researchers should investigate how policy frameworks in medical libraries can align with those in healthcare institutions, ensuring consistency in protecting sensitive information and promoting equity (25, 47).

Conclusion

Integrating AI into medical university libraries presents significant opportunities to enhance access to medical literature, optimize knowledge organization, and support research and education. AI-driven systems ranging from intelligent search engines to virtual assistants can improve efficiency and deliver personalized services. Yet, these advancements also introduce ethical challenges that mirror those in healthcare, particularly regarding privacy, transparency, equity, and user autonomy. This narrative review underscores the need for a robust ethical framework to ensure that AI adoption strengthens, rather than compromises, the mission of medical libraries. Practical steps include developing clear policies on data protection, promoting transparency in AI algorithms, addressing inequities in access across institutions, and safeguarding user trust through participatory governance. Future research should move beyond descriptive accounts to provide empirical evidence on how ethical frameworks can be operationalized in diverse library contexts. By bridging principles from medical ethics and library science, medical university libraries can adopt AI responsibly, ensuring that technological innovation supports both equitable access and the integrity of medical education.

Declaration

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Conflict of Interest

The author declares that he has no competing interests.

Ethical Statement

The study procedures complied with the Declaration of Helsinki and institutional guidelines.

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Authors' Contribution

The author conducted all parts of this study and

takes responsibility for the integrity and accuracy of the data and the analysis.

Use of Artificial Intelligence

During the preparation of this manuscript, the author used an AI tool for light text editing and grammar checking. After using this tool, the author reviewed and edited the content as needed and takes full responsibility for the published work.

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