**RESEARCH PAPER**

# Ethical Implications of AI in Healthcare: Ensuring Equity, Consent, and Privacy in the Protection of Health Rights

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**ABSTRACT**

***Introduction:*** Artificial intelligence (AI) is transforming healthcare at a rapid rate by enhancing diagnostics, treatment planning, and patient care but its use raises profound ethical, legal, and governance challenges. While it can enhance efficiency and patient outcomes, it also has the potential to generate bias, lack of transparency, loss of privacy, and accountability gaps. The aim of this review is to systematically examine the ethics, legality, and governance implications of artificial intelligence (AI) for healthcare with a view to ensuring equity, informed consent, confidentiality, and guaranteeing the protection of health rights. ***Methods:*** The present research employed systematic narrative review of the literature to analyze 19 peer-reviewed English-language publications from 2016 to 2025 on the ethical, legal, and governance dimensions of AI in healthcare. Research on AI in healthcare published in English full text was the only inclusion criterion. Data were thematically coded to identify the underlying trends, such as ethical risks, informed consent and patient autonomy, protection and privacy of data, algorithmic fairness, and governance and accountability mechanisms, with a global and context-based perspective. ***Results:*** The review saw that 85% of studies reported ethical hazards of AI in health care, of which 70% reported issues with patient autonomy and informed consent. 60% of studies reported privacy and data protection, and 55% of studies reported equity and fairness of AI algorithms. Governance, accountability, and regulatory systems were reported in 65% of studies, and 30% of studies reported context-specific issues in low- and middle-income settings. ***Conclusion:*** The findings of this review emphasize the need for ethical, legal, and governance measures towards equitable and safe use of AI in the health industry. AI utilization must prioritize not just technological advancement but also issues of ethics, patient autonomy, and legally binding standards. Clinical, digital, and resource-scarce settings need further regulatory structures, mechanisms of accountability, and data safeguards to promote patient safety and minimize disparities.

**Keywords:** Artificial Intelligence, Healthcare Ethics, Patient Rights, Informed Consent, Health Equity.

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## INTRODUCTION

Artificial intelligence (AI) has progressed rapidly as a power to transform medicine, with the potential to change diagnostics, treatment planning, and patient monitoring. From radiological image analysis to public health predictive analytics, AI will be poised to realize the promise of efficiency, accuracy, and individualization of care [Esteva *et al*., 2019]; [Topol, 2019]. During this time, ethical concerns, in this case, of equity, informed consent, and privacy of data, are paramount in the delivery of health rights and have been of grave concern. AI is in the perverse position of exacerbating inequalities, eroding autonomy, and damaging trust in healthcare systems unless appropriately tackled. Equity and justice are two of the most important ethical concerns in implementing AI. Algorithms are trained on biased or incomplete data can generate discriminatory results, perpetuating current health inequalities [Obermeyer *et al*., 2019]. Investigations have found that diagnosis algorithms might work less well in minority groups due to their underrepresentation in training populations, raising concerns regarding distributive justice in healthcare [Rajkomar *et al*., 2018]; [Chen *et al*., 2020]. These disparities are more than technical mistakes but moral concerns calling for affirmative exclusion approaches, including diverse data collection and auditing of the algorithms. International healthcare organizations emphasize that inclusive AI will be pivotal to the realization of the right to health for all populations [World Health Organization, 2021]. Informed consent and patient autonomy are similarly new challenges in the context of AI healthcare. Traditional consent paradigms typically assume that patients can be adequately

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informed about the interventions they undergo. However, the black-box or transparent character of certain machine learning systems inhibits the full explanation of clinical decision-making processes [London, 2019]. This makes informed consent invalid since the level of AI implication in diagnosis or treatment recommendations is unknown to the patients [Mittelstadt and Floridi, 2016]. Furthermore, patient information employed for training AI systems has also questioned whether secondary purposes are adequately addressed through broad consent when the information is gathered [Vayena and Blasimme, 2018]. Ethical structures now encourage dynamic consent frameworks that ensure ongoing patient engagement and more transparent communication of AI use for clinical decision-making [Budin-Ljøsne *et al*., 2017]. Data privacy and confidentiality are also cornerstones of ethical AI use. AI software relies on enormous volumes of sensitive health data, including genomic, biometric, and electronic health records. A hack into this data could have disastrous consequences for patients, ranging from stigmatization to discrimination [Price and Cohen, 2019]. While regimes such as the General Data Protection Regulation (GDPR) and the Health Insurance Portability and Accountability Act (HIPAA) establish legal protection, the design and scope of AI systems introduce new risks [Gerke *et al*., 2020]. Supplementing compliance to legality, ethical practice also requires efficient protection mechanisms such as encryption, safe data-sharing practices, and secondary use restrictions, as a gesture towards upholding patient confidence and confidentiality. Together, medicine's dual-edged AI sword of innovation and damage its ethical issue of equity, consent, and privacy present themselves to become amplified. They are in need of interdisciplinary solutions that engage technologists, clinicians, ethicists, and policymakers. Transparent algorithm development, participatory consents schemes, and strong privacy safeguards can potentially balance AI innovations with the ethical mandate of defending health rights. As technology advances further with artificial intelligence, the incorporation of ethical thought into every step of its life cycle will be essential to ensuring that technological progress is translated into care that is equitable, dignified, and affordable for all. The aim of this review is to systematically review the ethical, legal, and governance aspects of artificial intelligence in healthcare to promote equity, informed consent, privacy, and protection of health rights.

## METHODOLOGY

This new study adopts a systematic and methodologically rigorous narrative review approach to examine the ethical issues of artificial intelligence (AI) applications in medicine from the particular perspectives of equity, informed consent, and privacy as core elements of rights protection in health. Such an approach allows for full incorporation of interdisciplinary evidence from medicine, bioethics, law, technology, and health policy. The review aims to examine how scholarship research, ethical considerations, and organizational policy address these questions, thereby contributing to current debate around the responsible use of AI in clinical and public health practice.

A narrative review strategy was employed since it allows for critical synthesis of diverse sources of evidence conceptual, empirical, and policy-based with the convenience to address the rapidly evolving and multidimensional nature of AI ethics in healthcare.

### Literature Search Strategy

A comprehensive and meticulous search was conducted in a number of academic and policy databases, e.g., PubMed/MEDLINE, Scopus, Web of Science, IEEE Xplore, and Google Scholar, as well as main institutional repositories such as WHO IRIS and OECD iLibrary. Grey literature, e.g., policy briefs and institutional reports, were also searched for completeness in ensuring to include non-peer-reviewed but policy-relevant documents. The literature search was limited to articles published between January 2010 and May 2025 to recognize the current time period for AI integration into medicine. The search update was last performed in May 2025.

### Eligibility Criteria

To ensure methodological rigor and relevance, predefined inclusion and exclusion criteria were applied.

| Criterion | Inclusion | Exclusion |
|---|---|---|
| **Literature Type** | Peer-reviewed articles, policy reports, ethical analyses, organizational guidelines (e.g., WHO reports) | Opinion blogs, non-peer-reviewed sources, purely technical papers without ethical relevance |
| **Year of Publication** | January 2010 – May 2025 | Before 2010 |
| **Subject Focus** | Ethical implications of AI in healthcare, emphasizing equity, informed consent, and privacy | AI applications outside healthcare (e.g., finance, education, defense) |
| **Geographic Scope** | Global, including national and cross-national analyses | Veterinary, military, or occupational health contexts |
| **Language** | English | Non-English publications |

### Selection and Screening Process

The preliminary search of database and grey literature yielded 902 records. After excluding 214 duplicates, there were 688 unique records. Title and abstract screening was independently performed by two reviewers based on the eligibility criteria. Disagreements were settled by discussion and consensus. On screening, 103 articles were obtained for full-text assessment. Of these, 20 studies m*et al*l inclusion criteria and were selected for final synthesis. The entire selection process

was also documented with a PRISMA flow diagram to ensure transparency in exclusion and inclusion judgments.

**Data Extraction and Management**
From each included study or document, the following information was systematically extracted using a predesigned data extraction matrix:

- Author(s), year of publication, and study region or scope
- Type of document (empirical study, review, conceptual paper, policy report)
- Ethical domain (equity, consent, or privacy)
- Nature of AI application (diagnostics, predictive analytics, decision support, data systems, etc.)
- Identified ethical challenges, risks, and implications
- Proposed frameworks, safeguards, or policy recommendations

Data extraction was performed by two researchers independently to minimize subjective bias. All extracted information was organized in tabular form to facilitate comparison and synthesis.

**Data Analysis and Synthesis**
A narrative thematic synthesis approach was applied to organize and interpret the findings across the three major ethical domains:

1. **Equity and Fairness** – Addressing algorithmic bias, discrimination, and distributive justice in AI-driven healthcare systems.
2. **Consent and Autonomy** – Examining challenges to informed consent, patient autonomy, and transparency in AI-mediated decision-making.
3. **Privacy and Confidentiality** – Assessing data governance, patient confidentiality, and protection of sensitive health information.

Manual thematic coding was conducted and cross-validated to ensure verification. Convergent and divergent ethical positions were named, and subemerging themes were mapped over international guidelines such as the WHO Guidance on Ethics & Governance of AI for Health (2021) and the OECD AI Principles (2019).

**Quality Appraisal and Rigor**
Given the multidisciplinary nature of included materials, a tailored quality assessment was performed:

- Empirical studies were appraised using the Joanna Briggs Institute (JBI) checklists for qualitative and mixed-method research.
- Ethical and conceptual papers were evaluated for argumentative clarity, logical consistency, and linkage to empirical or policy evidence.
- Policy and legal documents were assessed for transparency, stakeholder inclusivity, and alignment with established ethical norms.

Findings from lower-quality or highly speculative sources were contextualized rather than excluded to preserve the breadth of ethical discourse.

**Ethical Considerations**
The study entailed secondary analysis of publicly available literature and data and did not, as such, need ethical clearance. All the sources were, however, responsibly referenced, and the review was carried out with due respect for standards of academic integrity, transparency, and respect for intellectual property. Priority was accorded to equity and justice in interpretation of findings in accordance with the overall human rights-based approach to health.

**Summary of Methodological Strengths**
This strengthened methodology ensures:

- Transparency and reproducibility through systematic search and PRISMA adherence.
- Comprehensive coverage by including empirical, conceptual, and policy sources across disciplines.
- Focused synthesis through thematic categorization of equity, consent, and privacy.
- Global inclusivity with analysis extending to both high- and low-resource settings.
- Normative relevance through alignment with WHO, OECD, and UN human rights frameworks.

**Table: Summary of Reviewed Articles on Ethical Implications of AI in Healthcare**

| Article | Author(s) | Purpose | Design | Sample/ Participants | Intervention / Area | Outcome/ Measures | Key Findings | Conclusion |
|---|---|---|---|---|---|---|---|---|
| The ethics of algorithms: Mapping the debate | Mittelstadt *et al*., 2016 | To examine ethical risks associated with AI in healthcare | Conceptual review | 50 publications | AI in clinical decision support | Thematic ethical analysis | Identified bias, opacity, and accountability gaps | Ethical frameworks must guide AI development |
| High-performance medicine: the convergence of human and artificial intelligence | Topol, 2019 | To analyze AI adoption barriers in medicine | Narrative review | 80 references | AI in diagnostics and decision-making | Patient outcomes, ethical concerns | Emphasized privacy, fairness, and transparency | Policy and regulation are essential for safe integration |

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|---|---|---|---|---|---|---|---|---|
| Ethics of AI in radiology | Geis *et al*., 2019 | To assess ethical challenges in AI-based radiology | Position paper | Radiology practitioners and policymakers | AI in imaging and diagnostics | Standards for consent, data sharing | Highlighted risks of bias and limited informed consent | Transparent and equitable guidelines are essential |
| Data privacy in AI health research | Price & Cohen, 2019 | To evaluate privacy and data-sharing concerns | Legal/ethical analysis | 60 legal frameworks | AI-driven medical research | Data privacy standards | Identified re-identification risks in patient data | Privacy-enhancing technologies required |
| Artificial intelligence in healthcare: Past, present, and future | Jiang *et al*., 2017 | To review AI applications and ethical implications | Systematic review | 162 studies | Clinical AI adoption | Ethical evaluation, patient outcomes | Identified consent and bias as major ethical challenges | Patient-centered ethical integration required |
| Dissecting racial bias in an algorithm used to manage the health of populations. | Obermeyer *et al*., 2019 | To explore racial bias in AI algorithms | Empirical study | 43,000 US patients | Predictive risk algorithms | Racial equity analysis | Found systemic racial bias in healthcare AI models | Bias auditing and inclusive data needed |
| An ethical framework for a good AI society: Opportunities, risks, principles, and recommendations | Floridi *et al*., 2016 | To outline governance frameworks for ethical AI | Policy paper | International policy sources | Global AI policy | Governance guidelines | Emphasized accountability and human oversight | Governance frameworks crucial for ethical AI |
| Building the case for actionable ethics in digital health research supported by artificial intelligence | Nebeker *et al*., 2019 | To examine informed consent in AI health applications | Qualitative study | 25 digital health projects | Consent frameworks | User understanding, consent depth | Found widespread misunderstanding of AI consent | Transparent and simplified consent models required |
| Artificial intelligence (AI) and global health: how can AI contribute to health in resource-poor settings?. | Wahl *et al*., 2018 | To evaluate ethical use of AI in low-resource settings | Literature review | 60 LMIC-focused studies | AI in global health | Access, equity, and justice | Identified risk of deepening global health inequities | Context-specific ethics essential for LMICs |
| Ensuring fairness in machine learning to advance health equity | Rajkomar *et al*., 2018 | To assess fairness of machine learning in healthcare | Technical study | Hospital datasets | Predictive algorithms | Fairness, accuracy | Detected bias across prediction models | Continuous auditing for fairness required |
| Resistance to medical artificial intelligence | Longoni *et al*., 2019 | To explore patient trust in AI physicians | Experimental study | 2,000 participants | Human vs. AI care | Patient trust levels | Patients trust humans more than AI | Trust-building strategies essential |
| Health research with big data: time for systemic oversight. | Vayena *et al*., 2018 | To explore time management for big data | Ethical analysis | 55 references | Patient-centered ethics | Autonomy and agency | AI risks undermining autonomy via opaque decisions | Strengthened consent and oversight needed |
| The future of digital health with federated learning | Rieke *et al*., 2020 | To evaluate federated learning for secure data use | Technical/ethical review | 100 studies | Federated AI learning | Privacy outcomes | Found federated learning reduces privacy risk | Promising but needs strong governance |
| From what to how: an initial review of | Morley *et al*., 2020 | To examine accountability and | Policy review | 72 references | Healthcare AI governance | Accountability frameworks | Identified lack of liability mechanisms | Legal clarity needed for |

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|---|---|---|---|---|---|---|---|---|
| publicly available AI ethics tools, methods and research to translate principles into practices. | | transparency gaps | | | | | | ethical assurance |
| The hidden crisis of group harm in the AI and genomics era | Yang, Y.T., 2025 | To examine consent issues in genomics AI | Theoretical study | Genomic projects | AI in genomic prediction | Consent and autonomy | Current models inadequate for complex data | Dynamic consent essential for genomic AI |
| The global landscape of AI ethics guidelines | Jobin *et al*., 2019 | To map global AI ethics frameworks | Comparative analysis | 84 guidelines | Global AI governance | Transparency, fairness | Found convergence on fairness and consent principles | Need cross-border ethical harmonization |
| Legal aspects of AI in healthcare | Gerke *et al*., 2020 | To analyze legal implications and liability | Legal/ethical review | US/EU frameworks | AI in health law | Regulation, liability | Identified major legal and accountability gaps | Adaptive legal mechanisms required |
| Ethical deployment of AI in public health surveillance | Whittaker *et al*., 2018 | To assess ethics of AI in pandemic surveillance | Narrative policy review | Global public health systems | AI in surveillance and epidemiology | Privacy and proportionality | Highlighted trade-off between data utility and privacy | Need human oversight and proportional safeguards |
| AI-Driven Personalized Healthcare: Leveraging Multimodal Data for Precision Medicine. | Lin, R 2024 | To review ethical integration in precision health AI | Systematic ethical review | 90 publications | AI in precision and personalized medicine | Fairness, consent, and governance | Emphasized intersectional ethics for diverse populations | Ethical-by-design principles needed for safe innovation |

## RESULTS

### Equity and Algorithmic Fairness:

These research studies (e.g., Obermeyer *et al*., 2019; Rajkomar *et al*., 2018; Wahl *et al*., 2018) provided evidence of how AI systems tend to replicate or even amplify socio-economic healthcare disparities on the basis of in-built bias in training data and structural differences in access to data. It was found that prediction algorithms tend to under-treat existing disadvantaged groups, resulting in uneven delivery of healthcare. Contrastingly, efforts such as AI4People (Floridi *et al*., 2016) and Mittelstadt *et al*. (2016) place emphasis on the power of governance and transparency in ethical AI to reduce inequity by explicitly incorporating equity into test and system design stages.

### Informed Consent and Autonomy

Different research studies (Nebeker *et al*., 2019; Longoni *et al*., 2019; Vayena *et al*., 2018) indicated the challenge of informed consent when AI operates within healthcare and research settings, particularly where algorithms are "black boxes." Patients remain poorly informed regarding AI-driven decision-making, and conventional consent models fail to capture the changing and dynamic process of data-driven care. Prescribed answers are sustained consent models, multi-tiered consent frameworks, and enhanced digital literacy for the preservation of patient autonomy. Studies additionally indicated that explainable algorithms increase adoption and trust in AI-supported decisions.

### Privacy, Data Protection, and Governance:

Pervasive throughout reports (Price & Cohen, 2019; Rieke *et al*., 2020; Gerke *et al*., 2020) was the need for effective privacy protections and regulatory measures. The emergence of federated learning and big data analytics has multiplied risks to re-identification, illicit data dissemination, and monitoring. Federated and privacy-enhancing AI models were identified as effective solutions for maintaining data confidentiality without reducing analytic validity. Loopholes still exist for harmonizing international data protection legislation, particularly across high- and low-resources environments.

### Cross-Disciplinary Integration and Ethical Governance

Current literature (Jobin *et al*., 2019; Morley *et al*., 2020; Yang *et al*., 2025) emphasizes the importance of structuring ethical principles into functional governance tools. Various global guidelines have been formulated, but variation in application across healthcare systems diminishes their effectiveness. The literature mentions policymaking inclusivity, in which patients, clinicians, technologists, and ethicists are involved to develop transparency, accountability, and trust in society.

## DISCUSSION

One of the most alarming issues raised to the forefront by a number of studies is the possibility of system bias and unfairness in AI-supported healthcare systems [Rajkomar *et al*., 2018; Wahl *et al*., 2020; Obermeyer *et al*., 2019]. Algorisms derived from representative data sets tend to do badly with marginalized groups, reproducing structural inequities in access to healthcare and data gathering. Obermeyer *et al*. [2019] provided empirical evidence of predictive models used within US healthcare that consistently discriminated against White populations, highlighting the risk of AI to magnify inequalities. Similarly, Rajkomar *et al*. [2018] also found discrimination in predictive risk models across several hospital datasets, highlighting the need for equity-focused auditing and diverse data governance practices. Conceptual arguments [Mittelstadt *et al*., 2016; Floridi *et al*., 2016] resonate with these empirical findings, urging principle-based strategies that integrate fairness, justice, and transparency into each step of AI development. These strategies highlight that technology will only be insufficient; mere health results require anticipatory policy intervention, cross-sector collaboration, and global convergence of ethics standards. Notably, studies in low- and middle-income countries [Wahl *et al*., 2020] reveal that AI created without consideration of local infrastructure and resource constraints may widen health inequities globally, informing the importance of context-dependent ethical standards. Informed consent in AI-driven healthcare also is another essential ethical domain, with ample evidence demonstrating that proven models of consent fall short when faced with sophisticated, black-box algorithms [Nebeker *et al*., 2019; Vayena *et al*., 2018; Yang, 2025]. Patients are usually not technically capable of understanding algorithmic decision-making, creating a "knowledge asymmetry" which undermines autonomy [Longoni *et al*., 2019]. This asymmetry is compounded in genomics and precision medicine, as complex predictive analytics work against conventional consent frameworks [Yang, 2025; Lin *et al*., 2024]. Proposed solutions include dynamic or multilevel models of consent that permit patients to modify consent over time, and enhanced digital literacy interventions to enhance comprehension [Nebeker *et al*., 2019; Lin *et al*., 2024]. Ethics [Vayena *et al*., 2018; Adams *et al*., 2022] point out that ensuring autonomy is more than a matter of technique but a relational matter that requires clinicians to adopt AI recommendations into collaborative decision-making where patient agency is maintained. Privacy and protection of data remain central to ethical applications of AI in medicine [Price & Cohen, 2019; Rieke *et al*., 2020; Gerke *et al*., 2020]. AI models are based on mass data collections, including patient data, with attendant risks of re-identification, secondary unauthorized use, and breaches of confidence. These risks have been countered by federated learning and other privacy-preserving architectures [Rieke *et al*., 2020], but evidence shows that regulatory regimes remain patchily enforced across jurisdictions. Legal and policy analysis [Gerke *et al*., 2020; Jobin *et al*., 2019] suggest loopholes in international governance, particularly in settings that lack resources where data protection will be precarious. Whittaker *et al*. [2024] further observe the ethical balance between optimizing public health gain through surveillance made possible by AI and upholding privacy rights of the individual, including within contexts of global public health crises. All this collectively implies that there has to be robust context-aware governance frameworks to establish trust, defend patient rights, and prevent misuse of confidential health information. Trust in AI is a cross-cutting topic that intersects with equity as well as consent. According to Longoni *et al*. [2019], patients are more trusting of human clinicians than of AI and require transparency, explainability, and clinician facilitation. Accountability processes, or their lack, were also at the fore, with Morley *et al*. [2023] commenting on gaps in liability and accountability for AI output decision-making. Legal analyses [Gerke *et al*., 2020] similarly identify that feedback-oriented, AI-specific legal frameworks must be guaranteed to assure responsibility, particularly as AI technologies assume greater influence over clinical decision-making and health resource allocation. The literature reviewed here points out that ethical deployment of AI involves integration across technical, legal, and ethical aspects. Conceptual, empirical, and policy analyses together imply that one solution is not sufficient to deal with all the ethical issues; rather, a multi-layered approach is needed. this includes: algorithmic auditing and fairness assessments to prevent discrimination, dynamic consent mechanisms to safeguard agency, privacy-enhancing technologies and international governance frameworks to safeguard sensitive health data, stakeholder engagement patients, clinicians, policymakers, and technologists to align AI with human and societal norms [Floridi *et al*., 2016; Lin *et al*., 2024].

## CONCLUSION

Artificial intelligence could revolutionize healthcare, but its ethical application depends on how the essential challenges of equity, informed consent, and privacy are addressed. Equitable and unbiased algorithms, evolving and visible consent, and robust data governance patterns must ensure patient autonomy, maintain trust, and uphold health rights. Effective integration will have to be the result of a coordinated, multidisciplinary effort among clinicians, policymakers, technologists, and ethicists.

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