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Original Article

Transforming Prior Authorization through Artificial Intelligence: A National Framework for Reducing Administrative Burden and Improving Patient Access

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Abstract: *Prior authorization is widely used to manage healthcare utilization and control costs, yet its current implementation often creates substantial administrative burden, delays in treatment, inconsistent insurer requirements, and barriers to patient access. Healthcare professionals frequently spend considerable time preparing documentation, responding to payer queries, and managing appeals, while patients may experience uncertainty, interrupted care, and delayed access to clinically necessary services. This paper examines how artificial intelligence can transform prior authorization through a national framework designed to reduce administrative workload while improving timeliness, transparency, equity, and clinical accountability. The proposed framework integrates interoperable health-data exchange, AI-supported documentation extraction, eligibility checking, risk-based case triage, clinician-led review, patient communication tools, and continuous performance monitoring. AI is positioned as a decision-support mechanism rather than an autonomous decision-maker, ensuring that complex, high-risk, and denied cases remain subject to qualified human oversight. The framework also incorporates safeguards for privacy, explain ability, bias detection, patient appeal rights, and independent governance. By standardizing workflows and reducing repetitive administrative tasks, an AI-enabled national prior-authorization system may improve provider efficiency, accelerate appropriate treatment access, and support a more patient-centered healthcare system. Future empirical research should evaluate the framework using real-world payer, provider, and patient outcome data.*

Keywords: *Prior Authorization, Artificial Intelligence, Administrative Burden, Patient Access, Interoperability, Clinical Decision Support, Healthcare Governance.*

1. Introduction

1.1. Background to Prior Authorization

Prior authorization is a utilisation-management process through which health insurers or other payers assess whether a requested healthcare service meets predefined coverage, medical-necessity, or cost-effectiveness requirements before it is provided or reimbursed. It is commonly applied to prescription medicines, diagnostic investigations, surgical procedures, specialist referrals, rehabilitation services, and high-cost treatments. In principle, prior authorization is intended to encourage evidence-based practice, prevent inappropriate utilisation, and manage limited healthcare resources. By requiring supporting clinical information, insurers aim to ensure that requested interventions are aligned with approved indications, treatment guidelines, and benefit-plan criteria.

However, the practical operation of prior authorization has become increasingly complex. Requirements often differ across insurers, treatment categories, and patient benefit plans, creating a fragmented system in which healthcare professionals must navigate multiple forms, portals, documentation standards, and review processes. A request that is approved quickly by one payer may require extensive additional evidence or repeated follow-up with another. Consequently, a process designed to promote appropriate care may instead delay clinically indicated interventions, particularly when decisions are slow, criteria are unclear, or communication between providers and insurers is inefficient. The challenge is therefore not whether prior authorization should exist in all circumstances, but how it can be redesigned to preserve appropriate oversight without creating avoidable barriers to care.

1.2. Administrative Burden in Healthcare

Administrative burden provides an important lens for understanding the consequences of prior authorization. Herd and Moynihan (2019) describe administrative burden as the learning, compliance, and psychological costs that individuals experience when interacting with institutional systems. In healthcare, these burdens affect not only patients but also physicians, nurses, pharmacists, and administrative personnel who must learn insurer-specific rules, collect clinical documentation, submit requests, respond to additional information demands, and pursue appeals when coverage is delayed or denied. The compliance burden can be substantial. Healthcare workers frequently spend time completing repetitive forms, retrieving medical records, documenting treatment histories, contacting payer representatives, and monitoring the progress of submitted

requests. Casalino et al. (2009) demonstrated that interactions between physician practices and health insurance plans generate significant administrative costs. Similarly, Sinsky et al. (2016) found that ambulatory physicians devote a considerable share of their working time to electronic health records and desk-based administrative activities rather than direct clinical contact with patients. Prior authorization adds to this workload by requiring staff to translate clinical information into payer-specific administrative formats.

These demands also have financial and psychological consequences. Organisations may need dedicated staff to manage authorizations, appeals, and insurer communications, while clinicians may experience frustration when treatment decisions are delayed by non-clinical procedures. For patients, the burden may include understanding coverage rules, contacting insurers, gathering documents, and advocating for urgent care. Administrative burden therefore extends beyond paperwork. It can alter how healthcare time, professional attention, and organisational resources are allocated.

1.3. Provider and Organisational Consequences

From the provider perspective, prior authorization frequently disrupts clinical workflow. Bhattacharjee et al. (2019) found that medication prior authorization involves substantial administrative effort, including documentation preparation, repeated communication with insurers, and delays in prescription processing. These activities are particularly challenging in busy clinical environments where treatment decisions must be made quickly and where staff already face competing demands. Department-level evidence also illustrates the financial and operational cost of the process. Carlisle et al. (2020), in a dermatology setting, reported that prior authorizations require considerable staff time and organisational expenditure. Such costs include time spent by physicians, nurses, medical assistants, pharmacists, and administrative staff, as well as the indirect consequences of interrupted scheduling and delayed treatment planning. When different insurers apply different rules, healthcare organisations are unable to rely on a consistent workflow. Instead, they must maintain multiple systems and knowledge bases, increasing the likelihood of incomplete submissions, repeated requests for information, and avoidable delays. Recent stakeholder evidence further shows that many clinicians perceive prior authorization as burdensome, inconsistent, and insufficiently aligned with patient-centred care (Sahni et al., 2024). Although payers may regard authorization as a necessary safeguard, providers often experience it as a process that shifts responsibility for cost control into clinical settings without providing adequate administrative support. The resulting tension can undermine professional autonomy and reduce the time available for diagnosis, counselling, shared decision-making, and follow-up.

1.4. Patient Access and Equity Implications

Prior authorization is not solely an administrative problem. It may directly affect patients' ability to obtain timely treatment. Delays can postpone medication initiation, diagnostic testing, specialist care, or procedures, particularly when requests require several rounds of clarification or appeal. For patients with chronic, progressive, or life-threatening conditions, even short delays may create anxiety, worsen symptoms, or interfere with planned care pathways.

The patient experience of prior authorization in cancer care illustrates these concerns. Chino et al. (2023) found that patients may experience prior authorization as a source of distress, uncertainty, and treatment disruption. Cancer patients and their families may be required to manage insurer communications at a time when they are already coping with complex medical decisions. In this context, administrative delays are not experienced as neutral procedural steps; they can become an additional source of emotional and practical burden.

Kyle and Frakt (2021) similarly argue that patient administrative burden is a significant feature of the United States healthcare system. Patients may be expected to understand complex insurance requirements, obtain documents, coordinate between providers and insurers, and challenge decisions that affect access to care. These burdens may be more severe for people with limited health literacy, language barriers, disabilities, financial constraints, limited digital access, or multiple chronic conditions. Consequently, poorly designed prior-authorization systems may deepen existing inequities by placing greater demands on patients who have the fewest resources to manage them.

1.5. Aim and Objectives

This paper aims to develop a national framework for artificial intelligence-enabled prior authorization that reduces administrative burden and improves timely, equitable, and clinically appropriate patient access to care. The study has five objectives:

1. To examine the administrative and patient-access challenges associated with existing prior-authorization systems.
2. To assess how artificial intelligence, interoperability, and clinical decision support can improve authorization workflows.
3. To develop a nationally applicable AI-enabled prior-authorization framework.
4. To identify governance, ethics, equity, and implementation safeguards needed for responsible adoption.
5. To propose indicators for evaluating the framework's effect on administrative burden, decision timeliness, patient access, clinical safety, and fairness.

1.6. Research Questions

This paper addresses four research questions:

1. How does prior authorization generate administrative burden for healthcare providers and patients?
2. Which aspects of the prior-authorization process can be supported by AI without weakening clinical autonomy?

3. What governance safeguards are required to prevent bias, opaque decision-making, and inappropriate automation?
4. How can a national AI-enabled prior-authorization framework improve patient access and healthcare-system efficiency?

2. Literature Review: Prior Authorization, Administrative Burden, and Artificial Intelligence in Healthcare

2.1. Purpose and consequences of prior authorization

Prior authorization was introduced as a utilisation-management mechanism intended to promote clinically appropriate care, control avoidable expenditure, and ensure that medicines, procedures, and diagnostic services align with coverage policies and evidence-based practice. It is commonly applied to high-cost medicines, specialist procedures, imaging, and treatments where lower-cost or first-line alternatives may be available. In principle, prior authorization can support formulary management and reduce unnecessary service use. However, its effectiveness depends on whether requirements are proportionate, timely, clinically justified, and consistently applied.

Evidence indicates that restrictive authorization requirements can produce unintended consequences for patients and health systems. Happe et al. (2014) found that formulary restrictions may influence medication adherence, clinical outcomes, healthcare-resource use, and financial costs. Although such policies can reduce immediate drug expenditure, delayed or interrupted access to treatment may generate additional clinical and administrative costs elsewhere in the healthcare system. Hartung et al. (2004) similarly demonstrated that a prior-authorization policy can alter prescription-drug use and medical-service utilisation within a Medicaid population. These findings suggest that the effect of prior authorization should not be assessed solely through short-term cost reduction.

The impact may be particularly serious for patients with chronic or complex conditions. Lu et al. (2010) reported unintended effects of Medicaid prior authorization on access to medicines used for bipolar illness, illustrating the risks of administrative controls that interrupt established treatment pathways. More recent evidence also suggests that cost sharing and prior authorization can affect access to specialty medicines, particularly where patients require continuous treatment or face complex coverage requirements (Ismail et al., 2023). Therefore, prior authorization should be viewed as a policy tool with potential value, but also with substantial implications for medication continuity, patient outcomes, and equitable access to care.

2.2. Growth and variation across insurers

The use of prior authorization has expanded significantly, particularly within Medicare Advantage. Neprash et al. (2024) identified continuing growth in prior-authorization requirements within this sector, raising concerns about the volume of requests that providers and patients must manage before treatment can proceed. This expansion increases the likelihood that clinicians will devote substantial time to documentation, follow-up communication, and appeals rather than direct patient care.

A further challenge is variation between insurers. Gupta et al. (2024) found meaningful differences in prior-authorization practices across Medicare Advantage insurers, indicating that providers may encounter different requirements for comparable treatments depending on the patient's plan. Such variation creates inconsistency and duplication because healthcare organisations must learn, interpret, and comply with multiple payer-specific processes. Providers may need to submit similar clinical information through different forms, portals, or communication channels, while patients may receive different access outcomes for the same service. This fragmentation can create confusion, delay decisions, and undermine confidence in the fairness of the system. A nationally coordinated model is therefore needed to establish clearer standards while preserving clinically appropriate flexibility.

2.3. Artificial intelligence and clinical decision support

Artificial intelligence offers potential to improve prior-authorization workflows by reducing repetitive administrative tasks and supporting more timely review. AI techniques, including machine learning and natural-language processing, can extract relevant clinical information from electronic health records, identify missing documentation, summarise patient history, and match requests against transparent coverage criteria. These functions may reduce manual data entry and minimise incomplete submissions.

The wider healthcare literature demonstrates that AI can support prediction, diagnosis, workflow optimisation, and decision-making when implemented responsibly (Jiang et al., 2017; Panch et al., 2018; Esteva et al., 2019). Clinical decision-support systems can provide relevant information at the point of care, helping clinicians make informed decisions while maintaining professional authority (Shortliffe & Sepúlveda, 2018). In prior authorization, AI could assist with case triage by identifying straightforward, guideline-concordant requests for accelerated processing while directing complex, urgent, or uncertain cases to qualified human reviewers.

However, AI should augment rather than replace clinical judgment. Topol (2019) argues that the most valuable future of AI in medicine lies in the combination of technological capability and human expertise. Accordingly, an AI-enabled prior-authorization system should not autonomously deny care. Its principal role should be to reduce low-value administrative work, improve documentation quality, and support clinicians and reviewers in making transparent, patient-centred decisions.

2.4. Interoperability and digital-health infrastructure

AI-enabled prior authorization depends on reliable access to complete, structured, and interoperable health information. Clinical data are often dispersed across electronic health records, pharmacy systems, laboratory

platforms, imaging repositories, insurer portals, and specialist services. When these systems cannot communicate effectively, providers must manually retrieve and re-enter information, creating delays and increasing the risk of incomplete requests.

Lehne et al. (2019) emphasised that digital medicine depends on interoperability because meaningful health-data exchange is essential for coordinated and efficient care. Standards such as Fast Healthcare Interoperability Resources (FHIR) provide a structured approach for sharing health information across different systems. SMART on FHIR further supports interoperable applications that can connect with electronic health records and present relevant information within clinical workflows (Mandel et al., 2016). Within prior authorization, these tools could enable the secure transfer of diagnosis codes, medication histories, laboratory results, imaging findings, clinical notes, and treatment rationales. This would reduce repetitive manual entry and improve the completeness of evidence available for review.

2.5. Ethics, explainability, bias, and accountability

Despite its potential, AI-supported prior authorization raises important ethical and governance concerns. Algorithms may rely on incomplete or historically biased data, producing unequal recommendations across patient groups. Obermeyer et al. (2019) demonstrated how an algorithm used in population health management reproduced racial bias because of the way need was measured. Similar risks could arise in authorization systems if models are trained on unequal historical access patterns.

AI systems must also be transparent and open to human challenge. Char et al. (2018), Vayena et al. (2018), and London (2019) emphasised the need to address accountability, safety, and explainability in healthcare AI. Although explainability tools may help users understand algorithmic outputs, Ghassemi et al. (2021) cautioned that current approaches can create false confidence if explanations do not accurately reflect model behaviour. Therefore, responsible implementation requires human oversight, clear decision rationales, regular bias audits, documented accountability, and accessible appeal mechanisms. These principles align with the World Health Organization's (2021) guidance that AI for health should protect autonomy, equity, safety, transparency, and public trust.

Table 1: Evidence Base Supporting AI-Enabled Prior Authorization

Evidence area	Key evidence	Implication for the framework
Prior-authorization consequences	Happe et al. (2014); Hartung et al. (2004); Lu et al. (2010); Ismail et al. (2023)	Monitor medication access, adherence, and unintended clinical effects
Insurer variation	Neprash et al. (2024); Gupta et al. (2024)	Establish national standards and reduce payer-specific duplication
AI and clinical support	Jiang et al. (2017); Panch et al. (2018); Topol (2019)	Use AI to support workflow efficiency, not replace clinicians
Interoperability	Lehne et al. (2019); Mandel et al. (2016)	Enable secure, structured exchange of clinical information
Ethics and governance	Char et al. (2018); Obermeyer et al. (2019); WHO (2021)	Require human oversight, fairness monitoring, and accountability

3. Methodology and Framework Development Approach

3.1. Study Design

This study adopts a structured integrative review and conceptual framework-development design. The approach was selected because the purpose of the paper is not to develop, train, or validate a specific artificial intelligence model for prior authorization. Rather, the study synthesises evidence from healthcare administration, prior-authorization research, clinical decision support, digital-health interoperability, and responsible artificial intelligence governance to develop a nationally applicable policy and implementation framework. An integrative review is appropriate because it allows evidence from diverse sources and methodological traditions to be examined together. Prior authorization is not solely a technical process. It involves organisational workflows, insurance policy, clinical decision-making, patient access, administrative workload, ethics, data governance, and healthcare equity. Therefore, a narrow technical review would not sufficiently capture the full range of factors that shape its effectiveness and consequences. The present approach brings together evidence on provider burden, patient experience, medication access, health-system operations, AI-enabled decision support, and governance requirements.

The framework-development component translates the reviewed evidence into a proposed national model for AI-enabled prior authorization. The model is intended to guide policymakers, insurers, healthcare providers, digital-health developers, and patient representatives in redesigning prior-authorization systems. It focuses on using AI to reduce repetitive administrative tasks, improve information flow, identify incomplete requests, and support timely routing of cases. Importantly, the framework does not recommend autonomous approval or denial decisions without human involvement. Instead, it positions AI as a support tool that assists healthcare professionals and administrative teams while preserving clinical accountability and patient rights. This design is also informed by the recognition that the consequences of prior authorization extend beyond

organisational efficiency. Administrative processes can create learning, compliance, and psychological costs for individuals navigating healthcare systems (Herd & Moynihan, 2019). In clinical settings, these burdens may affect provider workload, treatment timeliness, patient confidence, and continuity of care. Accordingly, the proposed framework considers both operational efficiency and the broader ethical responsibility to maintain equitable and patient-centred access to medically necessary services.

3.2. Evidence Domains

The reviewed literature is organised into five interconnected evidence domains. This structure enables the study to identify both the problems associated with conventional prior authorization and the conditions required for responsible AI-supported reform.

The first domain focuses on administrative burden and operational costs. This domain examines the time, labour, documentation effort, and financial resources required for clinicians and healthcare organisations to interact with payer systems. Existing research has shown that insurance-related administration consumes substantial physician and staff time, often diverting resources away from direct patient care (Casalino et al., 2009; Sinsky et al., 2016). Evidence from specialty practice also demonstrates that prior authorization can generate significant staff workload and departmental costs (Carlisle et al., 2020).

The second domain addresses provider and patient experiences of prior authorization. This includes challenges such as repeated form completion, unclear insurer requirements, communication delays, appeal procedures, and treatment uncertainty. Provider-focused studies show that prior authorization can disrupt clinical workflows and increase frustration among healthcare professionals (Bhattacharjee et al., 2019; Sahni et al., 2024). From the patient perspective, authorization barriers may generate anxiety, confusion, and delayed access to critical treatment, particularly in high-risk areas such as cancer care (Chino et al., 2023; Kyle & Frakt, 2021).

The third domain examines treatment access, adherence, and healthcare outcomes. This area evaluates how authorization restrictions may influence medication initiation, continuity of treatment, adherence, service use, and clinical outcomes. Previous studies suggest that restrictive policies can create unintended barriers to appropriate medicine use and may affect vulnerable patient groups disproportionately (Hartung et al., 2004; Lu et al., 2010; Happe et al., 2014; Ismail et al., 2023).

The fourth domain considers artificial intelligence, clinical decision support, and interoperability. It explores how AI-enabled tools, natural-language processing, structured data extraction, and decision-support systems can assist with documentation review, eligibility checks, and case triage. AI can improve workflow efficiency when integrated carefully into clinical environments, but its effectiveness depends on reliable data infrastructure and interoperable systems (Jiang et al., 2017; Shortliffe & Sepúlveda, 2018; Esteva et al., 2019). Interoperability standards, including FHIR-based platforms, are especially important because they enable secure exchange of information between electronic health records, payer platforms, pharmacy systems, and clinical applications (Lehne et al., 2019; Mandel et al., 2016).

The fifth domain focuses on ethics, equity, explainability, governance, and accountability. It addresses the risks of biased data, opaque algorithms, inadequate human oversight, and unequal patient outcomes. These issues are central because AI-supported prior authorization may affect access to treatment and therefore requires rigorous safeguards for fairness, transparency, and clinical safety (Char et al., 2018; Obermeyer et al., 2019; Ghassemi et al., 2021).

3.3. Analytical Framework

The analysis applies administrative-burden theory and responsible-AI principles as complementary lenses. Administrative-burden theory is used to assess how prior authorization creates learning, compliance, time, and psychological costs for providers and patients (Herd & Moynihan, 2019). This lens supports examination of whether AI-enabled systems can reduce unnecessary tasks without transferring burden to patients or frontline staff.Responsible-AI principles are used to assess clinical safety, transparency, human oversight, equity, accountability, and data governance. The framework draws particularly on healthcare AI governance guidance, which emphasises that AI systems should remain subject to clear oversight, continuous evaluation, and meaningful professional accountability (Reddy et al., 2020; World Health Organization, 2021). These principles ensure that efficiency improvements do not compromise fairness, patient autonomy, or the ability to challenge inappropriate decisions.

3.4. Framework-Development Principles

The proposed national framework is built around six principles: reducing unnecessary administrative work; ensuring timely and equitable access to treatment; enabling interoperable and secure health-data exchange; maintaining transparent clinical and coverage criteria; requiring human review of complex and denied requests; and continuously monitoring bias, safety, and patient outcomes. Together, these principles position AI as an assistive technology that strengthens, rather than replaces, patient-centred clinical decision-making.

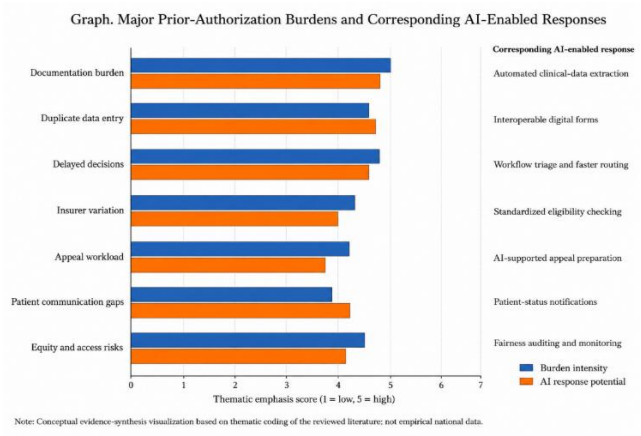

Fig 1: Major Prior-Authorization Burdens and Corresponding AI-Enabled Responses

4. Proposed National AI-Enabled Prior Authorization Framework

4.1. Framework overview

This paper proposes a national AI-enabled prior-authorization framework that treats authorization as clinical support. It standardises data requirements, decision stages, communication, and accountability across payers while preserving clinical discretion. The framework responds to repeated documentation, inconsistent forms, incomplete submissions, and delayed decisions that impose compliance, time, and patient-provider burden (Herd & Moynihan, 2019).

The model is not an automated denial system. AI is limited to low-risk administrative tasks, including information retrieval, documentation preparation, completeness checking, and case routing. Decisions that may delay, alter, or deny care remain under qualified human control. This reflects the principle that clinical AI should augment, not substitute for, professional judgement (Shortliffe & Sepúlveda, 2018; Topol, 2019).

4.2. Interoperable health-data foundation

The framework requires secure national interoperability between electronic health records, laboratory systems, pharmacy records, imaging reports, insurer platforms, clinical guideline repositories, and patient portals. Authorised evidence should be retrieved rather than re-entered. Structured exchange can improve completeness, reduce transcription errors, and reduce workload.

Interoperability must also include common definitions, minimum documentation fields, consent procedures, access controls, audit trails, and correction rules. FHIR-based exchange and SMART on FHIR applications offer practical mechanisms for embedding interoperable tools within electronic records (Mandel et al., 2016). Meaningful interoperability is essential because digital medicine cannot function effectively through isolated platforms (Lehne et al., 2019).

4.3. AI-supported documentation and eligibility review

AI can support providers before a request reaches the payer. Natural-language processing can identify diagnoses, prior therapies, medication histories, laboratory findings, imaging results, and clinical recommendations. The system can create a structured evidence summary, flag missing documents, and compare the request with transparent coverage criteria. It should then classify the submission as complete, requiring clarification, or needing specialist review.

These functions must be advisory and traceable. Clinicians must view source records, correct extraction errors, and add relevant context. AI can therefore reduce preventable rework without becoming a black-box gatekeeper. This aligns with Lenert et al. (2023), who argue that AI may make prior authorization more humane when it reduces friction and supports care rather than merely accelerating payer control.

4.4. Risk-based triage model

The framework contains three pathways. The fast-track pathway is for routine, low-risk, guideline-concordant requests with complete documentation. These cases may proceed rapidly under predefined rules. The assisted-review pathway applies where information is missing, coding is inconsistent, or verification is required. The system should return a specific request for clarification rather than a vague rejection. Specialist review is mandatory for urgent, high-cost, cancer-related, rare-disease, paediatric, disability-related, and clinically complex requests. They are routed to qualified reviewers to protect treatment continuity.

4.5. Human oversight and clinical accountability

Human oversight is the framework's principal safeguard. Final denials and adverse determinations must be reviewed and approved by a qualified decision-maker. Providers must be able to challenge recommendations, submit evidence, and request expedited review. Each determination should record the applicable criteria, evidence reviewed, rationale, and accountable reviewer.

These protections operationalise responsible-AI requirements for safety, transparency, accountability, and meaningful human control (Reddy et al., 2020; World Health Organization, 2021). They also reduce risks associated with opaque recommendations, biased historical data, and automation bias (Char et al., 2018; Obermeyer et al., 2019).

4.6. Patient communication and appeal support

Patients should receive clear updates on request receipt, missing information, expected decision dates, and final outcomes. Where authorization is delayed or declined, the notice should explain the relevant clinical or coverage basis in plain language and identify the appeal route and evidence required. Communication must accommodate language, disability, literacy, and digital-access needs.

This responds to evidence that prior authorization can create uncertainty and distress in time-sensitive care (Chino et al., 2023; Kyle & Frakt, 2021). Appeals should provide human case support, urgent-review routes, and independent monitoring of denial reversals. Communication and

contestability are therefore core protections for patient access.

Table 2: Components of the National AI-Enabled Prior Authorization Framework

Component	Primary function	Safeguard
Interoperable data layer	Retrieves clinical evidence	Consent and audit
AI documentation assistant	Summarises records; flags gaps	Provider validation
Eligibility support engine	Checks published criteria	No autonomous denial
Risk-based triage	Routes by urgency and complexity	Specialist review
Human review	Confirms denials and complex cases	Clinical accountability
Patient portal	Updates and appeals	Accessible language
Equity audit module	Monitors disparities and errors	Independent oversight

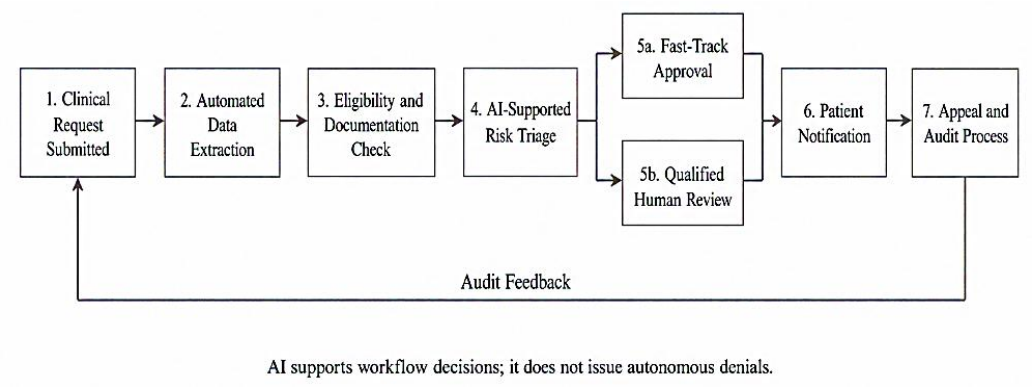

Fig 2: Proposed AI-Enabled Prior Authorization Workflow

5. National Implementation, Governance, and Evaluation Framework

5.1. National Implementation Roadmap

A national transition towards AI-enabled prior authorization should follow a phased and closely governed pathway. Implementing AI without common standards and testing could increase, rather than reduce, variation across payers.

Phase 1 should establish the national policy foundation. The health authority should define minimum standards for authorization timelines, clinical documentation, denial notices, appeal processes, data quality, and patient communication. Legal guidance should state that AI may support administrative and clinical-review tasks but cannot issue autonomous denials. A national governance body should also be established, with rules for privacy, validation, and accountability.

Phase 2 should develop interoperable digital infrastructure. Standardised electronic prior-authorization forms should be embedded within electronic health-record systems and connected with payer platforms, pharmacy, laboratory, imaging, and guideline databases. Fragmented systems require staff to repeatedly enter or transmit the same information. Structured exchange through nationally approved standards can improve completeness, reduce manual work, and provide a reliable foundation for AI applications (Lehne et al., 2019; Mandel et al., 2016).

Phase 3 should introduce pilots of AI-supported documentation and triage in selected health systems and specialties. Early pilots should focus on requests. Complex services, urgent cases, oncology, rare diseases, paediatrics, and disability-related care should remain under specialist human review. AI may extract relevant evidence, flag missing documentation, identify duplicate requests, and route cases by urgency. This is a decision-support model, not a replacement for professional judgment (Lenert et al., 2023; Shortliffe & Sepúlveda, 2018).

Phase 4 should require independent evaluation before wider deployment. Assessment should cover efficiency, turnaround times, treatment access, clinical appropriateness, provider workload, patient experience, reliability, and equity. Reviewers should investigate whether the system creates unequal approval, denial, or escalation patterns, since healthcare algorithms may reproduce historical inequities when data reflect unequal access (Obermeyer et al., 2019).

Phase 5 should scale only those pilots demonstrating benefit and safety performance. National expansion should be accompanied by continuous monitoring, model recalibration, regulatory inspection, and reporting. Systems that fail equity, safety, or accessibility requirements should be suspended or redesigned rather than expanded.

5.2. Governance Structure

A national governance body should coordinate implementation across government health agencies, insurers, provider organisations, patient representatives, professional associations, data-protection regulators, AI specialists, and independent ethics experts. It should approve minimum standards, review high-risk applications, monitor

performance, and ensure that no organisation shifts responsibility for harmful decisions to an algorithm. Ernance requires clear accountability. Payers remain responsible for coverage decisions; healthcare organisations remain responsible for the clinical integrity of submitted information; and technology providers remain responsible for model quality, security, documentation, and post-deployment monitoring. Independent audits should evaluate clinical validity, data quality, cybersecurity, bias, and compliance. This arrangement reflects healthcare-AI governance principles centred on oversight, transparency, lifecycle monitoring, and institutional responsibility (Reddy et al., 2020; World Health Organization, 2021).

5.3. Explainability and Contestability

Providers and patients should receive understandable reasons for AI-supported recommendations, where a request is delayed or not approved. Explanation should not, however, be reduced to a superficial technical display. Ghassemi et al. (2021) caution that explainable-AI techniques can create false confidence when their explanations do not accurately represent complex model behaviour. The framework should therefore prioritise transparent coverage criteria, written rationales, documentation of the information considered, qualified human review, and accessible appeal rights. Patients should be able to request human reconsideration, submit additional evidence, and receive a written explanation of the final decision. Providers should be able to challenge AI-supported triage where clinical context is incomplete or exceptional. These safeguards preserve contestability and limit automation bias.

5.4. Evaluation Indicators

Evaluation should combine operational, clinical, patient-centred, and equity measures. Table 3 presents the core indicators authorities should monitor.

Table 3: Performance Indicators for National AI-Enabled Prior Authorization

Domain	Indicator	Measurement approach	Desired direction
Administrative efficiency	Average staff time per request	Minutes preparing and processing a request	Decrease
Timeliness	Median authorization turnaround time	Submission-to-final-decision interval	Decrease
Data quality	Incomplete request rate	Requests returned for missing information	Decrease
Patient access	Treatment initiation delay	Days from clinical decision to treatment start	Decrease
Decision quality	Overturned denial rate	Denials reversed after review or appeal	Decrease
Provider experience	Provider satisfaction score	Standardised pre- and post-implementation survey	Increase
Patient experience	Satisfaction and clarity score	Survey of communication, access, and appeals	Increase
Equity	Equity-monitoring compliance	Routine stratified reporting	Increase

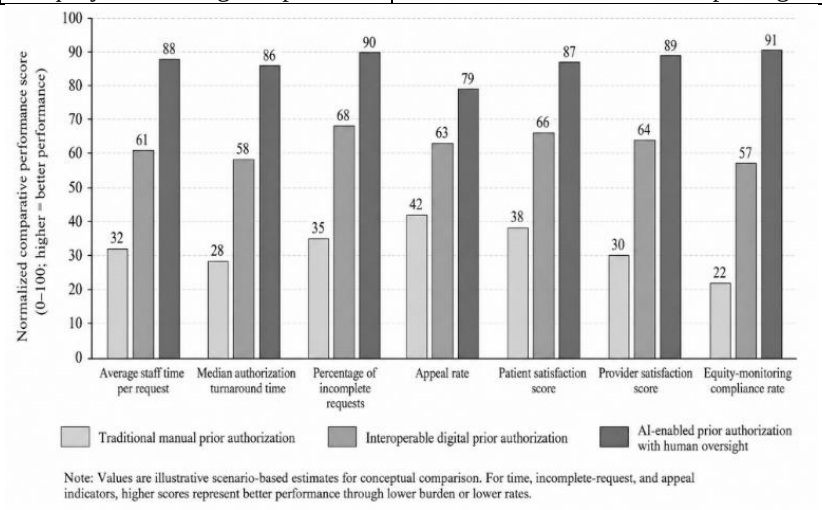

Fig 3: Comparative Performance of Prior Authorization Models

6. Discussion

6.1. Expected Contribution of the Framework

The proposed national framework positions artificial intelligence as an enabling mechanism for modernising prior authorization rather than as a substitute for clinical judgment. Its principal contribution is the redesign of a process that is currently characterised by fragmented documentation, repeated manual data entry, payer-specific requirements, delayed decisions, and extensive appeal activity. By integrating interoperable digital forms, structured clinical data, and AI-supported documentation review, the framework can reduce the time that clinicians and

administrative staff spend locating records, completing repetitive forms, and responding to requests for information already contained within electronic health records.

A major expected benefit is improved consistency. Standardised national data requirements and transparent coverage rules can reduce variation across insurers and decrease uncertainty for providers and patients. AI-supported eligibility checks may identify incomplete documentation before submission, while risk-based triage can route routine, guideline-concordant requests through an accelerated pathway. This may reduce avoidable delays for patients requiring medicines, diagnostic services, procedures, or specialist treatment. Faster processing is particularly important for individuals with cancer, chronic illness, rare conditions, or time-sensitive clinical needs, for whom delayed authorization may disrupt treatment plans and increase psychological stress.

The framework may also improve the allocation of professional time. Instead of spending substantial portions of the working day on administrative negotiations, clinicians can devote more attention to diagnosis, treatment planning, communication, and direct patient care. This outcome is consistent with the broader view that artificial intelligence should augment human expertise by supporting information processing, pattern recognition, and workflow efficiency, while preserving the professional responsibility of clinicians in complex decisions (Kelly et al., 2019; Topol, 2019). The proposed model therefore treats AI as a clinical and administrative support tool, with the greatest value arising when technology and professional judgment operate together.

6.2. Risks and Mitigation Strategies

Despite its potential advantages, AI-enabled prior authorization introduces significant technical, ethical, and governance risks. A primary concern is biased or incomplete health data. Electronic records may contain missing information, inconsistent coding, historical inequities, or documentation patterns that differ across hospitals, patient populations, and geographic locations. If such data are used without careful validation, an AI system may produce unequal recommendations or systematically disadvantage particular patient groups. Evidence from healthcare algorithms has shown that apparently neutral systems can reproduce racial and socioeconomic inequities when they rely on biased proxy measures or historically unequal care patterns (Obermeyer et al., 2019).

Unequal performance across populations is therefore a central risk. AI systems should be assessed not only for overall accuracy but also for whether approval recommendations, documentation flags, and triage outcomes differ unfairly by race, sex, age, disability status, language, location, insurance type, or socioeconomic position. Independent fairness audits, subgroup performance testing, and continuous monitoring should be mandatory before and after deployment.

Inadequate interoperability also presents a practical challenge. If provider systems, payer platforms, pharmacy records, and electronic health records cannot exchange structured information reliably, AI may simply add another layer of administrative complexity. National technical standards, common data fields, and secure interoperability requirements are necessary to prevent fragmented implementation. Cybersecurity and privacy risks must also be addressed, since prior-authorization systems process sensitive clinical, financial, and personal information. Strong access controls, encryption, audit logs, consent procedures, and incident-response mechanisms are essential.

Further risks include automation bias and excessive reliance on AI-generated recommendations. Staff may accept a system output without sufficiently examining the clinical context, particularly where workflow pressures are high. For this reason, AI recommendations should remain advisory, and clinicians should retain the authority to challenge, override, or request further review. Transparent documentation of how an AI-supported recommendation was reached is also necessary. However, explainability should not be reduced to simplistic visual outputs that may create false confidence about complex model behaviour (London, 2019). Effective governance requires meaningful clinical rationales, clear accountability, independent validation, and appealable decisions (Char et al., 2018; Vayena et al., 2018).

6.3. Policy Implications

National policy should establish consistent prior-authorization criteria, maximum response times, standardised documentation requirements, and interoperable structured-data fields. Payers should be required to provide clear written explanations for denials, identify missing clinical information, and offer accessible appeal routes for patients and providers. Public reporting should include approval, denial, overturn, and appeal rates, as well as turnaround times and equity indicators. These measures would promote accountability, enable comparison across insurers, and reduce opaque variation in decision-making.

6.4. Limitations

This paper is conceptual and does not evaluate a deployed AI-enabled prior-authorization system using real-world claims, electronic health-record, or patient-outcome data. Its framework is based on existing literature and policy analysis rather than direct empirical testing. Future research should therefore examine implementation across insurers, clinical specialties, hospitals, patient populations, and healthcare settings. Longitudinal studies should assess whether the framework reduces workload, shortens treatment delays, improves patient experience, and avoids widening disparities in access to care.

7. Conclusion

Prior authorization has become a major administrative and patient-access challenge within contemporary healthcare systems. Although it was originally designed to promote appropriate utilisation, manage healthcare expenditure, and encourage evidence-based treatment decisions, its practical

implementation has often produced complex, repetitive, and time-consuming processes for healthcare providers and patients. In many settings, clinicians and administrative staff must complete insurer-specific forms, gather supporting documents from fragmented records, respond to repeated information requests, make telephone calls, and manage appeals. These activities consume substantial organisational capacity that could otherwise be directed toward direct patient care, care coordination, and clinical decision-making (Casalino et al., 2009; Sinsky et al., 2016). The burden created by prior authorization should not be viewed solely as an operational inconvenience. It represents a broader administrative-burden problem that affects providers, healthcare organisations, patients, and families. Administrative systems can impose learning, compliance, time, and psychological costs on those required to navigate them, particularly where requirements are unclear, inconsistent, or difficult to contest (Herd & Moynihan, 2019). Evidence from provider-focused studies indicates that prior-authorization processes can create delays, duplicate administrative tasks, financial costs, and professional frustration across multiple specialties (Bhattacharjee et al., 2019; Carlisle et al., 2020). At the patient level, delayed approvals can interrupt treatment plans, create uncertainty, prolong distress, and require individuals or caregivers to undertake complex administrative work during periods of illness. These concerns are especially serious in time-sensitive contexts such as cancer care, where treatment delays may have significant clinical and emotional consequences (Chino et al., 2023; Kyle & Frakt, 2021).

The growth of prior authorization across health insurance markets, together with variation in requirements among insurers, further demonstrates the need for national reform. Differences in approval criteria, documentation expectations, review processes, and response times can create avoidable inconsistency for providers caring for patients covered by multiple health plans (Neprash et al., 2024; Gupta et al., 2024). While utilisation management remains important for maintaining sustainable healthcare systems, cost-management objectives should not be pursued through processes that delay clinically necessary care, undermine continuity of treatment, or place unreasonable administrative burdens on patients and healthcare professionals. Previous research has shown that restrictive prior-authorization arrangements may influence medication access, treatment adherence, service use, and health outcomes, reinforcing the need for careful policy design and ongoing evaluation (Happe et al., 2014; Hartung et al., 2004; Lu et al., 2010; Ismail et al., 2023). Artificial intelligence offers an important opportunity to redesign prior authorization in a more efficient, clinically responsive, and patient-centred manner. AI-supported systems can assist with the extraction of relevant clinical information from electronic health records, identification of missing documentation, completion of structured authorization forms, matching of requests against transparent coverage criteria, and triage of routine low-risk cases. Used appropriately, these functions can reduce repetitive manual work, improve data completeness, shorten turnaround times, and allow staff to focus greater attention on complex cases that require professional judgment. This approach is consistent with wider evidence showing that AI can strengthen clinical decision support when it is designed to augment, rather than replace, healthcare professionals (Shortliffe & Sepúlveda, 2018; Esteva et al., 2019; Topol, 2019).

However, the use of AI in prior authorization must not create a new form of automated exclusion or opaque decision-making. AI should never function as an unchallengeable denial mechanism, nor should it replace clinician expertise in cases involving significant clinical uncertainty, high-cost treatment, serious illness, disability, rare conditions, or urgent care needs. Human oversight must remain mandatory for denied requests, complex cases, and decisions with potentially serious consequences for patient health. Providers and patients should receive understandable explanations of the reasons for AI-supported recommendations, while maintaining clear avenues for review, appeal, and clinical override. Meaningful accountability requires more than simplified technical explanations; it requires transparent criteria, documented rationale, responsible governance, and effective contestability mechanisms (London, 2019; Ghassemi et al., 2021). A national AI-enabled prior-authorization framework must therefore be built on interoperability, patient-centred design, equity, transparency, and strong governance. Interoperable data standards are essential to enable secure and accurate exchange between electronic health records, payer systems, pharmacies, laboratories, and clinical guideline platforms (Lehne et al., 2019; Mandel et al., 2016). At the same time, national oversight bodies should establish minimum standards for data quality, clinical validation, fairness testing, cybersecurity, auditability, and public reporting. Such governance is necessary because algorithmic systems can reproduce historical inequalities when they rely on biased data, inappropriate proxies, or incomplete information (Obermeyer et al., 2019). Responsible implementation must therefore include continuous monitoring of approval patterns, denial rates, turnaround times, appeal outcomes, provider workload, patient experience, and disparities across demographic groups. Ultimately, the value of AI in prior authorization will not be determined by the degree of automation achieved. Its value will depend on whether it reduces unnecessary administrative friction while preserving timely, equitable, and clinically appropriate access to care. With responsible national implementation, AI can help transform prior authorization from a fragmented and burdensome administrative process into a more transparent, accountable, and patient-focused pathway. This requires a model in which technology supports clinicians, patients remain informed and protected, and healthcare institutions remain responsible for the fairness, safety, and legitimacy of every decision made.

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