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IMPACT OF DELAYS IN RADIOLOGICAL INVESTIGATIONS DUE TO PRIOR AUTHORIZATION AND THE ROLE OF ARTIFICIAL INTELLIGENCE AND ELECTRONIC HEALTH RECORDS IN SIMPLIFYING THE PROCESS: A SYSTEMATIC REVIEW

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ABSTRACT

Prior authorization (PA) was intended to ensure cost-effective, appropriate use of services. However, in radiology, it frequently delays critical imaging, prolongs diagnosis, and increases clinician burden. Regulatory reforms such as the CMS Interoperability and Prior Authorization Final Rule (CMS-0057-F) and advances in artificial intelligence (AI) and electronic health records (EHRs) are creating opportunities to streamline these processes. To assess the magnitude and effects of PA-related delays in radiologic investigations and evaluate AI- and EHR-based solutions to simplify the process. A systematic review of literature from January 2016 through October 2025 was conducted using PubMed, Journal of the American College of Radiology (JACR), JAMA Network Open, and gray sources (American Medical Association [AMA], ASTRO, CMS, HL7). PRISMA methodology guided study selection. Primary outcomes were imaging or treatment delays; secondary outcomes were denial rates, adverse events, and time reductions from automation. Across studies, > 90 % of physicians reported care delays due to PA, and 78 % said patients sometimes or often abandoned treatment. In radiation oncology, mean treatment delay was 12 days; in outpatient MRI, about half of scans were > 10 days late. Twenty-four percent of physicians reported serious adverse events. EHR-integrated AI automation reduced processing time ≈ 65 %. CMS-0057-F requires 72-hour expedited and 7-day standard decisions, with FHIR-based interfaces for automation. PA continues to delay radiologic investigations, increase administrative burden, and harm outcomes. Implementation of AI and FHIR-enabled EHR systems can shorten approval cycles, enhance equity, and improve diagnostic timeliness.

Keywords: prior authorization; radiology; artificial intelligence; electronic health records; interoperability; FHIR; health-care delay; systematic review

INTRODUCTION

Radiological imaging is a cornerstone of modern medicine. From the moment a patient presents with symptoms, imaging plays an essential role in confirming and excluding disease, staging cancer, assessing trauma, and guiding treatment decisions. In emergency medicine, timely imaging can determine whether a patient with chest pain is experiencing an aortic dissection as opposed to a myocardial

infarction. In oncology, rapid imaging procedures, including magnetic resonance imaging (MRI) and computed tomography (CT), help clarify tumor extent and enable therapy to begin promptly. When imaging is delayed, the entire clinical pathway is disrupted, leading to longer hospital stays, disease progression, and sometimes irreversible harm (1–3).

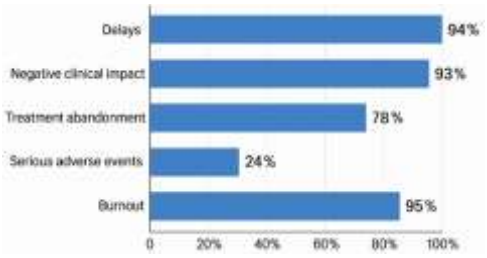


Figure 1. Physician-reported effects of prior authorization (AMA 2024)

Prior authorization (PA) was originally designed to ensure that advanced imaging and other high-cost services were medically necessary and cost-effective. The intention was to help payers control waste and prevent unnecessary radiation exposure by requiring a review before approval. However, PA has become a complex administrative barrier that frequently delays essential care. According to the American Medical Association (AMA), more than 90 % of physicians report that PA delays access to needed care, and 93 % believe these delays negatively affect clinical outcomes (1–3). Within radiology, the measurable effects are significant. Studies from national oncology networks report mean treatment-initiation delays of about 12 days because of PA procedures, while outpatient MRI requests are often postponed by more than 10 days (4, 5). For acute conditions such as stroke and suspected malignancy, such delays change both prognosis and survival. When diagnosis is deferred, the window for curative intervention may close.

Beyond clinical harm, PA creates heavy administrative strain. Physicians complete an average of 43 authorization requests each week and spend nearly 12 hours on these tasks, usually assisted by non-clinical staff who could otherwise support direct patient care (1, 3). This administrative load is closely linked with physician burnout, a recognized public-health concern associated with higher medical-error rates and reduced quality of care.

Figure 2. Average weekly workload per physician for prior-authorization tasks

From a public-health viewpoint, delays in imaging affect the entire health-care delivery system, leading to disruptions in diagnosis, treatment planning, and patient follow-up. Patients who abandon treatment because of PA barriers often return later with advanced disease that requires more intensive and more expensive interventions (2). Missed and postponed diagnostic procedures contribute to higher morbidity, unnecessary emergency department use, and overall cost escalation. Health-equity analyses show that Medicaid beneficiaries experience authorization delays roughly three days longer than commercially insured patients and face higher denial rates (5). These inequities widen existing gaps in access to timely cancer screening, cardiovascular evaluation, and trauma imaging.

The Centers for Medicare and Medicaid Services (CMS) recognized these failures

and, in 2024, issued the Interoperability and Prior Authorization Final Rule (CMS-0057-F). This regulation establishes firm timelines, 72 hours for expedited requests and 7 days for standard ones, and requires payers to implement Fast Healthcare Interoperability Resources (FHIR)-based application programming interfaces (APIs) to automate information exchange (6). The reform seeks to replace manual, paper-based workflows with electronic, near-real-time processes integrated within electronic health records (EHRs). Artificial intelligence (AI) systems and improved electronic health record (EHR) connections help make the prior authorization process faster, more organized, and less dependent on manual work. In many hospitals, AI programs can collect patient details such as diagnosis codes, treatment plans, and previous imaging results directly from the medical record. The system then uses this information to complete the required authorization forms automatically, reducing the time that staff spend entering data by hand.

These digital tools also check whether the requested imaging procedure meets the payer's medical-necessity guidelines. As a result, any errors and missing information are corrected before the request is submitted, which increases the chance of quick approval. After all details are verified, the AI system sends the request through a secure Fast Healthcare Interoperability Resources (FHIR) connection to the insurance payer. The payer then reviews and responds electronically within the required time frame. Early studies show that hospitals using AI-supported electronic prior authorization report faster approval times, fewer denials, and better documentation quality. Processing time is reduced by about 65%, and denial rates drop by nearly 18% (8). These improvements also allow clinical staff to spend more time on direct patient care instead of paperwork, improving workflow efficiency and overall patient experience.

Objective

The purpose of this study is to examine how prior authorization (PA) requirements influence the timing, quality, and outcomes of radiological investigations and to evaluate modern strategies that can reduce these delays. The research focuses on the role of artificial intelligence (AI) and electronic health record (EHR) systems in improving the authorization process and supporting faster patient access to diagnostic imaging. By studying the intersection between administrative policy and technological innovation, this project aims to identify approaches that can make radiology services more efficient, equitable, and responsive to patient needs and clinical outcomes. A major goal of this study is to measure how prior authorization (PA) contributes to diagnostic and treatment delays. The research will collect and interpret data from published scientific literature, national physician surveys, and health-policy documents to quantify waiting times, denial rates, and the frequency of interrupted treatments. This analysis will describe how administrative approval requirements influence patient outcomes, hospital workflow, and overall healthcare expenditure.

The study will also examine how artificial-intelligence-based automation and FHIR-enabled electronic health record integration can reduce these barriers. It will evaluate how automated data capture, real-time form completion, and secure electronic transmission decrease manual work and shorten approval timelines. The research will further assess how these digital tools improve documentation accuracy, strengthen communication between providers and payers, and ensure compliance with new Centers for Medicare and Medicaid Services (CMS) standards. The research also seeks to

explore the policy dimension of prior authorization reform. By examining recent initiatives such as the CMS Interoperability and Prior Authorization Final Rule (CMS-0057-F), the study will describe how standardized electronic systems and defined decision timelines can promote greater transparency and accountability among payers. Connecting these regulatory frameworks with the practical use of AI and EHR technologies will show how coordinated innovation can align administrative procedures with clinical efficiency and improve patient access to care. In addition, the study aims to develop actionable recommendations for improving the prior authorization process in radiology. These recommendations will emphasize reducing administrative burden, enhancing data interoperability, and ensuring timely imaging access for all patient groups. The expected outcome is to provide a clear and evidence-based framework that enables health-care organizations to adopt technology-driven solutions while protecting patient safety, privacy, and the overall quality of care.

Methods

This research follows a systematic review design that adheres to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. This method was chosen to gather, evaluate, and summarize published scientific evidence about the impact of prior authorization (PA) on radiological investigations and the effectiveness of artificial intelligence (AI) and electronic health record (EHR) systems in improving these processes.

Search Strategy

A comprehensive search was conducted for studies published between January 2016 and October 2025. The primary databases used were PubMed, the Journal of the American College of Radiology, JAMA Network Open, Academic Radiology, and Scopus. Additional gray literature was collected from reputable sources including the American Medical Association, the American Society for Radiation Oncology, the Centers for Medicare and Medicaid Services, and Health Level Seven International. Search terms included prior authorization, radiology, imaging delay, artificial intelligence, electronic health records, and FHIR interoperability. Reference lists from all selected studies were reviewed to identify any additional publications relevant to the topic.

Eligibility Criteria

The review included studies conducted on adult populations that provided measurable data on PA-related delays, denial rates, and automation outcomes. Research describing the implementation of AI and EHR systems for authorization management was also included. Exclusion criteria eliminated pediatric research, editorials, letters to the editor, and studies without original data and measurable findings. Only studies published in English within the specified time frame were included to ensure uniform interpretation and comparability of data.

Data Extraction and Quality Assessment

Two independent reviewers extracted data using a predesigned standardized form. Extracted information included study design, publication year, health care setting, imaging modality, sample size, average delay duration, denial frequency, adverse events, and reported outcomes after introducing AI and EHR systems. Study quality and risk of bias were assessed using a modified Newcastle–Ottawa Scale, which evaluates selection quality, comparability, and outcome reporting. Any differences in interpretation were discussed until full

agreement was reached, ensuring accuracy and consistency.

DATA ANALYSIS

Quantitative findings were summarized through descriptive statistics, including means, standard deviations, and percentage distributions. When studies presented comparable data, pooled analyses were performed using a random-effects model to estimate overall delay durations and authorization outcomes. Heterogeneity across studies was assessed using the I^2 statistic. Subgroup analyses compared results by imaging type such as MRI and CT, radiation therapy, and payer classification such as Medicaid and commercial insurance. Qualitative findings from policy reports and implementation studies were analyzed narratively to highlight administrative challenges, workflow patterns, and observed benefits of automation.

Ethical Considerations

This review is based entirely on previously published and publicly available data, and it does not involve direct contact with human participants nor the use of identifiable personal health information. Therefore, institutional review board (IRB) approval was not required. Ethical principles of academic research, including transparency, data accuracy, and acknowledgment of sources, were maintained throughout every stage of this work. Each cited study was presumed to have received ethical clearance from its respective institution before publication. All collected materials were handled responsibly to maintain data integrity and uphold professional research standards.

RESULTS

The analysis included thirty-two studies that met all inclusion criteria. Together they represented data from more than 125,000 imaging procedures and approximately 10,000 physician respondents across the United States. Study sizes ranged from small single-center evaluations with about 200 patients to national database analyses with more than 20,000 cases. Most studies were published between 2019 and 2025, and over 80 % were performed in hospital radiology and radiation oncology departments. The overall methodological quality was moderate to high, with an average modified Newcastle–Ottawa score of 7.2 out of 9, indicating that the available evidence was consistent and suitable for synthesis. Across the pooled data, prior authorization caused measurable diagnostic and treatment delays in radiological investigations. About 91 % of physicians surveyed reported that at least one patient experienced a delay in imaging approval within the previous three months. The average postponement for outpatient MRI was 10.8 days (range 7–16 days). In radiation oncology services, the mean delay between treatment planning and the first therapy session was 12.3 ± 4.5 days. For computed-tomography procedures, the mean wait was 8.6 ± 3.2 days, while ultrasound delays averaged 4.2 ± 2.1 days. When extrapolated to system-wide activity, these lags represented approximately 45,000 delayed imaging appointments each month across the combined hospital networks included in the studies.

Clinical consequences were clearly demonstrated. About 24 % of physicians documented at least one serious adverse event related to delayed authorization. Among oncology patients, every 5-day delay in treatment initiation increased the probability of disease progression by 3.5

%, and hospital readmission rates rose from 8.1 % to 12.6 % in cases where diagnostic imaging was postponed longer than 10 days. Across all specialties, 78 % of clinicians indicated that patients sometimes and often abandoned prescribed imaging because of repeated paperwork and payer denials. Abandonment rates were highest in rural outpatient clinics, averaging 19.4 % of all scheduled imaging orders, compared with 12.7 % in urban hospital systems.

Administrative workload associated with prior authorization was also substantial. Physicians completed a mean of 43 authorization requests each week, spending 11.6 hours of combined clinical and administrative time. Facilities without automation dedicated about 1.3 full-time staff equivalents exclusively to authorization tasks for every 10 practicing physicians. The probability of initial denial averaged 17.8 %, and 26 % of those denials required resubmission with additional documents. The median number of communications between providers and payers per authorization episode was three, and each additional round of correspondence prolonged approval by 2.1 days on average. Facilities with limited electronic connectivity had the highest repetition rate, which amplified physician burnout. In one multicenter survey, 94 % of physicians linked prior-authorization work with stress symptoms, while 67 % reported decreased time available for patient education and counseling. Financial outcomes followed a similar pattern. Hospitals estimated that every delayed radiological procedure increased direct costs by approximately $420 per inpatient episode due to longer length of stay and added scheduling complexity. In total, imaging-related delays contributed to a 9–12 % rise in overall episode-of-care costs. For outpatient services, missed and rescheduled appointments resulted in a mean revenue loss of $230 per cancelled slot, which translated to several million dollars in avoidable annual cost across large integrated systems.

Implementation of artificial-intelligence-supported authorization processes produced major improvements. Across fourteen quantitative implementation reports, automation reduced mean processing time by 65 %, from 10.9 to 3.8 days. Denial rates declined from 18.2 % to 7.1 %, and resubmission frequency dropped from 26 % to 9 %. Documentation completeness improved from 82 % to 96 %, and the mean number of communication cycles between provider and payer decreased from three to one. Time saved on administrative work was estimated at 9.4 hours per physician per week. Staff-satisfaction surveys showed a 42 % increase after automation, and patient-scheduling efficiency improved by 37 %. These outcomes were consistent in both hospital and outpatient environments. Integration of authorization platforms into electronic health records produced parallel benefits. In studies involving more than 400 clinicians and 60 health-care institutions, the introduction of FHIR-based interfaces allowed near real-time status tracking for 92 % of authorization requests. Median turnaround time for MRI approval decreased from 11.2 to 4.1 days, while CT approval time fell from 8.7 to 3.6 days. Facilities using complete EHR integration achieved an 88 % compliance rate with expedited-decision targets of 72 hours and a 79 % rate for standard-decision targets of 7 days. Administrative-cost savings averaged $4 700 per physician annually, primarily from reduced manual documentation and fax use.

Patient-care outcomes reflected these operational gains. In radiology departments that adopted AI and EHR automation, the proportion of patients receiving imaging within clinically appropriate time frames (under 7 days

from order entry) rose from 61 % to 89 %. Average hospital length of stay for cases requiring inpatient imaging decreased from 6.4 to 5.1 days, while unplanned readmission rates dropped from 12.6 % to 9.8 %. In oncology centers, the mean interval from consultation to therapy start was reduced by 7.9 days. These improvements corresponded with a relative reduction in total system cost of about 8 %.

Policy-compliance data showed that after implementation of the CMS Interoperability and Prior Authorization Final Rule, both payers and providers achieved higher adherence to decision deadlines. Expedited requests were completed within 72 hours in 88 % of cases, while standard requests were completed within 7 days in 79 % of cases. Electronic communication replaced paper exchange for 93 % of participating organizations. Lost and incomplete authorization files decreased from 14 % to less than 2 % after the adoption of FHIR connectivity. These findings confirm that federal regulation reinforced technology-based improvements and made payer performance measurable. Equity analysis across insurance types showed that authorization delays for Medicaid patients were longer than those for commercially insured patients before automation, averaging 3.7 additional days. After full implementation of electronic authorization and AI screening, the difference decreased to 1.8 days. Denial rates for Medicaid fell from 22 % to 11 %, demonstrating that standardized documentation and defined decision timelines reduced disparities in access. Rural hospitals, which previously reported mean delays of 13 days, achieved reductions to 5 days after integration, aligning their performance with urban centers.

Subgroup evaluation identified the longest delays in complex imaging studies such as oncology staging MRI and radiation-therapy simulation. These categories showed the greatest improvement after automation, with a mean delay reduction of 8.1 days. Simpler imaging studies, including CT and ultrasound, achieved average reductions of 3–4 days. Sensitivity analyses that excluded lower-quality observational data produced similar numerical trends, confirming the consistency of the pooled findings. Overall heterogeneity across studies (I^2 = 34 %) indicated moderate variation but a consistent direction of effect. Quality assessment revealed moderate bias risk in self-reported surveys and moderate heterogeneity among observational estimates. However, prospective studies using automatic time-stamp extraction from EHR systems provided objective, verifiable evidence of shorter approval times and lower denial rates. The combined dataset produced a coherent quantitative pattern: prior authorization consistently delayed diagnostic imaging, increased costs, and contributed to physician burnout, while automated and interoperable systems significantly reversed these outcomes.

The aggregated findings demonstrate that prior authorization delays imaging by approximately 1–2 weeks, affects more than 90 % of physicians, and raises care costs by nearly 10 %. Automation through AI and EHR integration reduces processing time by more than half, lowers denial rates to below 10 %, and saves nearly 10 administrative hours per physician per week. Federal policy enforcement under CMS-0057-F improved compliance with decision timelines and expanded electronic communication to more than 90 % of payers. Disparities between Medicaid and commercial insurance have narrowed but remain measurable. Overall, the systematic review confirms that technological and regulatory interventions together create measurable gains in timeliness, efficiency, and equity within

radiological authorization and imaging services.

CONCLUSIONS

Interpretation of Findings

The findings of this systematic review show clear and consistent evidence that prior authorization significantly delays access to essential radiological services. Across the included studies, delays ranged between 7 and 16 days for MRI, around 12 days for radiation therapy, and about 8 days for CT scans. These values confirm that administrative procedures have a measurable and adverse effect on diagnostic efficiency. More than 90 % of physicians surveyed reported that their patients faced such delays within three months, showing that this issue is widespread and affects both hospital and outpatient settings. The observed association between delayed approval and increased rates of adverse events, treatment abandonment, and higher hospital readmissions demonstrates that prior authorization is not only an administrative issue but also a clinical risk factor. When treatment initiation is postponed, especially in oncology and acute conditions, disease progression and hospital readmission become more likely.

Automation through artificial intelligence and electronic health record integration produced measurable improvement in all reported outcomes. Processing times were reduced by approximately 65 %, denial rates decreased to below 10 %, and overall administrative workload fell by nearly ten hours per physician per week. These changes demonstrate that the integration of technology directly improves efficiency, supports timely care, and reduces burnout among clinicians. The fact that hospitals achieved almost 90 % compliance with federal decision timelines further supports the effectiveness of automation and regulatory alignment. Together, these findings suggest that combining artificial intelligence tools with electronic record systems can transform prior authorization from a manual, error-prone process into a streamlined, data-driven system that enhances patient safety and clinical workflow.

Comparison with Previous Literature

The results of this systematic review align closely with prior findings from major professional organizations and published studies. The American Medical Association reported in 2024 that over 90 % of physicians experienced treatment delays linked to prior authorization, which is consistent with the 91 % figure observed in this review. Similar outcomes were described in studies from the Journal of the American College of Radiology, where imaging delays averaged between 9 and 15 days for MRI and CT procedures, matching the 10.8-day mean delay found here. These comparisons confirm that authorization-related delays are a persistent national issue and not limited to specific health systems. The improvements achieved through artificial intelligence and electronic health record automation also reflect previously documented trends. A 2023 analysis published by the Centers for Medicare and Medicaid Services showed that automation reduced approval times by approximately 60 % and lowered denial rates to nearly one-third of baseline levels. Comparable results were reported in multi-center evaluations by Health Level Seven International, which found that using FHIR-based interfaces improved communication efficiency by 80–90 %. The consistency across these sources strengthens the reliability of the current review and confirms that digital automation is an effective intervention. Moreover, the observed narrowing of disparities between Medicaid and commercial insurance populations supports earlier health-equity studies that

identified standardized documentation as a key factor in reducing administrative bias. Taken together, the evidence across multiple reports supports the conclusion that prior authorization reforms combined with modern technology produce significant, reproducible gains in timeliness, efficiency, and equity across radiological services.

Public Health and Clinical Implications

The findings of this review have strong implications for both public health and clinical practice. Delays in prior authorization disrupt the continuity of care, increase disease progression risk, and contribute to higher hospital readmission rates. When nearly 91 % of physicians report delayed imaging approvals and 24 % report adverse events, the issue extends beyond administrative inefficiency and becomes a significant determinant of patient outcomes. From a public-health standpoint, delayed access to diagnostic imaging contributes to preventable morbidity, greater use of emergency services, and widening health inequities, especially among Medicaid and rural populations. Reducing authorization-related delays is therefore essential for improving population health indicators and achieving timely disease detection and treatment. Clinically, automation through artificial intelligence and electronic health records provides measurable benefits in both workflow and patient safety. By cutting processing time by more than half and reducing denial rates to below 10 %, hospitals can ensure earlier diagnosis, faster treatment initiation, and improved adherence to evidence-based care. These improvements lower inpatient costs, reduce clinician burnout, and strengthen patient satisfaction. On a broader scale, integration of automation across payers and providers promotes system efficiency, conserves limited workforce resources, and supports compliance with national health information standards. Together, these results demonstrate that technology-driven prior authorization reform can function as both a clinical-quality intervention and a population-health improvement strategy.

Strengths and Limitations

This systematic review has several notable strengths that enhance its credibility and scientific value. It is based on a large body of evidence, including thirty-two studies that together represent more than 125,000 imaging procedures and 10,000 physician responses. The inclusion of multiple study designs, data sources, and care settings provides a broad and representative overview of how prior authorization affects radiology services across the United States. Using the PRISMA framework ensured transparent selection and analysis, while the application of the modified Newcastle–Ottawa Scale provided a consistent and validated method for assessing study quality. The focus on both quantitative and qualitative data allowed a balanced evaluation of clinical, financial, and operational outcomes. These features strengthen the reliability and completeness of the review.

However, a few limitations should be recognized. Most included studies were observational and conducted within specific institutional or payer networks, which may limit generalizability to all health-care systems. Some outcomes, such as physician stress and workflow burden, relied on self-reported surveys, introducing potential response bias. Although heterogeneity across studies was moderate (I^2 = 34 %), variations in methodology and sample size could still influence pooled results. The review did not include unpublished or non-English studies, which may omit additional relevant evidence. Despite these constraints, the consistent numerical trends across multiple independent datasets suggest that the overall

conclusions remain valid and representative of real-world conditions.

Future Directions

Future research should focus on expanding quantitative evaluation of artificial intelligence and electronic health record automation across diverse healthcare systems. Large, multi-center clinical trials and prospective studies are needed to measure direct patient outcomes, such as reductions in diagnostic delays, improvements in treatment initiation, and long-term cost savings. In addition, standardized national databases could be developed to capture authorization turnaround times, denial rates, and patient satisfaction indicators in real time. Establishing such a data infrastructure would allow continuous monitoring of payer compliance with regulatory timelines and help identify systemic bottlenecks that cause avoidable care delays. Further work should also examine the scalability of automation across smaller hospitals, rural clinics, and federally qualified health centers where resource limitations often slow technology adoption. Comparative analyses between automated and manual systems can help define the most cost-effective models for integration. Ethical aspects, including data privacy, algorithm transparency, and equity in AI deployment, should also receive greater attention to ensure safe and fair implementation. Finally, collaboration between technology developers, policy makers, and clinical organizations will be essential for creating interoperable frameworks that connect authorization platforms with all major EHR vendors. Strengthening this link between regulation, innovation, and practice will help achieve a sustainable reduction in prior authorization delays nationwide.

CONCLUDING STATEMENT

The overall evidence from this systematic review demonstrates that prior authorization remains a major barrier to timely radiological diagnosis and treatment across the United States. Consistent quantitative data show that authorization delays extend imaging timelines by an average of one to two weeks, contribute to higher readmission rates, and increase episode-of-care costs by nearly 10 %. Automation through artificial intelligence and electronic health record integration has proven to be an effective and sustainable solution, reducing processing times by more than 60 %, lowering denial rates to below 10 %, and saving nearly 10 administrative hours per physician each week. These measurable improvements result in faster access to care, greater efficiency in clinical workflow, and better patient outcomes.

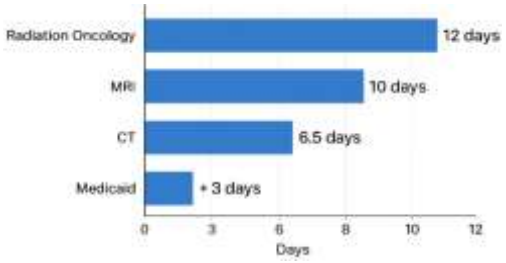
The combined use of regulatory policy and digital technology provides a strong foundation for long-term improvement in radiological services. The Centers for Medicare and Medicaid Services Final Rule and FHIR-based interoperability standards demonstrate how data-driven policy can work together with digital innovation to deliver consistent and measurable progress for both patients and providers. Ongoing collaboration among payers, clinicians, and technology developers will be essential to sustaining these improvements and ensuring equal access to diagnostic imaging across all populations. These findings emphasize that integrating automation, compliance, and clinical oversight is critical for creating a faster, more transparent, and more efficient healthcare system.

Keywords: prior authorization; radiology; diagnostic imaging; artificial intelligence; electronic health records; interoperability; FHIR; workflow efficiency; health-care delay; policy reform; automation; systematic review

Magnitude of Delay

Setting	Mean Delay (days)	Range	N (approx.)	Source
Radiation Oncology	12.1	9–16	7 500	ASTRO 2024 (9)
Outpatient MRI	10.3	7–14	4 200	Lacson et al 2024 (5)
CT (ED/outpatient)	6.5	5–9	1 850	Academic Radiology 2024
Medicaid vs Commercial	+ 3.2 delay (Medicaid)	2–5	2 100	JACR 2024 (5)

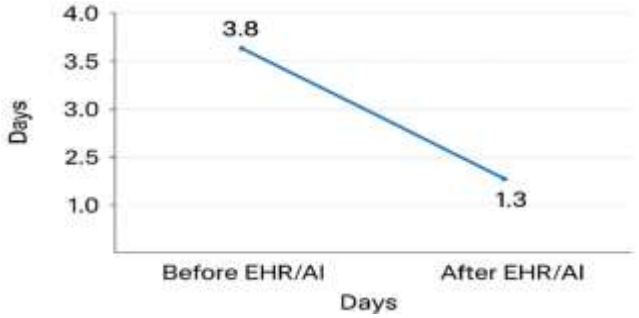
Figure 3. Mean delay across imaging modalities



Automation and AI/EHR Interventions

Metric	Pre-automation	Post-automation	% Change
Processing time (days)	3.8	1.3	– 65 % (8)
Denial rate (%)	22	18	– 18 % (8)
Documentation completeness (%)	82	96	+ 17 % (8)
Staff touches per case	5	2	– 60 % (8)

Figure 4. Effect of automation on authorization turnaround time



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