How are US hospitals quantifying the ROI of replacing radiologists with AI?

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Executive Summary

US hospitals are primarily quantifying the Return on Investment (ROI) of radiology AI by focusing on increased throughput and efficiency gains to manage rising imaging volumes and radiologist shortages, rather than direct radiologist replacement [2, 8, 9, 18]. While some frameworks consider estimated FTE savings and reduced error costs, widespread positive financial ROI remains largely unrealized for most institutions due to high implementation costs, the lack of standardized calculation methodologies, and unstable reimbursement pathways [12, 17, 18, 19].

Key Findings

ROI Focus: Throughput Over Direct Cost Reduction

US hospitals prioritize strategies to increase revenue through higher patient throughput when evaluating radiology AI investments, despite unstable reimbursement pathways [2, 8, 9]. While cost reduction, such as fewer repeat scans, is acknowledged as a potential benefit [6, 7], the primary financial driver is maximizing patient volume and optimizing workflows to meet imaging demands [4]. This approach is partly driven by significant challenges in securing consistent reimbursement for AI solutions [3, 8]. The radiology AI market, valued at $794.12 million in 2025, is projected to reach approximately $7.17 billion by 2035, with software accounting for 41% of the market share, suggesting investment in tools for faster processing and reporting [6]. However, only 24% of organizations using imaging AI report a clear, quantified positive financial ROI [18].

Quantification Methodologies and Metrics

Methodologies for calculating ROI for radiology AI within US hospitals currently lack a consistently used, standardized framework [17, 19, 20]. For the minority of hospitals that do have a formal framework, common key performance indicators (KPIs) include cost per

study, radiologist utilization rate, turnaround time, and error reduction rate [6, 7, 10, 11]. Beyond increased throughput, these frameworks are beginning to quantify the 'return' aspect through estimated FTE savings or avoidance resulting from reduced radiologist workload, and the financial impact of reduced error costs, potentially lowering malpractice expenses or the need for repeat scans [12]. For example, AI-based sepsis detection has shown a potential reduction in ICU length of stay of $1,500 - $3,000, indirectly impacting staffing needs [18]. An Italian cost-effectiveness analysis for AI-assisted liver lesion detection reported an incremental cost-effectiveness ratio (ICER) of â‚¬9,888 per quality-adjusted life year (QALY) gained [14].

Total Cost of Ownership (TCO) Components

US hospitals commonly track several financial components in their TCO calculations for radiology AI solutions. These include initial software licenses, necessary hardware upgrades (such as GPUs and increased server capacity), and IT integration to connect AI with existing PACS, RIS, and EHR systems [1, 2]. IT integration alone can represent 20-30% of the total implementation cost [2]. Data storage costs for the vast datasets required by AI models are also included, potentially adding tens of thousands of dollars annually [2]. Ongoing maintenance, encompassing software updates, model retraining, and technical support, typically accounts for 15-20% of the TCO over a five-year period [2]. Underestimation of these hidden costs beyond just the software is a common issue [17].

Productivity Gains and Implementation Realities

While AI solutions demonstrate potential for increased radiologist productivity, gains of up to 40% in report completion time [15] or a 2.66-minute relative improvement in report drafting time [16] are not universally guaranteed [10, 11]. The magnitude of these gains is substantially influenced by site-specific factors, case mixes, and careful implementation [10, 11]. Initial deployments may even lead to temporary increases in overall reporting time due to necessary workflow adjustments and radiologist learning curves [7, 10, 22, 23]. Furthermore, integrating AI radiology solutions into existing US hospital IT infrastructure generally requires considerable investment in data storage, processing power, and network connectivity [2, 21, 24].

Reimbursement as a Limiting Factor

The limited availability of dedicated billing codes for most radiology AI applications fundamentally restricts widespread adoption, even when demonstrable ROI exists [2, 8, 13]. Despite over 1,000 FDA-cleared radiology AI applications, securing reimbursement remains a significant hurdle for many due to a lack of dedicated billing codes or coverage [3, 8, 13]. As of April 2025, reimbursement has primarily been achieved through Medicare Administrative Contractor (MAC) coverage, the CMS New Technology Add-on Payment (NTAP) program, or Category III CPT codes [13]. Solutions like HeartFlow have achieved sustained ROI by securing both MAC coverage and a Category I CPT code [8, 9]. US hospitals are proactively advocating for expanded billing codes by demonstrating AI's value and securing coverage through existing pathways [13].

Leading Vendors and Sustained ROI

Aidoc and HeartFlow currently demonstrate compelling, sustained ROI for hospitals [8, 9]. HeartFlow's success is notably linked to achieving reimbursement through both MAC coverage and a Category I CPT code, establishing a clear financial pathway [8, 9]. Aidoc, along with other vendors like Arterys, GE Healthcare, and Siemens Healthineers, is experiencing substantial growth driven by increasing imaging volumes and radiologist shortages [5, 9]. Their success is tied to both technical capabilities and a clear understanding of the reimbursement landscape, enabling them to demonstrate financial value to healthcare systems [2, 9].

Implications

The current approach to quantifying ROI for radiology AI in US hospitals suggests a strategic shift towards augmenting radiologist capabilities to manage increasing demand and workforce shortages, rather than outright replacement. The focus on throughput and efficiency gains, coupled with the challenges in securing consistent reimbursement and the lack of standardized ROI metrics, means that AI is primarily viewed as a tool for operational optimization and revenue enhancement. For broader adoption and clearer financial benefits, hospitals will need to develop more robust and standardized ROI frameworks that comprehensively account for the full TCO, indirect benefits like reduced error rates, and the evolving reimbursement landscape.

Limitations and Caveats

This report's findings are subject to several limitations. A significant challenge is the lack of a consistently used, standardized framework for calculating radiology AI ROI across US hospitals, which makes direct comparisons and broad generalizations difficult [17, 19, 20]. Detailed TCO breakdowns for specific AI radiology solutions from individual vendors like Aidoc, Arterys, or GE Healthcare are not provided in the research [6]. Furthermore, documented ROI experiences and specific financial data for many other leading radiology AI vendors (e.g., Lunit, RadAI, Subtle Medical) are limited in the available research, making it difficult to assess their comparative success [8, 9]. The evidence also suggests that AI is largely used to assist or augment radiologists, rather than replace them, which impacts how ROI is conceptualized and measured.

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