

# Artificial Intelligence as a Catalyst for Value-Based Care in the U.S. Health Insurance

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# Artificial Intelligence as a Catalyst for Value-Based Care in the U.S. Health Insurance

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## Abstract

**Background:** The United States health insurance system is at a critical crossroads. Inflating costs, fragmented care, and administrative inefficiencies have revealed the limitations of the fee-for-service (FFS) model. This long-standing structure, while once effective in expanding access, now struggles to deliver efficiency and value. Value-based care (VBC) aims to realign incentives toward outcomes, quality, and efficiency.

**Objective:** This article explores how artificial intelligence (AI) can serve as the digital backbone to accelerate the transition from FFS to VBC.

**Methods:** The article reviews evidence from bundled payment programs and Accountable Care Organizations (ACOs), examines AI-driven frameworks for cost prediction, outcome measurement, and risk adjustment, and discusses challenges and future considerations with the aid of an illustrative case and example.

**Results:** Bundled payment models, such as the Comprehensive Care for Joint Replacement program, have shown average savings of ?\$1,012 per episode, while the ACO REACH model achieved average savings of ?\$930 per beneficiary compared with FFS benchmarks. AI applications provide scalable solutions for forecasting costs, optimizing care coordination, and supporting preventive interventions. An illustrative case vignette in congestive heart failure illustrates how AI-enabled VBC can reduce and lower episode costs by approximately 20%.

**Conclusions:** AI has the potential to accelerate the scaling of VBC by making it more efficient, equitable, and sustainable. However, realizing this promise requires safeguards for data quality, interoperability, fairness, and transparency. In the AI era, the defining measure of health insurance will shift from the number of claims processed to the number of lives improved. Clinical Trial: N/A

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## Original Manuscript

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## Artificial Intelligence as a Catalyst for Value-Based Health Insurance in the United States

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### Key words

Artificial Intelligence, AI, Machine Learning, ML, Value-Based Care, VBC, Health Insurance, Bundled Payment, Equity, Accountable Care Organizations, Transparency, Fee-For-Service, FFS

### Introduction

Artificial intelligence (AI) is rapidly transforming the way healthcare is delivered and financed, with applications that extend from clinical decision support to population health management. AI can play a key role in transitioning the traditional health insurance industry, which is standing at a decisive inflection point. Health insurance, a central pillar of healthcare services, is currently struggling with rising costs, fragmented care, uneven outcomes, and increasing administrative complexity. This highlights the inefficiencies of fee-for-service (FFS) models, where volume rather than value drives incentives (1,2). In response, a growing momentum is shifting toward value-based care (VBC), which prioritizes outcomes, quality, and efficiency over sheer quantity (3). AI, through predictive modeling, data analytics, and natural language processing, provides the operational digital backbone to make this shift both feasible and scalable (4). By enhancing cost forecasting, strengthening care coordination, improving outcome measurement, and enabling preventive interventions, AI creates the infrastructure for a system that rewards quality over quantity and aligns incentives with patient well-being.

### Textbox 1. Key Takeaways

- Today's healthcare models require urgent reform, as nearly 25–30% of U.S. health spending is considered avoidable waste.
- Value-based care (VBC) improves both quality and savings, with bundled payment programs reducing costs by about US \$1,012 per case.
- Artificial Intelligence can be harnessed to make value-based care scalable and efficient.
- Value-based care (VBC) particularly bundled episodes will bring transparency to the opaque healthcare system.

- With a responsible adoption, AI can act as a catalyst—transforming VBC from an aspiration into a reality by reducing costs and providing healthcare access to more people in the US.
- Transparency, equity, fairness, and trust must form the foundation of AI-enabled healthcare.

### Value-Based Models: Bundled Payments and ACOs

Value-based care realigns incentives by tying reimbursement to outcomes, quality, and efficiency. In bundled payment models, all services associated with an episode of care (e.g., hip or knee replacement) are combined into a single payment that covers diagnostics, procedures, hospitalization, rehabilitation, and follow-ups. Complications or readmissions within a defined period (e.g., 30–90 days) remain the provider's responsibility, encouraging coordination across teams and settings (5,6). Evidence from the Comprehensive Care for Joint Replacement (CJR) Model underscores the impact. In Performance Year 6 (2021–2022), CJR hospitals reduced episode payments by an average of \$1,012 per joint replacement and \$1,171 per elective replacement compared with FFS hospitals, while maintaining quality outcomes (7) (Figure 1). Accountable Care Organizations (ACOs) extend the reach of value-based incentives by aligning care delivery across entire patient populations. An ACO network brings together physicians, hospitals, and other healthcare providers who work collaboratively to deliver coordinated, high-quality care for a defined patient population. Their goal is to improve patient outcomes while reducing any unnecessary costs. This arrangement shifts the focus from volume to value.

Unlike an FFS arrangement, ACOs assume responsibility for the total cost and quality of care across primary, specialty, and hospital services (8). When expenditure remains below benchmarks and metrics are met, providers share the savings; when spending exceeds benchmarks, they may share the losses. Results from ACO REACH show average savings of ~\$930 per beneficiary compared with FFS benchmarks, demonstrating broad efficiency gains under population-level accountability (Figure 2).

Policy momentum continues to build. The Centers for Medicare & Medicaid Services (CMS) has finalized the Transforming Episode Accountability Model (TEAM)—a mandatory bundled payment initiative that will begin in 2026 across metropolitan areas—signaling a sustained federal commitment to value-based reimbursement.

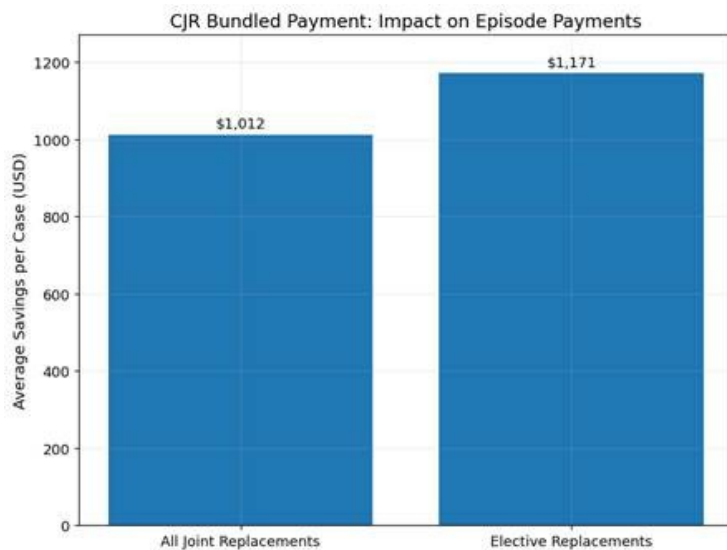


Figure 1. CJR Bundled Payment Impact on Episode Payments (CMS Performance Year 6, 2021–22).

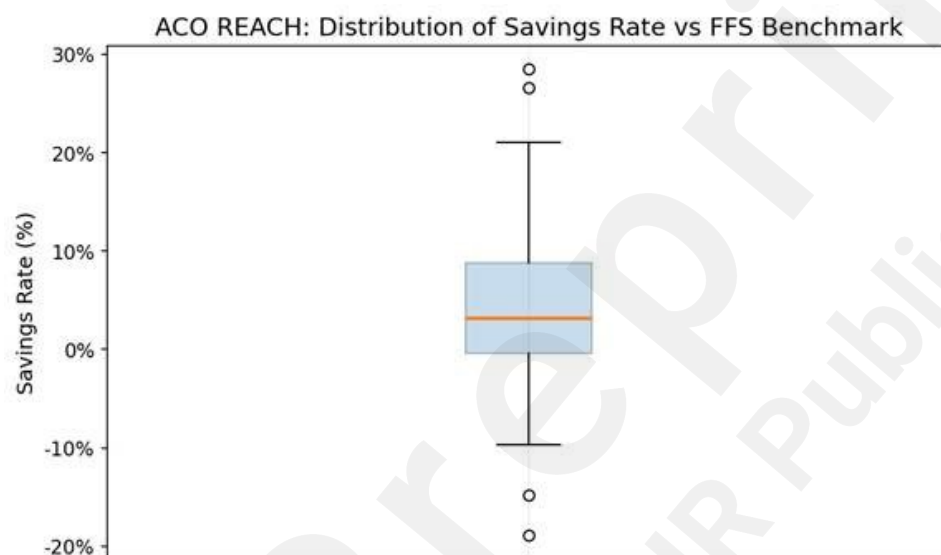


Figure 2. Average savings per beneficiary in the ACO REACH program compared with fee-for-service (FFS) benchmarks, 2022–2023. The boxplot shows the distribution of savings rates across participating organizations. The median savings (orange line) is approximately 3–4%, while the interquartile range (middle 50%) spans to approximately 9%. Most ACOs cluster within this range, indicating modest but consistent positive savings relative to FFS.

These findings reinforce the advantages of value-based care over traditional models like FFS. Together, bundled payments (episode-level) and ACOs (population-level) illustrate how outcomes-based models outperform FFS by aligning incentives with what matters to patients and purchasers. The next step is to harness AI to amplify these gains, making progress broader, faster, equitable and fairer. By combining these small incremental gains with the data-driven analytic power of AI, health systems can enhance efficiencies and achieve even greater cost savings, transforming small increments into a large-scale transformation.

This convergence sets the stage for examining how AI can accelerate the shift toward scalable, equitable value-based care.

### AI as a catalyst in the shift towards VBC

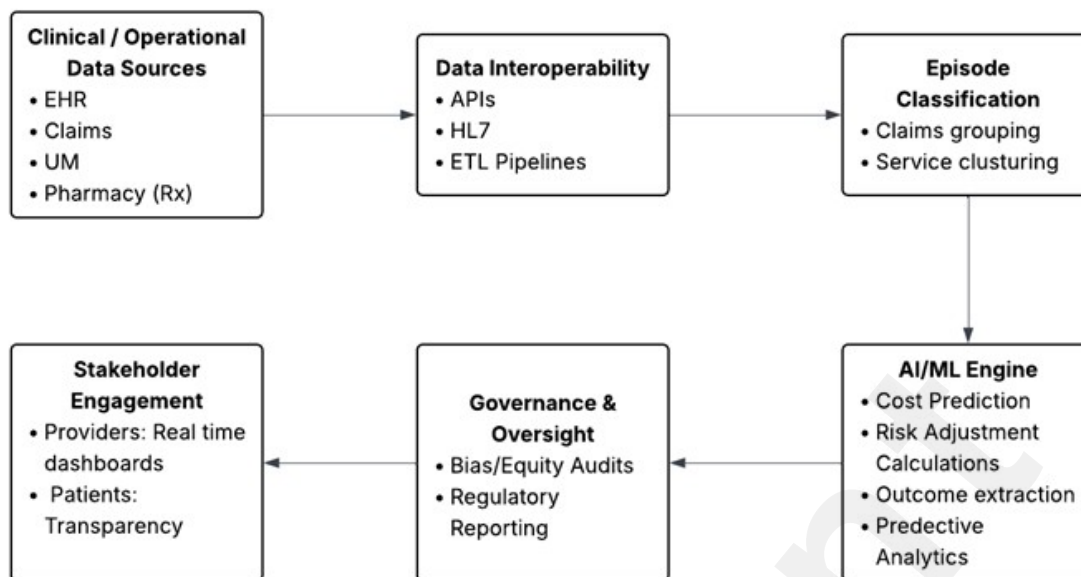


Figure 3. AI as a Catalyst in the Transition from Fee-for-Service to Value-Based Care: Workflow from Data Capture to Predictive Insights

#### AI as the Operational Backbone for Value-Based Care

Value-based care initiatives, including bundled payments and ACOs, have shown promise in reducing costs and improving outcomes, but widespread adoption and scaling up these models require a digital foundation capable of integrating heterogeneous data, enabling seamless coordination, and supporting continuous improvement. Artificial intelligence harmonizes clinical and claims data, applying machine learning and predictive analytics to generate actionable feedback at the point of care. By doing so, AI can transform value-based care from a policy concept into a practical reality.

#### Data Capture and Real-Time Interoperability

The starting point for the workflow is the entry of structured and unstructured data from clinical and operational systems (electronic health records (EHRs), laboratory and imaging results, claims streams, pharmacy transactions, and admission discharge transfer (ADT) events). Instead of static captures or retrospective batch uploads, modern architectures use APIs and event-driven pipelines to stream provisional claims, vitals, and medication updates into a real-time, unified cloud environment. The cloud system provides elastic compute and storage, as well as large-scale data engineering and high-throughput inference, ensuring that predictive models are continuously updated as new information becomes available. This cloud system infrastructure allows predictive models to refresh continuously as new information is added and continually processed.

#### Episode Classification and Benchmark Pricing

Once data is standardized and stored in the cloud environment, encounters are grouped into clinically coherent bundles using AI-assisted methods. Automated groupers utilize medical codes (ICD (International Classification of Diseases) /CPT (Current Procedural Terminology) along with unsupervised clustering of EHR events to accurately define episode boundaries. Automated systems utilize codes and patterns in health records to categorize related care into a single episode, such as for heart failure or any surgery. These episode definitions serve as the basis for benchmarking. Benchmark pricing sets the baseline for comparing patient-specific predictions, enabling early detection of deviations and facilitating timely intervention. These groupings are then compared with past data to set expected costs. This benchmark makes it easier to spot unusual changes early and take timely action.

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### *AI/ML Engines and the Closed-Loop Feedback Cycle*

At the core of this architecture, various machine learning and AI turn raw inputs to generate predictive insights. Some models, such as gradient boosting and LSTM-based models, estimate episode costs in comparison to expected benchmarks and dynamically recalculate as new utilization signals accumulate. Survival analysis models, such as DeepSurv, along with recurrent neural networks, generate continuously updated readmission probabilities by utilizing the longitudinal patient history and population-level patterns. Additional forecasting tools simulate possible care pathways after discharge, analyzing the chances of emergency visits or nursing care facility stays. Reinforcement learning agents simulate post-acute utilization pathways, projecting probabilities of emergency department visits or skilled nursing placement under different discharge strategies. Transparency tools identify the main factors, such as medication use, or lab markers, that drive these risks or costs. Explainability frameworks, such as SHAP, provide transparency by surfacing the most influential measures, including medication adherence, or biomarker trajectories, which drive cost or risk predictions.

These insights are not confined to data reports but are delivered directly into provider workflows through electronic health records, dashboards, and alerts. They are embedded directly into workflows through clinical decision support (CDS) webhooks in the EHR, role-specific dashboards, and automated alerts. Care teams can immediately adjust treatment plans, discharge timing, or follow-up as needed. The results of these actions ingest back into the system, enabling the models to learn and improve, while oversight mechanisms ensure fairness, compliance, and transparency. This closed-loop architecture ensures models continuously improve while governance layers enforce fairness, compliance, and interpretability.

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### *Illustrative Case Vignette*

Let us review a potential case of AI-enabled value-based care in Congestive Heart Failure (CHF) which would cost \$40,000 using the fee-for service model. Consider a patient admitted with congestive heart failure. Detection begins when claims data are processed through an automated grouper that maps CPT and ICD codes, linking them with related EHR encounters. A real-time pipeline streams discharge summaries, laboratory values, vitals, reconciliation notes, and provisional claims into a cloud-based system. A cost-prediction engine estimated the total spending for this episode at \$38,000, compared with the episode benchmark of \$34,000. This gives early signs to providers that this case is more prone to complications, as the engine has predicted a higher episode cost than the benchmark for similar episodes. The model continually adjusted as new lab results and service utilization information became available. It utilized a hybrid of gradient boosting and recurrent models, along with a readmission risk model, to integrate longitudinal predictors, including prior admissions, BNP trends, and adherence patterns, and estimate a high 30-day readmission risk. A reinforcement-learning forecaster simulates discharge options, flagging increased likelihood of acute-care utilization if cardiology follow-up is delayed.

Model explainability tools (e.g., SHAP) highlight renal impairment, elevated BNP, and incomplete medication optimization as the main cost drivers. These insights are surfaced in real-time to the provider team, prompting the deployment of remote monitoring and expedited follow-up care. As a result, deterioration is prevented, readmission is avoided, and the episode cost falls to \$32,500. Outcomes then feed back into the learning system, improving future predictive accuracy.

### *AI as a Force Multiplier for VBC*

This case demonstrates that value-based care, through bundled payments and coordinated services, can reduce waste and enhance efficiency. With the adoption of AI, utilizing real-time data pipelines, large-scale cloud integration, and predictive modeling, the impact becomes significantly more substantial. Costs are reduced not only by avoiding unnecessary utilization but by dynamically

tailoring interventions to individualized patient trajectories, guided by transparent and predictive analytics. The result is a delivery and financing system that achieves superior outcomes at lower cost, proving that AI is not just a reporting tool but the operational backbone that makes value-based care scalable, sustainable, and clinically impactful across the healthcare ecosystem(4).

#### Challenges and considerations

While AI has immense potential to reinforce and scale up the foundation of a value-based framework, shaping the future, we must be both optimistically cautious and prepared to tackle the challenges and obstacles ahead. Achieving this vision requires robust safeguards to ensure the responsible and equitable adoption. Data silos and inconsistent and incomplete records can weaken predictive accuracy. Without proper oversight, poorly designed algorithms, or insufficient transparency and regulation, bias may persist. Building and maintaining stakeholder trust will be vital to ensure equitable implementation.

Governance frameworks, such as explainability tools (for example, Shapley Additive exPlanations [SHAP] and Local Interpretable Model-agnostic Explanations [LIME]), together with model validation and equity audits, help ensure that predictions remain interpretable, unbiased, and clinically trustworthy. Insights generated through these systems are delivered to stakeholders in actionable ways: providers gain dashboards and decision-support tools integrated into workflows, while patients receive greater visibility into outcomes and costs, fostering trust in the value-based care ecosystem.

Despite these safeguards, challenges may persist. Another major barrier is the digital divide, where smaller providers, who face infrastructure gaps, suffer a significant setback and fall behind. Smaller payers and providers often lack the IT infrastructure or MLOps capacity to implement AI at scale, raising concerns that only large organizations may benefit. Bridging these structural gaps and broadening provider participation will be critical for equitable adoption nationwide.

Another obstacle lies in patient trust and engagement. As AI becomes more deeply embedded in reimbursement and care delivery, patients may fear opaque decision-making or automated claim denials. Recent lawsuits over insurer use of algorithms have already underscored these risks, highlighting the importance of transparency and accountability in protecting patient confidence.

#### Conclusion: Paradigm Shift – A Way Ahead

As we move toward a new dawn, in this new era, the most significant shift on the horizon is a paradigm change: in the age of AI, the real measure of health insurance will no longer be the number of claims processed, but the number of lives improved. As we pave the way for a healthier future, the need of the hour is to align insurers, providers, regulators, and technologists on a common framework of equity, transparency, and accountability.

As we move towards the adoption of a wider range of technology and AI in the healthcare insurance world, let us build the foundational blocks of transparency, equity, and efficiency. The transformation from volume to value in U.S. health insurance, which was once aspirational, is now a tangible reality, driven by policy reforms and enabled by AI.

AI will not “fix” the limitations of health insurance on its own, but can act as a transformative enabler, if used appropriately, to bring a paradigm shift. If built on the blocks of fairness and trust, AI-enabled value-based care can transform healthcare financing from a source of friction into a driver of healthier populations, where every life is valuable and matters. Success will depend not only on adoption but also on equity, transparency, and trust. *The defining measure of health insurance in the AI era will not be the number of services delivered, but the number of lives improved.*

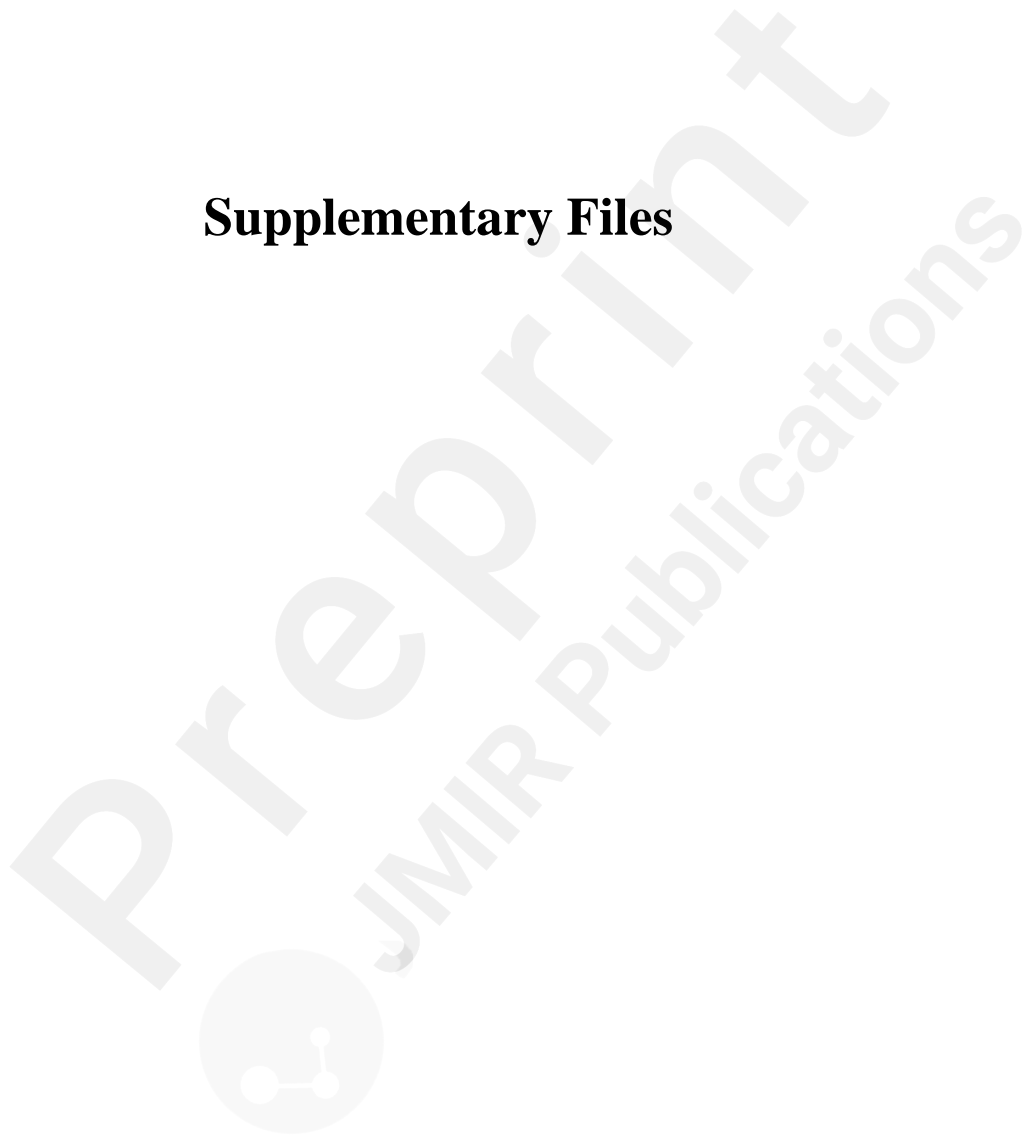
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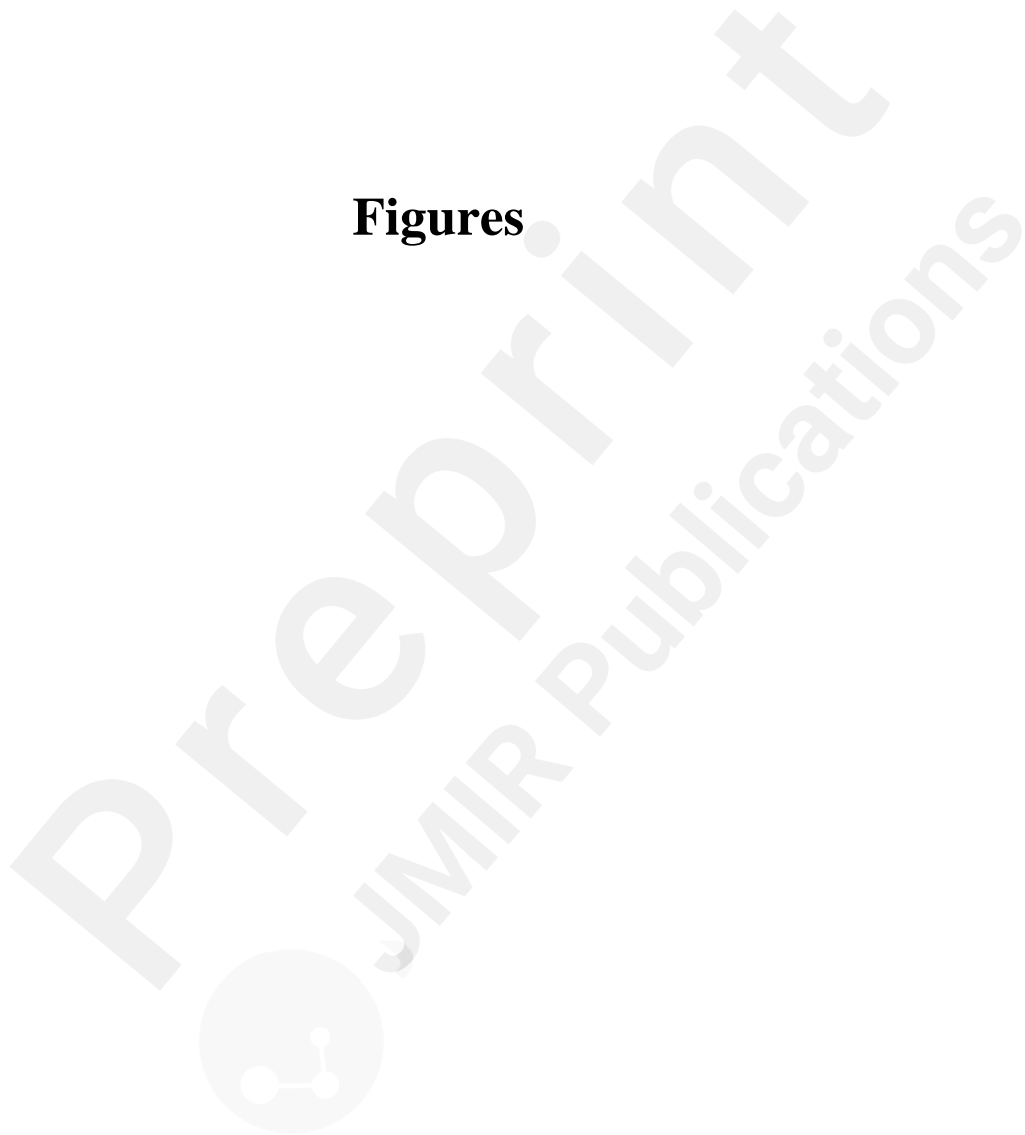
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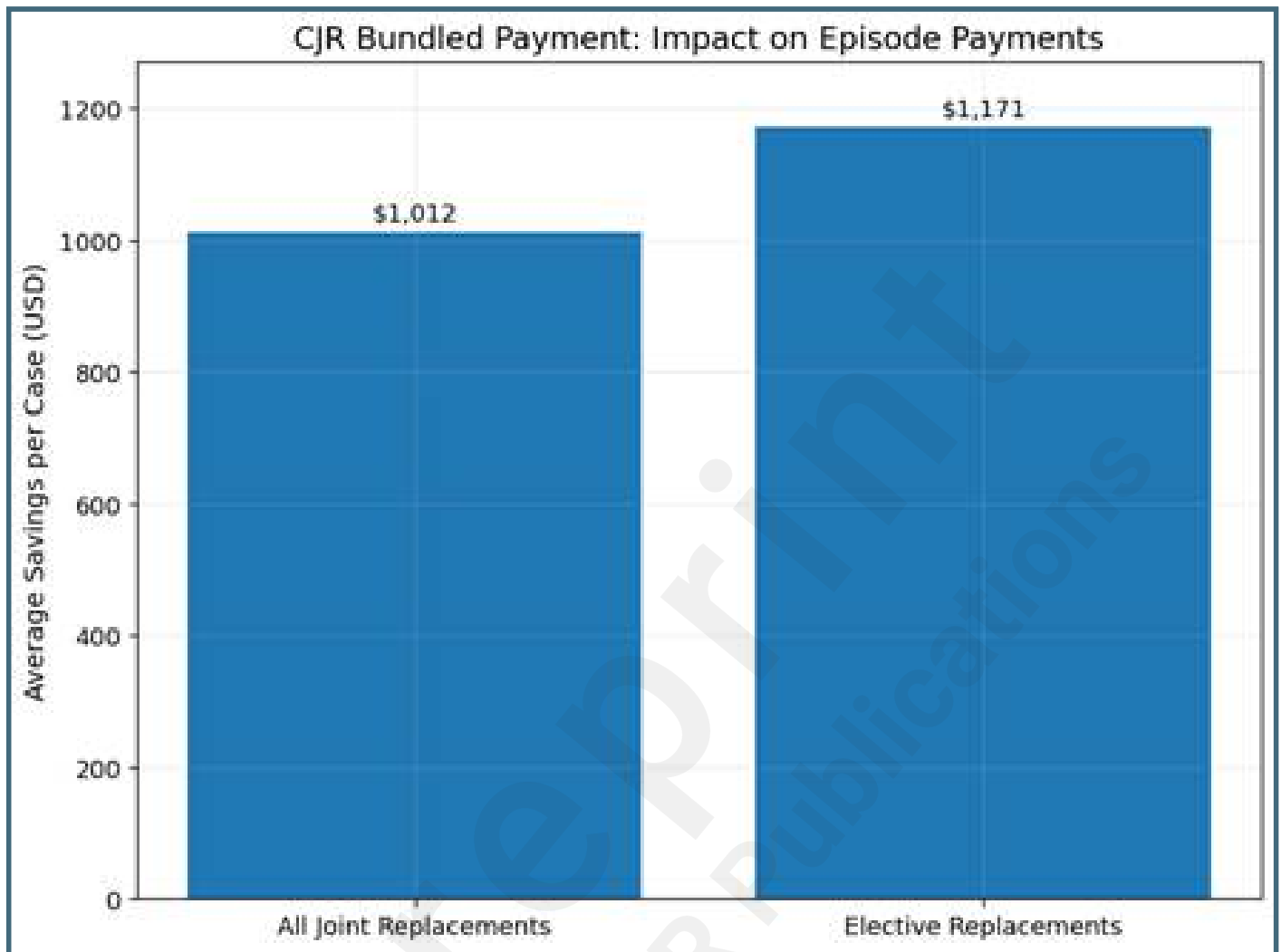
## Supplementary Files



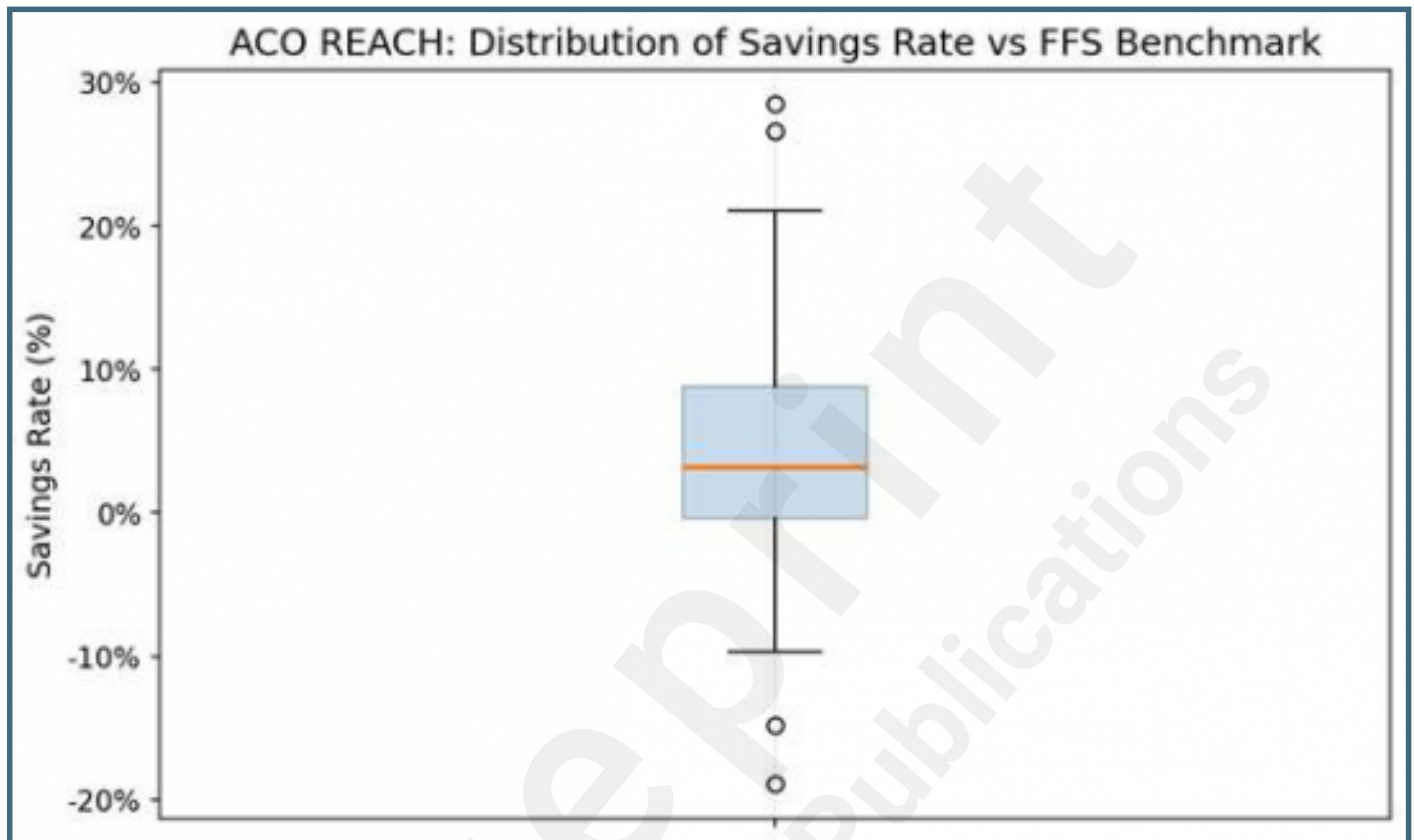
## Figures



CJR Bundled Payment Impact on Episode Payments (CMS Performance Year 6, 2021–22).



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Artificial Intelligence as a catalyst in the transition from fee-for-Service to value-based care: Workflow from data capture to predictive insights.

