



Hospital Use of AI/ML Tools and Its Associations with Medicare Spending among Older Adults with ADRD

Seyeon Jang, PhD¹⁻⁴ & Jie Chen, PhD¹⁻⁴

1. Department of Health Policy and Management, University of Maryland School of Public Health, College Park, MD
2. Center on Aging, University of Maryland, College Park, MD
3. Center for Seniors Uniting Nationwide to Support Health, INtegrated care, and Economics (SUNSHINE), University of Maryland, College Park, MD
4. Hospital And Public health interdisciplinary research (HAPPY) Lab, University of Maryland School of Public Health, College Park, MD

Background

- Hospitals are increasingly adopting artificial intelligence and machine learning (AI/ML) tools to support clinical care, yet evidence on how hospital AI/ML adoption relates to utilization and spending among clinically complex populations remains limited.
- While AI/ML tools may improve early risk identification and care coordination for ADRD patients, their implications for healthcare spending are unclear.
- Older adults with Alzheimer’s disease and related dementias (ADRD) are high-need, high-cost patients with increased risks of readmissions and potentially avoidable hospitalizations.

Objective

- To examine associations between hospital adoption of patient-related AI/ML tools and total and beneficiary out-of-pocket (OOP) spending among fee-for-service (FFS) beneficiaries with ADRD

Methods

Study design & Data Source:

- Cross-sectional study using the 2023 inpatient claims from Medicare Provider Analysis and Review (MedPAR) linked to the Master Beneficiary Summary File and the American Hospital Association Annual Survey IT Supplement

Study sample:

- 340,509 Medicare FFS beneficiaries aged 65≤ years with ADRD who experienced 1≤ inpatient hospitalization in 2023

Exposures:

- Hospital adoption of patient-related AI/ML tools was measured using four binary indicators: (1) Predict inpatient health risks, (2) Identify high-risk outpatients, (3) Monitor patient health, and (4) Recommend treatments
- Adoption was examined by both cumulative count (0–4) and individual tool type.

Main outcomes:

- Total Medicare payments and beneficiary OOP spending, adjusted to 2024 US dollars

Statistical Analysis:

- Generalized linear models with log link and gamma distribution adjusted for beneficiary- (age, sex, race/ethnicity, dual eligibility, comorbidity burden) and hospital-level (urban/rural status, bed size, teaching status, ownership) characteristics.
- Marginal effects were estimated and post-estimation contrast tests were used to assess predicted spending differences.
- Standard errors were clustered at the hospital level.

Results

Table 1. Total Number of Patient-related AI/ML Models and Medicare Spending (MR, ref: 0 models)

No. of AI/ML Models	Total Medicare Costs (MR)	95% CI	Beneficiary OOP Costs (MR)	95% CI
1	0.97	0.90–1.06	1.02	0.95–1.08
2	0.99	0.91–1.08	0.95	0.89–1.01
3	1.01	0.92–1.10	0.96	0.91–1.03
4	0.99	0.91–1.08	0.97	0.91–1.03

Table 2. Individual Patient-related AI/ML Model Types and Medicare Spending (MR, ref: no adoption)

AI/ML Model Type	Total Medicare Costs (MR)	95% CI	Beneficiary OOP Costs (MR)	95% CI
Predict inpatient health risks	0.94**	0.89–0.98	0.93**	0.89–0.98
Identify high-risk outpatients	1.05*	1.01–1.09	0.97*	0.95–1.00
Monitor patient health	1.00	0.96–1.03	0.99	0.97–1.01
Recommend treatments	1.01	0.97–1.04	1.03*	1.01–1.05

Significantly lower spending ($p < 0.05$) Significantly higher spending ($p < 0.05$) * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Figure 1. Predicted Medicare and OOP Spending by AI/ML Adoption

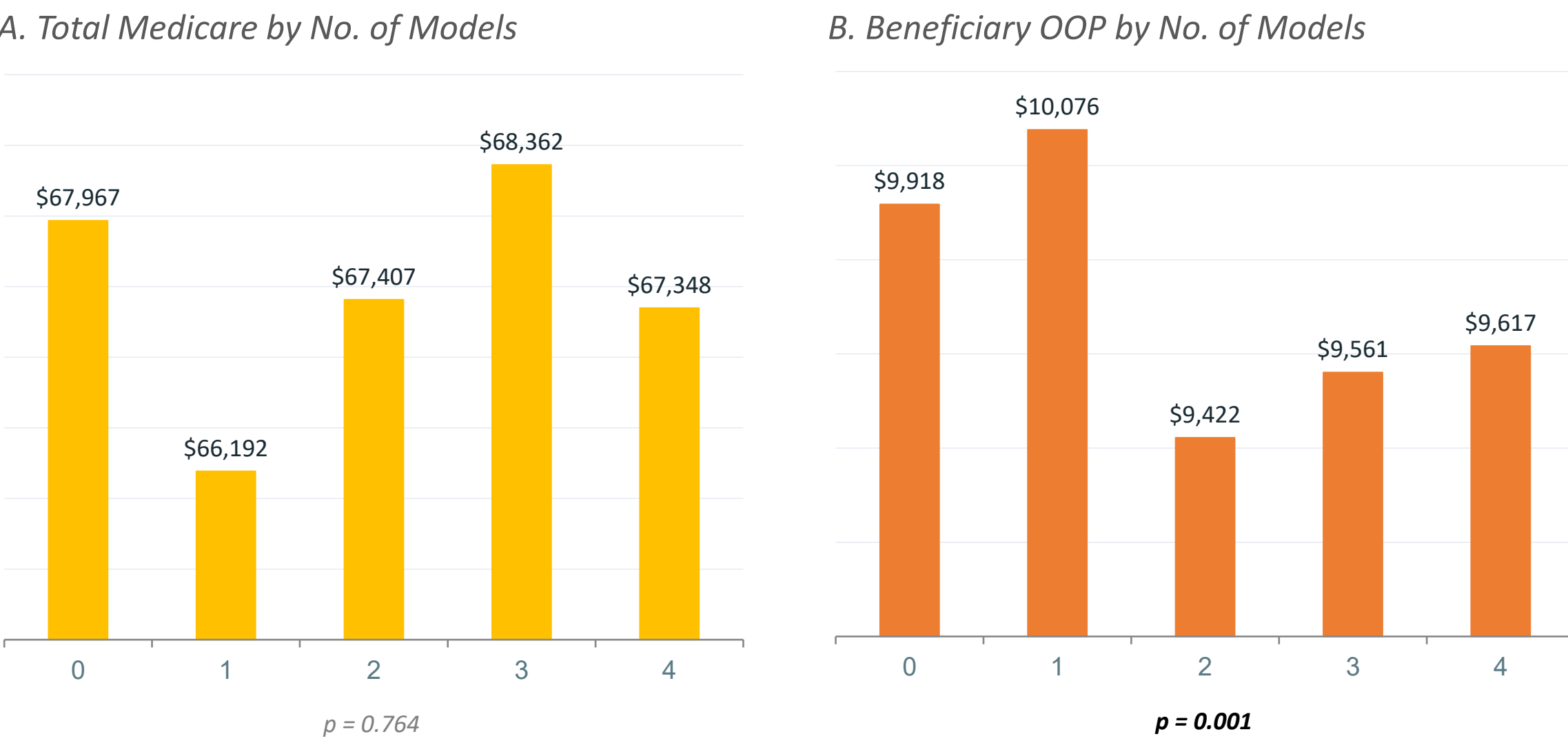
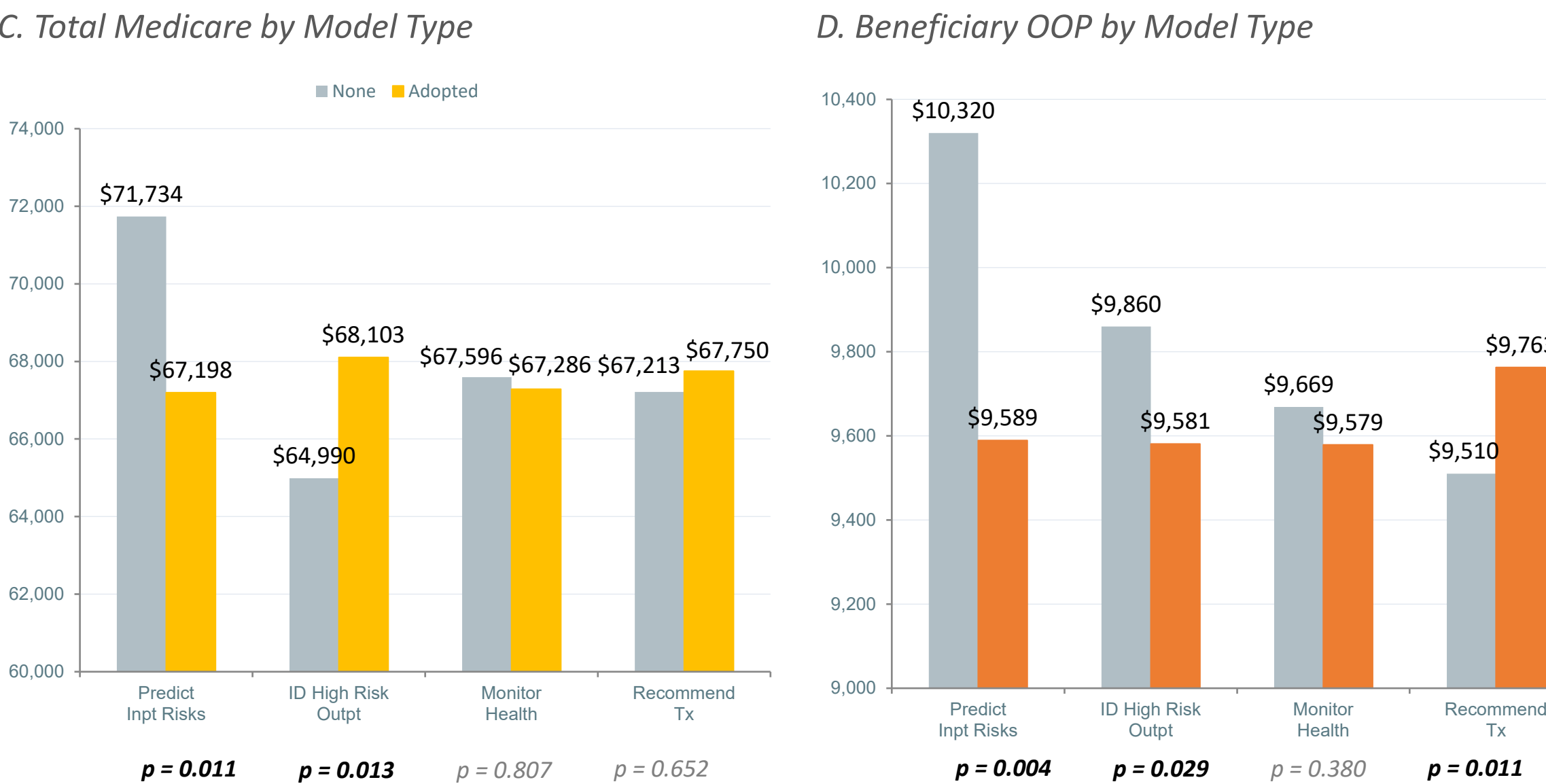


Figure 2. Predicted Spending by Individual AI/ML Model Type (None vs. Adopted)



Summary of Findings

- Overall AI/ML adoption level was not associated with total Medicare or beneficiary OOP spending.
- Spending differences varied by the specific AI/ML function used in hospitals.
- Inpatient risk prediction** tools were associated with lower total Medicare spending (MR=0.94, $p=0.009$) and lower beneficiary OOP spending (MR=0.93, $p=0.003$). Adjusted total Medicare spending was \$4,536 lower in hospitals using these tools.
- High-risk outpatient identification** tools were associated with higher total Medicare spending (MR=1.05, $p=0.014$) and lower OOP spending (MR=0.97, $p=0.028$). Adjusted total Medicare spending was \$3,113 higher in hospitals using these tools.
- Treatment recommendation** tools were associated with higher OOP spending (MR=1.03, $p=0.011$).

Practice & Policy implications

- Differences in Medicare and beneficiary spending varied by the specific function of AI/ML tools, highlighting the importance of evaluating specific AI applications rather than overall levels of AI adoption.
- Hospitals using inpatient risk prediction tools showed lower total Medicare and beneficiary OOP spending, suggesting the potential role of AI-enabled risk stratification in improving care coordination for high-need populations.
- AI tools that identify high-risk outpatients or recommend treatments were associated with higher spending, which may reflect greater detection of care needs and more proactive management among ADRD patients.
- Additional studies are needed to understand how AI tools are integrated into clinical decision-making and care delivery, particularly for complex populations such as individuals with ADRD.
- Future studies must examine longitudinal effects, implementation strategies, and equity implications of AI/ML in ADRD care.

Contact information

Seyeon Jang PhD
Assistant Research Scientist
syjang@umd.edu

