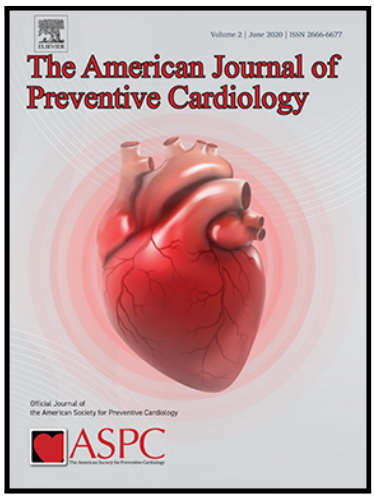


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Pauline Pearcy , Khurram Nasir , Elias Mossialos

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# Integrating Financial Risk into Cardiometabolic Prevention: From Price Transparency to Patient-Level Insights into Diabetes-Related Spending

Pauline Pearcy,[1] Khurram Nasir,[1,2,3] Elias Mossialos[1]

[1] LSE Health, London School of Economics and Political Science, London, United Kingdom
[2] Division of Cardiovascular Prevention and Wellness, Department of Cardiology, Houston Methodist DeBakey Heart and Vascular Center, Houston, Texas, United States
[3] Houston Methodist-Rice Digital Health Institute (HM-Rice DHI), Houston, Texas, United States

**Correspondence:**
Professor Elias Mossialos
LSE Health
London School of Economics and Political Science
London, WC2A 2AE
United Kingdom
e.a.mossialos@lse.ac.uk

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Cardiometabolic disease remains a leading driver of morbidity, mortality, and healthcare costs in the United States.(1–3) While clinical risk models have advanced, parallel frameworks to quantify financial exposure and vulnerability remain underdeveloped. Such insights are critical to support risk-informed coverage design and development of cost-effective interventions within cardiometabolic care pathways.

In this issue of the *American Journal of Preventive Cardiology*, Dhingra and colleagues present a methodologically relevant approach to this problem, leveraging electronic health record phenotyping and hospital price transparency data to quantify encounter-level spending among more than 106,000 patients with Type 2 diabetes mellitus (T2D) in a large integrated health system.(1) Their findings are consequential. Over a median follow-up of 5.4 years, patients generated an estimated $3.56 billion in healthcare spending, and costs rose sharply with cardiovascular comorbidities. Financial hardship, defined as annualized spending exceeding 20% of estimated household income, was observed in nearly one-third of patients with both atherosclerotic cardiovascular disease (ASCVD) and heart failure (HF). The gradients are clinically intuitive and policy relevant, linking cardiometabolic progression and inequity to an interpretable measure of financial risk.

This work matters not only because it quantifies burden, but because it introduces a pragmatic method for doing so. While administrative claims remain the conventional standard for spending research, they are often fragmented across payers and incomplete when patients move across systems. DIRECT-DM offers a complementary paradigm, using clinically rich EHR data to capture utilization and attaching prices from transparency files to approximate encounter-level spending. The result is a demonstration that mandatory price disclosure, originally designed to support patient decision-making, can also serve as analytic infrastructure for population health and prevention research.

**Methodological guardrails to strengthen interpretation**

Several considerations are worth emphasizing because they define what the estimates represent and where future refinement will add value.

Real-world reflection of costs

The estimates in this study are derived from standardized encounter-level spending derived from negotiated rate transparency files. These estimates do not reflect adjudicated payments nor do they directly measure patient out-of-pocket (OOP) costs. In absence of insurance benefit design, including patient cost sharing structures, 'financial hardship' is best interpreted as modelled risk rather than a direct measure of financial toxicity. The absence of pharmacy costs limits precision, particularly as pharmacotherapies are both central to prevention and major drivers of financial burden.(4) Finally, price inputs were standardized to 2023 rates, limiting the ability to account for changes in utilization related to shifts in unit pricing. Year-specific price inputs would be needed to assess true cost evolution.

Financially and clinically vulnerable populations

The payer mapping assumptions employed in this paper may matter most for vulnerable groups. Assigning Medicare-negotiated rates for those over 65 and median commercial negotiated rates for those under 65 is practical. However, the cohort includes substantial proportions of Medicaid and uninsured patients, and mis-estimation of spending exposure is more likely for populations at highest risk, central to hardship and equity concerns.(5) Financial hardship is defined using ZIP code-level median household income, which may obscure within-area socioeconomic variation. Finally, limiting the population to those with regular health system contact omits nearly 40% of the initial sample from the analysis, and may disproportionately exclude those with more fragmented access to care.

Methodological applications in other settings

The study relies on Medicare Severity-Diagnosis Related Groups (MS-DRGs) for cost assignments. While reproducible, they are most interpretable for inpatient admissions; applying them across diverse hospital encounters might be challenging. Future registry development many benefit from encounter type-specific costing frameworks. The study spans the COVID-19 pandemic but does not explicitly account for pandemic related utilization shifts. In addition, the findings are from a single, relatively affluent health system in the northeastern United States, and these findings may vary in systems with different payer mixes, care delivery models, or regional economic conditions.

**Affordability as a Prevention Issue**

The most important contribution of this study may be its reframing of ‘affordability’ as a modifiable risk factor within the CV prevention continuum.(6) The dramatic shift in spending exposure with ASCVD and HF reflects the underlying nature of T2D as a high-intensity, high-cost syndrome. The finding that the most comorbid patients face the highest per-capita costs suggests that those most likely to benefit from evidence based interventions are often those most likely to experience financial strain. This misalignment had serious consequences, including poor treatment adherence, delayed follow-up and increased rates of preventable complications.

These findings support coverage design and implementation that reduces friction for high-value prevention, particularly among high-risk patients. Value-based insurance approaches that lower cost-sharing for high-value cardiometabolic therapies and services align naturally with the clinical risk gradient identified here. Income-linked protections against excessive cost-sharing for chronic disease management may serve as an additional lever, especially for patients at high risk of crossing hardship thresholds.

**Equity Consideration in Implementation**

The fact that the highest rates of financial hardship risk are observed among Black and Hispanic patients, even after adjustment, points toward structural drivers of risk.(7) Future research could stratify hardship risk by both race/ethnicity and insurance type, while incorporating neighbourhood-level measures such as access to grocery stores, transportation infrastructure, environmental exposures, and proximity to specialty care. Identifying these structural drivers could inform targeted

policy interventions that reduce the burden of T2D in the populations that face the greatest clinical and financial risk.

**Future Directions**

The DIRECT-DM opens a focused agenda for advancing prevention-oriented research and practice. Validation of modelled spending estimates against adjudicated claims data will be essential to refine costing strategies and measurement errors. Bringing the registry closer to patient experience is equally important, and incorporating pharmacy spending will be an important addition. As cardiometabolic prevention and treatment increasingly draws on pharmaceutical interventions, such as GLP-1 agonists,(8) inclusion of medication costs will fully capture the financial dimensions of disease prevention and management. Integrating insurance benefit design or OOP data would enhance hardship measures to be more reflective of what choices patients face when accessing essential care, and make these insights more actionable for policies interventions to prevent financial hardship and reinforce the sustainability of preventive care plans

The registry can also offer a platform for stratifying across insurance type, income levels, and clinical phenotypes to enable targeted intervention at both individual and population level. Event-based analyses and examining cost surges following incident ASCVD or HF could directly link economic burden to preventable clinical transitions and allow researchers to quantify whether upstream interventions can modify these trajectories. Replication across systems and regions will be necessary to test generalizability, distinguish disease-intrinsic economics from system-specific drivers to refine better models for broader implementation.

Dhingra and colleagues should be applauded for showing that is feasible to quantify the economic burden of disease via novel strategies linking price transparency files, paired with clinically enriched EHR data, at a scale and granularity that has been difficult to achieve with traditional sources alone. Their findings also sharpen a central message: cardiometabolic complications in T2D are not only drivers of clinical harm; they are also amplifiers of financial vulnerability. The next phase is to refine measurement to refine these tools to better reflects patient experience across diverse settings and translate risk identification into prevention and affordability interventions that reduce both cardiometabolic events and financial strain.

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## Declaration of Competing Interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Khurram Nasir reports a relationship with Amgen, New Amsterdam, Merck, Regeneron, and Corsera Health that includes: consulting or advisory. Khurram Nasir reports a relationship with Ionis that includes: funding grants.

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**Author Agreement**

We confirm that all named authors have read and approved the manuscript, and that no other individuals who meet the criteria for authorship have been omitted. We further confirm that all authors have approved the order in which they are listed.

We confirm that we have given due consideration to the protection of intellectual property associated with this work and that there are no impediments to publication, including with respect to timing. We have followed our institutions' regulations concerning intellectual property.

We understand that the Corresponding Author is the sole contact for the editorial process, including all communications through Editorial Manager and direct correspondence with the journal office. The Corresponding Author is responsible for communicating with co-authors regarding progress, submission of revisions, and final approval of proofs. We confirm that we have provided a current, correct email address accessible to the Corresponding Author.

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**Declaration of interests**

☒The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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