Long-Term Cost-Effectiveness of a Mobile Health Intervention Delivered by Clinical Pharmacists and Community Health Workers for Type 2 Diabetes Management

EE496

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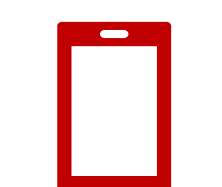[3]UMass Chan Medical School, Worcester, MA, USA

BACKGROUND

- Diabetes affects over 38 million adults in the U.S. with estimated healthcare costs reaching $412.9 billion annually.
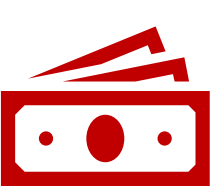- Historically underserved communities face a disproportionate disease burden.
- Interdisciplinary teams involving clinical pharmacists and community health workers (CHWs) can improve outcomes.
- Mobile health tools can enhance engagement and care coordination but are often underutilized in underserved populations
- A randomized trial demonstrated improved hemoglobin A1c (HbA1c) with a pharmacist-CHW team-based intervention integrating clinical, behavioral and digital health approaches for diabetes management.

OBJECTIVE

To evaluate the cost-effectiveness of a clinically effective clinical pharmacist and CHW team-based mobile health intervention for diabetes adherence support (mDAS), compared to usual care, among African American and Latinx individuals with type 2 diabetes, from a health system perspective.

METHODS

Cohort transition Markov model to simulate the occurrence of cardiovascular and renal complications of type 2 diabetes.
- Cohort characteristics: 55 years, 69.7% female, 13 years since diabetes diagnosis, 9.23% baseline HbA1c
- Model cycle length: 1 year
- Outcomes: Total costs, life years (LYs), quality-adjusted life years (QALYs)

MODEL INPUTS & STRUCTURE

Key model input	Input value
Treatment effectiveness	HbA1c: -0.62%; systolic blood pressure (SBP): -3.88 mmHg; LDL cholesterol: -4.38 mg/dL; HDL cholesterol: 0.22 mg/dL; BMI: -1.57 kg/m^2
Treatment cost	Start-up: $107; annual: $410
Annual rate of complications	IHD: 1.05%; MI (Male): 2.31%; MI (Female): 2.01%; Stroke: 1.30%; CHF: 0.74%; RF: 0.10%
Risk ratio for complications per % increase in HbA1c	MI (male): 1.11; MI (female): 1.08; Stroke: 1.10
Risk ratio for complications per 10 mmHg increase in SBP	IHD: 1.06; MI (male): 1.05; MI (female): 1.06; Stroke: 1.10; RF: 1.09
Risk ratio for complications per mmol/lit increase in LDL	IHD: 1.02; MI (male): 1.02; MI (female): 1.04; HF: 1.01; RF: 1.03
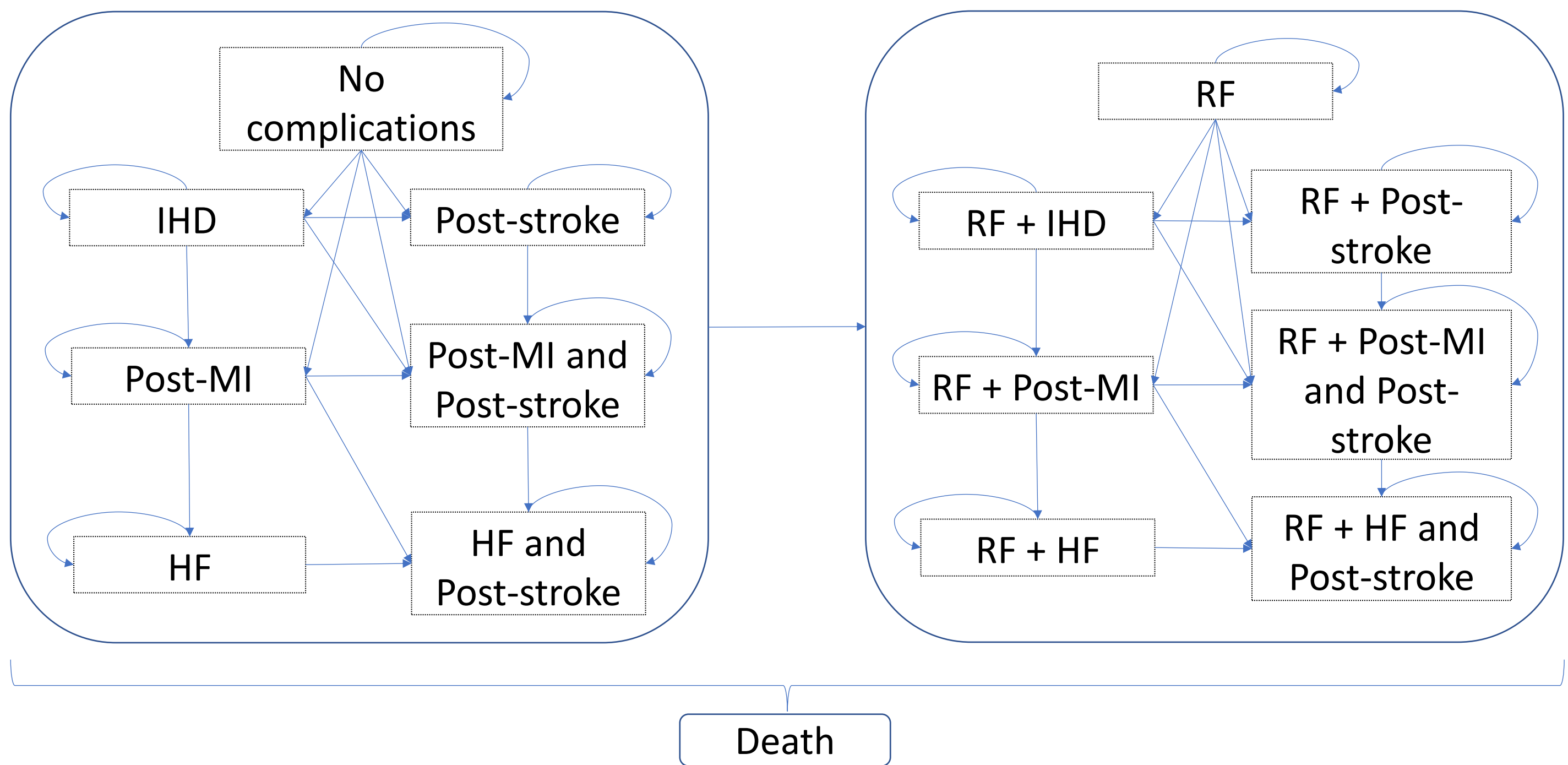
HF: heart failure; IHD: ischemic heart disease; MI: myocardial infarction; RF: renal failure

RESULTS

Reduction in annual risk of complications: IHD: 4.86%; MI: 10.95% (males), 11.38% (females); Second MI: 2.27%; Stroke: 15.05%, HF: 12.00%.
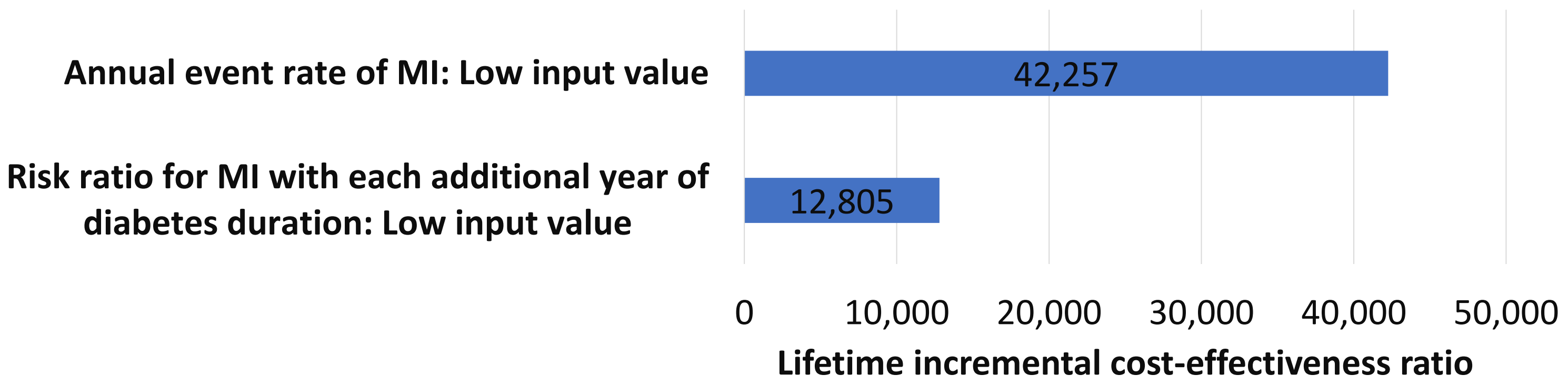
The intervention was cost-saving compared to usual care, incurring lower total costs (expressed in 2023 US dollars) and higher total LYs and QALYs over 5-year, 10-year and lifetime horizons, with benefits increasing with time horizon.

BASE-CASE OUTCOMES

	5 years			10 years			Lifetime		
	Costs	LYs	QALYs	Costs	LYs	QALYs	Costs	LYs	QALYs
Intervention	$29,647	4.42	3.45	$58,692	7.72	6.00	$107,378	12.62	9.79
Usual care	$30,342	4.41	3.44	$61,085	7.68	5.97	$114,207	12.43	9.62

One-way sensitivity analysis (OWSA): The intervention remained cost-saving when most individual inputs were varied within plausible ranges. **Increased risk of complications resulted in lower ICERs.**

Most influential model inputs in OWSA

	Lifetime incremental cost-effectiveness ratio
Annual event rate of MI: Low input value	42,257
Risk ratio for MI with each additional year of diabetes duration: Low input value	12,805

Probabilistic sensitivity analysis (PSA): Upon varying all inputs simultaneously in 10,000 Monte Carlo simulations, the intervention was **cost-effective at the WTP threshold of $50,000 per QALY gained in 99.93% iterations.**
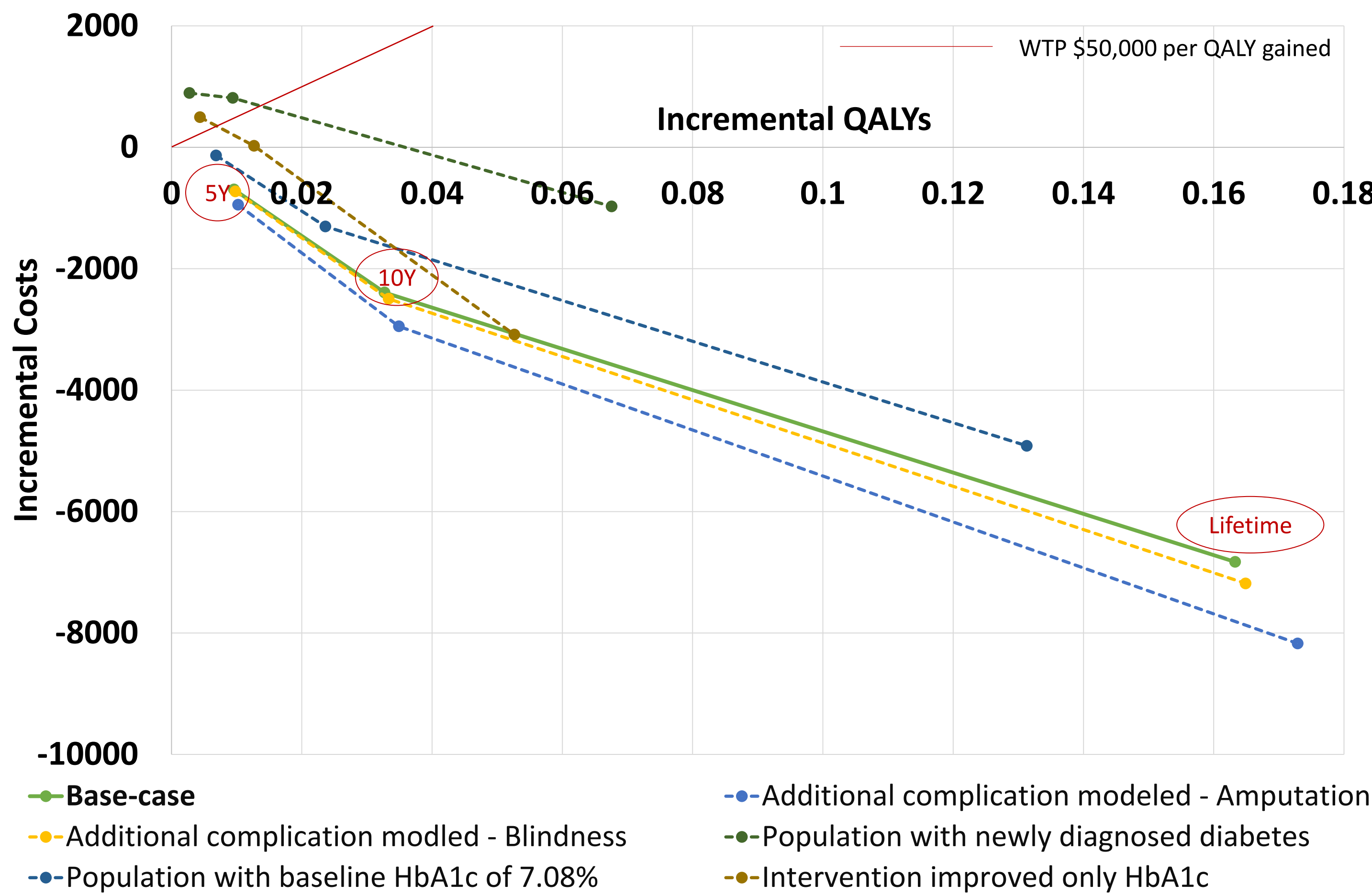
Threshold analysis: The intervention resulted in an ICER of $50,000 per QALY gained at a per-person annual cost of $1,517.

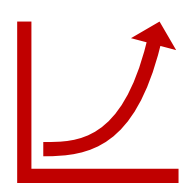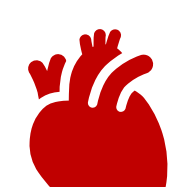### Incremental cost-effectiveness scatterplot showing results of PSA

WTP $50,000 per QALY gained
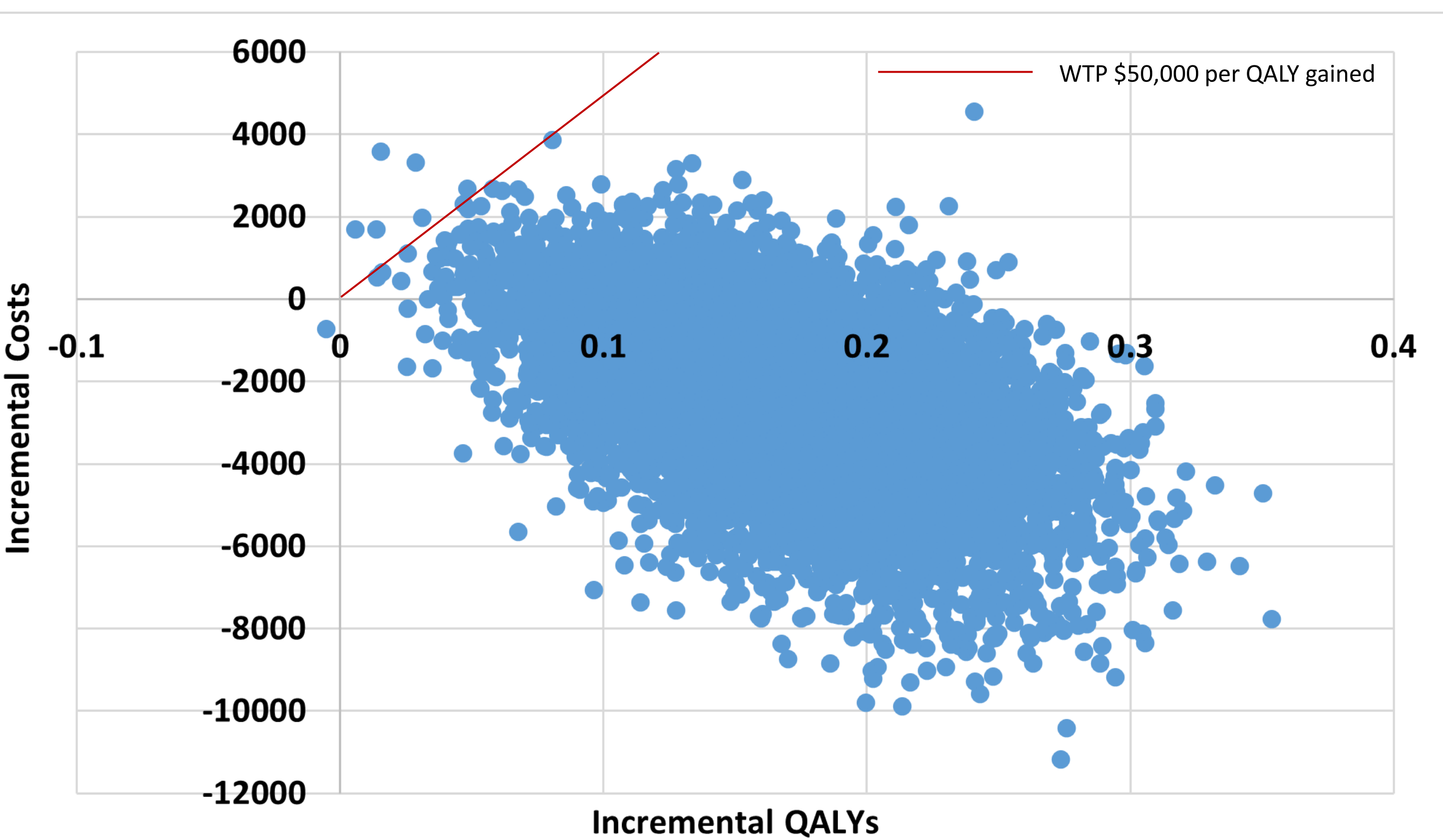
RESULTS – SCENARIO ANALYSES

Incremental costs and QALYs in base-case and scenario analyses over 5-years, 10-years and lifetime horizon

WTP $50,000 per QALY gained

- Base-case
- Additional complication modeled - Amputation
- Additional complication modled - Blindness
- Population with newly diagnosed diabetes
- Population with baseline HbA1c of 7.08%
- Intervention improved only HbA1c

DISCUSSION

- The study highlights the value of sustained clinical control on preventing costly complications, and the need for long-term perspectives in evaluating diabetes interventions.
- Given the elevated burden of complications among underserved populations, interventions targeting these populations can yield substantial economic benefits while advancing health equity.
- The intervention showed consistent cost-saving potential in scenario analyses, strengthening the case for its adoption in real-world healthcare settings.
- Future economic evaluations incorporating contemporary evidence on complication occurrence, medication utilization and costs may improve the validity of cost-effectiveness estimates.

CONCLUSIONS

The study adds to the growing body of evidence supporting the integration of interdisciplinary care models for diabetes management, particularly among those facing disparities in healthcare access and outcomes. Given the cost-saving potential of the mDAS intervention, it may be worthwhile for policymakers, healthcare systems, and insurers to consider funding and broader implementation of this innovative, technology-driven program.

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