

THE VALUE OF POPULATION GENOMIC SCREENING FOR CDC TIER 1 CONDITIONS

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CONTEXT

- In 2014, the CDC's Office of Public Health Genomics designated screening for hereditary breast and ovarian cancer (HBOC), Lynch syndrome (LS), and familial hypercholesterolemia (FH) Tier 1 genomic applications.¹⁻³
- To date, the clinical and economic value of screening for the Tier 1 conditions in an unselected US population remains uncertain.
- Is **simultaneous** genomic screening for all three conditions in the US population cost-effective at a \$100,000/QALY threshold?

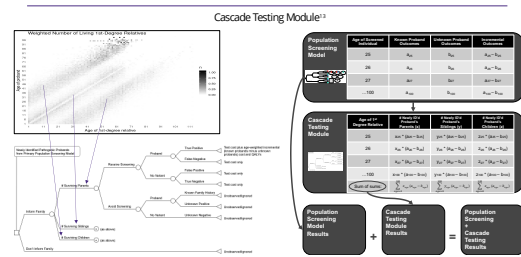
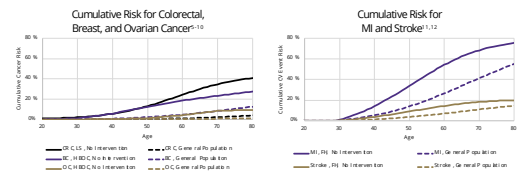
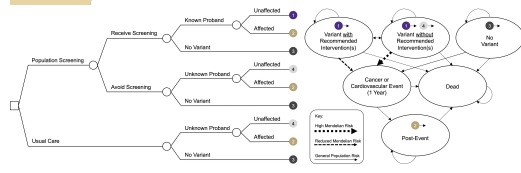
CDC Tier 1 Genomic Applications²

Condition	Acronym	Variant Prevalence	Increased Risk For:	Risk-Reduction Options
Hereditary Breast and Ovarian Cancer Syndrome	HBOC	0.5%	Breast cancer, Ovarian cancer, Other cancers	Mammography + MRI, Mastectomy, Salpingo-Oophorectomy
Lynch Syndrome	LS	0.3%	Colorectal cancer, Endometrial cancer, Other cancers	Increased colonoscopy surveillance
Familial Hypercholesterolemia	FH	0.4%	Myocardial infarction, Stroke	Lipid-lowering therapy

METHODS

- We first developed decision-analytic sub-models comparing population screening to usual care for each of the three Tier 1 conditions.
- We then combined sub-models to estimate the aggregate cost and quality-adjusted life-years (QALYs) for a screening program that simultaneously identified all variants with one assay.
- We also estimated the impact of cascade testing of probands' first-degree relatives.
- We assumed a population screening test cost of \$200/individual based on low-cost testing options currently available to the public.⁴

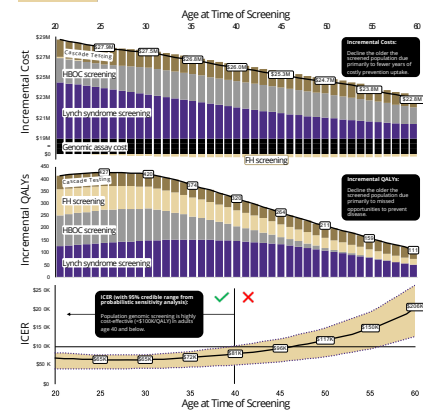
COST-UTILITY ANALYSIS MODEL



SINGLE CONDITION RESULTS

Single Condition Model	Screened at 30 years old	Screened at 50 years old
Hereditary Breast and Ovarian Cancer Syndrome	\$25.2 M 288 QALYs gained \$87,700/QALY	\$26.5 M 55 QALYs gained \$482,169/QALY
Lynch Syndrome	\$24.6 M 187 QALYs gained \$132,200/QALY	\$22.6 M 161 QALYs gained \$140,400/QALY
Familial Hypercholesterolemia	\$19.9 M 96 QALYs gained \$206,700/QALY	\$19.5 M 42 QALYs gained \$463,500/QALY

COMBINED CONDITION RESULTS BY AGE AT TIME OF SCREENING



SCENARIO ANALYSES

Scenario for Screened Unselected Individuals	Inputs			Results	
	Assay Cost	Adherence Multiplier	Overall Cascade Testing Uptake	ICER	PSA % Cost-Effective
Main Analysis	\$200	1	14%	\$65,400	100%
Societal Perspective	\$200	1	14%	\$47,500	100%
Lower Genetic Assay Cost	\$100	1	14%	\$42,500	100%
Higher Adherence to Follow-Up	\$200	0.5	14%	\$102,100	70%
Wider Cascade Testing	\$200	1	0%	\$70,000	100%
Higher Adherence to Cascade Testing	\$200	1	35%	\$60,400	100%

TAKEAWAYS

- If screening for single hereditary conditions, population genomic screening is potentially cost-effective for HBOC, but likely not for LS and FH.
- A multiplexed screening panel simultaneously testing for all three conditions is likely to be cost-effective for adults under 40.
- Screening becomes less cost-effective at older ages due primarily to missed opportunities to prevent disease.
- Falling test costs should make population genomic screening even more cost-effective in the future.

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