

Poster 3: Cost-effectiveness of early Lynch Syndrome screening at time of obstetrical prenatal carrier screening for maternal cancer prevention

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Topic
Genetics

Objectives

Lynch Syndrome (LS) is a hereditary cancer predisposition affecting approximately 1 in 354 individuals in the United States and is most commonly associated with colorectal, endometrial, and ovarian cancers. While prior studies demonstrate the cost-effectiveness of incorporating early BRCA1/2 testing into prenatal carrier screening for maternal cancer prevention, the value of adding LS screening remains unclear. This study aimed to evaluate the cost-effectiveness of adding LS screening for population-based screening during a time when precancer screening and/or risk-reducing surgery may be beneficial.

Methods

A decision-analytic Markov model was built using TreeAge software to compare the cancer outcomes and cost-effectiveness of early LS genetic screening versus routine prenatal screening. A theoretical cohort of 1.7 million U.S. women was followed over 45 annual cycles. Outcomes included endometrial, ovarian, and colorectal cancer incidence, cancer-related mortality, costs, and quality-adjusted life years (QALYs). The early screening strategy enabled risk-reducing hysterectomy with bilateral salpingo-oophorectomy (rrHxBSO) prior to cancer development. Endometrial, ovarian, and colorectal cancer risks for LS patients were stratified by LS mutation (MLH1, MSH6, MSH2/EPCAM, PMS2). The cost of pre-cancer surveillance (e.g. annual exams, endometrial biopsy) was estimated by assuming full adherence to current guidelines. The cost of cancer care was estimated by assuming patients undergo all standard of care treatments (e.g. surgery, chemotherapy, radiation) and have full adherence to recommended post-treatment follow-up care (e.g. exams, colonoscopy). Model inputs were derived from the literature. The cost-effectiveness threshold was \$100,000/quality-adjusted life-year (QALY). Sensitivity analyses were performed to assess the robustness of the results.

Results

Early LS screening that may prompt early risk-reducing interventions resulted in the prevention of 1,162 endometrial and 393 ovarian cancer cases and reduced cancer deaths by 1,396 (endometrial), 433 (ovarian), and 85 (colorectal) (Table 1). An additional 409 colorectal cancer cases were observed later in life, reflecting increased survival of individuals who may have died from an earlier cancer prevented by early risk-reducing surgery. Early LS screening was the cost-saving strategy compared with routine screening, reducing total healthcare costs by \$1.20 billion over 45 years, and yielded an additional 20,559 QALYs. Sensitivity analysis demonstrated that early LS screening remained cost-effective when annual surveillance costs were below \$26,019, remaining under the \$100,000/QALY willingness-to-pay threshold.

Conclusions

Early LS screening during prenatal care was cost-effective and cost-saving in our cohort and resulted in a reduction in endometrial and ovarian cancer cases and cancer-related mortality while improving quality of life. These findings support consideration of LS screening in population-based prenatal testing frameworks and broader implementation of LS screening beyond family history-based approaches, given that many at-risk individuals are unaware of their inherited cancer risk that would otherwise prompt testing and risk-reducing interventions. However, results assume full adherence to surveillance and post-treatment follow-up and care; real-world adherence rates warrant further study to refine these estimates.

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Abstract Table or Graph

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Table 1: Cancer cases identified, cancer deaths, cost, and effectiveness associated with LS screening versus no screening

	LS Screening	No LS Screening	Difference	ICER (\$/QALYs)
Endometrial cancer cases prevented	37,300	38,461	-1,162	
Ovarian cancer cases prevented	36,844	37,236	-393	
Colorectal cancer cases identified	50,095	49,686	409	
Endometrial cancer deaths	31,625	33,021	-1,396	
Ovarian cancer deaths	34,025	34,457	-433	
Colorectal cancer deaths	43,542	43,627	-85	
Cost (\$USD)	\$26,168,661,000	\$27,325,732,000	-\$1,157,071,000	
Effectiveness (QALYs)	42,834,740	42,814,182	20,559	Dominant