Health Economics Research in Cancer Screening: Current Challenges and Future Directions

Ya-Chen Tina Shih, PhD
Michael Halpern, MD, PhD, MPH
Joseph Lipscomb, PhD
Scott Ramsey, MD, PhD
Debra Ritzwoller, PhD
Lindsay Sabik, PhD
Natasha Stout, PhD
Framework of Cancer Health Economics Research

**Economic Inputs**
- Insurance coverage
- Benefit Design
- Access to Care
- Price of care
- Social Determinants of Health
- Employee Benefits

**Policy Factors**
- Coverage and eligibility
- Payments/payment models
- Federal or state mandates
- Regulatory factors
- Innovation and technology diffusion

**Structural Factors**
- Cancer care workforce
- Health care organizations/system
- Availability of personnel, services, and technologies

**Cancer Control Continuum**
- Prevention
- Screening
- Treatment
- Survivorship
- End-of-Life

**Patient-Level Outcomes**
- Survival
- QALYs
- Patient Costs
- Financial Hardship
- Variations by Patient/Provider Characteristics
- Employment Impacts

**Payer-, Provider-, System- and Societal-Level Outcomes**
- Cost-Effectiveness
- Value of Care
- Cost of Care
- Health Equity
- Quality of Care

*Halpern et al. Cancer 2020*
Role of Screening in Cancer Care Continuum

- Screening for prevention, early detection of cancers, their precursors can reduce treatment burden, mortality & morbidity
- Economic costs, with burden of screening upfront while benefits may not be realized for years
- Economic impact includes utilization of screening tests themselves but also diagnostic workup and follow-up that may result
  - Patient factors
  - Provider and system level factors including workforce and capital equipment
- Understanding economics key to ensuring value, equitable distribution of resources, and design of interventions to promote better outcomes

Kenkel: Prevention, Chapter 31 in Handbook of Health Economics, 2000
Developing and evaluating screening guidelines/programs:
- Modeling studies to assess costs and benefits of screening based on:
  - Age range
  - Risk profile
  - Modality of screening
  - Frequency of screening
  - Participation

Understanding factors influencing screening uptake:
- Observational and quasi-experimental studies to assess the impact of factors on screening use:
  - Supply and demand side factors
    - Provider supply and incentives
    - Insurance
    - Access, barriers
  - Policy environment (state, federal)
Current State of Science

- NCI review identified 27 *health economic systematic reviews* of screening programs or interventions
  - 19: cost-effectiveness of screening strategies (top three cancers: cervical, colorectal, breast)
  - 3: research methodology (simulation models)
  - 5: costs of care

- What’s unique about cancer health economics research in screening?
  - Policy environment and guidelines create rich opportunities for study designs based on natural experiments
  - Frequent use of microsimulation models to design and evaluate screening policies
Current State of Funding

- Screening-focused economics research accounted for ~1/3 of NCI-funded economics analyses/outcomes grants
  - Large % included use of simulation models
  - Relatively few grants focused primarily on policy evaluation using observational data for causal inference

- Main economic outcomes examined were cost and/or cost-effectiveness, but usually not primary focus of project

- Emerging topics that are less prominent in funded grants:
  - Financial hardship (toxicity) and out-of-pocket payment
  - Minority populations
  - Screening for cancer survivors
Opportunities: Study Topic/Type

- Studies on policy and market factors affecting screening
  - Demand and supply side issues
  - Need to drill down from US policy to local context
  - Variation in market factors across US impacts screening use

- Connect findings from simulation models to policies
  - Increased integration of modeling, observational quasi-experimental studies, and implementation science

- Better understand economic factors affecting over- and under-use of screening

- Focus on important subpopulations for targeted screening
  - Disparities in access to/use of screening, social/economic factors associated with screening
  - Rural populations
  - Precision medicine for risk-stratified screening
Opportunities: Data Resources

- Key data sources include national and focused surveys, administrative databases, registry data
- Fragmentation of data systems
  - Need longitudinal data to study patterns of screening use and understand downstream outcomes
  - Challenges of linking different data sources
  - Geographic identifiers for linkage and understanding local area factors
- Under-collected/reported information
  - Limited information on patient factors including cancer risk factors, quality of life, barriers/facilitators to screening
  - Quality of care measures
  - Patient/provider communication
  - Database of federal, state, local legislation on cancer screening policies
Opportunities: Methods Development, Training

- **Observational studies**
  - Ensure training in and application of state-of-the-art applied econometric methods for observational & quasi-experimental designs to address sources of potential endogeneity and allow for causal inference
  - Explore opportunities to conduct randomized policy studies to allow for robust evaluation

- **Modeling studies**
  - Translate cost-effectiveness results from simulation models to policy recommendations, including in local market contexts
  - Understand how to most accurately reflect costs in modeling studies
  - Incorporate modeling methods in conventional health economics curricula

- **Under-explored areas**
  - Partnerships with implementation science researchers
  - Application of evolving data science methodologies (e.g. machine learning, Bayesian models)
  - Determine research priorities using value of information analysis
Screening-focused Recommendations

- Develop policies and platforms for increased linkage and access while maintaining patient privacy/confidentiality
  - Novel data linkages to enrich clinical details, PRO data (e.g., NCI CanCORS), patient factors, biomarkers (BRCA)
- Ensure continued funding and access to large-scale registries and cohorts like Population-based Research to Optimize the Screening Process (PROSPR) & Breast Cancer Surveillance Consortium (BCSC) which are designed for screening research and offer research, collaboration opportunities
- Continued cross-disciplinary training in health econometric methods, economic theoretical foundation of screening and demand for health care, development/use of microsimulation models
- Promote collaborations between health economists, modelers, data partners, implementation scientists, policy makers, and patient stakeholders