Cancer Screening: Patient Navigation Services to Increase Screening for Breast and Cervical Cancers

Summary Evidence Tables – Systematic Economic Review

This table outlines information from the studies included in the Community Guide economic review of patient navigation services to increase breast and cervical cancers. It details study design and economic analysis, population and intervention characteristics, and economic outcomes considered in this review. Complete references for each study can be found in the Included Studies section of the review summaries for breast cancer and cervical cancer.

Abbreviations Used in This Document:

- Economic outcomes:
  - QALY: quality-adjusted life year
  - ROI: return on investment
- Study design:
  - RCT: randomized controlled trial
- Measurement terms:
  - DiD: difference in difference
  - Pct pt: percentage point
- Other terms:
  - Conversion Factor: Consumer Price Index/Purchasing Power Parity
  - ED: emergency department
  - EHR: electronic health record
  - HCUP: Healthcare Cost and Utilization Project
  - MEPS: Medical Expenditure Panel Survey
  - NHS, National Health Service, UK
  - NA, not applicable
  - NR: not reported
  - PCP: primary care provider
  - PN: patient navigator

Notes:

Quality of economic estimates – Studies are assessed to be of good, fair, or limited quality. This valuation is based on two domains: Quality of Capture, and Quality of Measurement.

Race and ethnicity of the study population: The Community Guide summarizes race and ethnicity only for studies conducted in the United States.

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
Author (Year): Allaire et al. (2019) **Design:** Modeled **Cancer Types:** Breast **Economic Method:** Cost per QALY gained **Funding Source:** Centers for Disease Control and Prevention **Monetary Values:** Reported in 2018 U.S. dollars	**Location:** Cost information from Colorado and modeled for U.S. using National Breast and Cervical Cancer Early Detection program (NBCCEDP) data **Setting:** Network of providers, health care systems, and partner organizations across all 50 states of NBCCEDP Program **Population:** Modeled for medically underserved women aged 40-64 years with annual income ≤ 250% federal poverty level **Sample Size:** 2 million women randomly drawn from NBCCEDP **Characteristics:** NR **Time Horizon:** NBCCEDP data from 1997 through 2006	**Intervention:** NBCCEDP program when using patient navigation may include some of these services: education, language translation services, reimbursement for transportation, guidance in interpreting doctor recommendations, emotional support, and help completing required documents. Navigation provided by non-clinical staff for screening and clinical staff after an abnormal screening result. Study ran three models. Review included the model that compared screening with patient navigation to screening without patient navigation (Model 1). Type of screening test: Mammogram **Comparison:** No patient navigation	**Incremental QALY gained** 0.006	**Intervention cost per patient:** Total intervention cost per patient $8,791 Cost for screening with patient navigation compared to screening without patient navigation: $202 Cost of patient navigation: $126 **Components:** Navigator wages, screening, diagnostic resolution, treatment **Source:** Colorado NBCCEDP data **Quality:** Good	**Change in healthcare cost per patient:** $173	**Cost per quality-adjusted life year gained:** $33,600 **Modeling Method:** Cancer Intervention and Surveillance Modeling Network (CISNET) Model **Quality:** Good
Author (Year): Lairson et al. (2013)	**Location:** Houston and Weslaco, Texas, USA	**Intervention:** Patient navigation and referral system through free 211 community call	**NR**	**Intervention cost:** $294.90 per patient per year	**NR**	**NR**

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
Design: RCT **Cancer Types:** Breast, cervical, colorectal **Economic Method:** Intervention cost **Funding Source:** Cancer Prevention Research Institute of Texas **Monetary Values:** Assumed reported in 2011 U.S. dollars	**Setting:** 211 call centers linked to free or low-cost facilities providing cancer screening **Population:** Callers to 211 community phone line who were aged 18 to 75 and spoke English or Spanish. **Sample Size:** Intervention: 732 Control: 2,201 **Characteristics:** Age: 18-26 years: 19.2% 27-30 years: 11.8% 31-39 years: 25.2% 40-49 years: 19.8% ≥50 years: 24.1% Females: 90.1% Hispanic or Latino: 39.3% Non-Hispanic: 58.6% Unknown race: 2.0% Less than High School: 20.1% Annual income less than $15,000: 63.0% Unemployed: 53.8% **Time Horizon:** Cost data from November 2010 to May 2012	center. Cancer risk assessment during call by motivational interviewing to determine screening and prevention needs. Referral by information specialist to accessible and affordable services. Select callers referred to patient navigation based on response to questions. Navigators provided ongoing logistical and personalized support to overcome barriers such as access to healthcare. Navigators tracked all interactions. Mean risk assessment time was 41 minutes and mean navigation time was 94 minutes. Type of screening tests were mammography, pap, colonoscopy, sigmoidoscopy, FOBT. **Comparison:** Cancer risk assessment and referral to usual care		**Cost for Control:** $35.90 per patient per year **Components:** Navigator wages, navigator training, database, other staff including supervisors and managers, participant time, tele-communications and computer, transportation **Source:** Study records, weekly navigator time logs, call center log, purchase orders **Quality:** Good		

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
Author (Year): Li et al. (2017) **Design:** Modeled from program outcomes **Cancer Types:** Cervical **Economic Method:** Intervention Cost, cost per QALY **Funding Source:** Cancer Prevention and Research Institute of Texas **Monetary Values:** Reported in 2015 U.S. dollars	**Location:** San Antonio, Texas, USA **Setting:** University Health System – Bexar County Hospital District **Population:** Hispanic women 40 years and older enrolled in financial assistance program for people without insurance **Sample Size:** Approximately 4,500 women **Characteristics:** Uninsured: 100% Hispanic: 100% **Time Horizon:** Program implemented 2012 through 2015. Modeled through lifetime.	**Intervention:** Community-based patient navigation program to improve cervical cancer screening Newsletters, public service announcements, and automated messages reminded participants to call and schedule appointments. Bilingual female navigator disseminated health information. Navigators assessed patients' knowledge about cervical cancer and screening and provided personalized education about the potential benefits of screening. Additional elements included a mass media health promotion campaign that helped women assess their subjective cervical cancer risk and align that with their actual risk, which they did using health education and information messages provided by patient navigators. Navigators were similar to, or representative of, the target population. All	**Intervention effects:** Screening increased by 15 pct pt from baseline of 65% Modeled lifetime per patient incremental QALY of 0.06 when compared with no program **Source:** Program data for screening rate. Modeled for QALY **Measure Type:** DiD for QALY	**Intervention cost:** $311 per patient **Cost per additional person screened:** $44.90 **Components:** Wages for patient navigator and other staff for screening-related activities, media, outreach **Source:** Intervention cost from program data **Quality:** Good	**Healthcare cost:** Modeled but estimate not reported **Components:** Includes cost of cancer treatment	**Lifetime Cost per QALY gained** $748 Incremental QALY: 0.06 **Modeling Method:** Microsimulation **Quality:** Good

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
		screening tests were free. Type of screening test: Pap **Comparison:** No program				
Author (Year): Li et al. (2019) **Design:** Modeled from program outcomes **Cancer Types:** Breast **Economic Method:** Intervention Cost, cost per QALY **Funding Source:** Cancer Prevention and Research Institute of Texas **Monetary Values:** Assumed reported in 2015 U.S. dollars	**Location:** San Antonio, Texas, USA **Setting:** University Health System – Bexar County Hospital District **Population:** Hispanic women 40 years and older enrolled in financial assistance program for people without insurance. Patients had never been screened for breast cancer or had not been screened in the last 5 years. **Sample Size:** Approximately 2,100 women **Characteristics:** Uninsured: 100% Hispanic: 100% Less than High School: 30%	**Intervention:** *A Su Salud* Breast Health Program Program included patient navigation and mammography service components to remove social, cultural, and economic barriers by supporting patients through the screening system and providing free service for eligible women. Program also included media campaign and educational outreach activities. Type of screening test: Mammogram **Comparison:** No program	**Intervention effects:** Screening increased by 20 pct pt from baseline of 60% Modeled lifetime per patient incremental QALY of 0.04 when compared with no program **Source:** Program data for screening rate and modeled for QALY **Measure Type:** DiD for QALY	**Intervention cost:** Lifetime per patient cost of program: $2,633. Lifetime per patient cost $2,508 for status quo (no program). Incremental lifetime cost: $124.80 Incremental cost per additional person screened: $124 **Components:** No details provided **Source:** Intervention cost from program data **Quality:** Good	**Healthcare cost:** NR	**Lifetime Cost per QALY gained:** $3,120 **Modeling Method:** Microsimulation using model developed by University of Minnesota and University of California, San Francisco **Quality:** Good

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
	Less than $18,000 annual income: 83% **Time Horizon:** Program implemented 2013 through 2016. Modeled through lifetime.					
Author (Year): Mitchell et al. (2012) **Design:** RCT; not random assignment in Arizona, Montana **Cancer Types:** Breast, cervical, colorectal, lung, prostate **Economic Method:** Intervention cost, healthcare cost **Funding Source:** Centers for Medicare and Medicaid Services **Monetary Values:**	**Location:** Arizona, Montana; Baltimore, Maryland; Detroit, -Michigan; Houston, Texas; Newark, New Jersey; Molokai, Hawaii **Setting:** On Molokai, Hawaii the program was in a small general hospital; in Detroit a large health system. All other locations were academic health centers with major cancer centers. **Population:** Sites chosen to focus on American Indian, Asian, Native Hawaiian or Pacific Islander, African American, or Hispanic populations. Excluded Health Maintenance Organization patients. Patients selected from baseline cancer assessment survey. Treatment arms	**Intervention:** Centers for Medicare and Medicaid Services demonstration projects. Patient navigation in screening and cancer treatment. Recruitment for treatment arm of navigation was very poor in most sites with less than 30 patients. Screening navigation at all sites followed CMS guidelines for screening, for the most part. Most contacts were by phone except for Arizona, Montana which was mostly in-person. Only Detroit had lay navigators with nurse supervision. Nurse assessed patient needs, interacted with providers, and ensured services were received while navigators focused on scheduling and patient access to related services; clinical oversight provided by	**Incremental pct pt increase** **Mammogram** Arizona, Montana: 2.4 Baltimore: 3.7 Detroit: 8.5 Houston: 1.6 Newark: 12.8 Molokai: 34.0 **Pap** Arizona, Montana: 1.6 Baltimore: 6.0 Detroit: 0.9 Houston: -2.5 Newark: 13.3 Molokai: 30.3 **Colonoscopy** Arizona, Montana: 2.4 Baltimore: 2.4 Detroit: 0.7 Houston: -0.4 Newark: 4.3 Molokai: 19.3 **FOBT**	**Intervention cost per enrollee:** Arizona, Montana: $6,127 Baltimore: $3,287 Detroit: $1,239 Houston: $3,333 Newark: $3,586 Molokai: $3.974 **Patient navigation cost per enrollee:** Arizona, Montana: $269 Baltimore: $384 Detroit: $96 Houston: $453 Newark: $429 Molokai: $579 **Components of intervention cost:** Patient navigation, program management, outreach, recruitment, professional development, data	**Change in healthcare cost per patient:** Arizona, Montana: -$47 Baltimore: $398 Detroit: -$1,125 Houston: $95 Newark: $453 Molokai: -$2,369 **Components:** Inpatient, outpatient, medication, ED, cancer treatment **Source:** Claims data **Measure Type:** DiD **Productivity:** NR **Quality:** Good	**NR**

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
Assumed reported in 2006 U.S. dollars	recruited patients with cancer diagnosis. All other patients assigned to screening arms. Cancers included breast, cervical, colorectal, prostate, and lung. **Sample Size:** Intervention: Arizona, Montana: 1540 Baltimore: 2313 Detroit: 4809 Houston: 1915 Newark: 1071 Molokai: 377 Control: matched controls **Characteristics:** Age: <65 years: Arizona, Montana: 26.3% Baltimore: 0.1% Detroit: 22.7% Houston: 20.7% Newark: 24.6% Molokai: 21.8% Age 65-74 years: Arizona, Montana: 48.2% Baltimore: 64.6% Detroit: 43.9% Houston: 50.2% Newark: 50.2% Molokai: 50.2%	senior staff. Other 5 sites had navigators provide bulk of services directly to participants with no direct clinical oversight except for access to physician on as-needed basis. Navigators addressed patient barriers across all 6 sites: fear of diagnosis, distrust of system, transport issues, multiple chronic diseases. Type of screening tests were mammogram, pap, prostate-specific antigen test, colonoscopy, FOBT **Comparison:** Usual care with cancer education materials	Arizona, Montana: 0.9 Baltimore: 0.7 Detroit: -0.4 Houston: 1.5 Newark: 1.3 Molokai: 0.0	collection, tracking, program evaluation, other activities, administrative overhead **Source:** Data submitted annually from 6 sites, Medicare claims data. Quarterly PN activity surveys. **Quality:** Good		

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
	Female percent: Arizona, Montana: 58.5% Baltimore: 73.4% Detroit: 68.4% Houston: 60.0% Newark: 62.8% Molokai: 51.7% **Income less than $10,000:** Arizona, Montana: 44.2% Baltimore: 23.6% Detroit: 25.6% Houston: 21.4% Newark: 48.6% Molokai: 27.8% **Prioritized Race/Ethnicity:** African American - Baltimore and Detroit Native American – Arizona, Montana Pacific Islander – Molokai Hispanic – Houston and Newark **Time Horizon:** Enrollment began October 1, 2006. Study period was 4 years. Claims from 2002 through 2010.					
Author (Year): Thompson et al. (2017)	**Location:** Yakima Valley, Washington, USA	**Intervention:** Partnership with federally qualified	**Incremental pct pt increase in Pap**	**Intervention cost per navigated**	**NR**	**NR**

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
Design: RCT **Cancer Types:** Cervical **Economic Method:** Intervention cost **Funding Source:** National Institutes of Health **Monetary Values:** Assumed reported in 2013 U.S. dollars	**Setting:** Clinics associated with YVFWC (Yakima Valley Farms Workers Clinic) **Population:** Latina residents of Yakima Valley seen in past 5 years at YVFWC, aged 21 to 64 years who had not had Pap test in past 3 years. Patients recruited by YVFWC staff. **Sample Size:** Intervention: Patient Navigation: 146 Video: 150 Control: 147 **Characteristics:** Mean Age: 43.2 years Uninsured: 75% Less than High School: 64.8% Rural percent: 100% **Race/Ethnicity:** Hispanic: 100% **Time Horizon:** Data collected from September 2011 through April 2015.	Yakima Valley Farm Workers Clinic (YVFWC) and state Breast, Cervical, and Colon Health Program. Free to low-cost cancer screening for individuals with lower incomes in cooperation with local clinics. Intervention 1: Spanish-language video about importance of Pap test mailed to homes, Intervention 2: video plus home-visits by *promotoras* who provided information on importance of Pap tests. *Promotora* watched video with patient. Patient made commitment to have Pap test done and/or *promotora* made appointment. Patient received local resource list for financial aid, transportation, and childcare; reminder refrigerator magnet; and appointment card. *Promotoras* navigated those with abnormal screenings to diagnostic resolution or initial treatment. Project health worker conducted baseline survey for demographics, acculturation, and	**screening versus control:** 19.39 pct pt	**patient versus control:** $82.32 **Intervention cost per additional person screened:** $4.24 (reported by authors) $424.55 (calculated by reviewers) **Components of intervention cost:** Navigator time, training, transport, materials **Source:** Trial data and navigator time diaries **Quality:** Good		

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
		cervical cancer knowledge. Type of screening: Pap test. **Comparison:** Usual care				
Author (Year): Weber et al. (1997) **Design:** RCT **Cancer Types:** Breast **Economic Method:** Cost per QALY gained **Funding Source:** Grant from NY Department of Health **Monetary Values:** Reported in 1994 U.S. dollars	**Location:** Rochester, New York, USA **Setting:** 6 primary care practices located throughout Rochester and affiliated with St. Mary's Hospital, which serves diverse patient populations that are socioeconomically disadvantaged. **Population:** Urban women aged 52 to 77 years who had not had a mammogram in at least 2 years **Sample Size:** Intervention 163 Control 190 **Characteristics:** Mean age: 63 years Black: 36% Hispanic: 7% Asian: 4% White: 042%	**Intervention:** Community Health Educator (CHE) navigation case-management program after a reminder letter from the patient's primary care provider. The structured outreach protocol by CHEs included patient education and reminders (using telephone calls, home visits, office visits, and mailed cards) and identification and removal of barriers to care (facilitation of appointment scheduling, transportation, and dependents' care). Type of screening test: Mammogram **Comparison:** Personalized reminder letters from primary care provider only for	**Intervention effects:** Screening increased from 14% in the reminders-only group to 41% in the CHE group, resulting in 24 additional mammograms in the CHE group. Modeled 500 women similar to study patients to save 1 additional life (0.8% cancer detection rate, 25% mortality reduction per cancer detected). **Source:** Program data	**Intervention cost:** Incremental cost of CHE program $8,994. Intervention cost per patient $55.18 Patient navigation cost per patient $50.64 Incremental cost per additional person screened: $375 **Components:** Salaries, fringe benefits (20%) for CHEs; mailing, transportation, nonmonetary incentive costs **Source:** Program data **Quality:** Good	**Healthcare cost:** Change in healthcare cost per patient $1234. Screening cost $375; workup diagnostic cost $1000; Averted cost of $25,000 per case of terminal cancer avoided **Source:** Program data	**Cost per life year gained (LYG):** $11,591 (Reviewers converted to cost per QALY using health utility weights from literature for early- and late-stage breast cancers) **Modeling Method:** Patients' cancer detection and terminal cancer data extended to 500 patients **Quality:** Good

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
	Medicaid: 21% Medicare: 40% (31% Medicare+ Other insurance, 9% Medicare alone) Commercial insurance: 30% Uninsured: 5% **Time Horizon:** Program implemented in 1993 to 1994. Modeled through lifetime.	scheduling mammography.	for screening rate and modeled for life year gained.			