Health Evidence Review Commission (HERC)

Multisector Intervention Report: Multicomponent Interventions to Improve Screening Outcomes or Attendance for Breast, Cervical, or Colorectal Cancer

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Multisector Interventions

To improve attendance at cancer screening for breast, cervical, and colorectal cancer, the evidence supports the following interventions across cancer types (ordered roughly according to effect size):

Across Cancer Types

Effective interventions

General population

- Combined approach including three interventions group (with objectives to increase community demand, community access, and provider delivery) (CPSTF, 2016)
- Patient navigation (Ali-Faisal et al, 2017)
- Combined approach including two interventions (with objectives to increase community demand and access) (CPSTF, 2016)
    - Increasing access is more effective than increasing demand
- Community health workers (Bellhouse et al, 2018)
- Narrative interventions (i.e. story-based; breast cancer and colorectal cancer) (Perrier et al, 2017)
- Clinician communication interventions (breast cancer and colorectal cancer) (Peterson et al, 2016)
    - Practice-facilitation workflow/communication skills training (breast cancer and colorectal cancer) (Peterson et al, 2016)

Subpopulations

- Limited English proficiency
    - Patient navigation (Genoff et al, 2016)
- Vulnerable populations
    - Community health workers (Kim et al, 2016)
- Hispanic/Latina populations
    - Educational interventions (*promotora*-delivered, one-on-one, group, combined, church or community-based settings) (Luque et al, 2018)

Interventions with unclear effectiveness

- Special events like health fairs, parties, special day (breast cancer, colorectal cancer and cervical cancer screening) (Escoffery et al, 2014)
- Clinician performance incentives (Mauro et al, 2019)

Breast Cancer Screening

Effective interventions

General population

- Two or more intervention approaches to increase community demand, community access and provider delivery (CPSTF, 2016)
- Two or more intervention approaches to reduce different structural barriers (CPSTF, 2016)

Subpopulations

- Multicomponent interventions to increase community demand or access in
  - African American populations (Copeland et al, 2018)
  - Rural areas (Rodriguez-Gomez et al, 2020)
- Multicomponent interventions that includes increasing provider delivery of screening services in rural areas (Rodriguez-Gomez et al, 2020)
- Individual-tailored educational interventions (provided by lay health workers) in American Indian/Alaska Native populations (Jerome D'Emilia et al, 2019)

Interventions with unclear effectiveness

- Health promotion programs (community-, home- or telephone-based) in ethnic minority women (Chan et al, 2015)
- Culturally tailored interventions (videos, individually tailored telephone counseling) in Chinese American women (Zhang et al, 2020)

Ineffective interventions

- Client reminders (calendar with health reminders) in American Indian/Alaska Native populations (Jerome D'Emilia et al, 2019)
- Small media in rural areas (Rodriguez-Gomez et al, 2020)
- One-on-one education in rural areas (Rodriguez-Gomez et al, 2020)

Cervical Cancer Screening

Effective interventions

General population

- Multicomponent interventions (two or more out of three categories) to increase community demand, access, or provider delivery (CPSTF, 2016)
- Two or more interventional approaches to reduce different structural barriers (CPSTF, 2016)

Subpopulations

- Rural populations (Rodriguez-Gomez et al, 2020)
  - Small media alone
  - Combination of small media, one-on-one education and client reminders
  - Combination of mass media, group education, and reducing structural barriers (e.g. HPV self-collection kit)
- Lower socioeconomic status populations
  - Client reminders (e.g. invitation) (Rees et al, 2018)
  - Lay health advisors (Rees et al, 2018)
  - Clinic-based strategies (Rees et al, 2018)
- Hispanic/Latina populations (Mann et al, 2015)
  - Lay health advisors
  - Clinic-based strategies
  - Church partnerships

Interventions with unclear effectiveness

- Health promotion programs alone in ethnic minority women (Chan et al, 2015)

Ineffective interventions

General population

- Provider assessment and feedback (CPSTF, 2016)

Subpopulations

- Rural areas (Rodriguez-Gomez et al, 2020)
  - Combination of group education and small media
  - Client reminders (e.g. invitation)
  - Small media (e.g. mailed video)

Colorectal Cancer Screening

Effective interventions

General population

- Multicomponent interventions (≥2 out of 3 categories) to increase community demand, access, or provider delivery (CPSTF, 2016; Dougherty et al, 2019)
- Two or more out of three intervention approaches to reduce different structural barriers (CPSTF, 2016)
- Distribution of fecal blood tests (in clinic or mailed outreach) (Dougherty et al, 2019; Issaka et al, 2019; Jager et al, 2019)
- Patient navigation (Dougherty et al, 2019)
- Multicomponent interventions (two or more out of three categories) to increase community demand, access, or provider delivery (CPSTF, 2016)

- Interventions focused on increasing community access
- Tailored communication interventions compared to control (Issaka et al, 2019)
- Clinician-directed interventions (Dougherty et al, 2019)
- Combination of FIT and influenza vaccination clinic (Issaka et al, 2019)
- Patient decision aids (Volk et al, 2016)
- Educational interventions (Dougherty et al, 2019; Issaka et al, 2019)
- Patient reminders (Dougherty et al, 2019)

Subpopulations

- Multicomponent interventions effective at increasing screening adherence in rural areas (Rodriguez-Gomez et al, 2020)
- Multicomponent interventions effective at increasing fecal testing in low-income and rural populations (Davis et al, 2018)
- First-degree relatives of individuals with colorectal cancer
    - Tailored communication interventions (Bai et al, 2020)
- Rural and low-income populations (Davis et al, 2018)
    - Multicomponent interventions to increase community demand, community access, and/or provider delivery
- Federally qualified health centers (Domingo et al, 2017)
    - Patient navigation
- Asian-Americans (Kim et al, 2020)
    - Culturally responsive interventions

Interventions with unclear effectiveness

- Interventions to increase community demand (Young et al, 2019)
- Tailored communication interventions based on family history and personal factors compared to mailed FIT kits (Issaka et al, 2019)

Ineffective interventions

General population

- Patient financial incentives (Dougherty et al, 2019)
- Small media (low literacy picture book, video mailed with FIT kit) (Issaka et al, 2019)

Subpopulations

- Rural areas (Rodriguez-Gomez, 2020)
    - Client reminders (e.g., telephone)
    - Clinician reminders (e.g., chart reminder)
    - Demonstrating how to use FIT kit

Table of Contents

Rationale for Development of Coverage Guidances and Multisector Intervention Reports

Coverage guidances are developed to inform coverage recommendations for public and private health plans in Oregon as plan administrators seek to improve patients' experience of care, population health, and the cost-effectiveness of health care. In the era of public and private sector health system transformation, reaching these goals requires a consideration of population-based health interventions from a variety of sectors in addition to individually focused clinical care. Multisector intervention reports will be developed to address these population-based health interventions or other types of interventions that occur outside of the typical clinical setting.

HERC uses the following principles in selecting topics for its reports to guide public and private payers:

- Represents a significant burden of disease or health problem
- Represents important uncertainty with regard to effectiveness or harms
- Represents important variation or controversy in implementation or practice
- Represents high costs or significant economic impact
- Topic is of high public interest

HERC bases its reports on a review of the best available research applicable to the intervention(s) in question. For coverage guidances, which focus on diagnostic and clinical interventions, evidence is evaluated using an adaptation of the Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) methodology. For more information on coverage guidance methodology, see Appendix A.

Multisector interventions can be effective ways to prevent, treat, or manage disease at a population level. In some cases, HERC has reviewed evidence and identified effective interventions, but has not made formal coverage recommendations when these policies are implemented in settings other than traditional health care delivery systems because effectiveness could depend on the environment in which the intervention is implemented.

Table 1. Evidence Table for Multicomponent Interventions to Improve Screening Outcomes or Attendance for Breast, Cervical, or Colorectal Cancer

Outcomes	Estimate of Population Health Effect *Evidence Type*	Resource Impact	Values and Preferences	Other Considerations
All-cause mortality *(Critical outcome)*	No evidence found	Multicomponent interventions to increase cancer screening are relatively low-cost per additional person screened, in the range of 10s to 100s of dollars. Cost-effectiveness analyses have found multicomponent interventions to increase colorectal cancer screening are cost-saving, and those for cervical cancer cost-effective. No cost-effectiveness studies were identified for multicomponent interventions to increase breast cancer screening. Overall, investment in multicomponent interventions are likely to be a good use of resources that will improve health at a reasonable cost.	Patients would strongly value decreasing their risk of cancer-related morbidity and cancer-related mortality. However, some of the screening types have more acceptability than other types (e.g., some people wish to avoid the unpleasantness of colonoscopy; some women wish to avoid the discomfort of Pap smears). For colon cancer screening, having a variety of available options for screening likely increases the willingness of patients to engage in screening. Culturally-appropriate interventions are more likely to be acceptable than those not well-aligned culturally. There may be variable uptake and interest for specific interventions compared to others. Overall, there is likely moderate variability in values and preferences with regard to multicomponent interventions to increase preventive cancer screening.	Payers may have barriers to investing in multisector interventions, given how capitation rates are calculated, and given the novel methods necessary to invest in some of these interventions (e.g., engaging lay health workers, mailing colorectal cancer screening kits). The optimal implementation methods of some multicomponent interventions are unknown. However, the evidence is consistent that using multicomponent interventions across three cancer types is effective, with more interventions yielding improved effect size, even with highly variable implementation methods. Cancer screening rates are important national quality measures and improving these rates would serve to improve external quality measures for health systems and payers.
Cancer-specific incidence or mortality *(Critical outcome)*	No evidence found			
Cancer-related morbidity *(Critical outcome)*	No evidence found			
Screening attendance *(Critical outcome)*	See tables below			
Harms *(Important outcome)*	No evidence found			

Table 2. Multi-Cancer Analyses – General Population (Outcome: Increasing Screening Adherence)

Intervention	CPSTF, 2016	Ali-Faisal et al., 2017	Bellhouse et al., 2018	Escoffery et al., 2014	Mauro et al., 2019	Perrier et al., 2017	Peterson et al., 2016
Interventions to increase community demand: • Client reminders • Client incentives • Small media • Mass media • Group education • One-on-one education	**Combined approach from each of 3 intervention groups** (community demand, community access, provider delivery) increased screening by median 24.2 percentage points (IQI: 8.8 to 39.0; 5 study arms).	**Patient navigation** • Face-to-face, phone, and/or mail • Arranging cancer screening • Providing language services Effective at increasing BC, CC, and CRC screening adherence compared to control group (19% increase, 53% vs. 34%; OR 2.48; 95% CI, 1.93 to 3.18). Evidence type: SR of 14 RCTs	**Community health workers** • Community-, home-, or telephone-based • Individual- or group-based Effective at increasing BC, CC, and CRC screening adherence (OR 1.90 vs. control; 95% CI, 1.60 to 2.26). Evidence type: SR of 30 RCTs, 13 cluster randomized trials	**Special events** • Health fairs, parties, cultural events, a special day, a play Unknown effectiveness based on insufficient evidence for BC, CC, and CRC screening adherence. Special events offering on-site screening are promising. Evidence type: SR of 3 pre-post studies, 7 post-event survey	NR	**Narrative interventions** (i.e., story-based) Effective at increasing BC and CRC screening adherence. Evidence type: • BC: 1 RCT, 1 quasi-experimental, 3 pre-post studies • CRC: 1 RCT, 1 quasi-experimental	NR
Interventions to increase community access: • Reducing structural barriers • Reducing client out-of-pocket costs	**Combined approach from interventions to increase community demand and access** increased screening by median 11.2 percentage points (IQI 5.3 to 18.2; 48 study arms). Evidence type: SR of 88 studies				NR	NR	NR
Interventions to increase provider delivery of screening services: • Provider assessment and feedback		NR	NR	NR	**Clinician performance incentives** The majority of studies on BC, CC,	NR	**Clinician communication interventions** • Communication skills training

Intervention	CPSTF, 2016	Ali-Faisal et al., 2017	Bellhouse et al., 2018	Escoffery et al., 2014	Mauro et al., 2019	Perrier et al., 2017	Peterson et al., 2016
• Provider incentives • Provider reminders	(breast: 33 studies; cervical: 20 studies; colorectal: 56 studies) *See following tables for cancer-specific findings*				and CRC reported no effects or partial effects. Evidence type: SR of 1 RCT, 5 quasi-experimental studies, 12 observational studies		• Practice-facilitation workflow Effective at increasing BC and CRC screening adherence (range for BC NR; range for CRC, 11% to 12%). Evidence type: • BC: 1 RCT and 1 convenience sample • CC: 1 RCT • CRC: 4 RCTs and 1 convenience sample

Color Key. ● Effective intervention; ● Interventions with unclear effectiveness; ● Not effective/likely not effective intervention; Blank cells indicate no evidence identified.

Abbreviations. BC: breast cancer; CC: cervical cancer; CI: confidence interval; CPSTF: Community Preventive Services Task Force; CRC: colorectal cancer; IQI: interquartile interval; OR: odds ratio; NR: not reported; RCT: randomized controlled trial; SR: systematic review.

Table 3. Multi-Cancer Analyses – Subpopulations (Outcome: Increasing Screening Adherence)

Intervention	Limited English Proficiency Genoff et al., 2016	Vulnerable Populations Kim et al., 2016	Hispanic/Latina Luque et al., 2018
Interventions to increase community demand (CPSTF domain)	**Patient navigation** • Face-to-face, phone, and/or mail • Arranging cancer screening • Providing language services Effective at increasing BC (7% to 25%), CC (13% to 40%), and CRC (13% to 61%) screening adherence. Evidence type: 6 RCTs, 2 nonrandomized trials, 7 cohort studies	**Community health workers** • Community-, home-, or telephone-based • Individual- or group-based 21 of 30 BC, CC, or CRC prevention studies found increases in screening behaviors (range for BC, 6% to 33%; range for CC, 7% to 29%; 1 study on CRC reported 15% increase). Evidence type: systematic review of 1 RCT, 29 observational studies	**Educational interventions** • *Promotora*-delivered • One-on-one, group, combined education • Church- or home-, or community-based settings Effective at increasing screening adherence vs. control (OR 1.67; 95% CI, 1.24 to 2.26). Evidence type: systematic review of 3 RCTs, 2 quasi-experimental studies
Interventions to increase community access (CPSTF domain)			NR
Interventions to increase provider delivery of screening services (CPSTF domain)	NR	NR	NR

Color Key. ● *Effective intervention; Blank cells indicate no evidence identified. Abbreviations. BC: breast cancer; CC: cervical cancer; CI: confidence interval; CPSTF: Community Preventive Services Task Force; CRC: colorectal cancer; NR: not reported; OR: odds ratio; RCT: randomized controlled trial; RR: relative risk.*

Table 4. Breast Cancer – General Population (Outcome: Increasing Screening Adherence)

Intervention	Community Preventive Services Task Force, 2016
Interventions to increase community demand: • Client reminders • Client incentives • Small media • Mass media • Group education • One-on-one education	**≥ 2 intervention approaches to increase community demand, community access, and provider delivery** of screening services or **≥ 2 intervention approaches to reduce different structural barriers** Multicomponent interventions vs. no intervention increased cervical cancer screening by a median of 6.2 percentage points (IQI: 0.9 to 14.5; 34 study arms). Evidence type: systematic review of 12 RCTs, 5 nonrandomized trials, 13 pre-post studies, 2 cohort studies, 1 time series
Interventions to increase community access: • Reducing structural barriers • Reducing client out-of-pocket costs	
Interventions to increase provider delivery of screening services: • Provider assessment and feedback • Provider incentives • Provider reminders	

Color Key. ● Effective intervention; Blank cells indicate no evidence identified. Abbreviations IQI: interquartile interval; RCT: randomized controlled trial.

Table 5. Breast Cancer – Subpopulations (Outcome: Increasing Screening Adherence)

Intervention	Ethnic Minority Women	African American	American Indian/Alaska Native	Rural Areas	Chinese American Women
	Chan et al., 2015	Copeland et al., 2018	Jerome D'Emilia et al., 2019	Rodriguez-Gomez et al., 2020	Zhang et al., 2020
Interventions to increase community demand: • Client reminders • Client incentives • Small media • Mass media • Group education • One-on-one education	**Health promotion programs** • Community-, home-, or telephone-based Inconsistent results on the effectiveness to increase mammography screening. Evidence type: SR of 4 RCTs	**≥ 1 interventions** effective at increasing screening adherence (OR 1.56 vs. control). Evidence type: SR of 14 RCTs	**Client reminders** • Calendar with health reminders Not effective at increasing mammography adherence. Evidence type: SR of 1 RCT **Educational interventions** • Individually-tailored Lay health worker intervention effective at increasing mammography completion vs. control (RR 1.56; 95% CI, 1.29 to 1.87). Evidence type: SR of 1 RCT	**Small media** not effective at increasing screening adherence. Evidence type: SR of 1 RCT **One-on-one education** not effective at increasing screening adherence. Evidence type: SR of 1 RCT **Multicomponent interventions** effective at increasing screening adherence. Evidence type: SR of 4 RCTs, 2 quasi-experimental studies	**Culturally Tailored Interventions** • Videos • Individually tailored telephone counseling Inconsistent results on the effectiveness of increasing mammography adherence. Evidence type: SR of 3 RCTs
Interventions to increase community access: • Reducing structural barriers • Reducing client out-of-pocket costs	NR		NR		NR

Intervention	Ethnic Minority Women	African American	American Indian/Alaska Native	Rural Areas	Chinese American Women
	Chan et al., 2015	Copeland et al., 2018	Jerome D'Emilia et al., 2019	Rodriguez-Gomez et al., 2020	Zhang et al., 2020
Interventions to increase provider delivery of screening services: • Provider assessment and feedback • Provider incentives • Provider reminders	NR	NR	NR		NR

Color Key. ● Effective intervention; ● Interventions with unclear effectiveness; ● Not effective/likely not effective intervention; Blank cells indicate no evidence identified. Abbreviations. CI: confidence interval; NR: not reported; OR: odds ratio; RCT: randomized controlled trial; RR: relative risk; SR: systematic review.

Table 6. Cervical Cancer – General Population and Subpopulations (Outcome: Increasing Screening Adherence)

Intervention	General Population (CPSTF, 2016)	Subpopulations			
		Rural **Rodriguez-Gomez et al., 2020**	**Hispanic/Latina** **Mann et al., 2015**	**Lower SES** **Rees et al., 2018**	**Ethnic Minority Women** **Chan et al., 2015**
Interventions to increase community demand: • Client reminders • Client incentives • Small media • Mass media • Group education • One-on-one education	**≥ 2 intervention approaches from interventions to increase community demand, community access, and provider delivery** of screening services or **≥ 2 intervention approaches to reduce different structural barriers** Multicomponent interventions vs. no intervention increased CC screening by a median of 6.1 percentage points (IQI: 1.1 to 11.6; 19 study arms). Evidence type: SR of 6 RCTs, 6 nonrandomized trials, 7 pre-post studies, 1 cohort study	**Client reminders** (e.g., invitation) not effective at increasing screening adherence. Evidence type: SR of 1 RCT **Small media** (e.g., mailed video) not effective at increasing screening adherence. Evidence type: SR of 1 RCT **Combination of:** • **Group education** (e.g., presentations on CC screening) • **Small media** (e.g., community newsletter, pamphlets/display posters, educational material, pictorial instructions) or mass media (e.g., promotion through radio, newspaper, local media) Not effective at increasing screening adherence. Evidence type: SR of 2 quasi-experimental studies **Combination of:** • **Small media** (e.g., community newsletter, pamphlets/display	**Lay health advisors** • one-on-one education • navigation services • small-group education • mass media Effective at increasing screening adherence. Evidence type: SR of 8 RCT, 5 quasi-experimental, and 4 pre-post design studies **Church partnerships** (e.g., free screenings at churches, educational interventions, recruitment for community screening programs) Effective at increasing screening adherence. Evidence type: SR of 1 RCT and 3 pre-post design studies	**Client reminders** (e.g., invitation) effective at increasing screening adherence (range, 23% to 77%). Evidence type: SR of 3 pre-post studies **Lay health advisors** • one-on-one education • navigation services • small-group education • mass media Effective at increasing screening adherence (range, 21% to 83%). Evidence type: SR of predominately pre-post studies	**Health promotion programs** Insufficient evidence to determine effectiveness for increasing CC screening compared to controls (range, -4% to 21%). Evidence type: SR of 4 RCTs

Intervention	General Population (CPSTF, 2016)	Subpopulations			
		Rural **Rodriguez-Gomez et al., 2020**	**Hispanic/Latina** **Mann et al., 2015**	**Lower SES** **Rees et al., 2018**	**Ethnic Minority Women** **Chan et al., 2015**
		posters, educational material, pictorial instructions) • **One-on-one education** (visit/talk/information session) • **Client reminders** (e.g., reminder phone calls for nonresponders, mailed invitation letters) Effective at increasing screening adherence. Evidence type: SR of 3 RCTs and 2 quasi-experimental			
Interventions to increase community access: • Reducing structural barriers • Reducing client out-of-pocket costs		**Combination of:** • **Mass media** (e.g., promotion through radio, newspaper, local media) • **Group education** (e.g., presentations on CC screening) • **Reducing structural barriers** (e.g., self-collect HPV test kit) Effective at increasing screening adherence. Evidence type: SR of 3 RCTs and 2 quasi-experimental	**Clinic-based strategies** (e.g., free screening services, expanding clinic hours, routinely offer CC screening to women needing a pelvic exam, clinic-based outreach and/or educational programs) effective at increasing screening adherence.	**Clinic-based strategies** (e.g., free screening services, expanding clinic hours, routinely offer CC screening to women needing a pelvic exam, clinic-based outreach and/or educational programs) effective at increasing screening adherence	NR

Intervention	General Population (CPSTF, 2016)	Subpopulations			
		Rural **Rodriguez-Gomez et al., 2020**	**Hispanic/Latina** **Mann et al., 2015**	**Lower SES** **Rees et al., 2018**	**Ethnic Minority Women** **Chan et al., 2015**
			Evidence type: SR of 2 RCTs and 2 quasi-experimental studies	Evidence type: SR (*included study types NR*)	
Interventions to increase provider delivery of screening services: • Provider assessment and feedback • Provider incentives • Provider reminders	**Provider assessment and feedback** not effective at increasing rates of CC screening. Evidence type: SR of 6 RCTs, 6 nonrandomized trials, 7 pre-post studies, 1 cohort study	NR	NR	NR	NR

Color Key. ● *Effective intervention;* ● *Interventions with unclear effectiveness;* ● *Not effective/likely not effective intervention; Blank cells indicate no evidence identified. Abbreviations. CC: cervical cancer; CPSTF: Community Preventive Services Task Force; HPV: human papillomavirus; IQI: interquartile interval; NR: not reported; RCT: randomized controlled trial; SES: socioeconomic status; SR: systematic review.*

Table 7. Colorectal Cancer – General Population (Outcome: Increasing Screening Adherence)

Intervention	CPSTF, 2016	Dougherty et al., 2019		Issaka et al., 2019	Jager et al., 2019	Volk et al., 2016	Young et al., 2019
Interventions to increase community demand: • Client reminders • Client incentives • Small media • Mass media • Group education • One-on-one education	**≥ 2 intervention approaches to increase community demand, community access, and provider delivery** of screening services or **≥ 2 intervention approaches to reduce different structural barriers** Multicomponent interventions vs. no intervention increased CRC screening by a median of 15.4 percentage points (IQI 6.0 to 21.6; 39 study arms). Evidence type: SR of 30 RCTs, 12 nonrandomized trials, 11 pre-post studies, 2 cohort studies, 1 time series	**Multicomponent interventions** increase screening adherence more than single interventions (mean difference 13%; 95% CI, 7% to 19%). Evidence type: SR of 73 RCTs	**Patient reminders** (phone calls, text messages, mail, email/internet-based) effective at increasing screening adherence (RD 3%; 95% CI, 0% to 5%; RR 1.20; 95% CI, 1.02 to 1.41). Evidence type: SR of 10 RCTs	**Small media** (e.g., low-literacy picture book, video with a mailed FIT kit) not effective at increasing screening adherence Evidence type: SR of 1 RCT	NR	**Patient decision aids** effective at increasing screening adherence vs. control (RR 1.3; 95% CI, 1.1 to 1.4; absolute increase 8%; 95% CI, 6% to 11%). Evidence type: 12 RCTs, 2 cluster-randomized trials, 4 nonrandomized trials, 3 pre-post studies	Screening adherence effect size ranged from -13 to 42 percentage points from studies that reported on client-level interventions. Evidence type: 14 SRs
			Patient financial incentives not effective at increasing screening adherence. Evidence type: SR of 2 RCTs	**Patient financial incentives** Not effective at increasing screening adherence Evidence type: SR of 1 RCT			
			Educational interventions • Personal phone calls • Mailings with phone calls after visits • Tailored interventions Effective at increasing screening adherence (RD 4%; 95% CI, 1% to 6%;	**Educational interventions** • Personal phone calls • Mailings with phone calls after visits • Tailored interventions Pre-FIT reminders and education effective at increasing screening adherence vs. control (4.1% increase; IQR 3.6% to 6.7%).			

Intervention	CPSTF, 2016	Dougherty et al., 2019		Issaka et al., 2019	Jager et al., 2019	Volk et al., 2016	Young et al., 2019
			RR 1.20; 95% CI, 1.06 to 1.36). Subgroup analysis reported personal phone calls and mailing with telephone calls showed significant pooled effects. However, decision aids and tailored educational interventions had nonsignificant pooled effects Evidence type: SR of 19 RCTs	Evidence type: SR of 4 RCTs			
			Patient navigation • Patient-level (e.g., patient education, client reminders, motivation and support, scheduling appointments, translation, assisting with transportation, counselling, providing test instructions) • Clinic-level (e.g., tracking referrals and follow-ups,	**Tailored communication interventions** based on: • Family history • Theoretical concepts • Personal factors (e.g., screening knowledge, health care access, screening history) Not effective at increasing screening adherence compared to mailed FIT kits (not significant increase of 0.8%).			

Intervention	CPSTF, 2016	Dougherty et al., 2019		Issaka et al., 2019	Jager et al., 2019	Volk et al., 2016	Young et al., 2019
			enhanced follow-up for high-risk participants, results tracking, standing orders, provider feedback) Effective at increasing screening adherence vs. control (RD 18%; 95% CI, 13% to 23%; RR 2.01, 95% CI, 1.64 to 2.46). Evidence type: SR of 16 RCTs	Evidence type: SR of 3 RCTs			
				Tailored communication interventions based on: • Family history • Theoretical concepts • Personal factors (e.g., screening knowledge, health care access, screening history) Effective at increasing screening adherence compared to control (11% increase). Evidence type: SR of 3 RCTs			
Interventions to increase community access: • Reducing structural barriers • Reducing client out-of-pocket costs				**Mailed FIT kits** effective at increasing screening adherence vs. control (23% increase; IQR 13.6 to 29%). Evidence base: SR of 10 RCTs	**Distribution of fecal blood test** (e.g., FIT or FOBT test kit, in clinic or by mail) Mailed outreach effective at increasing screening adherence vs. control (28% absolute increase; 95% CI,	NR	Screening adherence effect size ranged from 7 to 28 percentage points from studies that reported on client-level interventions. Evidence type: 2 SRs
			Distribution of fecal blood test (e.g., FIT or FOBT test kit in clinic or by mail) effective at	**Combination of FIT and influenza vaccination clinic** effective at increasing			

Intervention	CPSTF, 2016	Dougherty et al., 2019		Issaka et al., 2019	Jager et al., 2019	Volk et al., 2016	Young et al., 2019
			increasing screening adherence (RD 22% vs. control; 95% CI, 17% to 27%). Evidence type: SR of 17 RCTs	screening adherence (range, 9.2% to 15.2%). Evidence type: SR of 1 RCT, 1 observational study	25% to 30%; relative increase of screening completion 2.65; 95% CI, 2.03 to 3.45). Evidence type: SR of 7 RCTs		
Interventions to increase provider delivery of screening services: • Provider assessment and feedback • Provider incentives • Provider reminders			**Clinician-directed interventions** • Visit-based reminders • Non-visit-based interventions (e.g., academic detailing) Visit-based reminders (RD 13%; 95% CI, 8% to 19%) and non-visit-based interventions (RD 10%; 95% CI, 3% to 17%) effective at increasing screening adherence. Evidence type: SR of 18 RCTs	NR	NR	NR	Screening adherence effect size ranged from -0.1 to 23 percentage points from studies that reported on client-level interventions. Evidence type: 7 SRs

Color Key. ● Effective intervention; ● Interventions with unclear effectiveness; ● Not effective/likely not effective intervention; Blank cells indicate no evidence identified. Abbreviations: CI: confidence interval; CPSTF: Community Preventive Services Task Force; CRC: colorectal cancer; FIT: fecal immunohistochemical testing; FOBT: guaiac fecal occult blood test; IQI: interquartile interval; IQR: interquartile ratio; NR: not reported; RCT: randomized controlled trial; RD: risk difference; RR: relative risk; SR: systematic review.

Table 8. Colorectal Cancer – Subpopulations (Outcome: Increasing Screening Adherence)

Intervention	First-Degree Relatives of Individuals with CRC	Low-income and Rural	Federally Qualified Health Centers	Rural Areas	Asian Americans
	Bai et al., 2020	**Davis et al., 2018**	**Domingo et al., 2017**	**Rodriguez-Gomez et al., 2020**	**Kim et al., 2020**
Interventions to increase community demand: • Client reminders • Client incentives • Small media • Mass media • Group education • One-on-one education	**Tailored communication interventions** based on: • Family history • Theoretical concepts • Personal factors (e.g., screening knowledge, health care access, screening history) Effective at increasing screening adherence compared to controls (34% vs. 19%, increase of 15%; OR 2.21 vs. control; 95% CI, 1.71 to 2.85). Evidence type: SR of 3 cluster RCTs, 1 RCT	Multicomponent interventions effective at increasing fecal testing. Evidence type: SR of 20 RCTs, 2 nonrandomized trials, 3 pre-post studies, 1 cohort study, 1 feasibility study	**Patient navigation** • Patient-level: patient education, client reminders, motivation and support, scheduling appointments, translation, assisting with transportation, counselling, providing test instructions • Clinic-level: tracking referrals and follow-ups, enhanced follow-up for high-risk participants, results tracking, standing orders, provider feedback • Successful navigation programs assess CRC screening barriers, provider reminders, and offer motivation and support • Range, 9.7% to 44% increase Evidence type: 6 RCTs, 2 quasi-experimental studies	**Demonstrating how to use FIT kit** not effective at increasing screening adherence. Evidence type: 1 RCT **Client reminder** (e.g., telephone) not effective at increasing screening adherence. Evidence type: 1 RCT Multicomponent interventions effective at increasing screening adherence. Evidence type: 5 RCT, 1 quasi-experimental **Clinician reminder** (e.g., chart reminder) not effective at increasing screening adherence Evidence type: 1 RCT	**Culturally responsive interventions** (OR 1.78 vs. control; 95% CI, 1.44 to 2.11) Evidence type: 11 RCTs, 3 quasi-experimental studies
Interventions to increase community access: • Reducing structural barriers • Reducing client out-of-pocket costs	NR	NR			
Interventions to increase provider delivery of screening services: • Provider assessment and feedback • Provider incentives • Provider reminders	NR	NR			

Color Key. ● *Effective intervention;* ● *Not effective/likely not effective intervention; Blank cells indicate no evidence identified. Abbreviations: CI: confidence interval; CRC: colorectal cancer; FIT: fecal immunohistochemical testing; NR: not reported; OR: odds ratio; QEs: quasi-experimental studies; RCT: randomized controlled trial; SR: systematic review.*

Background

Breast, cervical, and colorectal cancer are significant health burdens on the adult U.S. population. Collectively, these diseases represent 24% of all new cancers detected (2016 data), and account for 16% of annual cancer deaths in the U.S. (2016 data).[1] Colorectal cancer is the third-most-common cancer and the third-most-common cause of cancer deaths among U.S. adults.[2] Among women, breast cancer is the most common cancer, with the disease being the leading cause of cancer death among Hispanic/Latina women and the second-most-common cause of cancer death among White, African American, Asian/Pacific Islander, and American Indian/Alaska Native women.[3] While cervical cancer rates and death from cervical cancer have decreased significantly over the last 40 years, screening rates have begun to decline.[4] In Oregon, colorectal cancer is the fourth most common cancer and the fourth most common cause of cancer death among adults.[1] Among adult women in Oregon, breast cancer is the most common newly-diagnosed cancer, and the third-most-common cause of cancer death.[1]

While survival rates for breast, cervical, and colorectal cancer continue to improve overall, persistent health disparities exist.[5,6] In general, individuals with low socioeconomic status and from racial/ethnic minority groups have higher cancer incidence and death rates than white populations or individuals with higher socioeconomic status.[5,6] For example, African Americans have higher death rates for most cancers and Hispanic/Latina and American Indian/Alaska Native women have higher rates of newly diagnosed cervical cancer compared to other racial and ethnic groups.[1,6]

These disparities are similar in cancer screening rates, with individuals with low socioeconomic status and racial/ethnic minorities more likely to be diagnosed with late-stage cancer that could have likely been detected earlier given more regular cancer screening.[6] In addition, language and other cultural barriers can play a factor. For example, Spanish-speaking Hispanic/Latinx patients are less likely to be screened for colorectal cancer than White or English-speaking Hispanic/Latinx patients.[6] For the majority of cancers, early cancer detection is associated with higher survival rates.[7]

Evidence Review

Multi-Cancer Interventions/Analyses

Centers for Disease Control and Prevention Community Guide, 2017[8-10]

This 2017 evidence review was conducted to inform recommendations by the Centers for Disease Control (CDC) Community Guide for multicomponent interventions to improve breast, cervical, and colorectal cancer screening. The authors included 88 studies across breast (33 studies), cervical (20 studies), or colorectal cancer (56 studies). Because the Community Guide does not publish their systematic reviews in the peer reviewed literature, Center staff were unable to make an assessment of methodologic quality.

Interventions were divided into 3 strategies: Interventions to increase provider delivery (e.g., provider reminders, provider incentives, provider assessment and feedback), interventions to increase demand (e.g., group education, individual education, client reminders, client incentives, small media, mass media), and interventions to increase access (e.g., reducing out-of-pocket costs, reducing structural

barriers, reducing administrative barriers, scheduling assistance, alternative screening sites or hours, providing transportation services, providing translation, providing child care).

Overall, the authors concluded that, when compared with no intervention, multicomponent interventions increased breast cancer screening by 6.2% (interquartile interval [IQI] 0.9% to 14.5%, based on 34 study arms), cervical cancer screening by 6.1% (IQI 1.1% to 11.6%, based on 19 study arms), and colorectal cancer screening by 15.4% (IQI 6% to 21.6%, based on 39 study arms).

Additional analyses were performed across all 3 cancer types without disaggregation. Across all cancer types included in the review (breast, colorectal, and cervical), multicomponent interventions drawing from all 3 intervention strategy areas were most effective at increasing screening (median increase of 24.2%, IQI 8.8% to 39%, based on 5 study arms), while multicomponent interventions drawn from strategies to increase community demand and access were slightly less effective (median increase of 11.2%, IQI 5.3% to 18.2%, based on 48 study arms). Multicomponent interventions that combined 5 or more individual interventions were associated with greater increases in screening than those with 2 to 4 interventions. Screening increases were observed across all individual interventions included under the 3 strategies, with the exception that provider assessment and feedback did not appear to increase rates of cervical cancer screening. Among interventions meant to reduce structural barriers, addressing transportation barriers (median increase 18.4%, IQI 8.5% to 30.2%, based on 11 studies) and providing interpreter or translation services (median increase 62.7%, range 11.6 to 71.2%, based on 4 studies) were most effective. When considering the incremental benefit of adding an intervention to an existing single component intervention, the authors found that adding an intervention to increase community demand increased screening by a median of 4.9% (IQI 0.4% to 12%, based on 14 study arms), while adding an intervention to increase community access increased screening by a median of 17.1% (IQI 4.6% to 18.7%, based on 2 study arms).

The authors noted that multicomponent interventions were effective across racial and ethnic groups and across populations with variable baseline screening use. While not all studies reported income status, those that did found increases in screening among low-income or uninsured participants; the authors believe the study results are applicable to these populations. The authors also observed that the results of these studies support the effectiveness of the interventions delivered in various setting and delivered by a variety of provider types including navigators, community health workers, and clinician educators.

In an accompanying systematic review[11] of economic studies of multicomponent interventions to increase cancer screening, the authors identified 53 economic analyses published between 2004 and 2018. In 17 studies of multicomponent interventions for breast cancer screening, the median intervention cost per participant was $26.29 (IQI $3.25 to $113.72) with a median incremental cost per additional person screened of $147.64 (IQI $32.92 to $924.98). In 10 studies of multicomponent interventions for cervical cancer screening, the median intervention cost per participant was $159.80 (IQI $117.62 to $214.73) with a median incremental cost per additional person screened of $159.49 (IQI $64.74 to $331.46). In 42 studies of multicomponent interventions for colorectal cancer screening, the median intervention cost per participant was $36.63 (IQI $7.70 to $139.23) with a median incremental cost per additional person screened of $582.44 (IQI $91.10 to $1,452.12). In 2 studies that reported the

incremental cost effectiveness ratio (ICER) for multicomponent interventions to increase cervical cancer screening, 1 study found an ICER of $748 per quality-adjusted life year (QALY) gained, while the other study found an ICER of $33,443 per QALY gained. In 2 studies that reported the ICER for multicomponent interventions to increase colorectal cancer screening, 1 study found an ICER of -$3,817 per QALY gained (reflecting cost savings), while the other study found an ICER of -$1,651 per QALY gained. No studies reported ICERs for multicomponent interventions to increase breast cancer screening.

Ali-Faisal et al., 2017[12]

This is a good-quality systematic review and meta-analysis of patient navigation interventions on health care utilization, including cancer screening. The authors identified 14 randomized controlled trials (RCTs) that examined the effects of patient navigators on screening events. All but 1 of those RCTs examined cancer screening completion for breast, cervical, or colorectal cancer. There was a total of 18,194 patients across the 14 RCTs; about two-thirds were women, three-quarters were non-White, the mean age was 61 years, and more than 90% were in the United States. In 6 studies the navigation intervention was delivered by trained laypersons, in 7 studies the intervention was delivered by professional navigators, and 1 study used a combination of lay and professional navigators. In the overall meta-analysis for health screening completion, patient navigation increased the odds of screening by 2.48 compared to control (95% confidence interval [CI], 1.93 to 3.18; $P < 0.0001$; $I^2 = 88\%$). In a subgroup analysis by study quality, the effect size of patient navigation did not differ significantly between higher- and lower-quality studies. In a subgroup analysis comparing interventions by type of navigator, professional navigators were associated with a greater effect size (odds ratio [OR] 2.82) than lay navigators (OR 1.97; *P* for subgroup difference < 0.0001). Overall, the authors concluded that patient navigation interventions were effective at increasing health screening events.

There was no outside funding for this review. The authors reported no relevant conflicts of interest.

Bellhouse et al., 2017[13]

This is a fair-quality systematic review and meta-analysis of community-based health workers (CBHW) to increase screening for breast, bowel (colorectal), or cervical cancer. The authors identified 30 RCTs and 13 cluster-randomized trials; 30 of the studies were conducted in the United States. The majority of the studies focused on ethnic minority women. In two-thirds of the studies, the CBHWs were gender concordant with the participants. Of the 15 studies that reported the theoretical model, 8 used a transtheoretical model while 7 used a health belief model. Over 20 behavior change techniques were used in the included studies, with social support, prompts and cues, and problem solving being the most commonly reported. The authors assessed the overall quality of the included studies as poor noting that only 1 study had a published protocol and 10 studies reported attrition rates in excess of 25%. In the overall random effects meta-analysis, CBHWs increased cancer screening compared to control (OR 1.90; 95% CI, 1.60 to 2.26; $P < 0.001$; $I^2 = 85.5\%$, reflecting very high heterogeneity). In sensitivity analysis, the results remained statistically significant when considering only studies using intention-to-treat or studies that confirmed screening outcomes through medical records. In subgroup analysis, the results remained statistically significant across cancer screening type, delivery setting, and intervention components. In 20 studies that focused on previously nonadherent participants, CBHWs increased the odds of screening

(OR 2.40; 95% CI, 1.85 to 3.11; $P < 0.001$), though the effect size was moderated (OR 1.58) in a trim-and-fill analysis used to account for publication bias. Overall, the authors concluded that CBHWs are effective for increasing cancer screening, including for patients who have previously been nonadherent with recommended screening.

There was no description of funding for the review. The authors reported no relevant conflicts of interest.

Chan et al., 2015[14]

This is a good-quality systematic review of breast and cervical cancer screening interventions in ethnic minority women. The authors identified 10 RCTs, 9 conducted in the U.S. and 1 in Canada. Six of the studies examined interventions to increase breast cancer screening while 4 studies examined cervical cancer screening interventions. The included studies focused on Hispanic (k=4), African American (k=2), Pacific Islander (k=1), and Chinese American (k=3) participants. The included studies examined linguistically and socially appropriate theory- and language-based health education interventions. Self-reported uptake of screening was reported in 8 studies. The authors found inconsistent results for mammography uptake with 2 studies reporting no increase, while 2 studies reported increases in screening. The authors found that 4 studies reported consistent increases in cervical cancer screening, and 1 of those studies confirmed increased screening using medical records. Overall, the authors conclude that there is "insufficient evidence to prove the effectiveness of such programmes because of discrepancies in the findings."[p.552]

There was no description of funding for the review. The authors reported no relevant conflicts of interest.

Escoffery et al., 2014[15]

This is a fair-quality systematic review of special events to increase breast, cervical, or colorectal cancer in the United States. The authors identified 10 studies of special events that reported screening outcomes. The special events included health fairs, parties, cultural events, special days and plays, and all the events used at least one strategy endorsed by The Community Guide. The studies were noncomparative and mainly used pre-post designs, and in many cases the outcome was screening intention measured at the event. The authors highlighted 2 events; in 1 study, 44 out of 50 women who participated in a special day with education and transportation to a reduced cost mammogram on Mother's Day or Valentine's Day underwent mammography (88%). In another study, all 50 uninsured minority patients who participated in a health fair offering sigmoidoscopy underwent screening, though this represented 62% of the total population scheduled to attend the health fair. Overall, the authors concluded that there was insufficient evidence that special events increase cancer screening, though there was some indication that special events offering on-site screening were promising. There was no description of funding for the review.

The authors reported no relevant conflicts of interest.

Genoff et al., 2016[16]

This is a good-quality systematic review of patient navigation to increase breast, cervical, or colorectal cancer screening for patients with limited English proficiency. The authors identified 6 RCTs, 2 nonrandomized controlled trials, and 7 cohort studies. The navigation intervention in the studies involved assisting participants with arranging cancer screening and providing language services. For studies of breast cancer screening, navigation led to an increase in screening ranging from 7% to 25%, with the exception of 1 study in Bengali or Pakistani women which found no effect of navigation on screening. For studies of colorectal cancer, navigation led to an increase in screening ranging from 13% to 40%. For studies of cervical cancer, navigation led to an increase in screening ranging from 13% to 61%. While cautioning that there was variability in the interventions and evaluation methods, the authors reported that navigation interventions were effective for increasing cancer screening in patients with limited English proficiency. There was no description of funding for the review.

The authors reported no relevant conflicts of interest.

Kim et al., 2016[17]

This is a good-quality systematic review of CBHW interventions to improve care in vulnerable populations. The authors identified 67 publications from 61 studies, including 30 studies of CBHWs for cancer prevention (all but one of which addressed breast, cervical or colorectal cancer). Quantitative meta-analysis was not undertaken due to the high degree of heterogeneity. Overall, 21 of the 30 cancer-prevention studies found increases in cancer screening behaviors. In 9 of 16 studies on mammography, CBHWs increased mammography uptake by 6% to 33%, with the largest effect size observed in an intensive multicomponent intervention targeting African American women. In 9 of 16 studies on cervical cancer screening, CBHWs increased Pap test uptake by 7% to 29%. In 1 of 3 studies on colorectal cancer screening, CBHWs increased screening by 15% compared with usual care. The authors observed that the remaining studies that did not find statistically significant improvements were often studies comparing different types of CBHW interventions or comparing CBHWs to less intensive interventions (as opposed to usual care control groups). The authors noted that there was no consistency in the duration or intensity of CBHW training in the studies, and that more than half the studies had incomplete descriptions of the CBHW characteristics. Overall, the authors conclude that CBHWs "can be an effective intervention…for low-income, underserved, and racial and ethnic minority communities."[p.e26]

The study was funded in part by the National Cancer Institute and Johns Hopkins University. There was no statement regarding conflicts of interest for the authors.

Mauro et al., 2019[18]

This is a fair-quality systematic review of clinician performance incentives to increase breast, cervical, or colorectal cancer screening. The authors identified 18 studies for qualitative synthesis (meta-analysis was not attempted due to heterogeneity). Most of the studies were conducted in the United States. Among the 18 studies, 6 examined all 3 cancer types, 5 studies addressed breast and cervical cancer, 4 studies addressed cervical cancer screening alone, 2 studies addressed breast cancer screening alone, and 1 study addressed colorectal cancer screening alone. For breast cancer screening, the authors

observed that 9 studies showed no effects or partial effects, while for cervical cancer screening 8 studies showed no effects or partial effects. For colorectal cancer, the authors observed "few positive or irrelevant effects were found regarding colorectal cancer screening."[p.7] The authors concluded that more research on incentive programs is needed to determine their effectiveness in improving cancer screening.

There was no description of funding for the review. The authors reported no relevant conflicts of interest.

Perrier et al., 2017[19]

This is a good-quality systematic review of narrative or story-telling interventions to improve health-screening behaviors. The authors identified 4 studies (1 quasi-experimental and 3 pre-post) that measured the effects of narrative interventions on breast cancer screening. In all 4 studies of narrative interventions, significantly more women reported breast cancer screening at 6 months, though in some cases breast self-exam was counted as screening. In 3 RCTs comparing narrative messages to statistical messages, 1 study found no difference between the messages for colorectal cancer screening, 1 study found that narrative messages were more effective for encouraging mammography among women with lower educational attainment, and a third study addressed skin cancer screening behavior. The authors concluded that evidence for narrative interventions was Class I (all evidence supports efficacy) Level B (from 1 RCT or multiple nonrandomized studies), while the evidence for narrative messages compared to statistical messages was Class IIb (efficacy of the intervention is less well established) Level A (multiple high-quality RCTs).

The study was partly funded by the Social Sciences and Research Council of Canada. The authors reported no conflicts of interest.

Peterson et al., 2016[20]

This is a fair-quality systematic review of the impact of patient-provider communication on cancer screening adherence. The authors identified a total of 8 communication intervention studies (2 for mammography, 1 for Pap test, and 5 for various colorectal cancer screening tests). These interventions involved communication skills training or education for clinicians. The intervention intensity ranged from simply instructing clinicians to discuss mammography with patients, to workshops and multiple feedback sessions. Three of the studies used standardized patients for the training, and 2 studies included changes to practice workflow (e.g., patient tracking, mailed reminders). Both mammography interventions increased screening compared to the control group, and 4 of the 5 colorectal cancer interventions found increased screening compared to control. In 1 study that reported on outcomes for both Pap testing and colorectal cancer screening, the communication intervention using standardized patients did not improve screening rates. Overall, the authors concluded that communications skills training and education can improve screening rates.

The study was partly funded by the National Institutes of Health. The authors reported no conflicts of interest.

Rodriguez-Gomez et al., 2020[21]

This is a good-quality systematic review of patient-directed interventions to increase cancer screening in rural areas. The authors identified 20 studies with 37 interventions. Most studies (k=16) were conducted in the U.S. and 70% of studies were RCTs (the remainder were classified as quasi-experimental). Most of the studies focused on breast, cervical, colorectal, or a combination of these cancers, and 70% of the studies included only women. Most studies (60%) were rated as high quality. Six of 20 studies examined breast cancer screening, and all the included interventions were multicomponent (e.g., small media, one-on-one education, group education, client reminders, reducing structural barriers or out-of-pocket costs, provider assessment and feedback). The authors observed that all these multicomponent interventions reported statistically significant increases in screening. Five of 20 studies examined cervical cancer screening, and all the included interventions were focused on increasing community demand for and/or access to screening. The authors observed that most of the interventions led to significant increases in screening, except that neither group education with small or mass media nor single interventions with client reminders or small media led to increases in screening. In 2 of 20 studies focused on breast and cervical cancer, community health worker interventions increased Pap tests and mammography, except in women who were already adherent to recommended cervical cancer screening. Six of 20 studies examined colorectal cancer screening using 13 interventions, 12 of the 13 interventions were intended to increase community demand and/or community access, and 3 of the interventions were intended to increase provider delivery. The authors observed that nearly all multicomponent interventions led to increased screening, with 1 of several colorectal cancer screening modalities; however, using only reminders to clients or providers, or merely demonstrating how to use the guaiac fecal occult blood test (FOBT) kit, was not effective. Overall, the authors concluded that this review supports the effectiveness of multicomponent interventions to increase breast, cervical, and colorectal cancer screening in rural areas.

The study was funded by the Spanish National Institute of Health and the Andalusian Regional Ministry of Health. The authors reported no conflicts of interest.

Breast Cancer

Copeland et al., 2018[22]

This is a fair-quality systematic review and meta-analysis of psychosocial, behavioral, or educational interventions to increase breast cancer screening in African American women. The authors identified 14 RCTs with a total of 5,791 participants. The average age of participants was 55 years. Two-thirds of the studies used high-contact, in-person, tailored interventions to encourage screening; 6 studies used multicomponent interventions (e.g., educational materials, videos, phone calls, lay health advisors [LHAs]), 3 studies used LHAs only, 1 study used a tailored counseling intervention, 1 study used an on-site screening intervention, and 1 study each used letters, magazines, or telephone reminders. In the overall meta-analysis, these interventions increased screening compared to control (OR 1.56; 95% CI, 1.27 to 1.93), but there was significant heterogeneity (Q = 35.6 [Cochrane's Q is a measure of heterogeneity and reflects the weighted sum of squared differences between individual study effects and pooled effects]; *P* = 0.017). In sensitivity analysis, there were no significant differences in the effect

size estimates when compared by use of active vs. usual care controls, study sample size, study duration, or high-vs.-low contact outreach. Overall, the authors concluded that culturally tailored psychosocial, behavioral, and educational interventions can increase breast cancer screening among African American women, and no patient or study characteristics significantly moderated the observed effectiveness.

There was no description of funding for the review. The authors reported no relevant conflicts of interest.

Jerome-D'Emilia et al., 2019[23]

This is a fair-quality systematic review of studies examining barriers and facilitators to mammography in American Indian and Alaskan Native women. The authors identified 3 intervention studies in these populations, but only 2 studies reported on mammogram completion. In 1 RCT of 5,633 patients conducted by the Washington/Seattle Indian Health Board, a calendar that included health messages did not result in increased mammogram completion after 15 months of follow-up when compared to a control calendar (14% of those receiving intervention calendars vs. 13.6% of those receiving control calendars, $P = 0.81$). In the second study, 851 women (including 323 American Indian women) in Robeson County (North Carolina) were randomized to receive an individually tailored education intervention from a LHA, or a physician letter and brochure about cervical cancer screening (control). Mammogram completion at 12-month follow-up was higher in the lay health worker intervention group (42.5%) than in the control group (27.3%) (relative risk [RR] 1.56; 95% CI, 1.29 to 1.87; $P = 0.001$), but the results were not analyzed by race/ethnicity. The authors of the review conclude that "the three intervention studies reviewed were not successful in improving screening rates or adherence."[p.184]

There was no outside funding for this review. The authors reported no relevant conflicts of interest.

Luque et al., 2018[24]

This is a fair-quality systematic review of educational interventions to increase mammography screening among Hispanic women in the United States. The authors identified 3 RCTs and 2 quasi-experimental studies that included at least 50% Hispanic women or which reported results separately for Hispanic women. Study quality was not clearly reported, but the authors noted that the attrition rates in the included studies ranged from less than 1% to 41%. All 5 of the included studies used *promotoras* (Hispanic/Latino community health workers) to deliver the educational interventions. In 4 of the 5 studies, the educational intervention addressed other types of cancer screening in addition to breast cancer screening. The study follow-up periods ranged from 2 to 24 months. All 5 studies were described as communitywide. In the overall random-effects meta-analysis, *promotora*-delivered educational interventions increased the odds of mammography screening by 1.67 (95% CI, 1.24 to 2.26; $I^2 = 60\%$) compared to control participants receiving usual care.

The study was funded by the National Cancer Institute. There was no statement regarding conflicts of interest for the authors.

Zhang et al., 2020[25]

This is a fair quality systematic review of culturally tailored interventions to increase mammography among Chinese American women. The authors identified 8 randomized trials or quasi-experimental studies of which 3 (all RCTs) reported on mammography completion. In 2 of the 3 studies a culturally tailored educational video was compared to a generic video or breast cancer fact sheet, while the third study compared a targeted breast health education intervention with phone-based individual counseling to a mammography brochure. All 3 studies reported mammography completion at 6 months. The 2 studies using the culturally tailored educational video did not find statistically significant increases in mammography, while the trial of the more intensive intervention with individual counseling found an increase in mammography completion. The authors of the review did not provide additional details on the magnitude of differences observed in these studies.

The authors of the review declared no conflicts of interest. A funding source was not reported.

Cervical Cancer

Mann et al., 2015[26]

This is a fair-quality systematic review of interventions to increase cervical cancer screening among Latinas in the United States. The authors identified 45 studies with 32 unique interventions. In more than half of the studies, breast cancer screening was also promoted in addition to cervical cancer screening. Thirteen of the interventions described their theoretical underpinning, of which social cognitive theory was most common. The most common intervention described across the studies was the use of LHAs (used in 24 of 32 interventions). Clinic-based strategies were the second-most-common intervention type (used in 9 of 32 interventions). Five interventions used partnerships with churches. Screening behavior was assessed by self-report in 29 studies and by medical record review in 7 studies. Among 17 studies that reported on changes in cervical cancer screening, 12 interventions led to statistically significant increases. The authors observed that 5 of the 12 successful interventions used behavioral theory, and 4 of the 12 used community-based participatory research in developing the intervention. LHAs were intervention components in 6 of the 12 interventions that increases cervical cancer screening, and the majority of these LHA interventions involved repeated contacts with participants. Clinic-based interventions to involving system changes or patient outreach were described in 4 of the 12 successful interventions. The authors concluded that more rigorous evaluation of these interventions is needed, but that intervention based on behavioral theory and community-based participatory research and those that utilize LHAs have the most promise.

The study was funded by the National Cancer Institute. There was no statement regarding conflicts of interest for the authors.

Rees et al., 2018[27]

This is a good-quality systematic review of interventions to increase cervical cancer screening among lower socioeconomic groups. This was an updated review that included RCTs or quasi-RCTs published since 2006. The authors identified 16 new studies. Two large studies of human papillomavirus (HPV) self-testing kits showed statistically significant increases in screening attendance, though both studies were

performed outside the United States. Between the 2 reviews, there were 15 studies of LHAs. Among 5 studies comparing LHAs to educational interventions, 2 studies found LHAs significantly increased cervical cancer screening rates, 1 study found LHAs increased cervical cancer screening among women who had received at least 2 lifetime Pap tests (but not in women with no prior screening), and 2 studies found nonsignificant increases in screening. Four studies compared LHAs to usual care and all 4 found significant increase in cervical cancer screening attendance. Three studies of outreach using telephone or mail reminders showed mixed results. One study in New York Medicaid found that outreach did not increase cervical cancer screening uptake, 1 study in Thailand found increased screening with the use of mailed fixed appointment letters, and 1 study found that lengthy and detailed mailings deterred screening when compared with simple messages. Five studies of in-reach (interventions targeting clinicians, clinician panels, or both) found mixed results with 3 studies finding increased screening and 2 studies with nonsignificant results. Overall, the authors concluded that HPV self-testing can increase screening uptake among low-income women (in studies done outside the U.S.), and that additional evidence supports the effectiveness of LHAs.

The study was funded by the Hull York Medical School and the Wellcome Trust. The authors reported no conflicts of interest.

Colorectal Cancer

Bai et al., 2020[28]

This is a fair-quality systematic review and meta-analysis of tailored communication interventions to increase colorectal cancer screening rates among participants with an affected first-degree relative. The authors identified 3 cluster randomized trials and 1 RCT with a total of 1,303 participants. The mean age in the included studies ranged from 48 to 54 years old, and 60% of participants were women. The tailored communication interventions were compared to general colorectal cancer screening information or no intervention. All studies relied on self-reported screening. For the overall meta-analysis, tailored communication increased colonoscopy screening rates compared to control (OR 2.21; 95% CI, 1.71 to 2.85; I^2 = 0%). Tailored interventions using telephone and print (OR 2.39; 95% CI, 1.78 to 3.21) were more effective than interventions using print alone (OR 1.52; 95% CI, 0.64 to 3.60). In addition, repeated contact increased the effectiveness of the tailored intervention. Overall, the authors concluded that tailored communication using telephone and print, especially with repeated contacts, can increase colonoscopy screening among people with a first-degree relative with colorectal cancer.

The authors report no funding for this study. The authors reported no conflicts of interest.

Davis et al., 2018[29]

This is a good-quality systematic review of clinic and community interventions to promote colorectal cancer screening in rural and low-income populations in the United States. The authors identified 20 RCTs, 2 nonrandomized controlled trials, 3 pre-post studies, 1 cohort study, and 1 feasibility study. Most of the studies (k=20) were conducted in underserved urban settings, while 5 studies were conducted in rural settings. Latino patients were the focus of 5 studies, Asians the focus of 4 studies, African Americans the focus of 3 studies, and native Hawaiians the focus of 1 study. Three-quarters of the

studies were done in primary care clinics, and all studies used FOBT, fecal immunohistochemical (FIT), or both. Two-thirds of the studies targeted patients who were not current on screening. All of the studies used multicomponent interventions with 25 studies including at least 1 component to increase community demand (e.g., small media, reminders, in-person education) and 24 studies with at least 1 component to increase community access (e.g., in-clinic distribution of kits, mailed kits, pre-addressed and stamped return envelopes). All of the studies that used mailed kits also used a reminder or recall intervention. Twelve studies used patient navigators. In the 20 studies done in the clinic setting, the most common intervention components were client reminders (60%), small media (60%), and pre-addressed stamped envelopes (55%), while no clinic-based studies used client incentives, mass media, or group education. In the 7 community-based studies, group education (64%), small media (82%), and individual education (64%) were the most common intervention components. The authors categorized included studies as highly effective (> 25% higher screening rate compared to control), effective (10% to 25% higher screening rate compared to control), or marginal (< 10% higher screening rate compared to control). All the studies with highly effective interventions were clinic-based, and the most commonly used intervention components were mailed kits, pre-addressed stamped envelopes, and client reminders. On average, highly effective interventions had six components, while effective interventions and marginal interventions had 4.6 and 4.0 components respectively. Overall, the authors concluded "multicomponent interventions can effectively increase fecal testing for colorectal cancer across diverse rural and low-income communities,"[p.12] particularly with clinic-based interventions. The authors did observe that the studies rarely provided sufficient detail on contextual factors and implementation to allow stakeholders to determine which interventions might be most effective locally.

The study was partly funded through Agency for Healthcare Research and Quality and Patient Centers Outcomes Research Institute grants. The authors reported no relevant conflicts of interest.

Domingo et al., 2017[30]

This is a fair-quality systematic review of the characteristics of effective patient navigation programs for colorectal cancer screening in federally qualified health centers. The authors identified 6 RCTs and 2 quasi-experimental studies with varied intervention and control groups. Most studies were conducted in predominantly Latino or African American populations, and mostly in urban areas. Three studies used FOBT as the screening modality, 3 studies used colonoscopy and two studies used a combination of FOBT, colonoscopy, or flexible sigmoidoscopy. All the studied found the patient navigation intervention increased screening compared to controls, with increases ranging from 9.7% to 44%, though one of the findings of one of the studies was nonsignificant due to a very small sample size. The navigation activities in the studies included screening education (100%), client reminders (100%), motivation and support (75%), scheduling appointments (62.5%, mainly in studies using colonoscopy), translation (62.5%), assisting with transport (50%, mainly in studies using colonoscopy), counseling (75%), and providing test instructions (50%). Clinic procedures in the studies included tracking referrals and follow-ups (75%), enhanced follow-up for high-risk participants (50%), results tracking (50%), standing orders (37.5%), and provider feedback (37.5%). The authors concluded that successful navigation programs assess colorectal cancer screening barriers, provide reminders, and offer motivation and support. They also observed that navigation activities should vary by screening type (e.g., transportation assistance for

colonoscopy, counseling and test instructions for FOBT). Finally, the authors concluded that clinics with more established screening procedures observe greater increases in screening completion.

The study was partly funded by the National Cancer Institute. There was no statement regarding conflicts of interest for the authors.

Dougherty et al., 2018[31]

This is a good-quality systematic review and meta-analysis of interventions to increase colorectal cancer screening rates in the United States. The authors identified 73 RCTs with low or medium risk of bias and a total of 366,766 participants. Based on 17 studies, active distribution of fecal blood tests (in clinic or by mail) increased screening compared to control (risk difference [RD] 22%; 95% CI, 17% to 27%; relative risk [RR] 2.26; 95% CI, 1.81 to 2.81). In meta-regression analysis, there was not significant effect modification by age, race/ethnicity, sex, insurance status, prior screening status, type of fecal blood test, duration of follow-up, use of co-interventions, or distribution method. There was high statistical heterogeneity (I^2 = 97.5%), but that was reduced when considering only studies with similar follow-up duration (I^2 = 63% to 69%). Based on 16 studies, patient navigation increased screening compared to control (RD 18%; 95% CI, 13% to 23%; RR 2.01; 95% CI, 1.64 to 2.46). Navigation was more effective when combined with additional components beyond educational materials or reminders, and in 5 studies navigation with mailed kits led to a small increase in screening compared to mailed kits alone (RR 1.14; 95% CI, 1.07 to 1.23). In meta-regression, culturally tailored navigation was not more effective than standard navigation, though all navigation interventions used language-concordant navigators. Based on 19 studies of educational interventions without extensive cointerventions compared to usual care, educational interventions led to small increases in screening (RD 4%; 95% CI, 1% to 6%; RR 1.20; 95% CI, 1.06 to 1.36). In subgroup analysis, personal telephone calls and mailings with telephone calls showed significant pooled effects while decisions aids and tailored educational interventions had nonsignificant pooled effects. In 10 studies, patient reminder led to a slight increase in screening (RD 3%; 95% CI, 0% to 5%; RR 1.20; 95% CI, 1.02 to 1.41), with telephone reminders or text messages appearing to be most effective. In 2 studies, patient financial incentives did not lead to a statistically significant increase in screening (RD 6%; 95% CI, -2% to 14%; RR 1.16; 95% CI, 0.95 to 1.42). In 18 studies of clinician-directed interventions, 8 studies of visit-based reminders found an increase in screening (RD 13%; 95% CI, 8% to 19%), and 6 medium- or low-risk-of-bias studies of non-visit-based interventions (e.g., academic detailing) also increased screening (RD 10%; 95% CI, 3% to 17%). Multicomponent interventions increased screening more than single interventions (mean difference 13%; 95% CI, 7% to 19%), and in meta-regression screening test outreach contributed more to multicomponent effects than navigation or patient or clinician reminders. Overall, the authors concluded that there was high strength evidence for fecal blood test outreach and navigation and moderate strength evidence for patient reminders and multicomponent interventions to increase colorectal cancer screening.

The study was funded in part by the University of North Carolina, the American Cancer Society, CDC, and the National Cancer Institute. One author reported an unrelated grant from Pfizer, but there were no other reported conflicts of interest.

Issaka et al., 2019[32]

This is a good-quality systematic review of provider- or system-level interventions to improve colorectal cancer screening with FIT. The authors identified 23 RCTs, 1 quasi-experimental study, and 1 observational study. The included studies were conducted in the U.S., western Europe, and Australia. Approximately half of the studies were conducted in safety net clinics, community health centers, or federally qualified health centers. Most studies were judged to be at low or unclear risk of bias, but 4 studies were considered to be at high risk of bias. In 10 studies, mailing FIT kits to participants led to a median increase in screening completion of 21.5% (IQR 13.6% to 29%). In 6 studies, pre-FIT patient reminders and education led to a median increase in screening completion of 4.1% (IQR 3.6% to 6.7%). In 2 studies, post-FIT patient reminders to improve return of the kits after distribution did not lead to statistically significant increases in screening completion. In 3 studies, tailored patient messaging did not lead to statistically significant increases in screening completion when compared with mailed FIT kits with or without reminders, though 1 of the studies did find that tailored messages increased screening completion when compared with a usual care control (43.8% vs. 32.6% respectively; $P = 0.002$). In 1 study, patients randomly assigned to receive a low-literacy picture booklet or videos with a mailed FIT kit were not statistically significantly more likely to be screened than those who received the standard CDC screening brochure with a mailed FIT kit (83.5% vs. 78.1%; $P = 0.17$). In 1 study, patient financial incentives ($5 or $10 upon return of a mailed FIT kit) did not lead to a statistically significant improvement in screening completion. In 2 studies, combining FIT testing with influenza (FLU) vaccination at so-called FLU-FIT clinics at 5 Kaiser-Permanente sites led to increased screening completion, compared to those seen at FLU only clinics (26.9% vs. 11.7%; $P < 0.01$). There were also 2 studies of provider alerts, but both were conducted in national health services in western Europe. Overall, the authors conclude that mailed FIT kits, pre- and post-FIT reminders, pairing FIT with vaccination clinics, and provider alerts increased screening completion.

The review was funded by the National Institutes of Health and CDC. The authors reported no conflicts of interest.

Jager et al., 2019[33]

This is a good-quality systematic review and meta-analysis of mailed outreach to improve colorectal cancer screening in the United States. The systematic review identified 7 RCTs with 12,501 participants, comparing mailed outreach with FIT (k=3) or FOBT (k=4) to usual care. The included studies were judged to be low (k=3) or moderate (k=4) risk of bias. All the studies were done in the U.S., the mean age in the included studies ranged from 56 to 64 years, the proportion of female participants ranged from 54% to 71%, and 6 of the 7 studies were done in predominantly low income or uninsured populations. In the overall meta-analysis, mailed outreach increased the absolute screening completion rate by 28% (95% CI, 25% to 30%; $I^2 = 47.2\%$), and also showed a relative increase in screening completion (RR 2.65; 95% CI, 2.03 to 3.45; $I^2 = 92.2\%$). In subgroup analyses there were no significant differences observed between the type of stool test (FIT vs. FOBT), the use of telephone reminders, or whether the population was underserved or not. Using a GRADE framework, the authors concluded that there is moderate strength evidence that mailed outreach with FIT or FOBT improves colorectal cancer screening completion.

The study was funded by the National Institutes of Health. The authors reported no relevant conflicts of interest.

Kim et al., 2020[34]

This is a fair-quality systematic review of interventions to encourage colorectal cancer screening in Asian American populations. The authors identified 11 RCTs and 3 quasi-experimental studies examining a mix of health education, lay health worker/community health advising, physician-directed interventions, and combined FOBT-vaccination programs. Most of the studies were conducted in California, Washington, or Hawaii. Most of interventions reported various theoretical models including the health behavior model, social cognitive theory, transtheoretical model, and pathway framework and innovations theory. In the overall meta-analysis, these interventions led to an increase in colorectal cancer screening (OR 1.78; 95% CI, 1.44 to 2.11; I^2=51.5%). In stratified analysis by ethnic background, only Vietnamese Americans had a statistically significant increase in screening with these interventions (OR 1.76; 95% CI, 1.14 to 2.39), though the estimates for Chinese Americans (OR 2.15; 95% CI, 0.88 to 3.41) and Filipino Americans (OR 2.06; 95% CI, 0.83 to 3.28) were more imprecise. Results were similar between those studies conducted by the Asian American Network of Cancer Awareness Research and Training and those that were not. The authors note that there was evidence of publication bias by visual analysis of the funnel plot and by Egger's test. Overall, the authors conclude that culturally-appropriate interventions to promote colorectal cancer screening among Asian Americans are effective in increasing screening.

There was no statement about study funding. The authors reported no relevant conflicts of interest.

Volk et al., 2016[35]

This is a fair-quality systematic review and meta-analysis of patient decision aids for colorectal cancer screening. The authors identified 21 studies (12 RCTs, 2 cluster randomized trials, 4 nonrandomized controlled trials, and 3 pre-post studies). Sixteen studies were conducted in the United States. The studies mainly focused on decision aids for average-risk adults between the ages of 50 and 74. One study each focused on participants with low educational attainment, individuals of low socioeconomic status, and Latinos with limited English proficiency. In total, 13 different decision aids presenting 7 different screening options were used across the studies. Among the comparative studies, decision aids were compared to no information (k=8) or general colorectal cancer screening information (k=7). In the overall meta-analysis of 8 studies that reported screening uptake at 16 to 52 weeks, decisions aids increased screening when compared with control (RR 1.3; 95% CI, 1.1 to 1.4) with an absolute increase in screening of 8% (95% CI, 6% to 11%). In the overall meta-analysis of 7 studies comparing decision aids to general colorectal cancer information, there were no significant differences between the groups in screening uptake between 4 and 24 weeks (RR 1.1; 95% CI, 0.78 to 1.5). Overall, the authors conclude that decision aids increase screening uptake when compared with no information, but do not result in greater screening uptake when compared with provision of general colorectal cancer information.

The study was funded in part by National Institutes of Health, the Agency for Healthcare Research and Quality, and the Cancer Prevention Research Institute of Texas. The authors reported to conflicts of interest.

Young et al, 2019[36]

This is a fair-quality meta-review of interventions to increase uptake of colorectal cancer screening in the United States. The meta-review includes 16 systematic reviews spanning 116 studies published between 1986 and 2013. The review was designed to examine effect size by screening modality (e.g., FIT, FOBT, colonoscopy), by intervention level (i.e., client-directed, provider-directed, system-directed), and by intervention component. Eight of the reviews included studies with varying combinations of screening modalities, but the screening modalities were not uniformly reported in the individual studies included in 7 of the 8 reviews; overall the authors concluded that the effect size by screening modality varied both within and across modalities. Eight of the reviews focused on FOBT as the sole screening modality. Among these reviews the effect size for screening completion ranged from -13% to 37%, but the authors noted very serious limitations in the reporting and analysis in these reviews. In the analysis by intervention level, 14 reviews included at least 1 study intervening at the client level (effect size -13% to 42%), 7 reviews included at least 1 study intervening at the provider level (effect size -0.1% to 23%), and 2 reviews included at least 1 study intervening at the system level (effect size 7% to 28%). In the analysis by intervention component, 3 reviews of client reminders reported effect sizes ranging from 0% to 0.6%, 9 reviews of combined client-directed components reported effect sizes ranging from -7% to 42%, 1 review of provider reminders reported a median effect size of 15.3%, 2 reviews of provider assessment and feedback reported effect sizes ranging from 13% to 45%, 2 reviews of provider incentives reported effect sizes ranging from -0.1% to 2.8%, and 2 reviews of patient referral and navigation reported effect sizes ranging from 7% to 28%. The remaining interventions included in the reviews (one-on-one education, small media, and multicomponent office-based interventions) did not report effect sizes.

The study was funded by the CDC. The authors reported no relevant conflicts of interest.

Evidence Summary

The peer-reviewed literature on interventions to increase screening for breast, cervical, and colorectal cancer is extensive. The effectiveness of multicomponent interventions to increase cancer screening was recently summarized by the Community Preventive Services Task Force (CPSTF) which concluded that multicomponent interventions (defined by the use of at least 1 intervention from 2 or more of the following strategy areas: increase provider delivery, increase community demand, or increase community access) led to increased cancer screening; the largest effect size was observed in colorectal cancer. Multicomponent interventions drawing from all 3 strategy areas and those that combined 5 or more individual interventions appeared to be the most effective. Our search of summary literature to supplement the CPSTF review identified additional evidence to support the effectiveness (broadly or in specific populations) of a variety of interventions including patient navigators, LHAs, CBHWs, mailed outreach, elimination of structural barriers, and other interventions.

There are serious limitations throughout the evidence we identified including performance bias due to an inadequate masking in most intervention studies, a very high degree of clinical and statistical heterogeneity in the studies included in the reviews, and, in some cases, poor adherence to quality standards for conducting and reporting systematic reviews.

Policy Landscape

The federal Patient Protection and Affordable Care Act (2010) requires that health plans cover specific preventive services without requiring a copayment, co-insurance, or that an individual meet a deductible.[37] Included in this list of services is the coverage of breast cancer mammography screenings every 1 to 2 years for women over 40 years of age, cervical cancer screening for sexually active women, and colorectal cancer screening for adults over 50 years of age (Table 8).[37] Within this policy context, some payers use quality metrics directly tied to breast, cervical, and colorectal cancer screening to evaluate the quality and effectiveness of health care. For example, the National Committee for Quality Assurance has developed Healthcare Effectiveness Data and Information Set (HEDIS) measures for breast, cervical, and colorectal cancer screening that are 3 of 11 measures for assessing the quality of prevention and screening activities under the domain of effectiveness of care.[38]

Table 8. National Quality Measures for Cancer Screening[37,39]

Measure	Measure Steward
Breast Cancer	
Women 50-74 years of age who had at least 1 mammogram to screen for breast cancer in the past 2 years	NCQA (HEDIS) *Note: This measure is part of CMS's 2020 Adult Core Set for Medicaid*
Cervical Cancer	
Women 21 to 64 who were screened for cervical cancer using either of the following criteria: • Women age 21 to 64 who had cervical cytology performed every 3 years • Women age 30 to 64 who had cervical cytology/HPV co-testing performed every 5 years	NCQA (HEDIS) *Note: This measure is part of CMS's 2020 Adult Core Set for Medicaid*
Colorectal Cancer	
Adults 50 to 75 who had appropriate screening for colorectal cancer with any of the following tests: annual FOBT, flexible sigmoidoscopy every 5 years, colonoscopy every 10 years, computed tomography colonography every 5 years, stool DNA every 3 years	NCQA (HEDIS)

Abbreviations. CMS: Centers for Medicare & Medicaid Services; FOBT: fecal occult blood test; HEDIS: Healthcare Effectiveness Data and Information Se; HPV: human papillomavirus; NCQA: National Committee for Quality Assurance.

To meet quality metric goals, payers use a variety of methods to increase screening rates for breast, cervical, and colorectal cancer that mirror those interventions discussed in the evidence section above. Recognizing the complexity of using multicomponent interventions to increase cancer screening, the National Colorectal Cancer Roundtable, in collaboration with the American Cancer Society, developed a toolkit for health plans that outlines best practices, case studies, templates, and tools for increasing colorectal cancer screening.[40] Similar approaches described in the toolkit could be applied to efforts to increase breast and cervical cancer screening attendance.

Recommendations from Others

Two sources were identified in the search for recommendations from others regarding multicomponent interventions to improve screening outcomes or attendance for breast, cervical, or colorectal cancer: The Community Guide from the CPSTF and Cancer Council Australia.

Community Preventive Services Task Force

To promote screening for breast, cervical, and colorectal cancer, the CPSTF recommends the use of 2 or more intervention approaches from the domains of interventions designed to increase community demand (e.g., small media, one-on-one education, group education, client reminders, client incentives), increase community access (e.g., reduce structural barriers, reduce client out-of-pocket costs), and increase provider delivery of screening services (provider assessment and feedback, provider incentives, provider reminders).[8-10] The CPSTF also recommends the use 2 or more interventions to reduce structural barriers (e.g., extending office hours, offering free screening).[8-10]

Cancer Council Australia

In a guideline focused on the prevention, early detection and management of colorectal cancer, Cancer Council Australia included a practice point guideline related to increasing screening attendance.[41] Within this guideline, practice points are based expert opinion and created through a consensus process.[41] The guideline states that encouragement from primary care providers, such as letters from providers prior to an individual receiving a test kit, provider reminder systems, and practice audits can be used to increase individual participation in colorectal cancer screening.[41]

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Appendix A. GRADE Table Element Descriptions

Element	Description
Balance of benefits and harms	The larger the difference between the desirable and undesirable effects, the higher the likelihood that a strong recommendation is warranted. An estimate that is not statistically significant or has a confidence interval crossing a predetermined clinical decision threshold will be downgraded.
Quality of evidence	The higher the quality of evidence, the higher the likelihood that a strong recommendation is warranted.
Resource allocation	The higher the costs of an intervention (i.e., the greater the resources consumed in the absence of likely cost offsets) the lower the likelihood that a strong recommendation is warranted.
Values and preferences	The more values and preferences vary, or the greater the uncertainty in values and preferences, the higher the likelihood that a weak recommendation is warranted.
Other considerations	Other considerations include issues about the implementation and operationalization of the technology or intervention in health systems and practices within Oregon.

Appendix B. Methods

Scope Statement

Populations

Adults eligible for breast, cervical, or colorectal cancer screening

Population scoping notes: None

Interventions

Multicomponent interventions to increase community demand for or access to screening services (e.g., reminders, incentives, medial campaigns, educational interventions, reducing or eliminating structural barriers, reducing out-of-pocket costs)

Intervention exclusions: None

Comparators

Care as usual, interventional components compared to each other

Outcomes

Critical: All-cause mortality, cancer-specific incidence or mortality, cancer-related morbidity, screening attendance

Important: Harms (including overscreening or inappropriate screening)

Considered but not selected for the GRADE table: None

Key Questions

KQ1: What is the comparative effectiveness of multicomponent interventions to improve screening outcomes or attendance for breast, cervical, or colorectal cancer?

KQ2: Does the comparative effectiveness of multicomponent interventions to improve screening outcomes or attendance vary by:

a. Patient-level characteristics
b. Community-level characteristics
c. Intervention intensity
d. Index screening vs. subsequent screening

KQ3. What are the harms of multicomponent interventions to improve screening outcomes or attendance for breast, cervical, or colorectal cancer?

Contextual Questions

None.

Search Strategy

A full search of the core sources was conducted to identify systematic reviews, meta-analyses, and technology assessments that meet the criteria for the scope described above. Searches of core sources were limited to citations published after 2013.

The following core sources were searched:

- Agency for Healthcare Research and Quality (AHRQ)
- Canadian Agency for Drugs and Technologies in Health (CADTH)
- Cochrane Library (Wiley Online Library)
- Institute for Clinical and Economic Review (ICER)
- Medicaid Evidence-based Decisions Project (MED)
- National Institute for Health and Care Excellence (NICE)
- Veterans Administration Evidence-based Synthesis Program (ESP)
- Washington State Health Technology Assessment Program

A MEDLINE® search was also conducted to identify systematic reviews, meta-analyses, and technology assessments, using the search strategy from the 2016 Community Preventive Services Task Force (CPSTF) systematic review.[8-10] The search was limited to publications in English published after November 2013 (the end search date for the 2016 CPSTF systematic review, which was judged to be the most comprehensive review on this topic).

Searches for clinical practice guidelines were limited to those published since 2014. A search for relevant clinical practice guidelines was also conducted using MEDLINE® and the following sources:

- Australian Government National Health and Medical Research Council (NHMRC)
- Canadian Agency for Drugs and Technologies in Health (CADTH)
- Centers for Disease Control and Prevention (CDC) Community Preventive Services
- National Institute for Health and Care Excellence (NICE)
- Scottish Intercollegiate Guidelines Network (SIGN)
- United States Preventive Services Task Force (USPSTF)
- Veterans Administration/Department of Defense (VA/DoD) Clinical Practice Guidelines

Inclusion/Exclusion Criteria

Studies were excluded if they were not published in English, did not address the scope statement, or used study designs other than systematic reviews, meta-analyses, technology assessments, or clinical practice guidelines. Systematic reviews that predominately included international studies were also excluded because of the limited applicability of the study results to the U.S. health care system. Systematic reviews that were rated as having poor methodological quality were also excluded.