PICO SEARCH ASSIGNMENT WORKSHEET

Brief description of patient problem/setting (summarize the case very briefly)

56-year-old male with past medical history of hypertension and hyperlipidemia presents to clinic for annual physical exam. During the visit, the provider reviews his preventive screenings and notes that he has never completed colorectal cancer screening. The provider discusses available screening options, including colonoscopy and fecal immunochemical testing, also known as FIT testing. The patient states that he is hesitant to complete a colonoscopy because of the bowel preparation, sedation, needing time off from work, and arranging transportation after the procedure. However, he says he would be more willing to complete a stool test at home if it is appropriate.

Search question: Clearly state the question (including outcomes or criteria to be tracked)

In average-risk adults aged 45 and older who are eligible for colorectal cancer screening, how do stool-based screening strategies compared with colonoscopy affect screening completion/adherence rates and long-term colorectal cancer outcomes, such as colorectal cancer incidence, mortality, and cost-effectiveness?

Question type: What kind of question is this?

☐Prevalence	**X Screening**	☐Diagnosis
☐Prognosis	☐Treatment	☐Harm

Assuming that the highest level of evidence to answer your question will be meta-analysis or systematic review, what other types of study might you include if these are not available (or if there is a much more current study of another type)? Please explain your choices.

I would include randomized controlled trials (RCTs) because they are the next highest level of evidence after systematic reviews and meta-analyses. RCTs can help limit bias through randomization and would be useful in directly comparing the two interventions of interest for this PICO question. I would also consider prospective cohort studies because they can provide follow-up data on patient outcomes after the screening interventions are implemented. Since my PICO focuses on colorectal cancer screening completion rates, I would also include decision-analytic modeling studies or cost-effectiveness studies if higher-level evidence is limited. Although these studies do not directly enroll and follow patients like RCTs or cohort studies, they can still be useful because they often use real-world adherence data on screening completion. For this PICO, it would also be interesting to find studies that assess whether stool-based testing affects patients' attitudes toward colorectal cancer screening, including whether it improves willingness to complete screening in the future.

PICO search terms:

P	I	C	O
Adults age 45+	Stool-based testing	Colonoscopy	Screening rates

Colorectal cancer average-risk	FIT	Endoscopic screening	Screening completion
	Cologuard		Screening adherence
	FOBT test		Patient compliance/satisfaction
	Stool DNA test		Mortality
			Cost-effectiveness
			Quality of life

Search tools and strategy used:

Database	**Search terms used**	**# or results**	**Filters applied**
PubMed	("adults") AND ("stool test" OR "FIT test" OR "Cologuard" OR FOBT test") AND ("colonoscopy") AND ("screening rates" OR "screening completion" OR screening adherence" OR "patient satisfaction/compliance" OR "mortality" OR "cost-effectiveness" OR "QOL")	7	Last 5 years, full text, full free text, meta-analysis, randomized controlled trial, systematic review, English, Humans, MEDLINE, Middle Aged + Aged: 45+ years
EBSCO	("adults") AND ("stool test" OR "FIT test" OR "Cologuard" OR FOBT test") AND ("colonoscopy") AND ("screening rates" OR "screening completion" OR screening adherence" OR "patient satisfaction/compliance" OR "mortality" OR "cost-effectiveness" OR "QOL")	11	Past 10 years, Peer Reviewed, Linked Full text, MEDLINE Complete, United States
Google scholar	("adults") AND ("stool test" OR "FIT test" OR "Cologuard" OR FOBT test") AND ("colonoscopy") AND	809	Time range: 2016-2026, Review articles, sort by relevance

	(“screening rates” OR “screening completion” OR screening adherence” OR “patient satisfaction/compliance” OR “mortality” OR “cost-effectiveness” OR “QOL”)		

For this PICO, I used PubMed, EBSCO, and Google Scholar to search for relevant literature. In PubMed, using the search terms and filters listed above resulted in 7 articles. For each article, I first reviewed the title to gain a general understanding of the study type and what was being compared. Afterward, I read the abstracts to better understand the objective, methods, and conclusions of each study. I focused on studies conducted in the United States because my PICO relates to colorectal cancer screening recommendations and practices that are specific to the U.S. healthcare system. In the end, I chose one article that was a randomized controlled trial. The other articles were either conducted outside the United States or did not compare the interventions of interest for my PICO.

In EBSCO, I used the same process to navigate my search. The initial search resulted in 11 articles. None of the articles were systematic reviews, meta-analyses, or randomized controlled trials. However, I found one cost-effectiveness study on stool-based testing for colorectal cancer screening. I decided to use this study because, in real-world clinical practice, cost, insurance coverage, and ability to pay can influence whether a patient chooses one screening option over another.

For Google Scholar, the initial search resulted in 809 articles. Since the search was filtered by relevance, I reviewed the titles and abstracts of the first 20 articles. I focused on studies with the highest level of evidence and selected two systematic reviews. These articles were useful because they compared colorectal cancer screening strategies and evaluated outcomes such as screening effectiveness, colorectal cancer incidence, and mortality.

Results found:

Article 1

Citation:

Galoosian, A., Dai, H., Croymans, D., Saccardo, S., Fox, C. R., Goshgarian, G., De Silva, S., Han, M. A., Vangala, S., & May, F. P. (2025). Population health colorectal cancer screening strategies in adults aged 45 to 49 years: A randomized clinical trial. *JAMA, 334*(9), 778–787. https://doi.org/10.1001/jama.2025.12049

Type of article: Randomized controlled trial

Abstract:
IMPORTANCE Colorectal cancer screening is now recommended at age 45 years for average-risk individuals; however, optimal outreach strategies to screen younger adults are unknown.

OBJECTIVE To determine the most effective population health outreach strategy to promote colorectal cancer screening in adults aged 45 to 49 years.

DESIGN, SETTING, AND PARTICIPANTS Randomized clinical trial with 20,509 participants conducted in a large health system (UCLA Health). Primary care patients aged 45 to 49 years at average risk for colorectal cancer were randomized 1:1:1:1 to 1 of 4 outreach strategies. The trial ran May 2, 2022, to May 13, 2022, with follow-up through November 13, 2022.

INTERVENTIONS Colorectal cancer screening via 1 of 4 strategies: (1) fecal immunochemical test (FIT)–only active choice; (2) colonoscopy-only active choice; (3) dual-modality (FIT or colonoscopy) active choice; and (4) usual care default mailed FIT outreach.

MAIN OUTCOME AND MEASURES Primary outcome was participation in screening (FIT or colonoscopy) at 6 months. Secondary outcome was screening modality completed.
RESULTS Among 20,509 participants (53.9% female, 4.2% Black and 50.8% non-Hispanic White; mean [SD] age, 47.4 [1.5] years), 3816 (18.6%) underwent screening. Participation was significantly lower in each of the 3 active choice groups (FIT only, 841 of 5131 [16.4%; rate difference, −9.8%; 95% CI, −11.3% to −8.2%]; colonoscopy only, 743 of 5127 [14.5%; rate difference, −11.7%; 95% CI, −13.2% to −10.1%]; dual-modality FIT or colonoscopy, 890 of 5125 [17.4%; rate difference, −8.9%; 95% CI, −10.5% to −7.4%]) than in the usual care default mailed FIT group (1342 of 5126 [26.2%]; all $P < .001$). Participants offered dual-modality active choice more likely completed any screening than those offered a single active choice modality (17.4% [dual-modality FIT or colonoscopy] vs 15.4% [FIT only and colonoscopy only combined]; rate difference, −1.8%; 95% CI, −3.0% to −0.1%; $P = .004$). Among 5125 participants offered a choice between 2 modalities (dual-modality active choice FIT or colonoscopy), colonoscopy was more common than FIT (616 [12.0%] vs 288 [5.6%]; rate difference, −6.4%; 95% CI, −7.5% to −5.3%; $P < .001$). There was notable crossover in the FIT-only groups to colonoscopy (502 of 5131 [9.8%; FIT-only active choice] and 501 of 5126 [9.8%; usual care default mailed FIT]). Crossover from colonoscopy to FIT was modest (137 of 5127 [2.7%; colonoscopy-only active choice]).

CONCLUSIONS AND RELEVANCE In this randomized clinical trial, 3 different active choice interventions had lower colorectal cancer screening completion rates among individuals aged 45 to 49 years compared with usual care.

Key findings:

- Mailed FIT outreach had the highest screening completion rate at 26.2%
- The other groups had lower completion rates: FIT-only active choice was 16.4%, colonoscopy-only active choice was 14.5%, and dual-modality active choice was 17.4%.
- Mail FIT kits to the patients can reduce barriers and improve screening completion compared with requiring patients to actively choose a screening option through a portal

- Even though mailed FIT had the highest completion rate, overall screening completion was still low, with only 18.6% of all participants completing screening within 6 months.
- For patients who are hesitant about colonoscopy due to bowel preparation, sedation, transportation, or time off from work, stool-based testing may be a more acceptable and practical option.
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Why I chose this article: I chose this article because it is a randomized controlled trial, which is a high-level study design for evaluating the effect of different colorectal cancer screening outreach strategies. This article relates to my PICO as it evaluates screening completion rates, one of the main outcomes I am interested in. The study compares FIT-based outreach with colonoscopy-based outreach and dual-modality screening options. This is similar to my patient scenario, where the patient is hesitant about colonoscopy due to bowel preparation, sedation, time off from work, and transportation, but is more willing to complete a stool-based test at home. I also chose this article because it was conducted in the United States and focuses on adults aged 45 to 49, which reflects the newer colorectal cancer screening recommendation to begin at age 45. Although my patient is older than this age range, the article is still relevant because it addresses average-risk adults who are eligible for screening and shows how different screening options may affect completion rates.

Article 2

Citation:

Fisher, D. A., Karlitz, J. J., Jeyakumar, S., Smith, N., Limburg, P., Lieberman, D., & Fendrick, A. M. (2021). Real-world cost-effectiveness of stool-based colorectal cancer screening in a Medicare population. *Journal of Medical Economics, 24*(1), 654–664. https://doi.org/10.1080/13696998.2021.1922240

Type of article: cost-effectiveness analysis study

Abstract:

Aim: Multiple screening strategies are guideline-endorsed for average-risk colorectal cancer (CRC). The impact of real-world adherence rates on the cost-effectiveness of non-invasive stool-based CRC screening strategies remains undefined.

Methods: This cost-effectiveness analysis from the perspective of Medicare as a primary payer used the Colorectal Cancer and Adenoma Incidence and Mortality Microsimulation Model (CRC–AIM) to estimate cost and clinical outcomes for triennial multi-target stool DNA (mt-sDNA), annual fecal immunochemical test (FIT), and annual fecal occult blood test (FOBT) screening strategies in a simulated cohort of US adults aged 65 years, who were assumed to either be previously unscreened or initiating screening upon entry to Medicare. Reported real-world adherence rates for initial stool-based screening and colonoscopy follow-up after a positive stool test result were defined as 71.1% and 73.0% for mt-sDNA, 42.6% and 47.0% for FIT, and 33.4% and 47.0% for FOBT, respectively. The incremental cost-effectiveness ratio using quality-adjusted life years (QALY) was defined as the primary outcome of interest; other cost and clinical

outcomes were also reported in secondary analyses. Multiple sensitivity and scenario analyses were conducted.
Results: When reported real-world adherence rates were included only for initial stool-based screening, mt-sDNA was cost-effective versus FIT ($62,814/QALY) and FOBT ($39,171/QALY); mt-sDNA also yielded improved clinical outcomes. When reported real-world adherence rates were included for both initial stool-based screening and follow-up colonoscopy when indicated, mt-sDNA was increasingly cost-effective compared to FIT and FOBT ($31,725/QALY and $28,465/QALY, respectively), with further improved clinical outcomes.

Limitations: Results are based on real-world cross-sectional adherence rates and may vary in the context of other types of settings. Only guideline-recommended stool-based strategies were considered in this analysis.

Conclusion: Comparisons of the effectiveness and benefits of specific CRC screening strategies should include both test-specific performance characteristics and real-world adherence to screening tests and, when indicated, follow-up colonoscopy.
Key findings:

- Adherence rate for multitarget stool DNA testing, FIT and FOB was 71.1%. 42.6% and 33.4%, respectively.
- Follow up colonoscopy after a positive stool test was 73.0% for multitarget stool DNA testing and 47.0% for FIT and FOBT.
- Multitarget stool DNA testing was more cost effective compared with FIT and FOBT
- The lifetime cost was $6,525 for multitarget stool DNA testing, compared with $5,797 for FIT and $5,801 for FOBT.
- Multitarget stool DNA testing had the highest QALY at 9.3694, compared with 9.3465 for FIT and 9.3439 for FOBT.

Why I chose this article: While my PICO focuses on stool-based screening compared with colonoscopy, this study helps explain why adherence and cost matter when choosing a screening strategy. In clinical practice, patients may prefer stool-based tests because they are less invasive, can be completed at home, and do not require sedation, bowel preparation, time off from work, or transportation. However, the benefits of stool-based screening depend on whether these patients complete the test and whether they follow up with colonoscopy if the result is positive. I chose this article because it connects adherence, cost-effectiveness, and clinical outcomes, in which cost, convenience, and ability to complete screening may influence whether a patient chooses and follows through with a screening option.

Article 3
Citation:
Jodal, H. C., Helsingen, L. M., Anderson, J. C., Lytvyn, L., Vandvik, P. O., & Emilsson, L. (2019). Colorectal cancer screening with faecal testing, sigmoidoscopy or colonoscopy: A systematic review and network meta-analysis. *BMJ Open, 9*(10), e032773. https://doi.org/10.1136/bmjopen-2019-032773
Type of article: Systematic review and meta-analysis

Abstract:
Objective: The objective of this study was to evaluate the effectiveness, harms, and burdens of fecal blood testing, sigmoidoscopy, and colonoscopy for colorectal cancer screening over a 15-year period.

Design/Methods: The authors updated a Cochrane systematic review and performed a network meta-analysis of randomized controlled trials. The review compared annual or biennial guaiac fecal occult blood testing, FIT, once-only sigmoidoscopy, and once-only colonoscopy in a healthy population aged 50 to 79 years. Follow-up of more than 5 years was required for analysis of colorectal cancer incidence and mortality.

Results: Twelve randomized trials were included. Compared with no screening, sigmoidoscopy slightly reduced colorectal cancer incidence and mortality. Guaiac fecal occult blood testing had little or no effect on colorectal cancer incidence but slightly reduced colorectal cancer mortality. No screening test reduced colorectal cancer incidence or mortality by more than 6 per 1,000 screened over 15 years. Sigmoidoscopy appeared to have greater benefit in men compared with women.

Conclusion: In a 15-year perspective, sigmoidoscopy reduced colorectal cancer incidence, while sigmoidoscopy and annual or biennial guaiac fecal occult blood testing reduced colorectal cancer mortality. The authors concluded that benefits and burdens should be considered when choosing colorectal cancer screening methods.
Key findings:

- Guaiac FOBT reduced colorectal cancer mortality but had little or no effect on colorectal cancer incidence
- Sigmoidoscopy reduced both colorectal cancer incidence and mortality
- The study found that no screening test reduced colorectal cancer incidence or mortality by more than 6 per 1,000 people screened over 15 years
- Stool-based tests mainly detect signs of existing cancer such as occult blood, while endoscopic test scan directly see and remove precancerous lesions such as polyps
- Stool-based testing may be easier to complete due to being less invasive and can be done at home. However, they require repeated screening and follow up colonoscopy if results are abnormal

Why I chose this article: This article helps support the long-term outcome aspect of my PICO because it compares colorectal cancer screening strategies, such as fecal testing and colonoscopy, and evaluates outcomes such as colorectal cancer incidence and mortality. Although it does not directly answer the screening completion rate part of my PICO, it is still useful in showing whether stool-based screening strategies have meaningful clinical benefit. This is important because a screening strategy is only clinically useful if it can both be completed by patients and reduce important outcomes such as colorectal cancer mortality. Therefore, I chose

this article to strengthen the evidence on the effectiveness of fecal testing and other screening strategies over a longer follow-up period.

Article 4

Citation:

Kaneko, M., & Sakuraba, A. (2026). Long-term effectiveness of endoscopic and stool-based colorectal cancer screening strategies: A systematic review and network meta-analysis. *Therapeutic Advances in Gastroenterology, 19*, 1–20. https://doi.org/10.1177/17562848261454186

Type of article: Systematic review and meta-analysis

Abstract:

Background: The population impact of colorectal cancer screening depends on both test performance and uptake. However, the comparative effectiveness of colonoscopy, flexible sigmoidoscopy, FIT, and gFOBT remains uncertain.

Objective: The objective of this study was to compare the 10-year effects of colonoscopy, flexible sigmoidoscopy, FIT, and gFOBT on colorectal cancer incidence, colorectal cancer mortality, and all-cause mortality.

Methods: The authors searched PubMed, EMBASE, and Cochrane CENTRAL from inception to June 13, 2025, for randomized controlled trials involving average-risk adults. Eligible trials compared colonoscopy, flexible sigmoidoscopy, FIT, or gFOBT with no screening or with each other. The authors used a frequentist random-effects network meta-analysis. Intention-to-treat analyses were used to estimate invitation-based population effectiveness, while exploratory per-protocol analyses were used to estimate outcomes among screening completers.

Results: In intention-to-treat analyses, colonoscopy and flexible sigmoidoscopy reduced colorectal cancer incidence compared with no screening. FIT and gFOBT did not significantly reduce colorectal cancer incidence in this analysis, although FIT evidence was limited. For colorectal cancer mortality, flexible sigmoidoscopy and gFOBT reduced risk, while colonoscopy and FIT did not show significant reductions. No strategy reduced all-cause mortality. In exploratory per-protocol analyses, colonoscopy and flexible sigmoidoscopy reduced colorectal cancer incidence, and colonoscopy, flexible sigmoidoscopy, and gFOBT reduced colorectal cancer mortality.

Conclusion: Colonoscopy reduced colorectal cancer incidence in intention-to-treat analysis but showed limited population-level effectiveness when uptake was low. Flexible sigmoidoscopy reduced colorectal cancer incidence and mortality, while gFOBT reduced colorectal cancer mortality. The authors concluded that screening strategies should be selected based on test characteristics, real-world participation, and healthcare capacity.

Key findings:

- The study emphasized that the population level-impact of colorectal cancer screening depends on both test performance and patient uptake of the screening exam
- In an analysis of intention to treat, colonoscopy was highly effective in reducing colorectal incidence, but the population-level effectiveness was limited due to low uptake of the exam.
- Guaiac FOBT reduced colorectal cancer mortality
- Due to limited evidence, FIT did not show significant long-term reductions in incidence of mortality, but this is not interpreted as FIT being ineffective.

Why I chose this article: I chose this article because it is a more current systematic review and network meta-analysis that looks at long-term colorectal cancer screening effectiveness while also considering real-world participation. This article relates to my PICO as it emphasizes that screening effectiveness depends not only on how accurate or effective the test is, but also on whether patients actually complete the screening. This is important for my patient scenario because he may be hesitant to complete a colonoscopy due to the bowel preparation, sedation, time off from work, and transportation concerns, but may be more willing to complete a stool-based test at home. Compared with the other systematic review by Jodal et al., this article includes more recent randomized trial evidence and discusses the difference between intention-to-treat and per-protocol findings. This show the difference between patients who are simply offered screening and patients who actually complete the screening test. As a result, it highlights the main issue in my PICO, which is that the best screening strategy is not only the one with strong clinical performance, but also the one the patient is willing and able to follow through with.

Clinical bottom line:

Stool-based colorectal cancer screening is a reasonable and practical option for average-risk adults who are eligible for screening, especially when colonoscopy-related barriers prevent screening completion. For my patient, a 56-year-old male who has never completed colorectal cancer screening, FIT testing would be an appropriate option if he is average risk and understands that an abnormal result must be followed by diagnostic colonoscopy. The evidence suggests that stool-based testing may improve completion because it is noninvasive, can be completed at home, and avoids several barriers associated with colonoscopy, including bowel preparation, sedation, time off from work, and transportation. The Galoosian et al. randomized controlled trial showed that mailed FIT outreach had higher screening completion than colonoscopy-based strategies which supports the idea that simplifying the screening process can improve participation. However, long-term evidence also shows that screening effectiveness depends on both the test performance and patient uptake/adherence. In this case, colonoscopy remains important because it allows direct visualization and removal of precancerous lesions but had limited population level impact in terms of uptake rates.

Stool-based testing may be more applicable in underserved settings because it reduces the need for transportation, time off from work, procedure scheduling, and sedation. These are all important social and economic barriers that may affect patients, especially those with limited

insurance coverage, unstable work schedules, lower health literacy, or limited access to specialty care. However, stool-based screening is only effective if the patient understands how to complete the test correctly and returns it on time. Patients also need to be counseled that a positive stool test is not the final step and must be followed by colonoscopy. Without reliable follow-up, stool-based testing may lead to a gap in care rather than completed screening. For my patient, I would use shared decision-making and focus on choosing the screening option he is most likely to complete. Since he is hesitant about colonoscopy but willing to complete FIT, FIT may be the better initial strategy instead of delaying screening completely. The plan should include simple instructions, review of insurance coverage, reminder systems, and a clear follow-up plan if the FIT result is abnormal.