

Cystic Fibrosis Foundation Colorectal Cancer Screening Consensus Recommendations Methodology Overview

The Colorectal Cancer Screening Consensus Recommendations For Individuals With Cystic Fibrosis Task Force convened for the first time in April 2015 at the Cystic Fibrosis Foundation Headquarters in Bethesda, Maryland. The 18-member task force consisted of pulmonologists, gastroenterologists, a social worker, nurse coordinator, surgeon, epidemiologist, statistician, adult with CF, and a parent of a child with CF. The task force was divided into 3 workgroups: Cancer Risk, Transplant, and Procedure and Preparation.

Evidence Synthesis and Review

At the initial meeting, the task force determined the scope of the document, developed PICO (Population, Intervention, Comparison, and Outcome) questions ([Supplementary Table 1](#)); and determined relevant search terms. The task force reviewed and approved of the PICO questions. The American Gastroenterological Association Governing Board also reviewed and approved of the PICO questions in April 2015.

PubMed was searched for relevant, published, articles in February–March, 2016. Task force members conducted independent searches on relevant information to strengthen the scope of research. The terms searched can be found at the end of this [Supplementary Material](#). A total of 1159 articles were retrieved. Of these articles, 198 articles were read at the full-text level. In total, 50 articles were included in the final manuscript ([Supplementary Figure 1](#)).

Initial review of the literature at the title level was conducted by a researcher at the CF Foundation and task force members. Abstracts not in English, did not address the PICO question, were basic science, not original research, did not involve humans, letters, and editorials were excluded ([Supplementary Figure 1](#)). Abstract only citations were also excluded. Articles that were deemed appropriate for review at a full-text level were distributed by workgroup-leads for further evaluation. Each workgroup reviewed the records found in the CF Foundation evidence synthesis.

If a task force member determined that the full text should be considered, it was pulled from either their institution or Johns Hopkins. Workgroups completed evidence tables for the records reviewed ([Supplementary Table 2](#)).

After a thorough review of the records, each workgroup drafted recommendation statements based on their PICO questions. A total of 10 recommendation statements were considered and voted on. An 80% agreement threshold was agreed to before the meeting.

Modeling

The CF Foundation contracted with Erasmus Medial Center, University Medical Center Rotterdam, Netherlands, to conduct modeling on screening individuals with CF for

colorectal cancer. The goal of the modeling was to provide estimates of the benefits and costs of screening in the CF population given that life expectancy and CRC risk differ from the general population. Data used for this modeling came from the CF Foundation Patient Registry and the current literature on the CRC in CF. The modeling was conducted using the Microsimulation Screening Analysis model, which is part of the Cancer Intervention and Surveillance Modeling Network. The data were presented to the task force in June 2016 to provide additional evidence to inform their recommendation statements. Revisions to the modeling were presented at the July 16, 2016 face-to-face meeting before voting on recommendation statements.

Voting

The task force reconvened at the CF Foundation Headquarters in July 2016. An a priori voting agreement threshold of 80% was determined before the second meeting. Voting occurred by a show of hands for or against the statement, and the project coordinator tallied the results. The task force then discussed and voted on each statement. Discussion and revision of the statements occurred before voting. For task force members who were not present, a recording of the meeting was distributed with the proposed recommendation statements. The votes from these task force members were collected electronically. Of the 10 statements, 8 achieved 100% consensus and 2 achieved 94% consensus.

External Review

The manuscript and recommendation statements were distributed to the CF Clinical Community, Lung Transplant Community, and Gastrointestinal Community through CF Foundation, International Society of Heart and Lung Transplantation and American Gastroenterological Association listservs. The CF Foundation listservs included center directors, dietitians, physical therapists, patients and families, social workers, nurses, and pharmacists. Reviewers were given 2 weeks to submit comments and feedback using an online survey tool, Survey Monkey. The comments were reviewed and responded to by the task force chairs and the manuscript was updated to reflect these comments when appropriate.

Major Gaps in the Evidence

When initiating these guidelines, the task force did not expect to find a large pool of evidence specific to individuals with CF. Additional research and clinical trials on screening for CRC in individuals with CF are needed to strengthen the task force's recommendations. Further research regarding the incidence of CRC in individuals with CF, and the effectiveness of additional screening tests, such as FIT and Cologuard are needed to close the gaps in the evidence.

Terms Searched

PubMed Search 3.22.16: (((colonoscopy) AND screening) AND transplant) AND "english and humans"[Filter]

PubMed Search 2.8.16: (((((((colon) OR colorectal) OR bowel) OR adenocarcinoma) OR gastrointestinal) AND “Cystic Fibrosis”) AND “cancer”[Filter]) AND “english”[Filter]

PubMed Search 3.23.16: ((Colorectal Cancer) AND Organ Transplant) And Cystic Fibrosis

Search Strategy Used to Create the Cancer Subset on PubMed. Strategy last modified February 2016.

Neoplasms OR American Cancer Society OR angiogenesis inducing agents OR antibodies, neoplasm OR antigens, neoplasm OR antineoplastic agents OR antineoplastic protocols OR biomarkers, tumor OR biopsy [mh] OR biopsy [tw] OR bone marrow purging OR bone marrow transplantation OR cancer care facilities OR cancer vaccines OR carcinogenicity tests OR carcinogens OR chemoembolization, therapeutic OR clonal evolution [mh] OR clonal evolution [tw] OR colonography, computed tomographic OR colonoscopy OR colposcopy OR combined modality therapy OR cryosurgery OR cytopheresis OR dna, neoplasm OR drug resistance, neoplasm OR drug screening assays, antitumor OR early detection of cancer OR gene expression regulation, neoplastic OR genes, neoplasm OR graft vs tumor effect OR hematopoietic stem cell transplantation OR hematopoietic stem cell mobilization OR immunotherapy, adoptive OR leukostasis OR lymph node excision OR lymphocytes, tumor-infiltrating OR mammography OR mastectomy OR medical oncology OR metastasectomy OR mohs surgery OR myelodysplastic-myeloproliferative diseases OR neoplasm grading OR neoplasm proteins OR neoplasm staging OR neoplasm transplantation OR neoplastic processes OR neoplastic stem cells OR oncogene fusion OR oncogenic viruses OR oncology nursing OR oncology service, hospital OR oncolytic viruses OR papanicolaou test [mh] OR papillomavirus vaccines OR peripheral blood stem cell transplantation OR polyomavirus OR radiotherapy OR radiotherapy planning, computer assisted OR rna, neoplasm OR second-look surgery OR SEER program OR stem cell transplantation [mh:noexp] OR transplantation conditioning OR tumor cells, cultured OR tumor escape OR tumor lysis syndrome OR tumor necrosis factors OR receptors, tumor necrosis factor OR tumor necrosis factor receptor-associated peptides and proteins OR ultrasonography, mammary OR AACR OR AJCC [tw] OR (ASCO NOT fungi) OR IARC OR “National Cancer Institute” OR NCI OR UICC OR aCML [tw] OR AGCUS [tw] OR AILD [tw] OR AML [tw] OR ANLL [tw] OR ASCUS [tw] OR ATLL [tw] OR BRCA [tw] OR BRCA1 [tw] OR BRCA2 [tw] OR CIN [tw] OR CLL [tw] OR CMML [tw] OR CMPD [tw] OR ECCL [tw] OR EGIST [tw] OR FMTC [tw] OR GLNH [tw] OR HNPCC [tw] OR HNSCC [tw] OR HPV [tw] OR HSIL [tw] OR ICD 0 [tw] OR JCML [tw] OR JMML [tw] OR LGLL [tw] OR MGUS [tw] OR MLH1 [tw] OR MPD [tw] OR MSH2 [tw] OR NSCLC [tw] OR RAEB [tw] OR RCMD [tw] OR SCLC [tw] OR VOD [tw] OR 5q syndrome [tw] OR BCR ABL [tw] OR c erbB 2 [tw] OR c erbB2 [tw] OR carney complex [tw] OR cone biopsy [tw] OR denys drash [tw] OR essential thrombocythemia [tw] OR estrogen receptor negative [tw] OR estrogen receptor positive [tw] OR li fraumeni [tw] OR meigs syndrome [tw] OR molar pregnancy [tw] OR mycosis fungoides [tw] OR peutz jehgers [tw] OR sentinel lymph node [tw] OR sezary syndrome [tw]

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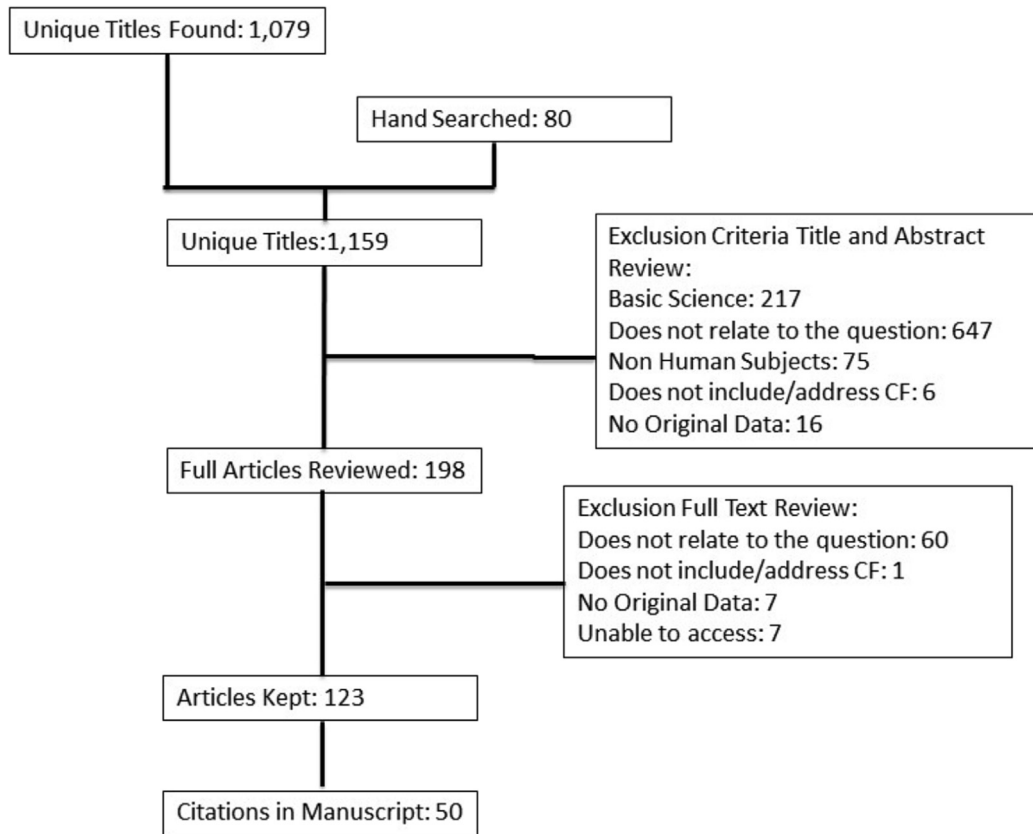
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Carcinog Risk Chem Hum [ta] OR IARC Monogr Eval Carcinog Risks Hum Suppl [ta] OR IARC Monogr Eval Carcinog Risks Hum [ta] OR IARC Sci Publ [ta] OR Important Adv Oncol [ta] OR Indian J Cancer [ta] OR Infect Agent Cancer [ta] OR Innov Oncol Nurs [ta] OR Int Adv Surg Oncol [ta] OR Int J Biol Markers [ta] OR Int J Cancer Suppl [ta] OR Int J Cancer [ta] OR Int J Clin Oncol [ta] OR Int J Gastrointest Cancer [ta] OR Int J Gynecol Cancer [ta] OR Int J Hyperthermia [ta] OR Int J Oncol [ta] OR Int J Radiat Oncol Biol Phys [ta] OR Int J Surg Oncol [ta] OR Integr Cancer Ther [ta] OR Invasion Metastasis [ta] OR Invest New Drugs [ta] OR J Adolesc Young Adult Oncol [ta] OR J Assoc Pediatr Oncol Nurses [ta] OR J Cancer Educ [ta] OR J Cancer Epidemiol Prev [ta] OR J Cancer Res Clin Oncol [ta] OR J Cancer Res [ta] OR J Cancer Surviv [ta] OR J Chemother [ta] OR J Clin Oncol [ta] OR J Community Support Oncol [ta] OR J Dermatol Surg Oncol [ta] OR J Egypt Natl Canc Inst [ta] OR J Environ Pathol Toxicol 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OR J Med Imaging Radiat Oncol [ta] OR J Natl Cancer Inst Monogr [ta] OR J Natl Cancer Inst [ta] OR J Natl Compr Canc Netw [ta] OR J Neurooncol [ta] OR J Oncol Manag [ta] OR J Oncol Pract [ta] OR J Oncol [ta] OR J Pediatr Hematol Oncol [ta] OR J Pediatr Oncol Nurs [ta] OR J Soc Integr Oncol [ta] OR J Support Oncol [ta] OR J Surg Oncol Suppl [ta] OR J Surg Oncol [ta] OR J Thorac Oncol [ta] OR Jaarb Kankeronderz Kankerbestrijd Ned [ta] OR JAMA Oncol [ta] OR Jpn J Cancer Res [ta] OR Jpn J Clin Oncol [ta] OR Klin Onkol [ta] OR Lancet Oncol [ta] OR Leuk Lymphoma [ta] OR Leuk Res [ta] OR Leukemia [ta] OR Lung Cancer [ta] OR Lutte Cancer [ta] OR Magy Onkol [ta] OR Med Oncol Tumor Pharmacother [ta] OR Med Oncol [ta] OR Med Pediatr Oncol Suppl [ta] OR Med Pediatr Oncol [ta] OR Melanoma Res [ta] OR Mol Cancer Res [ta] OR Mol Cancer Ther [ta] OR Mol Cancer [ta] OR Mol Oncol [ta] OR Monogr Neoplast Dis Var Sites [ta] OR NCI Monogr [ta] OR Nat Rev Cancer [ta] OR Nat Rev Clin Oncol [ta] OR Natl Cancer Inst Monogr [ta] OR Natl Cancer Inst Res Rep [ta] OR Neoplasia [ta] OR Neoplasma [ta] OR Neuro oncol [ta] OR Nippon Gan Chiryō Gakkai Shi [ta] OR Noshuyo Byori [ta] OR Nutr Cancer [ta] OR ONS Connect [ta] OR ONS News [ta] OR Oncogene Res [ta] OR Oncogene [ta] OR Oncol Nurs Forum [ta] OR Oncol Rep [ta] OR Oncol Res [ta] OR Oncol Res Treat [ta] OR Oncologist [ta] OR Oncology Huntingt [ta] OR Oncology [ta] OR Oncotarget [ta] OR Onkologie [ta] OR Open Clin Cancer J [ta] OR Oral Oncol [ta] OR Pathol Oncol Res [ta] OR Pediatr Blood Cancer [ta] OR Pediatr Hematol Oncol [ta] OR Pigment Cell Melanoma Res [ta] OR Pract Radiat Oncol [ta] OR Princess Takamatsu Symp [ta] OR Proc Am Assoc Cancer Res [ta] OR Proc Can Cancer Conf [ta] OR Proc Natl Cancer Conf [ta] OR Prog

Clin Cancer [ta] OR Prog Exp Tumor Res [ta] OR Prog Tumor Res [ta] OR Prostate Cancer Prostatic Dis [ta] OR Psychooncology [ta] OR Radiat Oncol Investig [ta] OR Radiat Oncol [ta] OR Radiother Oncol [ta] OR Recent Results Cancer Res [ta] OR Rep Carcinog Backgr Doc [ta] OR Rev Mex Cir Ginecol Cancer [ta] OR S Afr Cancer Bull [ta] OR Sci Rep Res Inst Tohoku Univ Med [ta] OR Sel Cancer Ther [ta] OR Semin Cancer Biol [ta] OR Semin Oncol Nurs [ta] OR Semin Oncol [ta] OR Semin Radiat Oncol [ta] OR Semin Surg Oncol [ta] OR Semin Urol Oncol [ta] OR Strahlenther Onkol [ta] OR Suppl J Med Oncol Tumor Pharmacother [ta] OR Suppl Tumori [ta] OR Support Cancer Ther [ta] OR Support Care Cancer [ta] OR Surg Oncol Clin N Am [ta] OR Surg Oncol [ta] OR Symp Fundam Cancer Res [ta] OR Target Oncol [ta] OR Technol Cancer Res Treat [ta] OR Transl Oncol [ta] OR Tumor Res [ta] OR Tumori [ta] OR Tumour Biol [ta] OR Urol Oncol [ta] OR Vet Comp Oncol [ta] OR Vopr Onkol [ta] OR World J Surg Oncol [ta] OR Z Krebsforsch Klin Onkol Cancer Res Clin Oncol [ta] OR Z Krebsforsch [ta] OR Zhongguo Fei Ai Za Zhi [ta] OR Zhonghua Zhong Liu Za Zhi [ta].

Task Force Member Literature Search

The search of literature was on terms that included: cystic fibrosis, colonoscopy preparation, bowel preparation, bowel (or colonoscopy) preparation guidelines, suboptimal bowel (or colonoscopy) preparation, optimal bowel (or colonoscopy) preparation, MiraLax bowel preparation, difficult bowel preparation, side effects, timing of bowel preparation, education and bowel preparation.



Supplementary Figure 1. Literature review diagram.

Supplementary Table 1. Population, Intervention, Comparison, and Outcome (PICO) Questions

Work group	Question no.	Question	Population(s)	Intervention(s)	Comparator	Outcome(s)
Cancer risk	1	What are the benefits and risks of screening adults with CF for CRC?	Adults with CF 18 y of age and older	Screening	Not screening	Detection of CRC, neoplastic polyps, mortality, CRC-specific mortality, LYG
Cancer risk	1a	What are the benefits and risks of screening adults with CF for CRC starting at age: 30, 35, 40, 45, 50 y?	Adults with CF 18 y of age and older	Screening	Not screening	Radiation risk, incidental findings, perforation, bleeding, cardiopulmonary complications, infection, electrolyte imbalance, death, treatment anxiety, unnecessary surgery
Cancer risk	1b	What are the benefits and risks of screening adults with CF for CRC?	Adults with CF 18 y of age and older	Colonoscopy	Not screening	Detection of CRC, neoplastic polyps, mortality, CRC-specific mortality, LYG
Cancer risk	1c	What are the benefits and risks of screening adults with CF for CRC?	Adults with CF 18 y of age and older	Colonoscopy	Other screening tools: FIT, Cologuard, flexible sigmoidoscopy with FIT	Detection of CRC, neoplastic polyps, mortality, CRC-specific mortality, LYG
Cancer risk	1d	What are the benefits and risk of screening adults with CF by age of screening onset?	Adults with CF 18 y of age and older	Age of screening onset: 30, 35, 40, 45, 50 y	Age of screening onset: 30, 35, 40, 45, 50 y	Detection of CRC, neoplastic polyps, mortality, CRC-specific mortality, LYG
Cancer risk	1e	What are the benefits and risks of surveillance (follow-up for neoplastic polyps and CRC) colonoscopy in adults with CF?	Adults with CF 18 y of age and older	Surveillance (Interval)	Surveillance (interval), no surveillance	Detection of CRC, neoplastic polyps, mortality, CRC-specific mortality, LYG
Cancer risk	1f	What are the benefits and risks of repeat screening (after initial negative screen) adults with CF?	Adults with CF 18 y of age and older	Re-screening	Not re-screening	Detection of CRC, neoplastic polyps, mortality, CRC-specific mortality, LYG

Supplementary Table 1. Continued

Work group	Question no.	Question	Population(s)	Intervention(s)	Comparator	Outcome(s)
Cancer risk	1g	At what age should screening be stopped for adults with CF?	Adults with CF 18 y of age and older	Stopping screening (age 55, 60, 65 y)	Not stopping screening (age 55, 60,65)	Detection of CRC, neoplastic polyps, mortality, CRC-specific mortality, LYG
Transplant	2	What are the benefits and risks of screening adults with CF who are being evaluated for a transplantation (all transplant, lung, liver, kidney)?	Adults with CF who are being evaluated for a transplantation, who are 18 y of age and older	Screening	Not screening	Detection of CRC, neoplastic polyps, mortality, CRC-specific mortality
Transplant	2a	What are the benefits and risks of screening adults with CF who are being evaluated for a transplantation (all transplant, lung, liver, kidney)?	Adults with CF who are being evaluated for a transplantation, who are 18 y of age and older	Colonoscopy	Not screening	Detection of CRC, neoplastic polyps, mortality, CRC-specific mortality,
Transplant	2b	What are the benefits and risks of screening adults with CF who are being evaluated for a transplantation (all transplant, lung, liver, kidney)?	Adults with CF who are being evaluated for a transplantation, who are 18 y of age and older	Colonoscopy	Other screening tools: FIT, Cologuard, flexible sigmoidoscopy with FIT	Detection of CRC, neoplastic polyps, mortality, CRC-specific mortality,
Transplant	2c	What are the benefits and risks of surveillance (follow-up for neoplastic polyps and CRC) screening adults with CF who are being evaluated for a transplantation (all transplant, lung, liver, kidney)?	Adults with CF who are being evaluated for a transplantation, who are 18 y of age and older	Surveillance (interval)	Surveillance (interval), no surveillance	Detection of CRC, neoplastic polyps, mortality, CRC-specific mortality,
Transplant	2d	What are the benefits and risks of repeat screening (after initial negative screen or X amount of time during evaluation) adults with CF who are being evaluated for a transplantation (all transplant, lung, liver, kidney)?	Adults with CF who are being evaluated for a transplantation, who are 18 y of age and older	Rescreening	Not rescreening	Detection of CRC, neoplastic polyps, mortality, CRC-specific mortality,
Transplant	3	What are the benefits and risks of screening adults with CF who have undergone transplantation?	Adults with CF 18 y of age and older who have undergone transplantation	Screening	Not screening	Detection of CRC, neoplastic polyps, mortality, CRC-specific mortality, LYG
Transplant	3a	What are the benefits and risks of screening adults with CF who have undergone transplantation?	Adults with CF 18 y of age and older who have undergone transplantation	Colonoscopy	Not screening	Detection of CRC, neoplastic polyps, mortality, CRC-specific mortality, LYG

Supplementary Table 1. Continued

Work group	Question no.	Question	Population(s)	Intervention(s)	Comparator	Outcome(s)
Transplant	3b	What are the benefits and risks of screening adults with CF who have undergone transplantation?	Adults with CF 18 y of age and older who have undergone transplantation	Colonoscopy	Other screening tools: FIT, Cologuard, flexible sigmoidoscopy with FIT	Detection of CRC, neoplastic polyps, mortality, CRC-specific mortality, LYG
Transplant	3c	What are the benefits and risks of surveillance (follow up for neoplastic polyps and CRC) in Adults with CF who have undergone transplantation?	Adults with CF 18 y of age and older who have undergone transplantation	Surveillance (interval)	Surveillance (interval), no surveillance	Detection of CRC, neoplastic polyps, mortality, CRC-specific mortality, LYG
Transplant	3d	What are the benefits and risks of repeat screening (after initial negative screen) in adults with CF who have undergone transplantation?	Adults with CF 18 y of age and older who have undergone transplantation	Rescreening	Not rescreening	Detection of CRC, neoplastic polyps, mortality, CRC-specific mortality, LYG
Transplant	3e	At what age should screening be stopped for adults with CF who have undergone a transplantation?	Adults with CF 18 y of age and older who have undergone transplantation	Age to stop screening: 40, 45, 50, 55, 60, 65 y	Not stopping screening (age 40, 45, 55, 60, 65 y)	Detection of CRC, neoplastic polyps, mortality, CRC-specific mortality, LYG
Procedure preparation	4	What is the diagnostic accuracy of various screening tools for CRC in adults with CF?	Adults age 18 and older with CF undergoing a screen for CRC	a. Colonoscopy b. FIT c. Cologuard d. Flexible sigmoidoscopy and FIT e. Colonography Screening	a. Colonoscopy b. FIT c. Cologuard d. Flexible sigmoidoscopy and FIT e. Colonography Not screening	Detection of CRC, Detection of neoplastic polyps Acceptance of screening, uptake, satisfaction, decision, patient preference
Cancer Risk and Transplant	5	What is the acceptability of the screening to the individual with CF?	Adults age 18 and older with CF who are not being evaluated for a transplantation			
Cancer risk	5a	What is the acceptability of the screening to the individual with CF?	Adults age 18 and older with CF who are not being evaluated for a transplantation	Colonoscopy	Not screening	Acceptance of screening, uptake, satisfaction, decision, patient preference
Cancer risk	5b	What is the acceptability of the screening to the individual with CF?	Adults age 18 and older with CF who are not being evaluated for a transplantation	Colonoscopy	Other screening tools: FIT, Cologuard, flexible sigmoidoscopy with FIT	Acceptance of screening, uptake, satisfaction, decision, patient preference

Supplementary Table 1. Continued

Work group	Question no.	Question	Population(s)	Intervention(s)	Comparator	Outcome(s)
Transplantation	5c	What is the acceptability of the screening to the individual with CF?	Adults age 18 and older with CF who are being evaluated for a transplantation	Screening	Not screening	Acceptance of screening, uptake, satisfaction, decision, patient preference
Transplantation	5d	What is the acceptability of the screening to the individual with CF?	Adults age 18 and older with CF who are being evaluated for a transplantation	Colonoscopy	Not screening	Acceptance of screening, uptake, satisfaction, decision, patient preference
Transplantation	5e	What is the acceptability of the screening to the individual with CF?	Adults age 18 and older with CF who are being evaluated for a transplantation	Colonoscopy	Other screening Tools: FIT Cologuard flexible sigmoidoscopy and FIT colonography	Acceptance of screening, uptake, satisfaction, decision, patient preference
Transplantation	5f	What is the acceptability of the screening to the individual with CF?	Adults at 18 and older who are post transplantation	Screening	Not screening	Acceptance of screening, uptake, satisfaction, decision, patient preference
Transplantation	5g	What is the acceptability of the screening to the individual with CF?	Adults at 18 and older who are post transplantation	Colonoscopy	Not screening	Acceptance of screening, uptake, satisfaction, decision, patient preference
Transplant	5h	What is the acceptability of the screening to the individual with CF?	Adults at 18 and older who are post transplantation	Colonoscopy	Other screening tools: FIT, Cologuard, flexible sigmoidoscopy with FIT	Acceptance of screening, uptake, satisfaction, decision, patient preference
Procedure preparation	6	What are the benefits and risks of using a CF specific colonoscopy preparation compared to a non CF-specific colonoscopy preparation for adults with CF?	Adult with CF who is 18 y of age and older undergoing colonoscopy	CF-specific colonoscopy preparation	no CF-specific colonoscopy preparation	Adenoma detection rate, cecal incubation rate, colonoscopy preparation quality, acceptability, and ability to complete in CF

Supplementary Table 2. Example of the Tables Completed by the Workgroups While Evaluating the Literature

Article	Include/ exclude	Study type	Objective	Population	Intervention	Comparison	Results	Outcome	Comments/ limitations
Andorsky M, et al. “Pediatric gastroenterology 1/1/69-12/31/75: a review. Part I. Hollow viscera and the pancreas.” Am J Dig Dis 1977;22: 56–68. Not available	No	Review	Summarize data	Pediatric population	NA	NA	NA	NA	Not available at full-text level
Asch WS, Bia MJ. Oncologic issues and kidney transplantation: a review of frequency, mortality, and screening. Adv Chronic Kidney Dis 2014;21: 106–113. https://doi.org/10.1053/j.ackd.2013.07.003	Yes	Review	Review of CA in renal transplant recipients. Examine incidence and effect of malignancies on KTR	KTR		Non-CF tx	12 times increased risk for colon CA supports need for screening especially post tx		
Ashlock MA, Olson ER. Therapeutics development for cystic fibrosis: a successful model for a multisystem genetic disease. Annu Rev Med 2001;62: 107–125.	No	Review	Discuss drug development	Genetic disorders	None	None	New drugs	None	Unrelated to any PICO question
Atassi T, Thuluvath PJ. Risk of colorectal adenoma in liver transplant recipients compared to immunocompetent control population undergoing routine screening colonoscopy. J Clin Gastroenterol 2003;37:72–73.	Yes	Retrospective study		Liver tx	Liver transplant recipients	Control	Increased risk post tx for CRC, did not have scope pre-tx		Small number

Supplementary Table 2. Continued

Article	Include/ exclude	Study type	Objective	Population	Intervention	Comparison	Results	Outcome	Comments/ limitations
Attard TM, et al. Appendiceal inversion as a lead point for ileocolic intussusception in a child with cystic fibrosis. <i>J Pediatr Gastroenterol Nutr</i> 2000;31:300–302.	No	Case report	Case description	Pediatric population	None	None	Patient survived		Unrelated to any PICO question
Audeh MW. Gastrointestinal cancer and the cystic fibrosis gene. <i>N Engl J Med</i> 1995;333:129–130.	Yes	Letter	Comment	CF patients	None	None	None		Comment on 1995 Neglia report
Bartram C, Small E. The intestinal radiological changes in older people with pancreatic cystic fibrosis." <i>Br J Radiol</i> 1971;44(519):196–197. Not available	No	Review; case series	Define x-ray changes in older CF patients	Older CF patients	None	None	None	None	Unrelated to any PICO question
Baysal C, et al. Colonoscopy findings in renal transplant patients with abdominal symptoms. <i>Transplant Proc</i> 1998;30:754–755.	No			KTR with diarrhea, abdominal pain, hematochezia, fever of unknown origin, and anemia	Colonoscopy		2 were found to have polyps		
Berk RN, Lee FA. The late gastrointestinal manifestations of cystic fibrosis of the pancreas. <i>Radiology</i> 1973;106:377–381.	No	Case report; Case series	Pancreatic findings in CF patients	CF patients	None	None	None	none	unrelated to any PICO question

Supplementary Table 2. Continued

Article	Include/ exclude	Study type	Objective	Population	Intervention	Comparison	Results	Outcome	Comments/ limitations
Billings JL, et al. Early colon screening of adult patients with cystic fibrosis reveals high incidence of adenomatous colon polyps. <i>J Clin Gastroenterol</i> 2014;48:e85–e88.	Yes	Case series	The primary aim of this study was to estimate the incidence of adenomatous colon polyps in patients with CF during systematic screening by colonoscopy	45 CF patients aged 40 y and above (mean age, 47 y) undergoing colonoscopic screening	Colonoscopy	None	Incidence of adenomatous colon polyps is greater in male patients, although the 1 patient in this cohort found to have CRC was female	Description of polyps	One of a few CF colonoscopy reports; Should include results table for male and females

CA, cancer; KTR, kidney transplantation; PICO, Population, Intervention, Comparison, and Outcome; tx, transplantation.