Colonoscopic surveillance for prevention of colorectal cancer in patients with ulcerative colitis, Crohn's disease or adenomas

APPENDICES
Part 1

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Appendix 1 – Scope

NATIONAL INSTITUTE FOR HEALTH AND CLINICAL EXCELLENCE

SCOPE

1 Guideline title

Colonoscopic surveillance for prevention of colorectal cancer in patients with ulcerative colitis, Crohn's disease or adenomas.

1.1 Short title

Colonoscopic surveillance for colorectal cancer in high-risk groups: inflammatory bowel disease and polyps.

2 The remit

The Department of Health has asked NICE: 'To produce a short clinical guideline on colonoscopic surveillance for patients with ulcerative colitis, Crohn's disease and polyps to prevent colorectal cancer.'

3 Clinical need for the guideline

3.1 Epidemiology

a) Colorectal cancer is the third most common cancer in the UK, with approximately 32,300 new cases diagnosed and 14,000 deaths in England and Wales each year. Around half of people diagnosed with colorectal cancer survive for at least 5 years after diagnosis.

b) Adults with inflammatory bowel disease (IBD: ulcerative colitis or Crohn's disease) or with polyps have a higher risk of developing colorectal cancer than the general population. Colonoscopic surveillance can be used for people in these high-risk groups to detect any problems early and potentially prevent progression to colorectal cancer.

c) Polyps can be either precancerous (neoplastic adenomas) or non-precancerous (non-neoplastic, including hyperplastic polyps). Strong evidence suggests that detecting and removing adenomas reduces the risk of cancer. Small polyps are rarely malignant and are unlikely to progress to invasive cancers.

d) The prevalence of ulcerative colitis is approximately 100 to 200 per 100,000 and the annual incidence is 10 to 20 per 100,000 respectively. The risk of colorectal cancer for people with ulcerative colitis is estimated as 2% after 10 years, 8% after 20 years and 18% after 30 years of disease.

e) The prevalence of Crohn's disease is 50 to 100 per 100,000 and the annual incidence is 5 to 10 per 100,000. The risk of developing colorectal cancer for people with Crohn's disease is considered to be similar to that for people with ulcerative colitis for the same extent of colonic involvement.

3.2 Current practice

a) In 2002, the British Society of Gastroenterology (BSG) issued guidelines for surveillance after removal of adenomatous polyps. These recommend that the frequency of post-operative surveillance should depend on the size and number of adenomas removed.

b) The 2002 BSG guidance recommended colonoscopic surveillance for IBD should start 8 to 10 years after onset of extensive colitis. They recommended surveillance every 3 years during the 2nd decade of disease, every 2 years for the 3rd decade and annually from the 4th decade onwards. For left-sided disease they recommended colonoscopy should be started after 15 to 20 years of disease and repeated every 5 years, with flexible sigmoidoscopy in the interim years. The guidance recommended annual surveillance in patients with primary sclerosing cholangitis (PSC) because of their higher risk for colorectal neoplasia.

c) Guidelines from the BSG in 2004 suggested that people with IBD should discuss with their clinical team whether colonoscopic surveillance is appropriate for them but should comply with the 2002 guidelines.

d) Updated BSG Guidelines for polyps and IBD are being developed at the moment but due to variations in current practice, there is a need for an evidence-based national clinical guideline on colonoscopic surveillance in these high-risk groups.

4 The guideline

The guideline development process is described in detail on the NICE website (see section 6, ‘Further information’).

This scope defines what the guideline will (and will not) examine, and what the guideline developers will consider. The scope is based on the referral from the Department of Health.

The areas that will be addressed by the guideline are described in the following sections.

4.1 Population

4.1.1 Groups that will be covered

a) Adults (18 years and older) with IBD (defined as ulcerative colitis or Crohn's disease involving the large bowel).

b) Adults with polyps (including adenomas) in the colon or rectum.

4.1.2 Groups that will not be covered

a) Children (younger than 18 years).

b) Adults with newly diagnosed or relapsed adenocarcinoma of the colon or rectum.

c) Adults with polyps that have previously been treated for colorectal cancer.

d) Adults with a genetic familial - history of colorectal cancer: hereditary non-polyposis colorectal cancer.

e) Adults with a familial history of polyposis syndromes:familial adenomatous polyposis.

4.2 Healthcare setting

a) Primary care.

b) Secondary care.

4.3 Clinical management

4.3.1 Key clinical issues that will be covered

a) Colonoscopic surveillance (using conventional colonoscopy or chromoscopy) for prevention and early detection of colorectal cancer compared with:

- no surveillance
- surveillance using other methods, such as flexible sigmoidoscopy, double-contrast barium enema, computed tomographic colonography,and tri-modal imaging (high resolution white light endoscopy, narrow-band imaging and auto-fluorescence imaging).

b) Initiation of surveillance and the frequency of ongoing surveillance (considering factors including duration and extent of condition, number, size and location of polyps).

c) Information and support needs of people undergoing or considering undergoing colonoscopic surveillance.

4.3.2 Clinical issues that will not be covered

a) Diagnosis and assessment of IBD or polyps.

b) Diagnosis and management of colorectal cancer.

4.4 Main outcomes

a) Progression to colorectal cancer

b) Stage at presentation.

c) Progression or regression of dysplasia at most recent follow-up of IBD.

d) Overall mortality or survival.

e) Reported adverse effects of colonoscopic surveillance techniques.

f) Health-related quality of life (related to colonoscopic surveillance).

g) Resource use and costs.

4.5 Economic aspects

Developers will take into account both clinical and cost-effectiveness when making recommendations involving a choice between alternative interventions. A review of the economic evidence will be conducted and analyses will be carried out as appropriate. The preferred unit of effectiveness is the quality-adjusted life year (QALY), and the costs considered will usually be only from an NHS and personal social services (PSS) perspective. Further detail on the methods can be found in 'The guidelines manual' (see ‘Further information’).

4.6 Status

4.6.1 Scope

This is the consultation draft of the scope. The consultation dates are 28 October to 25 November 2009.

4.6.2 Timing

The development of the guideline recommendations will begin in January 2010.

5 Related NICE guidance

5.1 Published guidance

5.1.1 NICE guidance to be updated

None.

5.1.2 NICE guidance to be incorporated

This guideline will incorporate the following NICE guidance:

- Computed tomographic colonography (virtual colonoscopy). NICE interventional procedure guidance 129 (2005). Available from www.nice.org.uk/IPG129

5.1.3 Other related NICE guidance

- Improving outcomes in colorectal cancer. Cancer service guidance (2004). Available from www.nice.org.uk/CSGCC
- Wireless capsule endoscopy for investigation of the small bowel. NICE interventional procedure guidance 101 (2004). Available from www.nice.org.uk/IPG101

5.2 Guidance under development

NICE is currently developing the following related guidance (details available from the NICE website):

- Diagnosis and management of colorectal cancer. NICE clinical guideline. Publication expected July 2011.
- The management of Crohn's disease. NICE clinical guideline. Publication date to be confirmed.

6 Further information

Information on the guideline development process is provided in:

- 'How NICE clinical guidelines are developed: an overview for stakeholders the public and the NHS'
- 'The guidelines manual'.

These are available from the NICE website (www.nice.org.uk/guidelinesmanual). Information on the progress of the guideline will also be available from the NICE website (www.nice.org.uk).

Appendix 2 –Review questions and review protocol

KEY CLINICAL QUESTIONS

Review question 1:

- Is colonoscopic surveillance for prevention and/or early detection of colorectal cancer in adults with inflammatory bowel disease (IBD) or polyps clinically effective compared with no surveillance?

Review question 2:

- Which colonoscopic surveillance technique for prevention and/or early detection of colorectal cancer in adults with IBD or polyps is more clinically effective compared with other methods of surveillance?

  - Using conventional colonoscopy or chromoscopy?
  - Compared to other methods of surveillance (flexible sigmoidoscopy [FSIG], double-contrast barium enema [DCBE], computed tomographic colonography [CTC], tri-modal imaging [high-resolution white light endoscopy, narrow-band imaging and auto-fluorescence imaging])?
  - Is colonoscopic surveillance with a dye (chromoscopy) for prevention and/or early detection of colorectal cancer clinically effective compared with colonoscopic surveillance without a dye (conventional colonoscopy)?

Review question 3:

- When should colonoscopic surveillance be started and what should be the frequency of surveillance?

Review question 4:

- What are the information and support needs of people, or carers of people undergoing or considering undergoing colonoscopic surveillance?

Review protocol for colonoscopic surveillance for patients with ulcerative colitis, Crohn's colitis or polyps in the prevention colorectal cancer.

KEY CLINICAL QUESTION 1		
	Details	**Notes and status**
Review question 1	Is colonoscopic surveillance for prevention and/or early detection of colorectal cancer in adults with inflammatory bowel disease or polyps clinically effective compared with no surveillance?	
Objective(s)	To determine the safety and effectiveness of colonoscopic surveillance in the prevention of colorectal cancer in high risk groups.	
Criteria for considering studies	PICO	
Population	Adults with ulcerative colitis, Crohn's colitis/disease and polyps (including adenomas) in the colon or rectum.	
Intervention(s)	Colonoscopic surveillance using: • conventional colonoscopy or • chromoscopy.	
Comparator(s)	No surveillance	
Outcome(s)	h) Progression to colorectal cancer and stage at presentation. i) Progression or regression of dysplasia/polyps at most recent follow-up in IBD j) Overall mortality and survival k) Reported adverse effects of colonoscopic surveillance techniques. l) Health related quality of life. m) Resource use and costs.	

How to be searched	As per the Guidelines Manual. No additional databases are required. Date restriction: none. Language restriction: English language. Study design: systematic reviews, RCTs and observational studies.	
Review strategy	GRADE profiles	

1

KEY CLINICAL QUESTION 2A		
	Details	**Notes and status**
Review question 2	Which colonoscopic surveillance technique (using conventional colonoscopy) for prevention and/or early detection of colorectal cancer in adults with IBD or polyps is more clinically effective compared with other methods of surveillance (flexible sigmoidoscopy [FSIG], double-contrast barium enema [DCBE], computed tomographic colonography [CTC], tri-modal imaging [high-resolution white light endoscopy, narrow-band imaging [NBI] and auto-fluorescence imaging)?	
Objective(s)	To determine the safety and effectiveness of colonoscopic surveillance compared with other surveillance techniques in the prevention of colorectal cancer in high-risk groups.	
Criteria for considering studies	PICO	
Population	Adults with ulcerative colitis, Crohn's colitis/disease and polyps (including adenomas) in the colon or rectum.	
Intervention(s)	Colonoscopic surveillance using conventional colonoscopy	
Comparator(s)	Surveillance using other methods (flexible sigmoidoscopy [FSIG], double-contrast barium enema [DCBE], computed tomographic colonography [CTC], tri-modal imaging: narrow-band imaging, high-resolution white light endoscopy and auto-fluorescence imaging	
Outcome(s)	n) Progression to colorectal cancer and stage at presentation. o) Progression or regression of dysplasia/polyps at most recent follow up in IBD. p) Overall mortality and survival. q) Reported adverse effects of colonoscopic	

	surveillance techniques. r) Health-related quality of life. s) Resource use and costs.	
How to be searched	As per the Guidelines Manual. No additional databases are required. Date restriction: none. Language restriction: English language. Study design: systematic reviews, RCTs and back-to-back clinical trials.	
Review strategy	GRADE profiles	

1

KEY CLINICAL QUESTION 2B	
	Details
Review question 2	Is colonoscopic surveillance with a dye (chromoscopy) for prevention and/or early detection of colorectal cancer clinically effective compared with conventional colonoscopy?
Objective(s)	To determine the safety and effectiveness of colonoscopic surveillance compared with other surveillance techniques in the prevention of colorectal cancer in high-risk groups.
Criteria for considering studies	PICO
Population	Adults with ulcerative colitis, Crohn's colitis/disease or polyps (including adenomas) in the colon or rectum.
Intervention(s)	Colonoscopic surveillance using chromoscopy
Comparator(s)	Conventional colonoscopy
Outcome(s)	t) Progression to colorectal cancer and stage at presentation. u) Progression or regression of dysplasia/polyps at most recent follow-up in IBD. v) Overall mortality and survival. w) Reported adverse effects of colonoscopic surveillance techniques. x) Health-related quality of life. y) Resource use and costs.

How to be searched	As per the Guidelines Manual. No additional databases are required. Date restriction: none. Language restriction: English language. Study design: systematic reviews, RCTs and back-to-back clinical trials.
Review strategy	GRADE profiles

1

KEY CLINICAL QUESTION 3		
	Details	**Notes and status**
Review question 3	When should colonoscopic surveillance be started and what should be the frequency of surveillance?	
Objective(s)	To determine when surveillance should be started and how frequently should it be done for the techniques.	
Criteria for considering studies	PICO	
Population	Adults with ulcerative colitis, Crohn's colitis/disease and polyps (including adenomas) in the colon or rectum.	
Intervention(s)	Colonoscopic surveillance using: • conventional colonoscopy or • chromoscopy	To be modified during consultation – remove colonoscopic surveillance terms and insert prognostic studies filter.
Comparator(s)	• No surveillance • Surveillance using other methods (flexible sigmoidoscopy [FSIG], double-contrast barium enema [DCBE], computed tomographic colonography [CTC], tri-modal imaging [high-resolution white-light endoscopy, narrow-band imaging, and auto-fluorescence imaging])	To be modified during consultation – remove colonoscopic surveillance terms and insert prognostic studies filter.
Outcome(s)	z) Factors including: extent and duration of disease, size, number, site and type of polyps/lesions. aa) Progression to colorectal cancer and stage at presentation. bb) Overall mortality and survival.	

How to be searched	As per the Guidelines Manual. No additional databases are required. Date restriction: none. Language restriction: English language. Study design: no study filter.	
Review strategy	GRADE profiles	

1

KEY CLINICAL QUESTION 4		
	Details	**Notes and status**
Review question 4	What are the information and support needs of people or the carers of people undergoing or considering undergoing colonoscopic surveillance?	
Objective(s)	To determine information and support needs for patients and carers.	
Criteria for considering studies	PICO	
Population	Adults with ulcerative colitis, Crohn's colitis/disease and polyps (including adenomas) in the colon or rectum.	
Intervention(s)	Colonoscopic surveillance using: • conventional colonoscopy or • chromoscopy	
Comparator(s)	• No surveillance • Surveillance using other methods (flexible sigmoidoscopy [FSIG], double-contrast barium enema [DCBE], computed tomographic colonography [CTC], tri-modal imaging [high-resolution white light endoscopy, narrow band imaging and auto-fluorescence imaging])	
Outcome(s)	• Patient satisfaction • Patient experience • Reported adverse effects of colonoscopic surveillance techniques	
How to be searched	As per the Guidelines Manual. No additional databases are required. Date restriction: none. Language restriction: English language. Study design: all study types; especially qualitative studies.	
Review strategy	Meta-thematic analysis	

2

Appendix 3 – Results of GDG short questionnaires

Short Questionnaire for GDG

Name: _____

Position: _____

Affiliation: _____

SECTION A: CLINICAL MANAGEMENT

Question A1a*: Is it appropriate to group ulcerative colitis and Crohn's disease together as inflammatory bowel disease and consider one pathway for colonoscopic surveillance for them?*

Question A1b: *In addition to the specified subgroups, are there any additional sub-groups that should be considered separately (if evidence is available)?*

Question A2: *Is it appropriate to consider all people with polyps and produce guidance for all sub-groups instead of just focusing on adenomas?*

Question A3: *The comparators that will be considered are flexible sigmoidoscopy (FSIG), double-contrast barium enema (DCBE), computed tomographic colonography (CTC), tri-modal imaging (high resolution white light endoscopy, narrow-band imaging and auto-fluorescence imaging). Are there any surveillance*

techniques that are commonly used for these high-risk groups that have not been covered as comparators?

END OF QUESTIONNAIRE

THANK YOU FOR YOUR TIME

Results

Question A1a: Is it appropriate to group ulcerative colitis and Crohn's disease together as inflammatory bowel disease and consider one pathway for colonoscopic surveillance for them?		Question A1b: In addition to the specified subgroups, are there any additional sub-groups that should be considered separately (if evidence is available)?
GDG1	Yes	No
GDG2	The diseases behave differently but are both associated with an increased risk of cancer. Emphasis needs to be placed on Crohn's colitis not Crohn's elsewhere.	After surgery – surveillance of transitional zones and retained rectal stumps
GDG3	At the moment Crohn's and colitis are put together and the treatment is similar i.e. same drugs used. Although some drugs help Crohn's and not colitis at all. They could follow the same pathway to some extent but the Colonoscopic surveillance must be tailored to the severity not just the condition.	-
GDG4	Yes	No
GDG5	Yes, particularly as some cases remain IBD unclassified. Initially it will probably be best to consider IBD as a whole, but that does not mean that there may not be differences in the final recommendations for each disease.	-
GDG6	Yes (note that it's only Crohn's patients with Crohn's colitis who are at risk though)	-
GDG7	My view would be that if the evidence suggests different outcomes for each condition then there ought to be separate pathways otherwise one pathway would be easier to follow.	-
GDG8	We should consider one pathway for colonoscopic surveillance for them. However, depending on the severity of Crohn's disease it might be more appropriate for those with ulcerative colitis to have more frequent or intensive surveillance but still working towards the same pathway	People on immuno suppression with a strong family history of cancer or those with large colorectal adenomas should also be dealt with centrally.
GDG9	Probably not.	-
SUMMARY: Most members are happy with considering one pathway for inflammatory bowel disease (IBD) combining ulcerative colitis and Crohn's colitis. If evidence is available for post surgery (partial resection) for IBD, or for immunosuppressed individuals or those with a family history separately, the sub-group will be considered.		

Question A2: Is it appropriate to consider all people with polyps and produce guidance for all sub-groups instead of just focusing on adenomas?	
GDG1	This is the area of concern, there is great confusion between the different types of polyps and the individual follow-up requirements. As often the person receiving information will be frequently unaware of the difference between certain kinds of polyps the advice needs to be clear.ie. many of the polyps identified will be hyperplastic and usually require no further surveillance. The number, size and differentiation of the adenomas will determine the follow-up protocol. This is well described in the BSG guidelines.
GDG2	There is published guidance from BSG on polyp surveillance including familial risks and metaplastic polyps It is my opinion that NICE should read this guidance then accept it as it stands and not reinvent the wheel.
GDG3	No – Some polyps which are very common in the bowel are not connected to IBD. Focusing on Adenomas and persons with multiple polyps should have definite guidelines of care. I.e. Colonoscopic surveillance every so many years etc.
GDG4	Yes
GDG5	Yes. I think that would clarify the situation and prepare for changes in the longterm as more data becomes available (e.g. hyperplastic/serrated polyps remain an important grey area at the moment and really need some management guidelines. Solitary Peutz-Jegher polyps and juvenile polyps may also be worth considering).
GDG6	Within polyps cohort, focus will be on adenomas, but comments on other polyp types would be worthwhile Consider covering other surveillance cohorts too – post-colorectal cancer surgery (easy); family history of cancer/ polyposis (complex)
GDG7	-
GDG8	We should look at people with all polyps as adenomas or only a small fraction of polyps.
GDG9	I think guidance should be produced for all groups, but there is still very little data on the subject.
SUMMARY: Most members feel that the different sub-groups for polyps should be considered separately if possible and guidance given accordingly. We will consider all sub-groups but data may not be available for all.	

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Question A3: The comparators that will be considered are flexible sigmoidoscopy (FSIG), double-contrast barium enema (DCBE), computed tomographic colonography (CTC), tri-modal imaging (high resolution white light endoscopy, narrow-band imaging and auto-fluorescence imaging). Are there any surveillance techniques that are commonly used for these high-risk groups that have not been covered as comparators?	
GDG1	Not within imaging.
GDG2	Rigid sigmoidoscopy may be appropriate for a select group.
GDG3	Colonoscopy
GDG4	Colonoscopy
GDG5	-
GDG6	Presumably the above are being compared against colonoscopy. Chromoendoscopy (pan-colonic dye-spraying) needs to be considered too. Other option is "no surveillance"
GDG7	-
GDG8	Flexible Sigmoidoscopy, double contrast enema, colonoscopy, tri-modal imaging, narrow-band imaging, auto-fluorescence imaging, standard CT scan of abdomen should all be used
GDG9	No.
SUMMARY: As per the scope we will be considering colonoscopy and chromoendoscopy as interventions and comparing them to the above listed comparators. Rigid sigmoidoscopy has not been included in this guideline, but as the searches were wide enough to catch any relevant studies for this population using rigid sigmoidscopy.	

2
3
4

Appendix 4 – Lists of excluded studies

Databases covered for systematic searches

- MEDLINE/MEDLINE In-Process
- EMBASE
- CINAHL (Cumulative Index to Nursing and Allied Health Literature)
- Cochrane Database of Systematic Reviews – CDSR (Cochrane reviews)
- Database of Abstracts of Reviews of Effects – DARE (other reviews)
- Cochrane Central Register of Controlled Trials – CENTRAL (clinical trials)
- Health Technology Assessment (HTA) database (technology assessments)

Review question 1

Is colonoscopic surveillance for prevention and/or early detection of colorectal cancer in adults with inflammatory bowel disease (IBD) or polyps clinically effective compared with no surveillance?

Eligibility criteria

Inclusion criteria

- Population
  - Adults (18 years and older) with IBD (defined as ulcerative colitis or Crohn's disease involving the large bowel).
  - Adults with polyps (including adenomas) in the colon or rectum.
- Intervention
  - Colonoscopic surveillance for prevention and early detection of colorectal cancer.
- Comparators
  - No surveillance.
- Study design
  - Systematic reviews, RCTs, observational studies.

Exclusion criteria

- Population
  - Children (younger than 18 years).

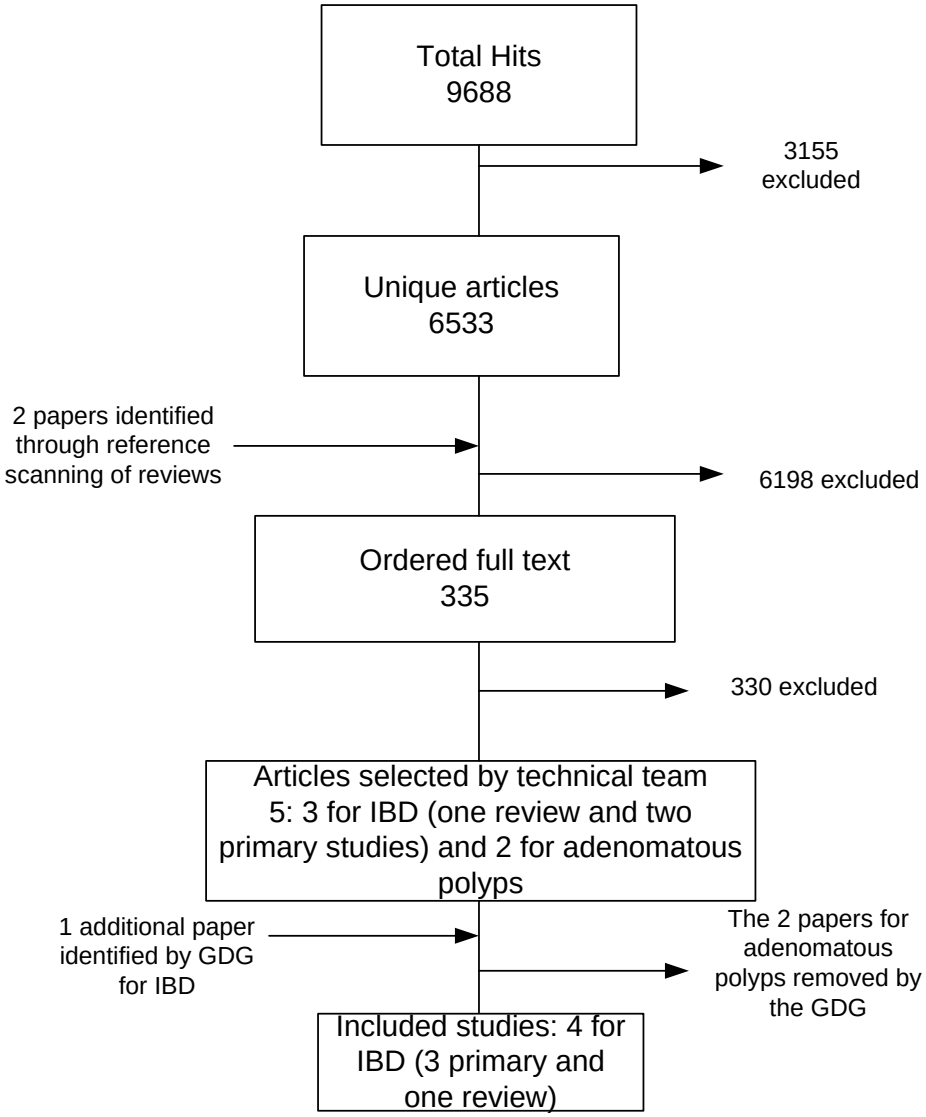
  - Adults with newly diagnosed or relapsed adenocarcinoma of the colon or rectum.
  - Adults with polyps that have previously been treated for colorectal cancer.
  - Adults with a genetic familial history of colorectal cancer: hereditary non-polyposis colorectal cancer.
  - Adults with a familial history of polyposis syndromes: familial adenomatous polyposis.
- Intervention
  - Diagnosis and assessment of IBD or polyps.
  - Diagnosis and management of colorectal cancer.
- Comparators
  - Comparators other than no surveillance.
- Study design
  - Case series and any single arm uncontrolled studies.

Evidence review results

- Initial 9688 hits including duplicates
- Total of 6533 unique articles
- Additional articles found via daisy chaining: 2
- Excluded on the basis of title and abstract: 6198
- Articles ordered full text: 335

Articles selected for review based on the inclusion and exclusion criteria were 2 primary studies for IBD and 2 primary studies for adenomas. The Guideline Development Group (GDG) felt that the two primary studies for adenomas were incorrectly selected and these were removed from the review by the technical team. The Group also referred to a new article (Lutgens et al. 2009) that was published in December 2009, which met the inclusion criteria for IBD and was added to the analysis. As the literature searches were done in October 2009, this paper was not identified by the technical team.

Review flow chart



Included studies for people with IBD

Choi PM, Nugent FW, Schoetz DJ et al. (1993) Colonoscopic surveillance reduces mortality from colorectal cancer in ulcerative colitis. Gastroenterology 105: 418–24

Collins PD, Mpofu C, Watson AJ et al. (2006) Strategies for detecting colon cancer and/or dysplasia in patients with inflammatory bowel disease [update of Cochrane Database of Systematic Reviews 2004; issue 2: CD000279; PMID: 15106148]. Cochrane Database of Systematic Reviews: CD000279 [review; 90 refs]

Lashner BA, Kane SV, Hanauer SB (1990) Colon cancer surveillance in chronic ulcerative colitis: historical cohort study. American Journal of Gastroenterology 85: 1083–7

Lutgens MWMD, Oldenburg B, Siersema PD et al. (2009) Colonoscopic surveillance improves survival after colorectal cancer diagnosis in inflammatory bowel disease. British Journal of Cancer 101: 1671–5

Included studies for people with adenomas

Two papers were included for this review but were excluded by the GDG.

Excluded studies

Ahluwalia JS, Miser WF, Bova JG (2007) Virtual colonoscopy: what is its role in cancer screening? [Review; 37 refs]. Journal of Family Practice 56 (3): 186–91. MEDLINE. Excluded – narrative review on CTC versus colonoscopy

Ahmad NA, Hoops TC (2000) The role of colonoscopy for screening of colorectal cancer. Seminars in Roentgenology 35 (4): 404–8. MEDLINE. Excluded – narrative review – references checked [review; 55 refs]

Ahmadi A, Polyak S, Draganov PV (2009) Colorectal cancer surveillance in inflammatory bowel disease: the search continues. World Journal of Gastroenterology 15 (1):, 61–6. Excluded – narrative review – references checked

Ahnen DJ (1996) Controlled clinical trials: the controls are the key. Gastroenterology 110 (2): 628–30. Excluded – narrative review – references checked

Albert MB, Nochomovitz LE (1989) Dysplasia and cancer surveillance in inflammatory bowel disease. Gastroenterology Clinics of North America 18 (1): 83–97. MEDLINE. Excluded – discussion on technical identification of dysplasia and surveillance of IBD – references checked [review; 76 refs]

Allen JE (2003) Not quite in a comfort zone. Los Angeles Times – Southern California Edition (front page) 9 December: F1. Excluded – new paper article about colorectal screenings

Almeida FF, Araujo SE, Santos FP et al. (2000) Colorectal cancer screening. Revista do Hospital Das Clinicas; Faculdade de Medicina da Universidade de Sao Paulo 55 (1): 35–42. MEDLINE. Excluded – narrative review – references checked [review; 26 refs]

Amonkar MM, Hunt TL, Zhou Z et al. (2005) Surveillance patterns and polyp recurrence following diagnosis and excision of colorectal polyps in a medicare population. Cancer Epidemiology Biomarkers and Prevention 14 (2): 417–21. Excluded – surveillance patterns and polyp recurrence

Anderson J (2000) Clinical practice guidelines: review of the recommendations for colorectal screening. Geriatrics 55 (2): 67–73. Excluded – review of the recommendations for colorectal screening

Armbrecht U (2001) Endoscopic screening in the prevention of colorectal cancer. European Journal of Cancer Prevention 10 (2): 169–72. MEDLINE. Excluded – discussion paper on colorectal cancer surveillance and guidelines

Atkin W (2003) Options for screening for colorectal cancer. Scandinavian Journal of Gastroenterology, Supplement 38 (237): 13–16. Excluded – discussion paper on CRC screening

Avidan B, Sonnenberg A, Schnell TG et al. (2002) What is the appropriate interval for repeat colonoscopy in patients with and without adenomatous polyps found on screening colonoscopy? Evidence-Based Gastroenterology 3 (3): 90–1. Excluded – to identify risk factors associated with recurrence of colorectal adenoma

Awais D, Siegel CA, Higgins PD (2009) Modelling dysplasia detection in ulcerative colitis: clinical implications of surveillance intensity. Gut 58 (11): 1498–503. In-Process. Excluded – mathemateical modelling to check for dysplasia

Axon ATR (1997) Screening and surveillance of ulcerative colitis. Gastrointestinal Endoscopy Clinics of North America 7 (1): 129–45. Excluded – narrative review – references checked

Baba R, Nagasako K, Yashiro K et al. (1992) Colonoscopic follow-up study after polypectomy. Digestive Endoscopy 4 (4): 355–9. Excluded – follow-up

Bader J.-P (1986) Screening of colorectal cancer. Digestive Diseases and Sciences 31 (9 Suppl.): 43S–56S. Excluded – discussion on screening of CRC: familial cases, FOBT, risk, cost effectiveness

Bampton PA, Sandford JJ, Young GP (2002) Applying evidence-based guidelines improves use of colonoscopy resources in patients with a moderate risk of colorectal neoplasia [see comment]. Medical Journal of Australia 176 (4): 155–7. MEDLINE. Excluded – applying evidence-based guidelines

Barkun AN, Jobin G, Cousineau G et al. (2004) The Quebec Association of Gastroenterology position paper on colorectal cancer screening – 2003. Canadian Journal of Gastroenterology 18 (8): 509–19. Excluded – guidelines from Quebec – references checked

Barthet M, Grimaud J.-C (2006) Place of endoscopy in the screening of colic cancer in IBD. Acta Endoscopica 36 (5): 701–11. Excluded – narrartive review – excluded at title and abstract [French, English]

Bauer WM, Lashner BA (1999) What is the optimal strategy for colon cancer surveillance in patients with ulcerative colitis? Cleveland Clinic Journal of Medicine 66 (5): 273. MEDLINE. Excluded – optimal strategy for colon cancer surveillance in ulcerative colitis [review; 10 refs]

Bauerfeind P (2001) Colon tumors and colonoscopy. Endoscopy 33 (11): 949–60. Excluded – narrative review – references checked

Beck DE, Opelka FG, Hicks TC et al. (1995) Colonoscopic follow-up of adenomas and colorectal cancer. Southern Medical Journal 88 (5): 567–70. Excluded – narrative review – references checked

Becker F, Nusko G, Welke J et al. (2007) Follow-up after colorectal polypectomy: a benefit–risk analysis of German surveillance recommendations. International Journal of Colorectal Disease 22 9(8): 929–39. Excluded – risk analysis of German surveillance recommendations

Befrits R, Ljung T, Jaramillo E et al. (2002) Low-grade dysplasia in extensive, long-standing inflammatory bowel disease: a follow-up study. Diseases of the Colon and Rectum 45 (5): 615–20. Excluded – dysplasia in extensive IBD

Bernstein CN (1999) Cancer surveillance in inflammatory bowel disease. Current Gastroenterology Reports 1 (6): 496–504. MEDLINE. Excluded – narrative review and discussion on cancer surveillance for IBD – references checked [review; 46 refs]

Bernstein CN (2004) A balancing view: dysplasia surveillance in ulcerative colitis – sorting the pro from the con. American Journal of Gastroenterology 99 (9): 1636–7. Excluded – narrartive review – excluded at title and abstract

Bernstein CN (2004) Ulcerative colitis with low-grade dysplasia. Gastroenterology 127 (3): 950–6. MEDLINE. Excluded – discusses a single case report and then review clinical management [review; 59 refs]

Bernstein CN (2008) Surveillance programmes for colorectal cancer in inflammatory bowel disease: have we got it right? [comment]. Gut 57 (9): 1194–6. MEDLINE. Excluded – narrartive review – excluded at title and abstract [review; 30 refs]

Biasco G, Brandi G, Paganelli GM et al. (1995) Colorectal cancer in patients with ulcerative colitis: a prospective cohort study in Italy. Cancer 75 (8): 2045–50. Excluded – effectiveness of colonoscopy and biopsy follow-up in colon cancer surveillance

Biasco G, Rossini FP, Hakim R et al. (2002) Cancer surveillance in ulcerative colitis: critical analysis of long-term prospective programme. Digestive and Liver Disease 34 (5): 339–42. Excluded – critical analysis of long-term prospective programme

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Williams CB (1985) Polyp follow-up: how, who for and how often? British Journal of Surgery 72 (Suppl. 6). MEDLINE. Excluded – pilot study

Williams CB, Bedenne L (1990) Management of colorectal polyps: is all the effort worthwhile? Journal of Gastroenterology & Hepatology 5 (Suppl. 65). MEDLINE. Excluded – management of colorectal polyps [review; 160 refs]

Winawer SJ (1999) Appropriate intervals for surveillance. Gastrointestinal Endoscopy 49 (3:Pt 2): t-6. MEDLINE. Excluded – RQ3

Winawer SJ (2005) Screening of colorectal cancer. Surgical Oncology Clinics of North America 14 (4): 699–722. Excluded – narrative review – references checked

Winawer SJ (2007) New post-polypectomy surveillance guidelines. Practical Gastroenterology 31 (8): 30–42. Excluded – post-polypectomy surveillance guidelines

Winawer SJ, Fletcher RH, Miller L et al. (2003) Colorectal cancer screening and surveillance: clinical guidelines and rationale – update based on new evidence. Gastroenterology 124 (2): 544–60. Excluded – CRC screening and surveillance: update based on new evidence

Winawer SJ, Schottenfeld D, Flehinger BJ (1991) Colorectal cancer screening. Journal of the National Cancer Institute 83 (4): 243–53. Excluded – narrative review and guideline for colorectal cancer screening. References checked

Winawer SJ, St John DJ, Bond JH et al. (1995) Prevention of colorectal cancer: guidelines based on new data. WHO Collaborating Center for the Prevention of Colorectal Cancer. Bulletin of the World Health Organization 73 (1): 7–10. MEDLINE. Excluded – WHO guidelines based on recent literature – references checked

Winawer SJ, Zauber AG, Fletcher RH et al. US Multi-Society Task Force on Colorectal Cancer, and American Cancer Society (2006) Guidelines for colonoscopy surveillance after polypectomy: a consensus update by the US Multi-Society Task Force on Colorectal Cancer and the American Cancer Society. Gastroenterology 130 (6): 1872–85. MEDLINE. Excluded – American guidelines based on literature review for post polypectomy surveillance: references checked [review; 83 refs]

Winawer SJ, Zauber AG, O'Brien MJ, et al. (1993) Randomized comparison of surveillance intervals after colonoscopic removal of newly diagnosed adenomatous polyps. New England Journal of Medicine 328 (13): 901–6. Excluded - to be used for RQ3

Woolfson IK, Eckholdt GJ, Wetzel CR et al. (1990) Usefulness of performing colonoscopy one year after endoscopic polypectomy. Diseases of the Colon and Rectum 33 (5): 389–93. Excluded – performing colonoscopy 1 year after endoscopic polypectomy

Yashiro K, Nagasako K, Sato S et al. (1989) Follow-up after polypectomy of colorectal adenomas. The importance of total colonoscopy. Surgical Endoscopy 3 (2): 87–91. MEDLINE. Excluded – for RQ3

Young GP (2007) Post-polypectomy surveillance – who and how. Practical Gastroenterology 31 (7): 19–25. Excluded – review article: references checked

Zauber AG, Winawer SJ (1997) Initial management and follow-up surveillance of patients with colorectal adenomas. Gastroenterology Clinics of North America 26 (1): 85–101. Excluded – narrative review: references checked

Zauber AG (2004) Quality control for flexible sigmoidoscopy: which polyps count? [comment]. Gastroenterology 126 (5): 1474–7. MEDLINE. Excluded – review: references checked [37 refs]

Ziebert JJ (2001) Colorectal cancer screening: the old and the new [see comment]. Texas Medicine 97 (2): 46–48. MEDLINE. Excluded – a symposium on what pry care needs to know [review; 15 refs]

Review question 2A

Which colonoscopic surveillance technique for prevention and/or early detection of colorectal cancer in adults with IBD or polyps is more clinically effective compared with other methods of surveillance (flexible sigmoidoscopy, double-contrast barium enema, computed tomographic colonography, tri-modal imaging [high-resolution white light endoscopy, narrow-band imaging and auto-fluorescence imaging])?

Eligibility criteria

Inclusion criteria

- Population
  - Adults (18 years and older) with IBD (defined as ulcerative colitis or Crohn's disease involving the large bowel).
  - Adults with polyps (including adenomas) in the colon or rectum.
- Intervention
  - Other methods of surveillance (flexible sigmoidoscopy, double-contrast barium enema, computed tomographic colonography, tri-modal imaging, high-resolution white light endoscopy, narrow-band imaging and auto-fluorescence imaging)
- Comparators
  - Conventional colonoscopy
- Study design
  - Systematic review, RCTs, controlled back to back clinical trials

Exclusion criteria

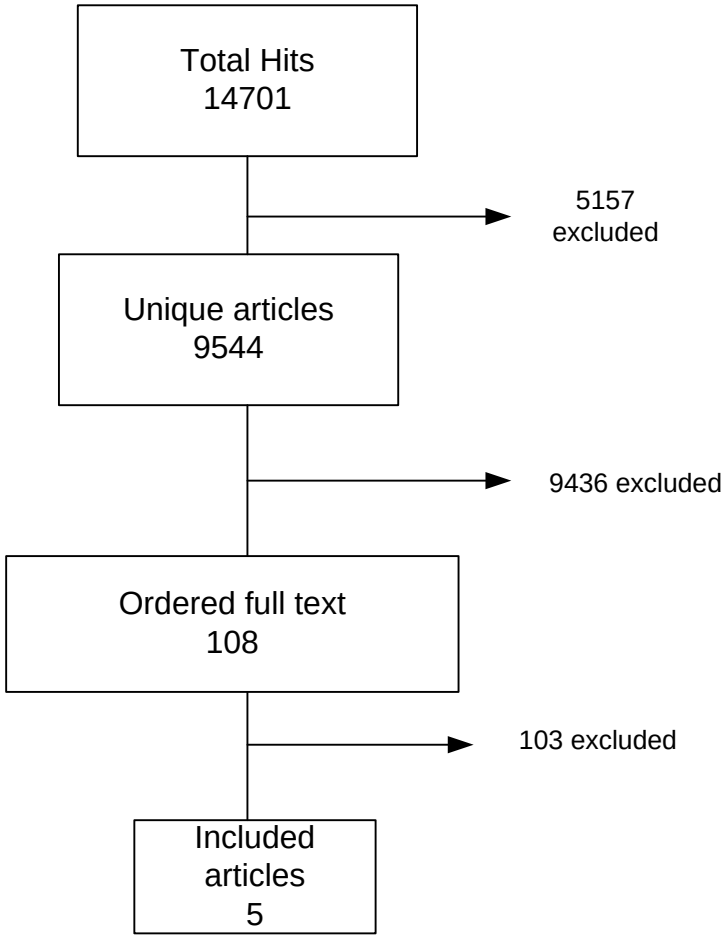
- Population
  - Children (younger than 18 years).
  - Adults with newly diagnosed or relapsed adenocarcinoma of the colon or rectum.
  - Adults with polyps that have previously been treated for colorectal cancer.
  - Adults with a genetic familial history of colorectal cancer: hereditary non-polyposis colorectal cancer.
  - Adults with a familial history of polyposis syndromes: familial adenomatous polyposis.
- Intervention
  - Interventions other than those listed above.
- Comparators
  - Comparators other than conventional colonoscopy.
- Study design
  - Systematic review, RCTs, controlled back-to-back clinical trials.

Evidence review results

- Initial 14,701 hits including duplicates
- Total of 9544 unique articles
- Excluded on the basis of title and abstract: 9436
- Articles ordered full text: 108

Articles selected for review based on the inclusion and exclusion criteria were 5 studies, 1 primary study for people with IBD and 4 (2 primary studies, 2 systematic reviews) for people with adenomas.

Review flow chart



Included studies for people with IBD

Dekker E, Van den Broek FJC, Reitsma JB et al. (2007) Narrow-band imaging compared with conventional colonoscopy for the detection of dysplasia in patients with longstanding ulcerative colitis. Endoscopy 39 (3):216–21

Included studies for people with adenomas

Mulhall BP, Veerappan GR, Jackson JL (2005) Meta-analysis: computed tomographic colonography. Annals of Internal Medicine 142 (8): 635–50

Rex DK, Mark D, Clarke B et al. (1995) Flexible sigmoidoscopy plus air-contrast barium enema versus colonoscopy for evaluation of symptomatic patients without evidence of bleeding. Gastrointestal Endoscopy 42 (2): 132–8

Van den Broek FJ, Reitsma JB, Curvers WL et al. (2009). Systematic review of narrow-band imaging for the detection and differentiation of neoplastic and non-neoplastic lesions in the colon. Gastrointestinal Endoscopy 69 (1): 124–35

Winawer SJ, Stewart ET, Zauber AG et al.(2000) A comparison of colonoscopy and double-contrast barium enema for surveillance after polypectomy. New England Journal of Medicine 342 (24): 1766–72

Excluded studies

Abdel Razek AA, Abu Zeid MM, Bilal M et al. (2005) Virtual CT colonoscopy versus conventional colonoscopy: a prospective study. Hepato-Gastroenterology 52 (66): 1698–702. MEDLINE. Excluded: people included children aged 10 yrs

Adler A, Papanikolaou I, Setka E et al. (2006) [A prospective, randomised study comparing Narrow Band Imaging (NBI) and conventional wide angle coloscopy for identification of colorectal adenomas]. Zeitschrift fur Gastroenterologie 44 (8): 842. Excluded: used systematic review

Adler A, Pohl H, Papanikolaou IS et al. (2008) A prospective randomised study on narrow-band imaging versus conventional colonoscopy for adenoma detection: does narrow-band imaging induce a learning effect? Gut 57 (1): 59–64. Excluded: used pooled result from systematic review

Andreoni B, Crosta C, Lotti M et al. (2000) Flexible sigmoidoscopy as a colorectal cancer screening test in the general population: recruitment phase results of a randomized controlled trial in Lombardia, Italy. Chirurgia Italiana 52 (3): 257–62. MEDLINE. Excluded: discussion on flexible sigmoidoscopy

Atkin W (2005) Pro screening: lessons from the UK sigmoidoscopy trial. Acta Gastro-Enterologica Belgica 68 (2): 247. Excluded: discussion on UK sigmoidoscopy trial

Atkin WS, Hart A, Edwards R et al. (1998) Uptake, yield of neoplasia, and adverse effects of flexible sigmoidoscopy screening. Gut 42 (4): 560–5. Excluded: adverse effects of flexible sigmoidoscopy screening

Badger SA, Gilliland R, Neilly PJ (2005) The effectiveness of flexible sigmoidoscopy as the primary method for investigating colorectal symptoms in low-risk patients. Surgical Endoscopy 19 (10): 1349–52. MEDLINE. Excluded: flexible sigmoidoscopy as the primary method for investigating colorectal symptoms

Bampton PA, Young GP (2000) Screening for colorectal cancer: use of colonoscopy or barium enema. Seminars in Colon and Rectal Surgery 11 (1), 9–15. Excluded: not addressing review question

Barry H (2003) How common are adenomas on initial screening sigmoidoscopies? Evidence-Based Practice 6 (3): 11-2, 2p. Excluded: narrative review

Bhutani MS, Pasricha PJ (2005) Review: computed tomographic colonography has high specificity but low-to-moderate sensitivity for detecting colorectal polyps. ACP Journal Club 143 (3): 78. Excluded: narrative review

Blue Cross Blue Shield Association (2004) CT colonography ('virtual colonoscopy') for colon cancer screening. Chicago IL: Blue Cross Blue Shield Association (BCBS). Excluded: discussion on CTC

Bolin TD, Lapsley HM, Korman MG (2001) Screening for colorectal cancer: what is the most cost-effective approach? Medical Journal of Australia 174 (6): 298–301. Excluded: narrative review

Brenner H, Chang-Claude J, Seiler CM et al. Potential for colorectal cancer prevention of sigmoidoscopy versus colonoscopy: population-based case control study. Cancer Epidemiology Biomarkers and Prevention 16 (3): 494–9. Excluded: patents diagnosed of primary cancer

Bretthauer M, Gondal G, Larsen K et al. (2002) Design, organization and management of a controlled population screening study for detection of colorectal neoplasia: attendance rates in the NORCCAP study (Norwegian Colorectal Cancer Prevention). Scandinavian Journal of Gastroenterology 37 (5): 568–73. MEDLINE. Excluded: technique included faecal occult blood test

Chambers CV (2004) Clinical clips. CT Virtual colonoscopy is an accurate screening tool. Patient Care for the Nurse Practitioner 2p. Excluded: CT virtual colonoscopy alone

Chiu HM, Chang CY, Chen CC et al. (2007) A prospective comparative study of narrow-band imaging, chromoendoscopy, and conventional colonoscopy in the diagnosis of colorectal neoplasia. 20070404. Gut 56[3], 373-379. 2007. MEDLINE. Excluded: not looking at the review question for conventional colonoscopy versus FSIG, DCBE, NBI and CTC

Christie JP, Felmar E, Lehman GA (1990) Flexible sigmoidoscopy screening. Patient Care 24 (12): 133. Excluded: review on flexible sigmoidoscopy screening

Clayton J (2003) Virtual colonoscopy approaches parity with conventional procedure. News Review (09637974) (151): 2. Excluded: narrative review

Colonoscopy or barium enema for surveillance? (2001) Emergency Medicine 33(4): 70. Excluded: narrative review

Dijkstra J, Reeders JWAJ, Tytgat GNJ (1955) Idiopathic inflammatory bowel disease: endoscopic-radiologic correlation. Radiology 197 (2): 369–75. Excluded: idiopathic inflammatory bowel disease

Dodd GD (1992) The role of the barium enema in the detection of colonic neoplasms. Cancer 70 (5 Suppl). MEDLINE. Excluded: narrative review [40 refs]

Duff SE, Murray D, Rate AJ et al. (2006) Computed tomographic colonography (CTC) performance: one-year clinical follow-up [see comment]. Clinical Radiology 61 (11): 932–6. MEDLINE. Excluded: case series for CTC

East JE, Saunders BP (2008) Narrow band imaging at colonoscopy: seeing through a glass darkly or the light of a new dawn? Expert Review of Gastroenterology and Hepatology 2 (1): 1–4. Excluded: narrative reviews

Ebell M (2000) Does colonoscopy detect more colorectal cancers and high-grade adenomas than flexible sigmoidoscopy? Evidence-Based Practice 3 (10): -3, 2p. Excluded: review

Ebell M (2000) Which is better at detecting polyps and adenomas in patients with a history of polyps: colonoscopy or double-contrast barium enema (DCBE)? Evidence-Based Practice 3 (9): 11-2, 2p. Excluded: narrative review

Edwards JT, Foster NM, Wood CJ et al. (2000) Colonic polyps missed at virtual colonoscopy: factors leading to diagnostic error [abstract]. Journal of Gastroenterology and Hepatology 15 (Suppl). Excluded: abstract only

Elwood JM, Ali G, Schlup MM et al. (1995) Flexible sigmoidoscopy or colonoscopy for colorectal screening: a randomized trial of performance and acceptability. Cancer Detection & Prevention 19 (4): 337–47. MEDLINE. Excluded: not addressing the review question

Fanucci A, Cerro P, Cosintino R et al. (1992) [Radiologic assessment of extent of ulcerative colitis in acute phase]. La Radiologia medica 83 (6): 765–9. Excluded: radiologic assessment – discussion

Ferrucci J, Rockey DC, Paulson E et al. (2005) CT colonography for detection of colon polyps and cancer... Rockey DC, Paulsen E, Niedzwiecki D et al. Analysis of air contrast barium enema, computed tomographic colononography [sic], and colonoscopy: procedure comparison. Lancet 2005; 365:305–11. Lancet 365 (9469): 1464–6. Excluded: study on CTC alone

Fichera A (2008) A prospective randomized study on narrow band imaging versus conventional colonoscopy for adenoma detection: does narrow band imaging induce a learning effect? Commentary. Diseases of the Colon and Rectum 51 (6): 993–4. Excluded: not looking at the review question

Fletcher RH (2000) The end of barium enemas. New England Journal of Medicine 342 (24): 1823–4. Excluded: review

Fletcher RH (2000) Virtual colonoscopy was sensitive and specific for detecting colorectal polyps and cancer... commentary on Fenlon HM, Nunes DP, Schroy PC 3d, et al. A comparison of virtual and conventional colonoscopy for the detection of colorectal polyps. N ENGL J MED 1999 Nov 11;341:1496–503. ACP Journal Club 132 (3): 110. Excluded: narrative review

Fletcher RH (2004) Virtual colonoscopy detected colorectal polyps in asymptomatic patients with average risk for colorectal neoplasia. ACP Journal Club 141 (1): 22–23. Excluded: discussion on virtual colonoscopy

Friedlich MS, Guindi M, Stern HS (2004) The management of dysplasia associated with ulcerative colitis: colectomy versus continued surveillance. Canadian Journal of Surgery 47 (3): 212–14. Excluded: management of dysplasia associated with ulcerative colitis

Gallo TM, Galatola G, Fracchia M et al. (2003) Computed tomography colonography in routine clinical practice. European Journal of Gastroenterology & Hepatology 15 (12): 1323–31. Excluded: not looking at the review question

Glick SN, Fibus T, Fister MR et al. (2000) Comparison of colonoscopy and double-contrast barium enema [1] (multiple letters). New England Journal of Medicine 343 (23): 1728–30. Excluded: narrative reviews

Halligan S, Altman DG, Taylor SA et al. (2005) CT colonography in the detection of colorectal polyps and cancer: systematic review meta-analysis, and proposed minimum data set for study level reporting. Radiology 237 (3): 893–904. Excluded: review on diagnostic efficacy of CTC

Halligan S, Lilford RJ, Wardle J et al. (2007) Design of a multicentre randomized trial to evaluate CT colonography versus colonoscopy or barium enema for diagnosis of colonic cancer in older symptomatic patients: The SIGGAR study. Trials [Electronic Resource] 8: 32. Excluded: trial still ongoing when paper was ordered

Hardacre JM, Ponsky JL, Baker ME (2005) Colonoscopy vs CT colonography to screen for colorectal neoplasia in average-risk patients. Surgical Endoscopy 19 (3): 448–56. MEDLINE. Excluded: narrative review [review; 79 refs]

Heiken JP, Peterson CM, Menias CO (2005) Virtual colonoscopy for colorectal cancer screening: current status. Cancer Imaging 5 (Spec-9). MEDLINE. Excluded: review on CTC screening [review; 59 refs]

Heresbach D, Ponchon T and Healthcare Committee of the Societe Francaise d'Endoscopie Digestive (2007) CT colonoscopy in 2007: the next standard for colorectal cancer screening in average-risk subjects?[comment]. Endoscopy 39 (6): 542–4. MEDLINE. Excluded : not looking at the review question

Heuschmid M, Luz O, Schaefer JF et al. Computed tomographic colonography (CTC): possibilities and limitations of clinical application in colorectal polyps and cancer. Technology in Cancer Research & Treatment 3 (2): 201–7. MEDLINE. Excluded: discussion paper on computed tomographic colonography [review; 51 refs]

Hoppe H, Quattropani C, Spreng A et al. (2004) Virtual colon dissection with CT colonography compared with axial interpretation and conventional colonoscopy: preliminary results. AJR American (5): 1151–8. MEDLINE. Excluded: comparing an older existing CTC tech. 2 a new one

Hough DM, Malone DE, Rawlinson J et al. (1994) Colon cancer detection: an algorithm using endoscopy and barium enema. Clinical Radiology 49 (3): 170–5. MEDLINE. Excluded: not looking at the review question

Hovendal CP, Kronborg O, Hem J et al. (1990) [Rectoscopy and Hemoccult II in irritable colon. A prospective study]. Ugeskrift for Laeger 152 (38): 2732–4. Excluded: discussion on hemoccult II

Inger DB (1999) Colorectal cancer screening. Primary Care – Clinics in Office Practice 26 (1): 179–87. Excluded: discussion on CRC screening

Inoue T, Murano M, Murano N et al. (2008) Comparative study of conventional colonoscopy and pan-colonic narrow-band imaging system in the detection of neoplastic colonic polyps: a randomized, controlled trial. Journal of Gastroenterology 43 (1): 45–50. Excluded: used pooled result from systematic review

Institute for Clinical Systems Improvement (2001) Computed tomographic colongraphy for detection of colorectal polyps and neoplasms. Bloomington, MN: Institute for Clinical Systems Improvement (ICSI). Excluded: discussion on CTC

Jacobsen MB, Sorensen B, Melsom M et al. (1985) [Postoperative control of patients operated on for colonic cancer. A comparative study of coloscopy and double contrast radiography]. Tidsskr-Nor-Laegeforen 105: 742–3. Excluded: postoperative control of patients operated on for colonic cancer

Kim YS, Kim N, Kim SH et al. (2008) The efficacy of intravenous contrast-enhanced 16-raw multidetector CT colonography for detecting patients with colorectal polyps in an asymptomatic population in Korea. Journal of Clinical Gastroenterology 42 (7): 791–8. Excluded: study in average risk population – excluded polyps and IBD

Kochman ML, Levin B (2004) Expert commentary – virtual colonoscopy: utility as a screening test for colorectal cancer? Medgenmed [Computer File]: Medscape General Medicine 6 (1): 21. MEDLINE. Excluded: discussion on virtual colonoscopy

Kronborg O, Hage E, Deichgraeber E (1981) The clean colon. A prospective, partly randomized study of the effectiveness of repeated examinations of the colon after polypectomy and radical surgery for cancer. Scandinavian Journal of Gastroenterology 16 (7): 879–84. Excluded: effectiveness of repeated examinations of the colon after polypectomy and radical surgery for cancer

Laghi A (2005) Virtual colonoscopy: clinical application. European Radiology 15 (Suppl-41). MEDLINE. Excluded: review on virtual colonoscopy (CTC) [review; 20 refs]

Laghi A, Iannaccone R, Carbone I et al. (2002) Computed tomographic colonography (virtual colonoscopy): Blinded prospective comparison with conventional colonoscopy for the detection of colorectal neoplasia. Endoscopy 34 (6): 441–6. Excluded: used pooled meta-analysis and systematic review

Lin OR, Praveen K, Schembre DB et al. (2005) Screening sigmoidoscopy and colonoscopy for reducing colorectal cancer mortality in asymtomatic persons. Cochrane Database of Systematic Reviews issue 2. Excluded: protocol for a review

Lund JN, Scholefield JH, Grainge MJ et al. (2002) Risks, costs, and compliance limit colorectal adenoma surveillance: Lessons from a randomised trial. Gut 49 (1): 91–6. Excluded: discussion on risks, costs, and compliance limit colorectal adenoma surveillance

Macari M, Bini EJ, Jacobs SL et al. (2004) Colorectal polyps and cancers in asymptomatic average-risk patients: evaluation with CT colonography. Radiology 230 (3): 629–36. MEDLINE. Excluded: diagnostic evaluation of CTC

Macari M, Milano A, Lavelle M et al. (2000) Comparison of time-efficient CT colonography with two- and three-dimensional colonic evaluation for detecting colorectal polyps. AJR American (6): 1543–9. MEDLINE. Excluded: not looking at the review question

MacCarty RL (1992) Colorectal cancer: the case for barium enema [see comment]. Mayo Clinic Proceedings 67 (3): 253–7. MEDLINE. Excluded: narrative review [29 refs]

Maltz C (2002) Ulcerative colitis. Emergency Medicine (00136654) 34 (6): 43. Excluded: discussion on ulcerative colitis

McLeod R with the Canadian Task Force on Preventive Health Care (2001) Screening strategies for colorectal cancer: systematic review and recommendations 35. London, Ontario: Canadian Task Force on Preventive Health Care (CTFPHC). CTFPHC Technical Report #01-2. Excluded: screening strategies for colorectal cancer

Mitchell RM, Byrne MF, Baillie J (2003) Colonoscopy or barium enema for population colorectal cancer screening? Digestive & Liver Disease 35 (4): 207–11. MEDLINE. Excluded: narrative review [review; 41 refs

Mosby J Nelson D (2005) Consultations & comments. Proper follow-up for hyperplastic polyps on flex sig. Consultant 45 (2); 152. Excluded: follow-up for hyperplastic polyps on flex sig – comments

Munikrishnan V, Gillams AR, Lees WR et al. (2003) Prospective study comparing multislice CT colonography with colonoscopy in the detection of colorectal cancer and polyps. Diseases of the Colon and Rectum 46 (10): 1384–90. Excluded: used pooled meta-analysis and systematic review

Nagorni A Bjelakovic G (2009) Colonoscopic polypectomy for prevention of colorectal cancer. Cochrane Database of Systematic Reviews issue 2. Excluded: protocol for a review

Nelson DB (2000) Colonoscopy versus double-contrast barium enema. Gastroenterology 119 (5): 1402–3. MEDLINE. Excluded: references checked

Ochsenkuhn T, Tillack C, Stepp H et al. (2006) Low frequency of colorectal dysplasia patients with long-standing inflammatory bowel disease colitis: detection by flourescence edoscopy. Endoscopy 38 (5): 477–82. Excluded: detecting dysplatic lesion with flourescence endoscopy

Ontario Ministry of Health and Long-Term Care (2003) Computed tomographic colonography (virtual colonoscopy) 49. Toronto: Medical Advisory Secretariat, Ontario Ministry of Health and Long-Term Care (MAS). Excluded: discussion on CTC

Orellana C (2004) New study supports use of virtual colonoscopy. Lancet Oncology 5 (1): 6. Excluded: discussion on virtual colonoscopy

Pappalardo G, Polettini E, Frattaroli FM et al. (2000) Magnetic resonance colonography versus conventional colonoscopy for the detection of colonic endoluminal lesions. Gastroenterology 119 (2): 300–4. MEDLINE. Excluded: magnetic resonance colonography versus conventional colonoscopy

Pedersen BG, Christiansen TEM, Bjerregaard NC et al. Colonoscopy and multidetector-array computed-tomographic colonography: detection rates and feasibility. Endoscopy 35 (9): 736–42. Excluded: discussion on detection rates and feasibility

Pickhardt PJ (2009) Screening: CT colonography: time for clinical implementation. Nature Reviews Clinical Oncology 6(4): 187–8. MEDLINE. Excluded: update on the ACRIN CTC trial – references checked

Pickhardt PJ, Choi JR, Hwang I et al. (2004) Screening computed tomographic colonography in asymptomatic adults: as good as colonoscopy? Evidence-Based Gastroenterology 5 (3): 82–3. Excluded: discussion CTC

Pineau BC, Paskett ED, Chen GJ et al. Validation of virtual colonoscopy in the detection of colorectal polyps and masses: rationale for proper study design. International Journal of Gastrointestinal Cancer 30 (3): 133–40. Excluded: discussion on virtual colonoscopy

Ransohoff DF (2005) Computed tomographic colonography without cathartic preparation performed well in detecting colorectal polyps. ACP Journal Club 142 (2); 49. Excluded: not looking at the review question

Reuterskiold MH, Lasson A, Svensson E et al. (2006) Diagnostic performance of computed tomography colonography in symptomatic patients and in patients with increased risk for colorectal

disease [see comment]. Acta Radiologica 47 (9): 888–98. MEDLINE. Excluded: discussion on diagnostic performance of CTC

Rex DK (2009) Third Eye Retroscope: rationale, efficacy, challenges. Reviews in Gastroenterological Disorders 9 (1): 1–6. MEDLINE. Excluded: narrative review [review; 24 refs

Rex DK, Mark D, Clarke B, et al. Flexible sigmoidoscopy plus air-contrast barium enema versus colonoscopy for evaluation of symptomatic patients without evidence of bleeding. Gastrointestinal Endoscopy 42 (2): 132–8. Excluded: evaluating patients with evidence of bleeding

Rex DK, Vining D, Kopecky KK (1999) An initial experience with screening for colon polyps using spiral CT with and without CT colonography (virtual colonoscopy) [see comment]. Gastrointestinal Endoscopy 50 (3): 309–13. MEDLINE. Excluded: spiral CT versus CTC – comment

Roberts-Thomson IC, Tucker GR, Hewett PJ. et al. (2008) Single-center study comparing computed tomography colonography with conventional colonoscopy. World Journal of Gastroenterology 14(3): 469–73. MEDLINE. Excluded: used pooled systematic review and meta-analysis from Mulhall et al.

Robinson MHE (1998) Should we be screening for colorectal cancer? British Medical Bulletin 54 (4): 807–21. Excluded: discussion on screening

Rockey DC, Paulson E, Niedzwiecki D et al. (2005) Analysis of air contrast barium enema, computed tomographic colonography, and colonoscopy: prospective comparison. Lancet 365 (9456): 305–11. Excluded: discussion on result analysis

Rosman AS, Korsten MA (2007) Meta-analysis comparing CT colonography, air contrast barium enema, and colonoscopy. American Journal of Medicine 120 (3): 203–10. Excluded: study did not address review question

Schrock TR (1995) Colonoscopy versus barium enema in the diagnosis of colorectal cancers and polyps. Primary Care – Clinics in Office Practice 22 (3): 513–38. Excluded: diagnosing colorectal cancer and polyps

Screening with colonoscopy or a sigmoidoscopy (2003) HealthFacts 28 (3): 4. Excluded: review

Selcuk D, Demirel K, Ozer H et al. (2006) Comparison of virtual colonoscopy with conventional colonoscopy in detection of colorectal polyps. Turkish Journal of Gastroenterology 17 (4): 288–93. MEDLINE. Excluded: used pooled systematic review and meta-analysis from Mulhall et al.

Sharma VK, Nguyen CC (2005) Colonoscopy detected colon polyps better than air contrast barium enema or computed tomographic colonography: Commentary. Evidence-Based Medicine 10 (4): 124. Excluded: narrative review

Spinzi G, Belloni G, Martegani A et al. (2001) Computed tomographic colonography and conventional colonoscopy for colon diseases: a prospective, blinded study. American Journal of Gastroenterology 96 (2): 394–400. MEDLINE. Excluded: used pooled systematic review and meta analysis result from Mulhall et al.

Stern MA, Fendrick AM, McDonnell WM et al. A randomized, controlled trial to assess a novel colorectal cancer screening strategy: the conversion strategy - a comparison of sequential sigmoidoscopy and colonoscopy with immediate conversion from sigmoidoscopy to colonoscopy in patients with an abnormal screening sigmoidoscopy. American Journal of Gastroenterology 95 (8): 2074–9. MEDLINE. Excluded: disscussion on converting people from sigmoidoscopy to colonoscopy

Su MY, Hsu CM, Ho YP et al. (2006) Comparative study of conventional colonoscopy, chromoendoscopy, and narrow-band imaging systems in differential diagnosis of neoplastic and nonneoplastic colonic polyps [see comment]. American Journal of Gastroenterology 101 (12): 2711–16. MEDLINE. Excluded: not looking at the review question for conventional colonoscopy versus FSIG, DCBE, NBI and CTC

Summers RM, Yao J, Pickhardt PJ et al. (2005) Computed tomographic virtual colonoscopy computer-aided polyp detection in a screening population. Gastroenterology 129 (6): 1832–44. Excluded: CTC versus virtual TC

Swedish Council on Technology Assessment in Health Care (2004) CT colonography (virtual colonoscopy) – early assessment briefs (Alert). Stockholm: Swedish Council on Technology Assessment in Health Care (SBU). Excluded: HTA report

Thiis-Evensen E, Hoff GS, Sauar J et al. (1999) Flexible sigmoidoscopy or colonoscopy as a screening modality for colorectal adenomas in older age groups? Findings in a cohort of the normal population aged 63–72 years. Gut 45 (6): 834–9. MEDLINE. Excluded: indirect comparison made

Tischendorf JJ, Wasmuth HE, Koch A et al. (2007) Value of magnifying chromoendoscopy and narrow band imaging (NBI) in classifying colorectal polyps: a prospective controlled study. Endoscopy 39 (12): 1092–6. MEDLINE. Excluded: not looking at the review question for conventional colonoscopy versus FSIG, DCBE, NBI and CTC

Van den Broek FJC, Fockens P, Van Eeden S et al. (2009) Clinical evaluation of endoscopic trimodal imaging for the detection and differentiation of colonic polyps. Clinical Gastroenterology and Hepatology 7(3): 288–95. Excluded: not looking at the clinical question

van Gelder RE, Nio CY, Florie J et al. (2004) Computed tomographic colonography compared with colonoscopy in patients at increased risk for colorectal cancer. Gastroenterology 127 (1): 41–48. MEDLINE. Excluded: not addressing the clinical question

Veerappan GR, Cash BD (2009) Should computed tomographic colonography replace optical colonoscopy in screening for colorectal cancer? Polskie Archiwum Medycyny Wewnetrznej 119 (4): 236–41. Excluded: computed tomographic colonography versus optical colonoscopy

Virtual colonoscopy. Medical Letter on Drugs & Therapeutics (2005); 47 (1202): 15–16. MEDLINE. Excluded: discussion on CTC. No comparative arm

Waye JD, Kahn O, Auerbach ME (1996) Complications of colonoscopy and flexible sigmoidoscopy. Gastrointestinal Endoscopy Clinics of North America 6 (2): 343–77. MEDLINE. Excluded: narrative review [review; 138 refs]

Weissfeld JL, Schoen RE, Pinsky PF et al. and the PLCO Project Team (2005) Flexible sigmoidoscopy in the PLCO cancer screening trial: results from the baseline screening examination of a randomized trial. Journal of the National Cancer Institute 97 (13): 989–97. MEDLINE. Excluded: no comparative arm

White TJ, Avery GR, Kennan N et al. (2009) Virtual colonoscopy vs conventional colonoscopy in patients at high risk of colorectal cancer – a prospective trial of 150 patients. Colorectal Disease 11 (2): 138–45. Excluded: CTC versus conventional colonoscopy

Yee J, Akerkar GA, Hung RK et al. (2001) Colorectal neoplasia: performance characteristics of CT colonography for detection in 300 patients. Radiology 219 (3): 685–92. Excluded: performance characteristics of CT colonography

Young PE, Gentry AB, Cash BD (2008) The utility of flexible sigmoidoscopy after a computerized tomographic colonography revealing only rectosigmoid lesions. Alimentary Pharmacology & Therapeutics 27 (6): 520–7. MEDLINE. Excluded: FSIG after CTC

Zauber AG, Lansdorp-Vogelaar I, Knudsen AB et al. (2008) Evaluating test strategies for colorectal cancer screening: a decision analysis for the U.S. Preventive Services Task Force. Annals of Internal Medicine 149 (9): 659–69.

Review question 2B

Is colonoscopic surveillance with a dye (chromoscopy) for prevention and/or early detection of colorectal cancer clinically effective compared with colonoscopic surveillance with conventional colonoscopy?

Eligibility criteria

Inclusion criteria

- Population
  - Adults (18 years and older) with IBD (defined as ulcerative colitis or Crohn's disease involving the large bowel).
  - Adults with polyps (including adenomas) in the colon or rectum.
- Intervention
  - Chromoscopy.
- Comparators
  - Conventional colonoscopy.
- Study design
  - Systematic review, RCTs, controlled back-to-back clinical trials.

Exclusion criteria

- Population
  - Children (younger than 18 years).
  - Adults with newly diagnosed or relapsed adenocarcinoma of the colon or rectum.
  - Adults with polyps that have previously been treated for colorectal cancer.
  - Adults with a genetic familial history of colorectal cancer: hereditary non-polyposis colorectal cancer.
  - Adults with a familial history of polyposis syndromes: familial adenomatous polyposis.
- Intervention
  - Interventions other than chromoscopy.
- Comparators
  - Comparators other than conventional colonoscopy.

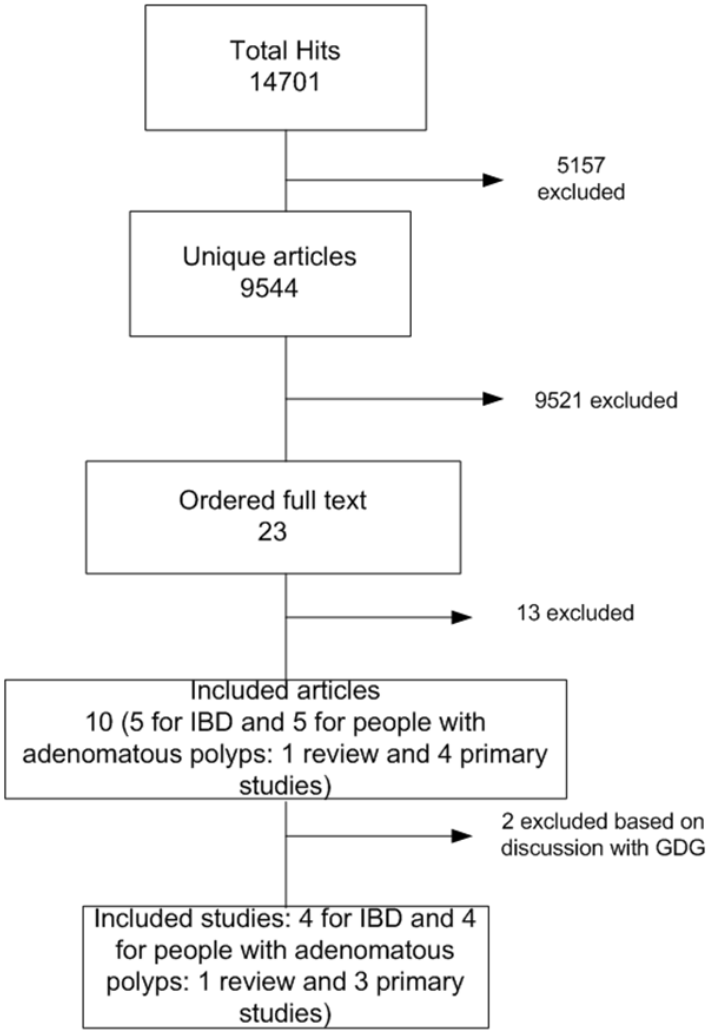
- Study design
  - Systematic review, RCTs, controlled back-to-back clinical trials.

Evidence review results

- Initial 14,701 hits including duplicates
- Total of 9544 unique articles
- Excluded on the basis of title and abstract: 9521
- Articles ordered full text: 23

Articles selected for review based on the inclusion and exclusion criteria were 10 studies; 5 for people with IBD and 5 for people with adenomas. Two studies, one for each population (Hurlstone et al. 2004 and Hurlstone et al. 2005) met the inclusion criteria but were excluded from the review after discussion with the GDG and advice from the editors of the journal because there was some uncertainty about the methods used. Therefore the relevant evidence was 4 primary studies for people with IBD and 1 Cochrane systematic review and 3 primary studies for people with adenomas.

Review flow chart



Included studies for people with IBD

Kiesslich R, Goetz M, Lammersdorf K et al. (2007) Chromoscopy-guided endomicroscopy increases the diagnostic yield of intraepithelial neoplasia in ulcerative colitis. Gastroenterology 132: 874–82

Kiesslich R, Fritsch J, Holtmann M et al. (2003) Methylene blue-aided chromoendoscopy for the detection of intraepithelial neoplasia and colon cancer in ulcerative colitis. Gastroenterology 124: 880–8

Marion JF, Waye JD, Present DH et al. (2008) Chromoendoscopy-targeted biopsies are superior to standard colonoscopic surveillance for detecting dysplasia in inflammatory bowel disease patients: A prospective endoscopic trial. American Journal of Gastroenterology 103: 2342–9

Rutter MD, Saunders BP, Schofield G et al. (2004) Pancolonic indigo carmine dye spraying for the detection of dysplasia in ulcerative colitis. Gut 53: 256–60

Included studies for people with adenomas

Brooker JC, Saunders BP, Shah SG et al. (2002) Total colonic dye-spray increases the detection of diminutive adenomas during routine colonoscopy: A randomized controlled trial. Gastrointestinal Endoscopy 56: 333–8

Brown SR, Baraza W, Hurlstone P (2007) Chromoscopy versus conventional endoscopy for the detection of polyps in the colon and rectum [review]. Cochrane Database of Systematic Reviews: CD006439

Lapalus M-G, Helbert T, Napoleon B et al. (2006) Does chromoendoscopy with structure enhancement improve the colonoscopic adenoma detection rate? Endoscopy 38: 444–8

Le RM, Coron E, Parlier D et al. (2006) High resolution colonoscopy with chromoscopy versus standard colonoscopy for the detection of colonic neoplasia: a randomized study. Clinical Gastroenterology and Hepatology 4: 349–54

Excluded studies

Brooker JC, Saunders BP, Shah SG et al. (2003). Total colonic dye spray increases the yield of colonoscopy. Evidence-Based Gastroenterology 4 (1): 18–19. Excluded: abstract, results taken from the fully published study

Brooker J, Shah S, Suzuki N et al. (2000). Pan-colonic dye spray to aid adenoma detection during colonoscopy: a randomized controlled trial. Gut 46 (Suppl. 2): A77. Excluded: used the later study with more recent results

Chiu HM, Chang CY, Chen CC et al. (2007). A prospective comparative study of narrow-band imaging, chromoendoscopy, and conventional colonoscopy in the diagnosis of colorectal neoplasia. Gut 56 (3): 373–9. MEDLINE. Excluded: to be covered with the other comparators question

De Palma GD, Rega M, Masone S et al. (2006). Conventional colonoscopy and magnified chromoendoscopy for the endoscopic histological prediction of diminutive colorectal polyps: a single operator study. World Journal of Gastroenterology 12 (15): 2402–5. MEDLINE. Excluded: single arm study

Hurlstone DP, Cross SS, Slater R et al. (2004) Detecting diminutive colorectal lesions at colonoscopy: A randomised controlled trial of pan-colonic versus targeted chromoscopy. Gut 53 (3): 376–80. Excluded: excluded from review based on discussion with GDG

Hurlstone DP, Sanders DS, Lobo AJ et al. (2005) Indigo carmine-assisted high-magnification chromoscopic colonoscopy for the detection and characterisation of intraepithelial neoplasia in ulcerative colitis: a prospective evaluation. Endoscopy 37 (12): 1186–92. Excluded: excluded from review based on discussion with GDG

Ibarra-Palomino J, Barreto-Zúñiga R, Elizondo-Rivera J et al. (2002) Application of chromoendoscopy to evaluate the severity and interobserver variation in chronic non-specific ulcerative colitis. Revista de gastroenterología de México 67 (4): 236–40. Excluded – in Spanish, only abstract in English

Kiesslich R, Jung M, DiSario JA et al. (2004). Perspectives of chromo and magnifying endoscopy: how, how much, when, whom should we stain? Journal of Clinical Gastroenterology 38 (1): 7–13. Excluded: narrative review – references checked

Le Rhun M, Coron E, Parlier D et al. (2005) Coloscopie de haute résolution avec chromoscopie versus coloscopie standard pour la détection des polypes. Résultats d'une étude prospective randomisée en groupes paralleles [abstract]. Endoscopy 37 (3): 305. Excluded: abstract full study in 2006 included

Rutter M, Bernstein C, Matsumoto T et al. (2004) Endoscopic appearance of dysplasia in ulcerative colitis and the role of staining. Endoscopy 36 (12): 1109–14. MEDLINE. Excluded: narrative review, references checked. [review; 12 refs]

Stoffel EM, Turgeon DK, Stockwell DH et al. and Great Lakes New England Clinical Epidemiology and Validation Center of the Early Detection Research Network (2008) Chromoendoscopy detects more adenomas than colonoscopy using intensive inspection without dye spraying. Cancer Prevention Research 1 (7): 507–13. MEDLINE. Excluded – included patients that could previously have CRC

Su MY, Hsu CM, Ho YP et al. (2006) Comparative study of conventional colonoscopy, chromoendoscopy, and narrow-band imaging systems in differential diagnosis of neoplastic and non-neoplastic colonic polyps. American Journal of Gastroenterology 101 (12): 2711–16. MEDLINE. Excluded: included people who had CRC previously

Tischendorf JJ, Wasmuth HE, Koch A et al. (2007) Value of magnifying chromoendoscopy and narrow band imaging (NBI) in classifying colorectal polyps: a prospective controlled study. Endoscopy 39 (12): 1092–6. MEDLINE. Excluded: included people with previous CRC

Togashi K, Hewett DG, Radford-Smith GL et al. (2009) The use of indigocarmine spray increases the colonoscopic detection rate of adenomas. Journal of Gastroenterology 44 (8): 826–33. MEDLINE. Excluded: included people who previously had CRC

Togashi K, Hewett D, Whitaker D et al. (2005) Does the use of indigocarmine spray increase the colonoscopic detection rate of advanced adenomas? [abstract] Journal of Gastroenterology 128 (4 Suppl. 2). Excluded: 2009 study available

Waye JD, Ganc AJ, Khelifa HB et al. (2002) Chromoscopy and zoom colonoscopy. Gastrointestinal Endoscopy 55 (6): 765–6. Excluded: narrative comment on the use of chromoendoscopy for the treatment of Barrett's oesophagus

Review question 3

When should colonoscopic surveillance be started and what should be the frequency of surveillance?

Eligibility criteria

Inclusion criteria

- Population
  - Adults (18 years and older) with IBD (defined as ulcerative colitis or Crohn's disease involving the large bowel).
  - Adults with polyps (including adenomas) in the colon or rectum.
- Intervention
  - Chromoscopy or conventional colonoscopy.

- Factors
  - Looking at any prognostic factors or surveillance schemes for colorectal cancer.
- Study design
  - No study design filter.

Exclusion criteria

- Population
  - Children (younger than 18 years).
  - Adults with newly diagnosed or relapsed adenocarcinoma of the colon or rectum.
  - Adults with polyps that have previously been treated for colorectal cancer.
  - Adults with a genetic familial - history of colorectal cancer: hereditary non-polyposis colorectal cancer.
  - Adults with a familial history of polyposis syndromes: familial adenomatous polyposis.
- Intervention
  - Interventions other than chromoscopy or conventional colonoscopy.

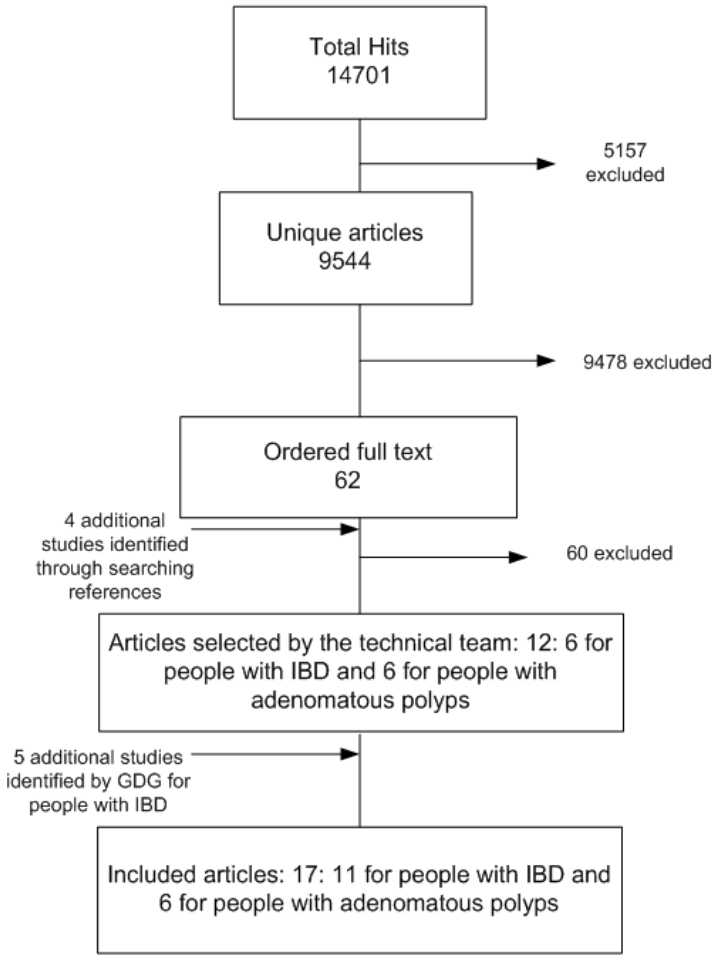
Evidence review results

- initial 14,701 hits including duplicates
- Total of 9544 unique articles
- Excluded on the basis of title and abstract: 9478
- Articles ordered full text: 62
- Additional articles found via daisy chaining: 4 (for people with adenomas).

Articles selected for review based on the inclusion and exclusion criteria were 6 for people with IBD and 6 for people with adenomas. Additionally 5 primary articles for people with IBD were provided by the GDG that were not identified by the technical team. The technical team decided to broaden the search criteria to try and identify other similar relevant prognostic studies that might have been missed because of strict search strategies and/or strict inclusion or exclusion criteria.

- Additional searches found 1781 articles (including some duplicates and non-English language papers).
- Based on the title and abstract alone 130 were assessed as relevant.
- Including the 11 papers already assessed as relevant, 140 articles in total (1 duplicate) were considered for this question.
- Where appropriate, reference lists of studies were checked to identify any further studies for inclusion. Studies identified as relevant from the searches and included in any of the meta-analyses were re-examined to see if any other relevant outcomes were reported (based on abstract alone).
- A total of 173 papers were considered as relevant based on title and abstract.
- Based on full text 28 studies were included.

6.1.1 Review flow chart



The additional studies identified from the updated search resulted in a total of 28 studies reviewed for this question.

Included studies for people with IBD

Askling J, Dickman PW, Karlen P et al. (2001) Family history as a risk factor for colorectal cancer in inflammatory bowel disease [abstract]. Gastroenterology 120 (6): 1356–62

Brentnall TA, Haggitt RC, Rabinovitch PS et al. (1996) Risk and natural history of colonic neoplasia in patients with primary sclerosing cholangitis and ulcerative colitis. Gastroenterology 110: 331–8

Broome U, Lindberg G, Lofberg R (1992) Primary sclerosing cholangitis in ulcerative colitis – a risk factor for the development of dysplasia and DNA aneuploidy? Gastroenterology 102: 1877–80

Broome U, Lofberg R, Veress B et al. (1995) Primary sclerosing cholangitis and ulcerative colitis: evidence for increased neoplastic potential. Hepatology 22: 1404–8

Eaden JA, Abrams KR, Mayberry JF (2001) The risk of colorectal cancer in ulcerative colitis: a meta-analysis. Gut 48: 526–35

Florin TH, Pandeya N, Radford-Smith GL (2004) Epidemiology of appendicectomy in primary sclerosing cholangitis and ulcerative colitis: its influence on the clinical behaviour of these diseases. Gut 53: 973–9

Friedman S, Rubin PH, Bodian C et al. (2001) Screening and surveillance colonoscopy in chronic Crohn's colitis. Gastroenterology 120: 820–6

Gilat T, Fireman Z, Grossman A et al. (1988) Colorectal cancer in patients with ulcerative colitis. A population study in central Israel. Gastroenterology 94: 870–7

Gupta RB, Harpaz N, Itzkowitz S et al. (2007) Histologic inflammation is a risk factor for progression to colorectal neoplasia in ulcerative colitis: a cohort study. Gastroenterology 133: 1099–105

Gyde SN, Prior P, Allan RN et al. (1988) Colorectal cancer in ulcerative colitis: a cohort study of primary referrals from three centres. Gut 29: 206–17

Hendriksen C, Kreiner S, Binder V (1985) Long term prognosis in ulcerative colitis – based on results from a regional patient group from the county of Copenhagen. Gut 26: 158–63

Jess T, Gamborg M, Matzen P et al. (2005) Increased risk of intestinal cancer in Crohn's disease: a meta-analysis of population-based cohort studies. American Journal of Gastroenterology 100: 2724–9

Jess T, Loftus EV Jr, Velayos FS et al. (2006) Incidence and prognosis of colorectal dysplasia in inflammatory bowel disease: a population-based study from Olmsted County, Minnesota. Inflammatory Bowel Diseases 12: 669–76

Jess T, Loftus EV Jr, Velayos FS et al. (2007) Risk factors for colorectal neoplasia in inflammatory bowel disease: a nested case-control study from Copenhagen county, Denmark and Olmsted county, Minnesota. American Journal of Gastroenterology 102: 829–36

Karlen P, Kornfeld D, Brostrom O et al. (1998) Is colonoscopic surveillance reducing colorectal cancer mortality in ulcerative colitis? A population based case control study. Gut 42: 711–14

Kvist N, Jacobsen O, Kvist HK et al. (1989) Malignancy in ulcerative colitis. Scandinavian Journal of Gastroenterology 24: 497–506

Langholz E, Munkholm P, Davidsen M et al. (1992) Colorectal cancer risk and mortality in patients with ulcerative colitis. Gastroenterology 103: 1444–51

Lennard-Jones JE, Melville DM, Morson BC et al. (1990) Precancer and cancer in extensive ulcerative colitis: findings among 401 patients over 22 years. Gut 31: 800–6

Loftus EV Jr, Harewood GC, Loftus CG et al. (2005) PSC-IBD: a unique form of inflammatory bowel disease associated with primary sclerosing cholangitis. Gut 54: 91–6

Nuako KW, Ahlquist DA, Mahoney DW et al. (1998) Familial predisposition for colorectal cancer in chronic ulcerative colitis: a case-control study. Gastroenterology 115: 1079–83

Nuako KW, Ahlquist DA, Sandborn WJ et al. (1998) Primary sclerosing cholangitis and colorectal carcinoma in patients with chronic ulcerative colitis: a case-control study. Cancer 82: 822–6

Rutter M, Saunders B, Wilkinson K et al. (2004) Severity of inflammation is a risk factor for colorectal neoplasia in ulcerative colitis. Gastroenterology 126: 451–9

Rutter MD, Saunders BP, Wilkinson KH et al. (2004) Cancer surveillance in longstandinq ulcerative colitis: Endoscopic appearances help predict cancer risk. Gut 53: 1813–16

Rutter MD, Saunders BP, Wilkinson KH et al. (2006) Thirty-year analysis of a colonoscopic surveillance program for neoplasia in ulcerative colitis. Gastroenterology 130: 1030–8

Soetikno RM, Lin OS, Heidenreich PA et al. (2002) Increased risk of colorectal neoplasia in patients with primary sclerosing cholangitis and ulcerative colitis: a meta-analysis. Gastrointestinal Endoscopy 56: 48–54

Stewenius J, Adnerhill I, Anderson H et al. (1995) Incidence of colorectal cancer and all cause mortality in non-selected patients with ulcerative colitis and indeterminate colitis in Malmo, Sweden. International Journal of Colorectal Disease 10: 117–22

Thomas T, Abrams KA, Robinson RJ et al. (2007) Meta-analysis: cancer risk of low-grade dysplasia in chronic ulcerative colitis. Alimentary Pharmacology and Therapeutics 25: 657–68

Velayos FS, Loftus J, Jess T et al. (2006) Predictive and protective factors associated with colorectal cancer in ulcerative colitis: a case–control study. Gastroenterology 130: 1941–9

Included studies for people with adenomas

Kronborg O, Jorgensen OD, Fenger C et al. (2006) Three randomized long-term surveillance trials in patients with sporadic colorectal adenomas. Scandinavian Journal of Gastroenterology 41: 737–43

Lieberman DA, Moravec M, Holub J et al. (2008) Polyp size and advanced histology in patients undergoing colonoscopy screening: implications for CT colonography. Gastroenterology 135 (4): 1100–105

Lieberman DA, Weiss DG, Harford WV et al. (2007) Five-year colon surveillance after screening colonoscopy. Gastroenterology 133: 1077–85

Lund JN, Scholefield JH, Grainge MJ et al. (2001) Risks, costs, and compliance limit colorectal adenoma surveillance: lessons from a randomised trial. Gut 49 (1): 91–6

Martinez ME, Baron JA, Lieberman DA et al. (2009) A pooled analysis of advanced colorectal neoplasia diagnoses after colonoscopic polypectomy. Gastroenterology 136 (3): 832–41

Nusko G, Mansmann U, Kirchner T et al. (2002) Risk related surveillance following colorectal polypectomy. Gut 51: 424–8

Saini SD, Kim HM, Schoenfeld P (2006) Incidence of advanced adenomas at surveillance colonoscopy in patients with a personal history of colon adenomas: a meta-analysis and systematic review. Gastrointestinal Endoscopy 64 (4): 614–26

Winawer SJ, Zauber AG, O'Brien MJ et al. (1993) Randomized comparison of surveillance intervals after colonoscopic removal of newly diagnosed adenomatous polyps. New England Journal of Medicine 328 (13): 901–6

Excluded studies

Anon (1997) Do benign diminutive adenomas mandate colonoscopy? Emergency Medicine (00136654) 29: 117. Excluded – magazine article – no references.

Anon (1999) Is colonoscopy indicated for small adenomas? Emergency Medicine (00136654) 31: 65. Excluded – Short magazine article – no references

Anon (2001) Colorectal screening and the risk of advanced proximal neoplasia in asymptomatic adults. Emergency Medicine (00136654) 33: 77. Excluded – short medical magazine article

Anon (2001) Colonoscopic surveillance has value in chronic Crohn colitis. Laparoscopic Surgery Update 9: 93. Excluded – short medical magazine discussion

Anon (2003) RN news watch: clinical highlights. Despite our best efforts, rate of recurrence of colorectal polyps is high. RN 66: 20. Excluded – news update on recurrence of colorectal polyps

Anon (2004) Colorectal cancer screening: how often is often enough? Emergency Medicine (00136654) 36: 53–4. Excluded – short medical magazine update

Aadland E, Schrumpf E, Fausa O et al. (1987) Primary sclerosing cholangitis: a long-term follow-up study. Scandinavian Journal of Gastroenterology 22: 655–64. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Aarnio M, Mustonen H, Mecklin JP et al. (1998) Prognosis of colorectal cancer varies in different high-risk conditions. Annals of Medicine 30: 75–80. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Abrahams NA, Halverson A, Fazio VW et al. (2002) Adenocarcinoma of the small bowel: a study of 37 cases with emphasis on histologic prognostic factors. Diseases of the Colon & Rectum 45: 1496–502. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Adler SN, Lyon DT, Sullivan PD (1982) Adenocarcinoma of the small bowel. Clinical features, similarity to regional enteritis, and analysis of 338 documented cases. American Journal of Gastroenterology 77: 326–30. Excluded – not patients with IBD

Ahsgren L, Jonsson B, Stenling R et al. (1993) Prognosis after early onset of ulcerative colitis. A study from an unselected patient population. Hepato-Gastroenterology 40: 467–70. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Alexander-Williams J (1976) Inflammatory disease of the bowel: the risk of cancer. Diseases of the Colon & Rectum 19: 579–81. Excluded – opinion piece

Ando T, Nishio Y, Watanabe O et al. (2008) Value of colonoscopy for prediction of prognosis in patients with ulcerative colitis. World Journal of Gastroenterology 14: 2133–8. Excluded – not systematic review [review; 66 refs]

Angulo P, Maor-Kendler Y, Lindor KD (2002) Small-duct primary sclerosing cholangitis: a long-term follow-up study. Hepatology 35: 1494–500. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Argov S, Sahu RK, Bernshtain E et al. (2004) Inflammatory bowel diseases as an intermediate stage between normal and cancer: a FTIR-microspectroscopy approach. Biopolymers 75: 384–92. Excluded– laboratory study comparing sample characteristics

Ataseven H, Parlak E, Yuksel I et al. (2009) Primary sclerosing cholangitis in Turkish patients: characteristic features and prognosis. Hepatobiliary & Pancreatic Diseases International 8: 312–5. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Atkin WS, Morson BC, Cuzick J (1992) Long-term risk of colorectal cancer after excision of rectosigmoid adenomas [see comment]. New England Journal of Medicine 326: 658–62. Excluded – intervention was rigid sigmoidscopy and one of the exclusion criteria was colonoscopy

Atkin WS, Williams CB, Macrae FA et al. (1992) Randomised study of surveillance intervals after removal of colorectal adenomas at colonoscopy [abstract]. Gut 33 (Suppl. 1): S52. Excluded – conference abstract – full article available

Balleste B, Bessa X, Pinol V et al. (2007) Detection of metachronous neoplasms in colorectal cancer patients: identification of risk factors. Diseases of the Colon & Rectum 50: 971–80. Excluded – excluded patients with IBD

Baxter NN, Goldwasser MA, Paszat LF et al. (2009) Association of colonoscopy and death from colorectal cancer. Annals of Internal Medicine 150: 1–8. Excluded – case control study but the controls were not true controls (not indivduals that had polypectomy without surveillance)

Beahrs OH (1982) Colorectal cancer staging as a prognostic feature. Cancer 50: 2615–7. Excluded – not systematic review. No link to people with IBD and subsequent risk of CRC

Beck DE, Opelka FG, Hicks TC et al. (1995) Colonoscopic follow-up of adenomas and colorectal cancer. Southern Medical Journal 88: 567–70. Excluded – narrative review –references checked

Befrits R, Ljung T, Jaramillo E et al. (2002) Low-grade dysplasia in extensive, long-standing inflammatory bowel disease: a follow–up study. Diseases of the Colon & Rectum 45: 615–20. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Bernstein CN (2006) Neoplasia in inflammatory bowel disease: surveillance and management strategies. Current Gastroenterology Reports 8: 513–8. Excluded – not systematic review. Checked reference list for relevant studies [review; 34 refs]

Bernstein CN, Blanchard JF, Kliewer E et al. (2001) Cancer risk in patients with inflammatory bowel disease: a population-based study. Cancer 91: 854–62. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Bernstein CN, Shanahan F, Weinstein WM (1994) Are we telling patients the truth about surveillance colonoscopy in ulcerative colitis? Lancet 343: 71–4. Excluded – systematic review on the effectiveness of surveillance. Checked reference list

Binder V (1988) Prognosis and quality of life in patients with ulcerative colitis and Crohn's disease. International Disability Studies 10: 172–4. Excluded – not systematic review

Binder V (2004) Epidemiology of IBD during the twentieth century: an integrated view. Best Practice & Research in Clinical Gastroenterology 18: 463–79. Excluded – not systematic reivew. Checked reference list.

Binder V, Hendriksen C, Kreiner S (1985) Prognosis in Crohn's disease – based on results from a regional patient group from the county of Copenhagen. Gut 26: 146–50. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Bjornsson E (2009) Small-duct primary sclerosing cholangitis. Current Gastroenterology Reports 11: 37–41. Excluded – not systematic review

Bond JH (2003) Update on colorectal polyps: Management and follow-up surveillance. Endoscopy 35: S35–40. Excluded – narrative review refrences checked

Bonderup OK, Folkersen BH, Gjersoe P et al. (1999) Collagenous colitis: a long-term follow-up study. European Journal of Gastroenterology & Hepatology 11: 493–5. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Bonnevie O, Binder V, Anthonisen P et al. (1974) The prognosis of ulcerative colitis. Scandinavian Journal of Gastroenterology 9: 81–91. Excluded – not risk of colorectal cancer.

Brackmann S, Andersen SN, Aamodt G et al. (2009) Two distinct groups of colorectal cancer in inflammatory bowel disease. Inflammatory Bowel Diseases 15: 9–16. Excluded – retrospective analysis of a series of patients with CRC

Branco BC, Harpaz N, Sachar DB et al. (2009) Colorectal carcinoma in indeterminate colitis. Inflammatory Bowel Diseases 15: 1076–81. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Bresci G, Parisi G, Capria A (2008) Duration of remission and long-term prognosis according to the extent of disease in patients with ulcerative colitis on continuous mesalamine treatment. Colorectal Disease 10: 814–17. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Brostrom O (1983) The role of cancer surveillance in long term prognosis of ulcerative colitis. Scandinavian Journal of Gastroenterology – Supplement 88: 40–2. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Brostrom O (1986) Ulcerative colitis in Stockholm County – a study of epidemiology, prognosis, mortality and cancer risk with special reference to a surveillance program. Acta Chirurgica Scandinavica – Supplementum 534: 1–60. Excluded – not available at British Library

Brostrom O, Monsen U, Nordenwall B et al. (1987) Prognosis and mortality of ulcerative colitis in Stockholm County, 1955–1979. Scandinavian Journal of Gastroenterology 22: 907–13. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Buckowitz A, Knaebel HP, Benner A et al. (2005) Microsatellite instability in colorectal cancer is associated with local lymphocyte infiltration and low frequency of distant metastases. British Journal of Cancer 92: 1746–53. Excluded – not patients with IBD

Canavan C, Abrams KR, Hawthorne B et al. (2007) Long-term prognosis in Crohn's disease: an epidemiological study of patients diagnosed more than 20 years ago in Cardiff. Alimentary Pharmacology & Therapeutics 25: 59–65. Excluded – not colorectal cancer related mortality. Overall mortality only

Chawla LS, Chinna JS, Dilawari JB et al. (1990) Course and prognosis of ulcerative colitis. Journal of the Indian Medical Association 88: 159–60. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Claessen MM, Lutgens MW, van Buuren HR et al. (2009) More right-sided IBD-associated colorectal cancer in patients with primary sclerosing cholangitis. Inflammatory Bowel Diseases 15: 1331–6. Excluded – retrospective analysis of a series of patients with CRC

Collier PE, Turowski P, Diamond DL (1985) Small intestinal adenocarcinoma complicating regional enteritis. Cancer 55: 516–21. Excluded – summary of published case reports

Cooke WT, Mallas E, Prior P et al. (1980) Crohn's disease: course, treatment and long term prognosis. Quarterly Journal of Medicine 49: 363–84. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Cosnes J (2008) Crohn's disease phenotype, prognosis, and long-term complications: what to expect? Acta Gastroenterologica Belgica 71: 303–7. Excluded – not systematic review

Cottone M, Scimeca D, Mocciaro F et al. (2008) Clinical course of ulcerative colitis. Digestive & Liver Disease 40: Suppl-52. Excluded – not systematic review. Checked reference list [review; 44 refs]

de Silva MV, Fernando MS, Fernando D (2000) Comparison of some clinical and histological features of colorectal carcinoma occurring in patients below and above 40 years. Ceylon Medical Journal 45: 166–8. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Dobbins WO III (1984) Dysplasia and malignancy in inflammatory bowel disease. Annual Review of Medicine 35: 33–48. Excluded – not systematic review [review; 43 refs]

Ebell M (2000) Does biannual colonoscopy improve survival in patients with ulcerative colitis? Evidence-Based Practice 3: 10, insert. Excluded – not available at British Library

Ebell M (2002) Is colonoscopy a reasonable screening test for colon cancer in patients aged 40 to 49? Evidence-Based Practice 5: 9–10, 2p. Excluded – not available at British Library

Ebell M (2002) Which patients with colorectal polyps are at greater risk of early recurrence? Evidence-Based Practice 5: 8–9, 2p. Excluded – conference abstract

Edwards FC, Truelove SC (1963) The course and prognosis of ulcerative colitis. Gut 4: 299–315. Excluded – not colorectal cancer related mortality. Overall mortality only

Ekbom A, Helmick CG, Zack M et al. (1992) Survival and causes of death in patients with inflammatory bowel disease: a population-based study. Gastroenterology 103: 954–60. Excluded – risk of death of CRC, not risk of CRC alone

Engelsgjerd M, Farraye FA, Odze RD (1999) Polypectomy may be adequate treatment for adenoma-like dysplastic lesions in chronic ulcerative colitis. Gastroenterology 117: 1288–94. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Farmer RG (1979) Long-term prognosis for patients with ulcerative proctosigmoiditis (ulcerative colitis confirmed to the rectum and sigmoid colon). Journal of Clinical Gastroenterology 1: 47–50. Excluded – not risk of colorectal cancer

Farmer RG (1989) Inflammatory bowel disease: who should be screened for cancer. Emergency Medicine (00136654) 21: 52. Excluded – medical magazine article on screening for IBD

Friedlich MS, Guindi M, Stern HS (2004) The management of dysplasia associated with ulcerative colitis: colectomy versus continued surveillance. Canadian Journal of Surgery 47: 212–4. Excluded – individual case report

Fujii S, Tominaga K, Kitajima K et al. (2005) Methylation of the oestrogen receptor gene in non-neoplastic epithelium as a marker of colorectal neoplasia risk in longstanding and extensive ulcerative colitis. Gut 54: 1287–92. Excluded – evaluation of biomarker for assessment of colorectal cancer risk

Goh HS (1987) Flow cytometry and colorectal neoplasia. Annals of the Academy of Medicine, Singapore 16: 535–8. Excluded – evaluation of DNA testing in risk assessment

Gorfine SR, Bauer JJ, Harris MT et al. (2000) Dysplasia complicating chronic ulcerative colitis: is immediate colectomy warranted? Diseases of the Colon & Rectum 43: 1575–81. Excluded –

assesses the utility of dysplasia as a test for cancer at colonoscopy. Not comparison of subgroups over time

Gossard AA, Angulo P, Lindor KD (2005) Secondary sclerosing cholangitis: a comparison to primary sclerosing cholangitis. American Journal of Gastroenterology 100: 1330–3. Excluded – not risk of colorectal cancer

Greenstein AJ, Sachar DB, Smith H et al. (1980) Patterns of neoplasia in Crohn's disease and ulcerative colitis. Cancer 46: 403–7. Excluded – not risk of colorectal cancer

Gurbuz AK, Giardiello FM, Bayless TM (1995) Colorectal neoplasia in patients with ulcerative colitis and primary sclerosing cholangitis. Diseases of the Colon & Rectum 38: 37–41. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Gurel S, Kiyici M (2005) Ulcerative colitis activity index: a useful prognostic factor for predicting ulcerative colitis outcome. Journal of International Medical Research 33: 103–10. Excluded – not risk of colorectal cancer

Harper PH, Fazio VW, Lavery IC et al. (1987) The long-term outcome in Crohn's disease. Diseases of the Colon & Rectum 30: 174–9. Excluded – not risk of colorectal cancer

Heimann TM, Oh SC, Martinelli G et al. (1992) Colorectal carcinoma associated with ulcerative colitis: a study of prognostic indicators. American Journal of Surgery 164: 13–7. Excluded – survival prognosis based on cancer related factors

Hellers G (1979) Crohn's disease in Stockholm county 1955–1974. A study of epidemiology, results of surgical treatment and long-term prognosis. Acta Chirurgica Scandinavica – Supplementum 490: 1–84. Excluded – not available at British Library

Henriksen M, Jahnsen J, Lygren I et al. (2006) Ulcerative colitis and clinical course: results of a 5-year population-based follow-up study (the IBSEN study). Inflammatory Bowel Diseases 12: 543–50. Excluded – not risk of colorectal cancer

Henriksen M, Jahnsen J, Lygren I et al. (2007) Clinical course in Crohn's disease: results of a five-year population-based follow-up study (the IBSEN study). Scandinavian Journal of Gastroenterology 42: 602–10. Excluded – not risk of colorectal cancer

Heresbach D, Alexandre JL, Bretagne JF et al. (2004) Crohn's disease in the over-60 age group: a population based study. European Journal of Gastroenterology & Hepatology 16: 657–64. Excluded – not risk of colorectal cancer

Hiwatashi N, Yamazaki H, Kimura M et al. (1991) Clinical course and long-term prognosis of Japanese patients with ulcerative colitis. Gastroenterologia Japonica 26: 312–8. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Holtmann MH, Galle PR (2004) Current concept of pathophysiological understanding and natural course of ulcerative colitis. Langenbecks Archives of Surgery 389: 341–9. Excluded – not systematic review. Checked reference list [review; 83 refs]

Hsieh CJ, Klump B, Holzmann K et al. (1998) Hypermethylation of the p16INK4a promoter in colectomy specimens of patients with long-standing and extensive ulcerative colitis. Cancer Research 58: 3942–5. Excluded – evaluation of biomarker for assessment of colorectal cancer risk

Iida M, Yao T, Okada M (1995) Long-term follow-up study of Crohn's disease in Japan. The Research Committee of Inflammatory Bowel Disease in Japan. Journal of Gastroenterology 30: Suppl–9. Excluded – not risk of colorectal cancer

Ismail T, Angrisani L, Powell JE et al. (1991) Primary sclerosing cholangitis: surgical options, prognostic variables and outcome. British Journal of Surgery 78: 564–7. Excluded – not risk of colorectal cancer

James EM, Carlson HC (1978) Chronic ulcerative colitis and colon cancer: can radiographic appearance predict survival patterns? AJR American: 825–30. Excluded – tumour assessment by barium enema examination

Jarvinen HJ, Turunen MJ (1984) Colorectal carcinoma before 40 years of age: prognosis and predisposing conditions. Scandinavian Journal of Gastroenterology 19: 634–8. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Jensen AB, Larsen M, Gislum M et al. (2006) Survival after colorectal cancer in patients with ulcerative colitis: a nationwide population-based Danish study. American Journal of Gastroenterology 101: 1283–7. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Jess T (2008) Prognosis of inflammatory bowel disease across time and countries. An epidemiological study of population-based patient cohorts. Danish Medical Bulletin 55: 103–20. Excluded – although systematic review with meta-analysis, summary estimates as reported were not relevant to this question as did not compare subgroups of people with IBD. Checked reference list [review; 81 refs]

Jess T, Loftus EV Jr, Velayos FS et al. (2006) Incidence and prognosis of colorectal dysplasia in inflammatory bowel disease: a population-based study from Olmsted County, Minnesota. Inflammatory Bowel Diseases 12: 669–76. Excluded – not all the patients were undergoing colonoscopic surveillance

Jess T, Riis L, Vind I et al. (2007) Changes in clinical characteristics, course, and prognosis of inflammatory bowel disease during the last 5 decades: a population-based study from Copenhagen, Denmark. Inflammatory Bowel Diseases 13: 481–9. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD).

Jess T, Winther KV, Munkholm P et al. (2004) Intestinal and extra-intestinal cancer in Crohn's disease: follow-up of a population-based cohort in Copenhagen County, Denmark. Alimentary Pharmacology & Therapeutics 19: 287–93. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Jonkers D, Ernst J, Pladdet I et al. (2006) Endoscopic follow-up of 383 patients with colorectal adenoma: an observational study in daily practice. European Journal of Cancer Prevention 15: 202–10. Excluded – case series

Jørgensen OD, Kronborg O, Fenger C (1994) Biennial versus quadrennial colonoscopic surveillance of patients with pedunculated and small sessile tubular and tubulovillous adenomas [abstract]. Gut 35 (Suppl. 4): A65. Excluded – abstract from conference proceedings – full study article available

Katoh H, Iwane S, Munakata A et al. (2000) Long-term prognosis of patients with ulcerative colitis in Japan. Journal of Epidemiology 10: 48–54. Excluded – not risk of colorectal cancer

Kelvin FM, Woodward BH, McLeod ME et al. (1982) Prospective diagnosis of dysplasia (precancer) in chronic ulcerative colitis. AJR American: 347–9. Excluded – case report

Khoury DA, Opelka FG, Beck DE et al. (1996) Colon surveillance after colorectal cancer surgery. Diseases of the Colon & Rectum 39: 252–5. Excluded – patients previously had colorectal adenocarcinoma

Korelitz BI, Lauwers GY, Sommers SC (1990) Rectal mucosal dysplasia in Crohn's disease. Gut 31: 1382–6. Excluded – biopsied using sigmoidoscoy, not colonoscopy

Krist AH, Jones RM, Woolf SH et al. (2007) Timing of repeat colonoscopy: disparity between guidelines and endoscopists' recommendation. American Journal of Preventive Medicine 33: 471–8. Excluded – study comparing the practice of endoscopists and guideline recommendations for colonoscopic surveillance

Kronberger IE, Graziadei IW, Vogel W (2006) Small bowel adenocarcinoma in Crohn's disease: a case report and review of literature. World Journal of Gastroenterology 12: 1317–20. Excluded – case report and narrative review [review; 60 refs]

Kronborg O, Hage E, Adamsen S et al. (1983) Follow-up after colorectal polypectomy. I. A comparison of the effectiveness of repeated examinations of the colon every 6 and 24 months after removal of stalked polyps. Scandinavian Journal of Gastroenterology 18: 1089–93. Excluded – results taken from 2006 article

Kronborg O, Hage E, Adamsen S et al. (1983) Follow-up after colorectal polypectomy. II. Repeated examinations of the colon every 6 months after removal of sessile adenomas and adenomas with the highest degrees of dysplasia. Scandinavian Journal of Gastroenterology 18: 1095–9. Excluded – results taken from the 2006 paper

Kronborg O, Hage E, Deichgraeber E (1981) The clean colon. A prospective, partly randomized study of the effectiveness of repeated examinations of the colon after polypectomy and radical surgery for cancer. Scandinavian Journal of Gastroenterology16: 879–84. Excluded – results taken from the 2006 paper

Kyle J, Ewen SW (1992) Two types of colorectal carcinoma in Crohn's disease. Annals of the Royal College of Surgeons of England 74: 387–90. Excluded – analysis of patients with CRC

Laiyemo AO, Pinsky PF, Marcus PM et al. (2009) Utilization and yield of surveillance colonoscopy in the continued follow-up study of the Polyp Prevention Trial. Clinical Gastroenterology and Hepatology 7: 562–7. Excluded – case series

Langholz E (1999) Ulcerative colitis. An epidemiological study based on a regional inception cohort, with special reference to disease course and prognosis. Danish Medical Bulletin 46: 400–15. Excluded – not systematic review. Checked reference list [review; 181 refs]

Langholz E, Munkholm P, Krasilnikoff PA et al. (1997) Inflammatory bowel diseases with onset in childhood. Clinical features, morbidity, and mortality in a regional cohort. Scandinavian Journal of Gastroenterology 32: 139–47. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Lashner BA, Bauer WM, Rybicki LA et al. (2003) Abnormal p53 immunohistochemistry is associated with an increased colorectal cancer-related mortality in patients with ulcerative colitis. American Journal of Gastroenterology 98: 1423–7. Excluded – evaluation of staining technique for gene mutations

Lashner BA, Shapiro BD, Husain A et al. (1999) Evaluation of the usefulness of testing for p53 mutations in colorectal cancer surveillance for ulcerative colitis. American Journal of Gastroenterology 94: 456–62. Excluded – evaluation of staining technique for gene mutations

Lavery IC, Chiulli RA, Jagelman DG et al. (1982) Survival with carcinoma arising in mucosal ulcerative colitis. Annals of Surgery 195: 508–12. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Lee PY, Fletcher WS, Sullivan ES et al. (1994) Colorectal cancer in young patients: characteristics and outcome. American Surgeon 60: 607–12. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Lennard-Jones JE, Misiewicz JJ, Parrish JA et al. (1974) Prospective study of outpatients with extensive colitis. Lancet 1: 1065–7. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Lind E, Fausa O, Gjone E et al. (1985) Crohn's disease. Treatment and outcome. Scandinavian Journal of Gastroenterology 20: 1014–8. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Loftus EV Jr, Sandborn WJ, Tremaine WJ et al. (1996) Risk of colorectal neoplasia in patients with primary sclerosing cholangitis. Gastroenterology 110: 432–40. Excluded – not people with IBD

Lovig T, Andersen SN, Clausen OP et al. (2007) Microsatellite instability in long-standing ulcerative colitis. Scandinavian Journal of Gastroenterology 42: 586–91. Excluded – evaluation of molecular marker for risk assessment

MacDougall IP (1964) The cancer risk in ulcerative colitis. Lancet 2: 655–8. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Manning AP, Bulgim OR, Dixon MF et al. (1987) Screening by colonoscopy for colonic epithelial dysplasia in inflammatory bowel disease. Gut 28: 1489–94. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Martinez ME, Henning SM, Alberts DS (2004) Folate and colorectal neoplasia: relation between plasma and dietary markers of folate and adenoma recurrence. American Journal of Clinical Nutrition 79: 691–7. Excluded – studying association of plasma and diet with adenoma recurrence

Martinez ME, Sampliner, R, Marshall, JR et al. (2001) Adenoma characteristics as risk factors for recurrence of advanced adenomas [abstract]. Gastroenterology 120 (5): 1077–83

Masala G, Bagnoli S, Ceroti M et al. (2004) Divergent patterns of total and cancer mortality in ulcerative colitis and Crohn’s disease patients: the Florence IBD study 1978. Gut 53: 1309–13. Excluded – identifies causes of mortality for IBD patients

Matek W, Guggenmoos-Holzmann I, Demling L (1985) Follow-up of patients with colorectal adenomas. Endoscopy 17: 175–81. Excluded – case series

Mayer DK (1992) Commentary on Long-term risk of colorectal cancer after excision of rectosigmoid adenomas [original article by Atkin W et al appears in NEW ENGL J MED 1992;326(10):658–62]. ONS Nursing Scan in Oncology 1: 5. Excluded – commentary/ discussion paper – not available through British library

Maykel JA, Hagerman G, Mellgren AF et al. (2006) Crohn's colitis: the incidence of dysplasia and adenocarcinoma in surgical patients. Diseases of the Colon & Rectum 49: 950–7. Excluded – cohort of patients undergoing colectomy

McGahren ED III, Mills SE, Wilhelm MC (1995) Colorectal carcinoma in patients 30 years of age and younger. American Surgeon 61: 78–82. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Melville DM, Jass JR, Morson BC et al. (1989) Observer study of the grading of dysplasia in ulcerative colitis: comparison with clinical outcome. Human Pathology 20: 1008–14. Excluded – evaluation of observer effect. Not direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Miseljic S, Galandiuk S, Myers SD et al. (1995) Expression of urokinase-type plasminogen activator and plasminogen activator inhibitor in colon disease. Journal of Clinical Laboratory Analysis 9: 413–7. Excluded – evaluation of protein UPA in risk assessment

Moore PA, Dilawari RA, Fidler WJ (1984) Adenocarcinoma of the colon and rectum in patients less than 40 years of age. American Surgeon 50: 10–4. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Moriyama T, Matsumoto T, Nakamura S et al. (2007) Hypermethylation of p14 (ARF) may be predictive of colitic cancer in patients with ulcerative colitis. Diseases of the Colon & Rectum 50: 1384–92. Excluded – evaluation of biomarker and molecular marker in risk assessment

Morris DS, Ewen KM, Selderbeek H (1985) Colonoscopy and the followup of colorectal carcinoma. New Zealand Medical Journal 98: 1009–10. Excluded – case series of patients getting surveillance post resection for colorectal cancer

Munkholm P, Langholz E, Davidsen M et al. (1993) Intestinal cancer risk and mortality in patients with Crohn's disease. Gastroenterology 105: 1716–23. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Myren J, Bouchier IA, Watkinson G et al. (1984) The O.M.G.E. Multinational Inflammatory Bowel Disease Survey 1976–1982. A further report on 2,657 cases. Scandinavian Journal of Gastroenterology – Supplement 95: 1–27. Excluded – survey of trialists

Ng EK, Chong WW, Jin H et al. (2009) Differential expression of microRNAs in plasma of patients with colorectal cancer: a potential marker for colorectal cancer screening. Gut 58: 1375–81. Excluded – evaluation of molecular marker in risk assessment

Niv Y, Hazazi R, Levi Z et al. (2008) Screening colonoscopy for colorectal cancer in asymptomatic people: a meta-analysis. Digestive Diseases and Sciences 53: 3049–54. Excluded – systematic review of diagnostic yields of screening colonoscopy for assymptomatic patients

Odze RD, Farraye, FA, Hecht, JL et al. (2004) Long-term follow-up after polypectomy treatment for adenoma-like dysplastic lesions in ulcerative colitis [abstract]. Clinical Gastroenterology and Hepatology : the official clinical practice journal of the American Gastroenterological Association 2 (7):534–41

Okada M, Sakurai T, Yao T et al. (1994) Clinical course and long-term prognosis of Crohn's disease in Japan. Journal of Gastroenterology 29: 406–14. Excluded – not risk of colorectal cancer

Okolicsanyi L, Fabris L, Viaggi S et al. (1996) Primary sclerosing cholangitis: clinical presentation, natural history and prognostic variables: an Italian multicentre study. The Italian PSC Study Group. European Journal of Gastroenterology & Hepatology 8: 685–91. Excluded – not risk of colorectal cancer

Olsen HW, Lawrence WA, Snook CW et al. (1988) Review of recurrent polyps and cancer in 500 patients with initial colonoscopy for polyps. Diseases of the Colon & Rectum 31: 222–7. Excluded – case series of patients undergoing surveillance after polyps detection

Oriuchi T, Hiwatashi N, Kinouchi Y et al. (2003) Clinical course and longterm prognosis of Japanese patients with Crohn's disease: predictive factors, rates of operation, and mortality. Journal of Gastroenterology 38: 942–53. Excluded – not risk of colorectal cancer

Palascak-Juif V, Bouvier AM, Cosnes J et al. (2005) Small bowel adenocarcinoma in patients with Crohn's disease compared with small bowel adenocarcinoma de novo. Inflammatory Bowel Diseases 11: 828–32. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Palli D, Masala G, Sera F et al. (2006) Colorectal cancer risk in patients affected with Crohn's disease. American Journal of Gastroenterology 101: 1400–1. Excluded – letter correcting Jess 2005. Not direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Park SH, Kim YM, Yang SK et al. (2007) Clinical features and natural history of ulcerative colitis in Korea. Inflammatory Bowel Diseases 13: 278–83. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Perman E, Hanauer S, Szeless S et al. (1995) International forum on ulcerative colitis. Risk selection aspects of ulcerative colitis. Journal of Insurance Medicine (Seattle) 27: 167–80. Excluded – not available at British Library

Persson PG, Bernell O, Leijonmarck CE et al. (1996) Survival and cause-specific mortality in inflammatory bowel disease: a population-based cohort study. Gastroenterology 110: 1339–45. Excluded – not risk of CRC

Peter HR, Sonya, F, Noam, H et al. (1999) Colonoscopic polypectomy in chronic colitis: conservative management after endoscopic resection of dysplastic polyps [abstract]. Gastroenterology 117 (6):1295–300

Provenzale D, Kowdley KV, Arora S et al. (1995) Prophylactic colectomy or surveillance for chronic ulcerative colitis? A decision analysis. Gastroenterology 109: 1188–96. Excluded – model, not primary research

Ribeiro MB, Greenstein AJ, Heimann TM et al. (1991) Adenocarcinoma of the small intestine in Crohn's disease. Surgery, Gynecology & Obstetrics 173: 343–9. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD).

Risques RA, Rabinovitch PS, Brentnall TA (2006) Cancer surveillance in inflammatory bowel disease: new molecular approaches. Current Opinion in Gastroenterology 22: 382–90. Excluded – review of molecular techniques for risk assessment [review; 103 refs]

Ritchie JK, Hawley PR, Lennard-Jones JE (1981) Prognosis of carcinoma in ulcerative colitis. Gut 22: 752–5. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Rodriguez-Bigas MA, Mahoney MC, Weber TK et al. (1996) Colorectal cancer in patients aged 30 years or younger. Surgical Oncology 5: 189–94. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Rubin DT, Rothe JA, Hetzel JT et al. (2007) Are dysplasia and colorectal cancer endoscopically visible in patients with ulcerative colitis? [see comment]. Gastrointestinal Endoscopy 65: 998–1004. Excluded – studying the endoscopic visibility of dysplasia and CRC in UC

Rutegard J, Ahsgren L, Janunger KG (1988) Ulcerative colitis. Mortality and surgery in an unselected population. Acta Chirurgica Scandinavica 154: 215–9. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Sachar DB, Greenstein AJ (1981) Cancer in ulcerative colitis: good news and bad news. Annals of Internal Medicine 95: 642–4. Excluded – editorial

Saegesser F, Waridel D (1969) Does the frequency of canceration in ulcerative colitis justify a prophylactic proctocolectomy? American Journal of Proctology 20: 33–44. Excluded – not systematic review

Schoen RE, Gerber, LD, Margulies, C (1997) The pathologic measurement of polyp size is preferable to the endoscopic estimate [abstract]. Gastrointestinal Endoscopy 46 (6):492–6

Schoen RE, Pinsky PF, Weissfeld JL et al. (2003) Results of repeat sigmoidoscopy 3 years after a negative examination [see comment]. JAMA 290: 41–8. Excluded – sigmoidscopy results

Schuman BM (2000) Premalignant lesions of the gastrointestinal tract. Surveillance regimens for three treatable disorders. Postgraduate Medicine 91: 219–22. Excluded – discussion paper on Barrett's oesophagus, UC and adenomatous polyps surveillance [review; 13 refs]

Shaughnessy A (1998) Is it necessary to perform a colonoscopy in patients found to have small adenomas on screening sigmoidoscopy? Evidence-Based Practice 1: –7, insert. Excluded – not available at British Library

Sjoqvist U (2004) Dysplasia in ulcerative colitis--clinical consequences? Langenbecks Archives of Surgery 389: 354–60. Excluded – not systematic review. Checked reference list [review; 56 refs]

Smith C, Butler JA (1989) Colorectal cancer in patients younger than 40 years of age. Diseases of the Colon & Rectum 32: 843–6. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Snapper SB, Syngal S, Friedman LS (1998) Ulcerative colitis and colon cancer: more controversy than clarity. Digestive Diseases 16: 81–7. Excluded – narrative review – references checked [review; 80 refs]

Solberg IC, Lygren I, Jahnsen J et al. (2009) Clinical course during the first 10 years of ulcerative colitis: results from a population-based inception cohort (IBSEN Study). Scandinavian Journal of Gastroenterology 44: 431–40. Excluded – not risk of colorectal cancer

Storgaard L, Bischoff N, Henriksen FW et al. (1979) Survival rate in Crohn's disease and ulcerative colitis. Scandinavian Journal of Gastroenterology 14: 225–30. Excluded – not risk of colorectal cancer

Symonds DA, Vickery AL (1976) Mucinous carcinoma of the colon and rectum. Cancer 37: 1891–900. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Tanaka A, Takamori Y, Toda G et al. (2008) Outcome and prognostic factors of 391 Japanese patients with primary sclerosing cholangitis. Liver International 28: 983–9. Excluded – not risk of colorectal cancer

Thomas GM, Sampliner RE, Garewal HS et al. (1996) The difference in colon polyp size before and after removal [abstract]. Gastrointestinal Endoscopy 43 (1):25–28

Travis SP (1997) Review article: insurance risks for patients with ulcerative colitis or Crohn's disease. Alimentary Pharmacology & Therapeutics 11: 51–9. Excluded – not systematic review. Checked reference list [review; 23 refs]

Triantafillidis JK, Emmanouilidis A, Manousos O et al. (1997) Ulcerative colitis in Greece: course and prognostic factors in 413 consecutive patients. Italian Journal of Gastroenterology & Hepatology 29: 285–6. Excluded – not risk of colorectal cancer

Triantafillidis JK, Emmanouilidis A, Manousos ON et al. (1998) Ulcerative colitis in Greece: clinicoepidemiological data, course, and prognostic factors in 413 consecutive patients. Journal of Clinical Gastroenterology 27: 204–10. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Ullman T, Odze R, Farraye FA (2009) Diagnosis and management of dysplasia in patients with ulcerative colitis and Crohn's disease of the colon. Inflammatory Bowel Diseases 15: 630–8. Excluded – narrative review – references checked

Umpleby HC, Williamson RC (1984) Carcinoma of the large bowel in the first four decades. British Journal of Surgery 71: 272–7. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Weterman IT, Biemond I, Pena AS (1990) Mortality and causes of death in Crohn's disease. Review of 50 years' experience in Leiden University Hospital. Gut 31: 1387–90. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Wexner SD, Reissman P, Pfeifer J et al. (1996) Laparoscopic colorectal surgery: analysis of 140 cases. Surgical Endoscopy 10: 133–6. Excluded – aimed to evaluate effect of surgery

Whelan G (1991) Ulcerative colitis – what is the risk of developing colorectal cancer? Australian & New Zealand Journal of Medicine 21: 71–7. Excluded – not systematic review. Checked reference list [review; 43 refs]

Winawer SJ (1999) Appropriate intervals for surveillance. Gastrointestinal Endoscopy 49: t-6. Excluded – narrative review – references checked

Winawer SJ, Zauber AG, Fletcher RH et al. (2006) Guidelines for colonoscopy surveillance after polypectomy: a consensus update by the US Multi-Society Task Force on Colorectal Cancer and the American Cancer Society. Gastroenterology 130: 1872–85. Excluded – American guidelines based on literature review for post polypectomy surveillance – references checked [review; 83 refs]

Wolters FL, Russel MG, Stockbrugger RW (2004) Systematic review: has disease outcome in Crohn's disease changed during the last four decades? Alimentary Pharmacology & Therapeutics 20: 483–96. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD) [review; 200 refs]

Wyatt MG, Houghton PW, Mortensen NJ et al. (1987) The malignant potential of colorectal Crohn's disease. Annals of the Royal College of Surgeons of England 69: 196–8. Excluded – report of case series (n=6)

Yano Y, Matsui T, Uno H et al. (2008) Risks and clinical features of colorectal cancer complicating Crohn's disease in Japanese patients. Journal of Gastroenterology & Hepatology 23: 1683–8. Excluded – no direct comparison of risk of colorectal cancer by subgroup (as identified at index colonoscopy or related to IBD)

Yantiss RK, Goodarzi M, Zhou XK et al. (2009) Clinical, pathologic, and molecular features of early-onset colorectal carcinoma. American Journal of Surgical Pathology 33: 572–82. Excluded – evaluation of molecular techniques for risk assessment

Review question 4

What are the information and support needs of people, or carers of people undergoing or considering undergoing colonoscopic surveillance?

Eligibility criteria

Inclusion criteria

- Population
  - Adults (18 years and older) with IBD (defined as ulcerative colitis or Crohn's disease involving the large bowel) considering colonscopy.
  - Adults with polyps (including adenomas) in the colon or rectum considering colonscopy.
- Intervention
  - Any discussion of patient preference or views on the procedure or the process of surveillance.
- Study design
  - No study design filter.

Exclusion criteria

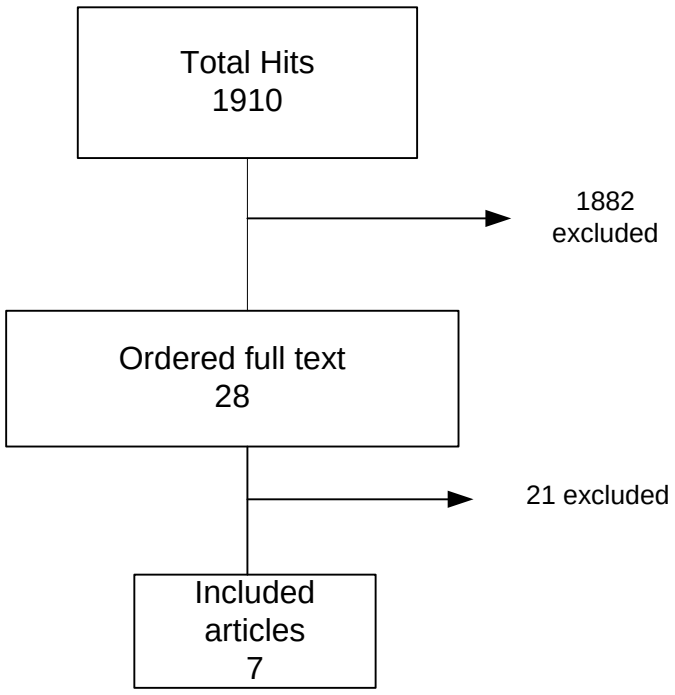
- Population
  - Children (younger than 18 years).
  - Adults with newly diagnosed or relapsed adenocarcinoma of the colon or rectum.
  - Adults with polyps that have previously been treated for colorectal cancer.
  - Adults with a genetic familial history of colorectal cancer: hereditary non-polyposis colorectal cancer.
  - Adults with a familial history of polyposis syndromes: familial adenomatous polyposis.
- Intervention
  - Views or preferences on interventions other than chromoscopy or conventional colonoscopy or surveillance.

Evidence review results

- Initial 1910 hits including duplicates
- Excluded on the basis of title and abstract: 1882
- Articles ordered full text: 28

Articles selected for review based on the inclusion and exclusion criteria were seven primary studies. It was agreed not to split by the evidence by groups for this question.

Review flow chart



Included studies (both groups)

Brotherstone H, Miles A, Robb KA et al. (2006) The impact of illustrations on public understanding of the aim of cancer screening. Patient Education and Counseling 63 (3 special issue): 328–35

Makoul G, Cameron KA, Baker DW et al. (2009) A multimedia patient education program on colorectal cancer screening increases knowledge and willingness to consider screening among Hispanic/Latino patients. Patient Education and Counseling 76 (2): 220–6.

Miles A, Atkin WS, Kralj-Hans I et al. (2009) The psychological impact of being offered surveillance colonoscopy following attendance at colorectal screening using flexible sigmoidoscopy. Journal of Medical Screening 16 (3):124–30

Rutter MD, Saunders BP, Wilkinson KH et al. (2006) Intangible costs and benefits of ulcerative colitis surveillance: a patient survey. Diseases of the Colon and Rectum 49 (8): 1177–83

Sequist TD, Zaslavsky AM, Marshall R et al. (2009) Patient and physician reminders to promote colorectal cancer screening: a randomized controlled trial. Archives of Internal Medicine 169 (4): 364–71

Sheikh RA, Kapre S, Calof OM et al. (2004) Screening preferences for colorectal cancer: a patient demographic study. Southern Medical Journal 97 (3): 224–30

Thiis-Evensen E, Wilhelmsen I, Hoff GS et al. (1999) The psychologic effect of attending a screening program for colorectal polyps. Scandinavian Journal of Gastroenterology 34 (1): 103–9

Excluded studies

Akerkar GA, Yee J, Hung R et al. (2001) Patient experience and preferences toward colon cancer screening: a comparison of virtual colonoscopy and conventional colonoscopy [see comment]. Gastrointestinal Endoscopy 54 (3): 310–15. MEDLINE. Excluded: comparing CTC to conventional colonoscopy

Angelucci E, Orlando A, Ardizzone S et al. (2009) Internet use among inflammatory bowel disease patients: an Italian multicenter survey. European Journal of Gastroenterology & Hepatology 21 (9): 1036–41. In-Process. Excluded: not looking at the clinical question of interest

Bosworth HB, Rockey DC, Paulson EK et al. (2006) Prospective comparison of patient experience with colon imaging tests [see comment]. American Journal of Medicine 119 (9): 791–9. MEDLINE. Excluded: not looking at the clinical question of interest

Denberg TD, Coombes JM, Byers TE et al. (2006) Effect of a mailed brochure on appointment-keeping for screening colonoscopy: a randomized trial. Annals of Internal Medicine 145 (12): 895–900. Excluded: appointment-keeping for screening colonoscopy

Eaden J, Abrams K, Shears J et al. Randomized controlled trial comparing the efficacy of a video and information leaflet versus information leaflet alone on patient knowledge about surveillance and cancer risk in ulcerative colitis. Inflammatory Bowel Diseases 8 (6): 407–12. MEDLINE. Excluded: covered by Makoul, 2009 and Brotherstone, 2006

Freedom from inflammatory bowel disease: keys to personalized ulcerative colitis management (2008) Gastroenterology and Hepatology 4 (5 Suppl. 13): 5–14. Excluded: not looking at the clinical question of interest

Gray JR, Leung E, Scales J (2009) Treatment of ulcerative colitis from the patient's perspective: a survey of preferences and satisfaction with therapy. Alimentary Pharmacology & Therapeutics 29 (10): 1114–20. In-Process. Excluded: not looking at the clinical question of interest

Halligan S, Altman DG, Taylor SA et al. (2005) CT colonography in the detection of colorectal polyps and cancer: systematic review, meta-analysis, and proposed minimum data set for study level reporting. Radiology 237 (3): 893–904. Excluded: CT colonography in the detection of colorectal polyps and cancer

Halligan S, Lilford RJ, Wardle J et al. (2007) Design of a multicentre randomized trial to evaluate CT colonography versus colonoscopy or barium enema for diagnosis of colonic cancer in older symptomatic patients: the SIGGAR study. Trials 8. Article Number: 32. Excluded: CT colonography versus colonoscopy or barium enema for diagnosis of colonic cancer in older symptomatic patients

Lacy BE, Weiser K, Noddin L et al. (2007) Irritable bowel syndrome: patients' attitudes, concerns and level of knowledge. Alimentary Pharmacology and Therapeutics 25 (11): 1329–41. Excluded: not looking at the clinical question of interest

Lydeard S (1990) Endoscopy: a patient's view. Practitioner 233 (1468): 696. MEDLINE. Excluded: not looking at the clinical question

Macrae FA, Tan KG, Williams CB (1983) Towards safer colonoscopy: a report on the complications of 5000 diagnostic or therapeutic colonoscopies. Gut 24 (5): 376–83. Excluded: not looking at the clinical question of interest

Miles A, Wardle J, Atkin W (2003) Receiving a screen-detected diagnosis of cancer: the experience of participants in the UK flexible sigmoidoscopy trial. Psycho-Oncology 12 (8): 784–802. Excluded: not looking at the clinical question of interest

Pernotto DA, Bairnsfather L, Sodeman W (1995) 'Informed consent' interactive videodisc for patients having a colonoscopy, a polypectomy, and an endoscopy. Medinfo 8, t. MEDLINE. Excluded: discussion on informed consent

Robinson RJ, Hart AR, Mayberry JF (1996) Cancer surveillance in ulcerative colitis: a survey of patients' knowledge. Endoscopy 28 (9): 761–62. Excluded: covered in the list of included papers

Schroy PC, Glick JT, Wilson S et al. (2008) An effective educational strategy for improving knowledge, risk perception, and risk communication among colorectal adenoma patients. Journal of Clinical Gastroenterology 42 (6): 708–714. Excluded: not looking at the clinical question of interest

Shen B (2008) Managing medical complications and recurrence after surgery for Crohn's disease. Current Gastroenterology Reports 10 (6): 606–11. Excluded: not looking at the clinical question of interest

Terheggen G, Lanyl B, Schanz S et al. (2008) Safety, feasibility, and tolerability of ileocolonoscopy in inflammatory bowel disease. Endoscopy 40 (8): 656–63. Excluded: not looking at the clinical question of interest

Wardle J, Williamson S, Sutton S et al. (2003) Psychological impact of colorectal cancer screening. Health Psychology 22 (1): 54–9. Excluded: covered by Thiis-Evensen, 1999 and Miles, 2009

Waye JD (2002) The best way to painless colonoscopy. Endoscopy 34 (6): 489–91. Excluded: covered by included papers

White TJ, Avery GR, Kennan N et al. (2009) Virtual colonoscopy vs conventional colonoscopy in patients at high risk of colorectal cancer – a prospective trial of 150 patients. Colorectal Disease 11 (2): 138–45. Excluded: colonoscopy versus CTC

Appendix 5 –Search strategies and literature search

Scoping searches

Scoping searches were undertaken in September 2009 using the following websites and databases (listed in alphabetical order); browsing or simple search strategies were employed. The search results were used to provide information for scope development and project planning.

Guidance/guidelines	**Systematic reviews/economic evaluations**
Age Concern England	Clinical Evidence
American Gastroenterological Association	Cochrane Database of Systematic Reviews (CDSR)
American Society of Colon & Rectal Surgeons	Database of Abstracts of Reviews of Effects (DARE)
Association of Coloproctology of Great Britain and Ireland	Health Economics Evaluations Database (HEED)
Beating Bowel Cancer	Health Technology Assessment (HTA) Database
British Geriatric Society	NHS Economic Evaluation Database (NHS EED)
British Society of Gastroenterology	NHS R&D Service Delivery and Organisation (NHS SDO) Programme
Canadian Medical Association Infobase	National Institute for Health Research (NIHR) Health Technology Assessment Programme
Clinical Knowledge Summaries	TRIP Database
Core	
Department of Health	
Guidelines International Network (GIN)	
Lynn's Bowel Cancer Campaign	
National Association for Crohn's and Colitis (NACC)	
National Health and Medical Research Council (Australia)	
National Institute for Health and	

Clinical Excellence (NICE) New Zealand Guidelines Group NHS Evidence – National Library of Guidelines NHS Evidence – Specialist Collections Primary Care Society for Gastroenterology Royal College of General Practitioners Royal College of Nursing Royal College of Paediatrics and Child Health Royal College of Pathologists Royal College of Physicians Royal College of Surgeons Scottish Intercollegiate Guidelines Network (SIGN) US National Guidelines Clearinghouse	

Main searches

The following sources were searched for the topics presented in the sections below.

- Cochrane Database of Systematic Reviews – CDSR (Wiley)
- Cochrane Central Register of Controlled Trials – CENTRAL (Wiley)
- Database of Abstracts of Reviews of Effects – DARE (CRD Databases)
- Health Technology Assessment Database HTA (CRD Databases)
- CINAHL (EBSCO and NHS Evidence – Search 2.0)
- EMBASE (Ovid)
- MEDLINE (Ovid)

- MEDLINE In-Process (Ovid)
- PSYCINFO (Ovid)

The searches were conducted in November 2009. The aim of the searches was to provide evidence on colonoscopic surveillance (using conventional colonoscopy or chromoscopy) for prevention and early detection of colorectal cancer compared with no surveillance. Search filters for systematic reviews, randomised controlled trials, and observational studies were appended to the search strategies to retrieve high quality papers (see **Identification of systematic reviews, randomised controlled trials, and observational studies**).

The MEDLINE search strategy is presented below. It was translated for use in all of the other databases.

Database: Ovid MEDLINE(R)<1950 to October Week 5 2009>

Date searched: 11th November 2009

Search strategy:

---

1. ulcerative colitis/
2. (ulcer$ adj4 colitis).tw.
3. (rectocolitis or colitide$).tw.
4. crohn disease/
5. crohn$.tw.
6. ((terminal or regional or granulomatous) adj3 (ileitis or colitis)).tw.
7. (ileocolitis or enteritis).tw.
8. inflammatory bowel disease/
9. (inflam$ adj3 bowel$ adj3 (disease$ or disorder$)).tw.
10. polyps/
11. intestinal polyps/
12. colonic polyps/
13. exp adenomatous polyps/
14. (polyp? or adenoma$).tw.
15. ((adenomatous or famil$ or hereditary or inherit$) adj3 polyposis).tw.
16. (gardner adj syndrom$).tw.
17. or/1-16
18. exp colonoscopy/
19. (colonoscop$ or coloscop$ or sigmoidoscop$ or chromoscop$).tw.
20. mass screening/
21. population surveillance/
22. or/18-21
23. 17 and 22

Identification of evidence on surveillance using other methods.

The searches were conducted in November 2009. The aim of the searches was to provide evidence on colonoscopic surveillance (using conventional colonoscopy or chromoscopy) for prevention and early detection of colorectal cancer compared with surveillance using other methods, such as flexible sigmoidoscopy, double-contrast barium enema, computed tomographic colonography,and tri-modal imaging (high resolution white light endoscopy, narrow-band imaging and auto-fluorescence imaging).

The MEDLINE search strategy is presented below. It was translated for use in all of the other databases.

Database: MEDLINE(R) <1950 to November Week 2 2009>

Date searched: 23rd November 2009

Search strategy:

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1. ulcerative colitis/ use mesz
2. (ulcer$ adj4 colitis).tw. use mesz
3. (colitide$ or rectocolitis).tw. use mesz
4. crohn disease/ use mesz
5. crohn$.tw. use mesz
6. ((terminal or regional or granulomatous) adj3 (ileitis or colitis)).tw. use mesz
7. (ileocolitis or enteritis).tw. use mesz
8. inflammatory bowel disease/ use mesz
9. (inflam$ adj3 bowel$ adj3 (disease$ or disorder$)).tw. use mesz
10. polyps/ use mesz
11. intestinal polyps/ use mesz
12. colonic polyps/ use mesz
13. exp adenomatous polyps/ use mesz
14. (polyp? or adenoma$).tw. use mesz
15. ((adenomatous or famil$ or hereditary or inherit$) adj3 polyposis).tw. use mesz
16. (gardner adj syndrom$).tw. use mesz
17. or/1-16
18. sigmoidoscopy/ use mesz
19. proctoscopy/ use mesz

20. (sigmoid?oscop$ or proctosigmoid?oscop$ or colonograp$ or proctoscop$ or rectoscop$).tw. use mesz
21. fsig.tw. use mesz
22. barium sulfate/ use mesz
23. enema/ use mesz
24. 22 and 23
25. (barium adj3 (enema$ or exam$)).tw. use mesz
26. (double adj2 contrast$ adj2 (enema$ or exam$)).tw. use mesz
27. (contrast$ adj2 enema$).tw. use mesz
28. (clysma$ or clyster$ or enteroclysis$).tw. use mesz
29. dcbe.tw. use mesz
30. or/24-29
31. colonography, computed tomographic/ use mesz
32. (comput$ adj2 tomograp$ adj2 (colonograp$ or pneumocolon$)).tw. use mesz
33. (ct adj2 (colonograp$ or pneumocolon$)).tw. use mesz
34. (virtual adj2 (colonoscop$ or pneumocolon$)).tw. use mesz
35. (trimodal$ adj2 imag$).tw. use mesz
36. (tri adj2 modal$ adj2 imag$).tw. use mesz
37. (high adj2 resolution adj2 endoscop$).tw. use mesz
38. (white adj2 light adj2 endoscop$).tw. use mesz
39. wle.tw. use mesz
40. (narrow adj2 band adj2 imag$).tw. use mesz
41. (narrowband adj2 imag$).tw. use mesz
42. nbi.tw. use mesz
43. fluorescence/ use mesz
44. microscopy, fluorescence/ use mesz
45. (autofluorescence adj2 (imag$ or endoscop$)).tw. use mesz
46. (auto adj fluorescence adj2 (imag$ or endoscop$)).tw. use mesz
47. or/18-21,30-46
48. 17 and 47

Identification of evidence on the information and support needs of people undergoing or considering undergoing colonoscopic surveillance.

The searches were conducted in December 2009. The aim of the searches was to provide evidence on the information and support needs of people undergoing or considering undergoing colonoscopic surveillance.

The MEDLINE search strategy is presented below. It was translated for use in all of the other databases.

Database: Ovid MEDLINE(R) <1950 to November Week 3 2009>

Date searched: 10th December 2009

Search strategy:

---

1. Colitis, Ulcerative/
2. (ulcer$ adj4 colitis).tw.
3. (rectocolitis or colitide$).tw.
4. crohn disease/
5. crohn$.tw.
6. ((terminal or regional or granulomatous) adj3 (ileitis or colitis)).tw.
7. (ileocolitis or enteritis).tw.
8. inflammatory bowel disease/
9. (inflam$ adj3 bowel$ adj3 (disease$ or disorder$)).tw
10. polyps/
11. intestinal polyps/
12. colonic polyps/
13. exp adenomatous polyps/
14. (polyp? or adenoma$).tw.
15. ((adenomatous or famil$ or hereditary or inherit$) adj3 polyposis).tw.
16. (gardner adj syndrom$).tw.
17. or/1-16
18. exp colonoscopy/
19. proctoscopy/
20. (colonoscop$ or coloscop$ or colonograp$ or chromoscop$ or sigmoid?oscop$ or proctosigmoid?scop$ or proctoscop$ or rectoscop$).tw.
21. fsig.tw.
22. barium sulfate/
23. enema/
24. 22 and 23
25. (barium adj3 (enema$ or exam$)).tw.
26. (double adj2 contrast$ adj2 (enema$ or exam$)).tw
27. (contrast$ adj2 enema$).tw.
28. (clysma$ or clyster$ or enteroclysis$).tw.
29. dcbe.tw.
30. or/24-29
31. colonography, computed tomographic/
32. (comput$ adj2 tomograp$ adj2 (colonograp$ or pneumocolon$)).tw.

33. (ct adj2 (colonograp$ or pneumocolon$)).tw.
34. (virtual adj2 (colonoscop$ or pneumocolon$)).tw.
35. (trimodal$ adj2 imag$).tw.
36. (tri adj2 modal$ adj2 imag$).tw.
37. (high adj2 resolution adj2 endoscop$).tw.
38. (white adj2 light adj2 endoscop$).tw.
39. wle.tw.
40. (narrow adj2 band adj2 imag$).tw.
41. (narrowband adj2 imag$).tw.
42. nbi.tw.
43. fluorescence/
44. microscopy, fluorescence/
45. (autofluorescence adj2 (imag$ or endoscop$)).tw.
46. (auto adj fluorescence adj2 (imag$ or endoscop$)).tw.
47. population surveillance/
48. mass screening/
49. or/18-21,30-48
50. 17 and 49
51. Qualitative research/
52. Nursing Methodology Research/
53. Interview/
54. Questionnaires/
55. Narration/
56. Health Care Surveys/
57. (qualitative$ or interview$ or focus group$ or questionnaire$ or narrative$ or narration$ or survey$).tw.
58. (ethno$ or emic or etic or phenomenolog$ or grounded theory or constant compar$ or (thematic$ adj3 analys$) or theoretical sampl$ or purposive sampl$).tw.
59. (hermeneutic$ or heidegger$ or husser$ or colaizzi$ or van kaam$ or van manen$ or giorgi$ or glasser$ or strauss$ or ricoeur$ or spiegelberg$ or merleau$).tw.
60. (metasynthes$ or meta-synthes$ or metasummar$ or meta-summar$ or metastud$ or meta-stud$).tw.
61. or/51-60
62. 50 and 61
63. Patients/
64. Family/
65. Spouses/

66. Caregivers/
67. or/63-66
68. Pamphlets/
69. Needs Assessment/
70. Information Centers/
71. Information Services/
72. Health Education/
73. Information Dissemination/
74. Counseling/
75. Social Support/
76. Self-Help Groups/
77. Self Care/
78. or/68-77
79. 67 and 78
80. Patient Education as Topic/
81. Patient Education Handout.pt.
82. Consumer Health Information/
83. ((patient$ or famil$ or relative$ or carer$ or caregiver$ or care-giver$ or spous$ or husband$ or wife$ or wive$ or partner$) adj5 (educat$ or informat$ or communicat$ or pamphlet$ or handout$ or hand-out$ or hand out$ or booklet$ or leaflet$ or support$ or need$ or advice$ or advis$)).ti.
84. ((patient$ or famil$ or relative$ or carer$ or caregiver$ or care-giver$ or spous$ or husband$ or wife$ or wive$ or partner$) adj5 (counsel$ or selfhelp$ or self-help$ or self help$ or selfcar$ or self-car$ or self car$)).ti.
85. or/80-84
86. 79 or 85
87. 50 and 86
88. exp patients/px
89. exp parents/px
90. exp family/px
91. caregivers/px
92. stress, psychological/
93. Emotions/
94. Anxiety/
95. Fear/
96. exp consumer satisfaction/
97. ((patient$ or parent$ or famil$ or carer$ or caregiver$ or care-giver$ or inpatient$ or in-patient$) adj2 (experience$ or belief$ or stress$ or emotion$ or anx$ or fear$ or

concern$ or uncertain$ or unsure$ or thought$ or feeling$ or felt$ or view$ or opinion$ or perception$ or perspective$ or attitud$ or satisfact$ or know$ or understand$ or aware$)).tw.
98. or/88-97
99. 50 and 98
100. 62 or 87 or 99
101. limit 100 to english language

Identification of systematic reviews, randomised controlled trials, and observational studies

Search filters for systematic reviews, randomised controlled trials, and observational studies were appended to the search strategy on **Identification of evidence on colonoscopic surveillance (and evidence on surveillance using other methods** above to retrieve high quality evidence.

The MEDLINE search filters are presented below. They were translated for use in the MEDLINE and EMBASE searches.

Systematic Reviews

1. Meta-Analysis.pt.
2. Meta-Analysis as Topic/
3. Review.pt.
4. exp Review Literature as Topic/
5. (metaanaly$ or metanaly$ or (meta adj2 analy$)).tw.
6. (review$ or overview$).tw.
7. (systematic$ adj4 (review$ or overview$)).tw.
8. ((quantitative$ or qualitative$) adj4 (review$ or overview$)).tw.
9. ((studies or trial$) adj1 (review$ or overview$)).tw.
10.(integrat$ adj2 (research or review$ or literature)).tw.
11.(pool$ adj1 (analy$ or data)).tw.
12.(handsearch$ or (hand adj2 search$)).tw.
13.(manual$ adj2 search$).tw.
14. or/1-13

Randomised Controlled Trials

1. Randomized Controlled Trial.pt.
2. Controlled Clinical Trial.pt.
3. Clinical Trial.pt.
4. exp Clinical Trials as Topic/
5. placebos/
6. Random Allocation/
7. Double-blind Method/
8. Single-Blind Method/
9. Cross-Over Studies/
10. ((random$ or control$ or clinical$) adj2 (trial$ or stud$)).tw.
11. (random$ adj2 allocat$).tw.
12. placebo$.tw.
13. ((singl$ or doubl$ or trebl$ or tripl$) adj (blind$ or mask$)).tw.
14. (crossover$ or (cross adj over$)).tw.
15. or/1-14

Observational Studies

1. Epidemiological studies/
2. exp case-control studies/
3. exp cohort studies/
4. Cross-Sectional Studies/
5. Comparative Study.pt.
6. case control$.tw.
7. case series.tw.
8. (cohort adj (study or studies)).tw.
9. cohort analy$.tw
10. (follow up adj (study or studies)).tw.
11. (observational adj (study or studies)).tw.
12. longitudinal.tw.
13. prospective.tw.
14. retrospective.tw.
15. cross sectional.tw.
16. or/1-15

Health economics

Sources

The following sources were searched to identify economic evaluations and quality of life data relating to colonoscopic surveillance (using conventional colonoscopy or chromoscopy) for prevention and early detection of colorectal cancer compared with no surveillance

- Health Economic Evaluations Database – HEED (Wiley)
- NHS Economic Evauation Database – NHS EED (Wiley and CRD website)
- EMBASE (Ovid)
- MEDLINE (Ovid)
- MEDLINE In-Process (Ovid)

Strategies

The searches were undertaken in November 2009. The MEDLINE search strategy presented in the sections RQ1 and RQ2 were used and translated for use in NHS EED and HEED. Filters to retrieve economic evaluations and quality of life papers were appended to the MEDLINE search strategy to identify relevant evidence.

The MEDLINE economic evaluations and quality of life search filters are presented below. They were translated for use in the MEDLINE In-Process and EMBASE databases.

Economics evaluations

1. Economics/
2. exp "Costs and Cost Analysis"/
3. Economics, Dental/
4. exp Economics, Hospital/
5. exp Economics, Medical/
6. Economics, Nursing/
7. Economics, Pharmaceutical/
8. Budgets/
9. exp Models, Economic/
10. Markov Chains/

11. Monte Carlo Method/
12. Decision Trees/
13. econom$.tw.
14. cba.tw.
15. cea.tw.
16. cua.tw.
17. markov$.tw.
18. (monte adj carlo).tw.
19. (decision adj2 (tree$ or analys$)).tw.
20. (cost or costs or costing$ or costly or costed).tw.
21. (price$ or pricing$).tw.
22. budget$.tw.
23. expenditure$.tw.
24. (value adj2 (money or monetary)).tw.
25. (pharmacoeconomic$ or (pharmaco adj economic$)).tw.
26. or/1-25

Quality of life

1. "Quality of Life"/
2. quality of life.tw.
3. "Value of Life"/
4. Quality-Adjusted Life Years/
5. quality adjusted life.tw.
6. (qaly$ or qald$ or qale$ or qtime$).tw.
7. disability adjusted life.tw.
8. daly$.tw.
9. Health Status Indicators/
10. (sf36 or sf 36 or short form 36 or shortform 36 or sf thirtysix or sf thirty six or shortform thirtysix or shortform thirty six or short form thirtysix or short form thirty six).tw.
11. (sf6 or sf 6 or short form 6 or shortform 6 or sf six or sfsix or shortform six or short form six).tw.
12. (sf12 or sf 12 or short form 12 or shortform 12 or sf twelve or sftwelve or shortform twelve or short form twelve).tw.
13. (sf16 or sf 16 or short form 16 or shortform 16 or sf sixteen or sfsixteen or shortform sixteen or short form sixteen).tw.
14. (sf20 or sf 20 or short form 20 or shortform 20 or sf twenty or sftwenty or shortform twenty or short form twenty).tw.

15. (euroqol or euro qol or eq5d or eq 5d).tw.
16. (qol or hql or hqol or hrqol).tw.
17. (hye or hyes).tw.
18. health$ year$ equivalent$.tw.
19. utilit$.tw.
20. (hui or hui1 or hui2 or hui3).tw.
21. disutili$.tw.
22. rosser.tw.
23. quality of wellbeing.tw.
24. quality of well-being.tw.
25. qwb.tw.
26. willingness to pay.tw.
27. standard gamble$.tw.
28. time trade off.tw.
29. time tradeoff.tw.
30. tto.tw.
31. or/1-30

Appendix 6 – Evidence tables

Review question 1: People with inflammatory bowel disease

Evidence table for review question 1: Is colonoscopic surveillance for prevention and/or early detection of colorectal cancer in adults with inflammatory bowel disease clinically effective compared with no surveillance?							
Study ID	**Study design**	**Follow-up**	**Population**	**Intervention**	**Comparison**	**Outcomes**	**Comments**
Choi et al. (1993)	Prospective case–control study. The authors compared the groups for: a) age at diagnosis of ulcerative colitis (UC) b) age at diagnosis of cancer c) duration of UC before cancer. No statistically significant difference was found by the Mann-Whitney test (P > 0.05)	The median follow-up after diagnosis of cancer until death or last visit was 4.9 years (range 0.4–11.4 years) for the surveillance group and 1.4 years (range 0.1–12.1 years) for the no surveillance group.	Patients with ulcerative colitis from the Lahey Clinic Medical Center in Seattle, USA (N = 050). Patients with duration of disease of 8 years or more and extension of disease proximal to the sigmoid colon were included. CRC incidence: 41 had colorectal carcinoma out of 2050 patients; 19 of those had surveillance and 22 did not have surveillance.	The patients on surveillance had biopsies every 2 years (every 3 years in the early years of the programme) after negative results on two consecutive annual examinations. Any specimens with suspicion of dysplasia were reviewed by two pathologists. In patients with biopsies indefinite dysplasia was investigated every 6–12 months, for low-grade dysplasia it was 3–6 months and for high-grade dysplasia or for a dysplasia-associated lesion or mass, colectomy was advised.	No surveillance	Survival analysis was done using the Kaplan-Meier product limit method. The statistical significance of differences was analysed by the Tarone-Ware method. **Duke's stage of carcinoma when detected:** 15/19 were detected at Duke's stage A or B for the surveillance group versus 9/22 for the no surveillance group (P = 0.039). The removal of two patients whose colorectal carcinoma was detected without surveillance still showed a statistically significant difference (P = 0.036). **5-year survival:** 5-year overall survival rate was 77.2%±10.1% for the surveillance group versus 36.3%±12.7% for the no surveillance group (P = 0.026). Removing the patients whose colorectal carcinoma was detected without surveillance still showed a statistically significant difference (P = 0.037) and 5-year overall survival in the surveillance arm changed to 76.2%±12.1%. The 5-year survival of the two groups by Dukes' stage did not show a statistically significant difference (P > 0.05). **Overall mortality:** 4 deaths occurred in the surveillance group versus 11 in the no surveillance group.	The authors state that the big difference in the follow-up time between the two groups was the high early mortality rate for the no surveillance group. The study compared the two groups for three different criteria and found no statistical significance.

Evidence table for review question 1: Is colonoscopic surveillance for prevention and/or early detection of colorectal cancer in adults with inflammatory bowel disease clinically effective compared with no surveillance?							
Study ID	**Study design**	**Follow-up**	**Population**	**Intervention**	**Comparison**	**Outcomes**	**Comments**
Lashner et al. (1990)	Historical cohort study Crude survival analysis was done using Kaplan-Meier product limit survival curves and differences in the two groups were adjusted to remove confounding factors by the Cox proportional hazards model.	Eligible patients entered the registry on June 15 1984, until death or the end of the study on November. 15 1986.	Patients (N = 186) were taken from the Chicago inflammatory bowel disease registry. Eligible patients had extensive ulcerative colitis (defined as continued disease from any point proximal to the splenic flexure to the distal rectum) with at least 9 years of disease duration. Cohort 1: n = 91 had surveillance at least once during the study period. Cohort 2: n = 95 had no surveillance within the study (but could have it outside).	Colonoscopic surveillance at least once during the study period. Patients had 4.2± 3.0 (range 1–16) colonoscopies during the study period at a mean of 17 years after symptom onset. Patients who were found to have cancer on referral or their first colonoscopy were excluded.	No surveillance within the programme	No statistically significant difference was seen between the two groups in sample size, sex, age at symptom onset and family history for colon cancer. There was no morbidity or mortality directly from colonoscopy. A total of 92%of people from the surveillance group and 94% from the control group had complete vital status information at the end of the study. **Duration of disease at colectomy:** 19±2.7 years in the surveillance group versus 14.3±11.8 years in the control group. **Colectomy:** 33 people in the surveillance group versus 51 in the control group. Colectomy was performed 4 years later in the surveillance group. **Indication for colectomy*:*** cancer **–** 3 people in the surveillance group versus 6 in the control group; dysplasia – 10 people in the surveillance group versus 3 in the control group; active disease – 20 people in the surveillance group versus 42 in the control group. **Mortality:** 6 people in the surveillance group versus 14 in the control group. However, deaths caused by cancer were more frequent in the surveillance group than in the control group, where deaths were more frequent because of exacerbation. The survival curves showed a significant reduction in mortality in the surveillance group ($p < 0.05$).	The authors mention potential sources of bias for misclassification for both surveillance and cancer. As some patients had their dysplasia discovered in programmes outside the study surveillance and some patients not receiving surveillance could have had surveillance outside the surveillance programme within the study, further error could have been introduced. The sample size of the study was also small and this could potentially favour the null hypothesis. The study had an overall follow up of 93% of patients giving it a high validity. The authors also performed a Cox proportional hazards model to adjust for prognostic factors.

Evidence table for review question 1: Is colonoscopic surveillance for prevention and/or early detection of colorectal cancer in adults with inflammatory bowel disease clinically effective compared with no surveillance?							
Study ID	**Study design**	**Follow-up**	**Population**	**Intervention**	**Comparison**	**Outcomes**	**Comments**
						Using the Cox proportional hazards model the surveillance group had 61% reduction in mortality compared with the control group. The relative risk for death was 0.39 (95% CI 0.15 to1.00). **Cancer detection rate:** the surveillance group had 67% increased cancer detection rate compared with the control group. The relative risk for cancer detection was 1.67(95% CI 0.30 to 9.33). **Colectomy:** the surveillance group had 47% reduction in colectomy rate compared with the control group. The relative risk for colectomy was 0.53 (95% CI 0.34 to 0.83).	
Lutgens et al. (2009)	Retrospective case–control study. The characteristics of people in the surveillance group and non-surveillance group were compared for the type of IBD, gender, comorbidity, median age at IBD diagnosis, median age at CRC diagnosis,	Data were taken from 1971 to 1 July 2006 (primary end point of the study) or the date of death. When a patient was lost to follow-up, the last visit to the hospital was recorded as end of follow-up. 21% (31 patients) were lost to	Patients with IBD (N = 149; 89 with ulcerative colitis, 59 with Crohn's disease and 1 with indeterminate colitis) with CRC were taken from a nationwide pathology database (PALGA) in the Netherlands. Overall 42 deaths occurred from 145 (29%) people and metastasised CRC was the direct cause of death for 30 of those (six patients died from metastasis of a	Colonoscopic surveillance (n = 23) For the surveillance group patients had to have at least one or more surveillance colonoscopies at regular intervals (every 1–3 years). Surveillance was intended to detect neoplasia by taking four random biopsies every 10 cm in addition to targeted biopsies of suspicious areas. Surveillance started after a median of 14.3 (standard 8) years after diagnosis of IBD. CRC developed after a	No surveillance (n = 126)	Survival analyses were calculated by Kaplan-Meier curves and Cox regression analyses were used for calculations and the Tarone-Ware method was used to compare the differences between the survival curves. **Overall survival** The overall 5-year survival rates were 100% in the surveillance group and 65% in the non-surveillance group (P = 0.029). **Overall mortality** One patient from the surveillance group died compared with 29 in the non-surveillance group (P = 0.047). The CRC-related 5-year mortalities were 0% in the surveillance group and 26% in the non-surveillance group (P = 0.042). Cox regression analysis showed that	The study has the results of ulcerative colitis and Crohn's disease patients in the analysis. There were no statistically significant differences seen between the two groups in patient characteristics. Cox regression analysis was used to examine the effect of type of IBD, age at CRC diagnosis, comorbidity, presence of primary sclerosing cholangitis and surveillance on CRC-related mortality. The authors tried to minimise selection bias by excluding patients

Evidence table for review question 1: Is colonoscopic surveillance for prevention and/or early detection of colorectal cancer in adults with inflammatory bowel disease clinically effective compared with no surveillance?							
Study ID	**Study design**	**Follow-up**	**Population**	**Intervention**	**Comparison**	**Outcomes**	**Comments**
	presence of primary sclerosing cholangitis, median interval between onset of IBD symptoms and diagnosis of CRC and mean follow-up time after CRC. No statistically significant difference was found between the groups.	follow-up. Four of these were immediately after diagnosis of CRC and were excluded from survival analysis.	different cancer, and another six died from complications of colectomy.	median of 6.4 years (range 1–21) after initiation of surveillance.		colonoscopic surveillance improved survival and CRC-related mortality but this did not reach statistical significance (P = 0.10, and 0.08 when 11 patients that had simultaneous IBD and CRC diagnosis were excluded). When the 11 patients were excluded, the 5-year overall mortality changed to 0% in the surveillance group and 36% in the non-surveillance group (P = 0.02). The CRC-related mortality changed to 0% and 29% (P = 0.03). **Tumour stage** Tumour classification was not available for 11 patients (93%). There were 12 (52.2%) patients in the surveillance group in whom tumours were detected at stage 0 or 1 (AJCC – American Joint Committee on Cancer, which is equivalent to T in situ and T1, T2, NO, MO) compared with 28 (24.3%) in the no surveillance group (P = 0.004). There were fewer people with advanced stage tumours, stage 3B–C and 4 tumours (AJCC, which is equivalent to T3, T4, N1, N2, MO, M1), in the surveillance group compared with 48 (41.7%) in the non-surveillance group (P = 0.049). **5-ASA prescription** Ten patients (7%) did not have any information regarding the use of 5-ASA prescription, so were excluded from the analysis. Out of the included 139 people, 119 (86%) had used 5-ASA during the course of their disease and 64 (54%) of those had 5-ASA medication for more	who were diagnosed with IBD and CRC simultaneously. The authors stated that lack of randomisation may have led to volunteer bias, but felt that because the mean duration of disease was longer (22.7 years versus 19.3 years) this was not a major issue. Four cancers in the surveillance group were found to be interval cancers, but it was hard to determine if these were not detected during a previous colonoscopy.

Evidence table for review question 1: Is colonoscopic surveillance for prevention and/or early detection of colorectal cancer in adults with inflammatory bowel disease clinically effective compared with no surveillance?							
Study ID	**Study design**	**Follow-up**	**Population**	**Intervention**	**Comparison**	**Outcomes**	**Comments**
						than three-quarters of their disease duration and all developed CRC. In the surveillance group 20 (100%) and 96 (77%) in the no surveillance group had used 5-ASA preparations (P = 0.08). Using Cox regression, the effect of 5-ASA on survival and surveillance is not significant (P = 0.96 and P = 0.098 respectively).	

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1 **Review question 1: People with adenomas**

2

Evidence table for review question 1: Is colonoscopic surveillance for prevention and/or early detection of colorectal cancer in adults with adenomas clinically effective compared with no surveillance?							
Study ID	**Study design**	**Follow-up**	**Population**	**Intervention**	**Comparison**	**Outcomes**	**Comments**
Thiis-Evensen (1999a)	Prospective cohort study. Population randomised into a screening (intervention) group and a control group.	1983–1996 Study represents 9600 person-years of follow up.	Screening (intervention group): 400 men and women in Oslo, Norway. Control group: 399. 324 (81%) out of the 400 enrolled attended the screening because of the presence of polyps in 1983, 277 (85%) were still alive in 1996. In the control group of 399, 358 (89%) were still alive in 1996. 210 (76%) from the screening group and 241 (68%) in the control group, 451 (71%) people in total attended in 1996. Mean age of people attending was 67.4 years in the screening group and 67 years in the control group. Range: 63–72 years for both groups.	Screening intervention with FSIG and colonoscopy.	No screening.	Forty-eight of the controls (12% of the original group of 399) had a colonoscopic examination between 1983 and 1996. Ten of these people had a total of 18 adenomas removed, 8 of which measured 5–10 mm in diameter and the largest 10 mm; none showed more than moderate dysplasia. In the screening group 27 (7% of the original group of 400) had a colonoscopy other than the study colonoscopies in 1983, 1985 and 1989. Three of these people (1%) each had one adenoma removed, the largest measuring 5 mm in diameter and showing moderate dysplasia. **Incidence of CRC:** 12 people had CRC diagnosed during 13 years of observation. Two people in the screening group had CRC compared with 10 in the control group (relative risk 0.2; 95% CI 0.03 to 0.95, P = 0.02). **Overall mortality:** overall accumulated death rate, from January 1983 to December 1994, showed 55 (14%) deaths in the screening group, compared with 35 (9%) in the control group (relative risk 1.57; 95% CI 1.03 to 2.4, P = 0.02).	324 (81%) people accepted FSIG screening at the initial stage (mean age 54.4 years). People in whom polyps were detected had a full colonoscopy with polypectomy and were offered follow-up by colonoscopy with polypectomy. People in the control group were not informed about their status as enrolled control. The people in both groups matched for age, sex and body mass index.

Evidence table for review question 1: Is colonoscopic surveillance for prevention and/or early detection of colorectal cancer in adults with adenomas clinically effective compared with no surveillance?							
Study ID	**Study design**	**Follow-up**	**Population**	**Intervention**	**Comparison**	**Outcomes**	**Comments**
						The higher mortality in the screening group could be explained by a collectively higher frequency of deaths caused by coronary heart disease, cerebrovascular accidents, sudden death, chronic obstructive lung disease and alcohol abuse (P = 0.03). **Adverse effects** There were no complications from the endoscopic examinations and polypectomies.	
Jorgensen (1993)	Prospective randomised study of patients with colorectal adenomas subject to different surveillance follow-up. The group was compared with controls from the normal Danish population, Eide (1986) and Stryker (1987), matched for age and sex.	Long term (1–24 years) colonoscopic surveillance.	Population of patients with all types of adenomas regardless of size and method of removal. 2041 patients were included from 1978 to 2002. Their ages were between 24 and 76 years old (average 60.8 years for men and 60.1 years for women). 497 men and 362 women had advanced adenoma that is, adenomas > 10 mm. A clean colon was achieved before patients were included in the study. No patient had a history of familial adenomatous polyposis (FAP), hereditary nonpolyposis colorectal cancer (HNCC) or IBD. Patients participating in a	Surveillance intervention with colonoscopy was supplemented with double-contrast barium enema (DCBE). Colonoscopy was performed in all patients and complete in 1871; incomplete colonoscopy was supplemented by DCBE in 148 leaving 22 who had	No surveillance.	115 of 2041patients had reached 24 years of colonoscopic surveillance after inclusion at November 2002. Colonoscopy had been performed 6289 times and DCBE 998 times during 13,993 patient years of surveillance. Compliance: 72.9% in men and 76.3% in women. Colonoscopy was complete in 95% of the examinations for men and 92% for women. **Incidence of CRC:** CRC was found in 27 (23.48%) of the 115 that had 24 years of colonoscopic surveillance (relative risk 0.65; 95% CI, 0.43 to 0.95) of which 14 were men (relative risk 0.54; 95% CI, 0.29 to 0.90) and 13 were women (relative risk 0.86; 95% CI 0.46 to 1.46). At the end of the study, three patients died from CRC (relative risk 0.12; 95% CI, 0.03 to 0.36). **Risk of CRC relative to various reference populations:** RR (95% CI)	The relative risk of CRC and death from CRC in the total study population (2041 patients) was calculated from 1978 to 2002 by dividing the observed number by the number expected in a standard Danish population with the same age and sex distribution. The estimates of RR were adjusted for differences in the age, sex and calendar specific incidence and death rates.

Evidence table for review question 1: Is colonoscopic surveillance for prevention and/or early detection of colorectal cancer in adults with adenomas clinically effective compared with no surveillance?							
Study ID	**Study design**	**Follow-up**	**Population**	**Intervention**	**Comparison**	**Outcomes**	**Comments**
			chemoprevention trial were excluded.	documentation of a clean colon without neoplasia.		Large (≥ 10 mm) adenomas – 0.16 (0.08 to 0.30) Severe dysplastic adenomas – 0.09 (0.04 to 0.17) Villous adenomas – 0.96 (0.46 to 1.76) All with adenomas – 0.89 (0.43 to 1.64) Large (≥ 10 mm) adenomas – 0.57 (0.27 to 1.04) **Adverse effects:** severe complications from surveillance examinations were seen in 20 patients and two died from these complications. One death was from diagnostic colonic perforation and the other from coronary occlusion after colonoscopy with polypectomy.	

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1 Review question 2A: People with adenomas

Evidence table for review question 2A (a, b): Is colonoscopic surveillance for prevention and/or early detection of colorectal cancer in adults with inflammatory bowel disease or polyps clinically effective compared with comparators?

<table>
<tr><th>Study ID</th><th>Study design</th><th>Follow-up</th><th>Population</th><th>Intervention</th><th>Comparison</th><th>Outcomes</th><th>Comments</th></tr>
<tr>
<td>Van den Broek (2009)</td>
<td>Systematic review of three randomised control trials (RCTs): Narrow band imaging (NBI) versus white light endoscopy (WLE)
• Rex and Helbig (2007)
• Alder (2007)
• Inoue (2008)</td>
<td colspan="3">
Percentage of patients with at least one adenoma and mean number of adenomas per examined patient for NBI versus WLE (RCTs)
<table>
<tr><th>Author (RCT): NBI vs WLE</th><th>No. of NBI</th><th>No. of WLE</th><th>Patients with adenoma detected by NBI (%)</th><th>Patients with adenoma detected by WLE (%)</th><th>Odds ratio (95% CI) of NBI vs WLE</th><th>No. of adenomas detected by NBI (mean per patient)</th><th>No. of adenomas detected by WLE (mean per patient)</th><th>Relative ratio (95% CI)</th></tr>
<tr><td>Rex and Helbig (2007)</td><td>217</td><td>217</td><td>140 (65%)</td><td>145 (67%)</td><td>0.90 (0.61 to 1.34)</td><td>403 (1.86)</td><td>395 (1.82)</td><td>1.02 (0.89 to 1.17)</td></tr>
<tr><td>Alder (2007)</td><td>198</td><td>198</td><td>45 (23%)</td><td>33 (17%)</td><td>1.47 (0.89 to 2.42)</td><td>65 (0.33)</td><td>51 (0.26)</td><td>1.27 (0.88 to 1.84)</td></tr>
<tr><td>Inoue (2008)</td><td>122</td><td>121</td><td>51 (42%)</td><td>41 (34%)</td><td>1.40 (0.83 to 2.36)</td><td>103 (0.84)*</td><td>66 (0.55)*</td><td>1.55 (1.14 to 2.11)</td></tr>
<tr><td>Pooled results</td><td>537</td><td>536</td><td>236 (44%)</td><td>219 (41%)</td><td>1.19 (0.86 to 1.64)</td><td>571 (1.06)</td><td>512 (0.96)</td><td>1.23 (0.93 to 1.61)</td></tr>
</table>
*Includes two invasive cancers

Rex and Helbig (2007): 434 patients were included aged 50 years or older with an intact colon. There was no difference in the percentage of patients with adenoma for the entire cohort for WLE (67%) vs NBI (65%) (p = 0.61).
One highly experienced endoscopist performed all examinations. No complications occurred.

Alder (2007): 401 patients were included (mean age 59.4 years, 52.6% men). Adenomas were detected more frequently in the NBI group (23%) than in the control group (17%) with 17 colonoscopies needed to find one additional adenoma patient; however the difference was not statistically significant (p = 0.129).
</td>
<td>Inoue (2008) demonstrated a significantly improved adenoma detection rate by NBI vs WLE (mean number of adenomas per evaluated patient, 0.84 vs 0.55; p = 0.046). No advantage for NBI could be demonstrated when the proportion of patients with at least one adenoma was compared between NBI and WLE.
An insufficient allocation method caused inadequate distribution of NBI procedures among all participating endoscopists.

Rex and Helbig (2007) and Alder (2007) could not demonstrate an increased adenoma detection rate (both per lesion and per patient) by NBI in two large randomised studies.

Some differences existed among the three randomised studies:
• Rex and Helbig used</td>
</tr>
</table>

Evidence table for review question 2A (a, b): Is colonoscopic surveillance for prevention and/or early detection of colorectal cancer in adults with inflammatory bowel disease or polyps clinically effective compared with comparators?							
Study ID	**Study design**	**Follow-up**	**Population**	**Intervention**	**Comparison**	**Outcomes**	**Comments**
		seven endoscopists without previous experience of NBI performed the examinations. **Inoue (2008):** 205 polyps were removed from 109 (44.86%) patients out of a total of 243 patients randomised; 127 of these polyps (67%) were assigned to the NBI group and 78 (38%) to the control group (WLE). Of the 205 polyps detected, 169 (82.4%) were neoplastic, with 66 (39.1%) detected in the control group and 103 (60.1%) detected in the NBI group. Six endoscopists with unknown experience performed the examinations; one performed more than 60% of the examinations. There were no immediate complications. All patients were contacted within 2 weeks of the procedure, and none of them reported any significant adverse effects from colonoscopy or polyp resection.				high-definition monitors, which may have improved adenoma detection compared with standard monitors. • There were differences in NBI-systems, inclusion criteria, and endoscopist experience. The pooled results of the three randomised studies revealed a non-significant increase in the number of patients with at least one adenoma (odds ratio [OR] 1.19; 95% CI, 0.86 to1.64) or the total number of adenomas (OR 1.23; 95% CI, 0.93 to1.61) when NBI was used for detection.
Study ID	**Study Design**	**Follow-up**	**Population**	**Intervention**	**Comparison**	**Outcomes**	**Comments**
Dekker (2007)	Prospective RCT: cross-over study design		Forty-two patients with longstanding ulcerative colitis. The study group comprised 31 men and 11 women with a mean age (±SD) of 50 ± 11.2 years. The mean duration (±SD)	Narrow-band imaging (NBI)	Conventional colonoscopy	The number of patients with true positive findings (8 for NBI vs. 7 for WLE) and false-positive findings (9 for NBI vs. 6 for WLE) for the endoscopic procedures was not significantly different	All participants underwent NBI and conventional colonoscopy with at least 3 weeks between the two procedures to allow healing of any biopsy sites. All colonoscopies were performed by one of three

Evidence table for review question 2A (a, b): Is colonoscopic surveillance for prevention and/or early detection of colorectal cancer in adults with inflammatory bowel disease or polyps clinically effective compared with comparators?							
Study ID	**Study design**	**Follow-up**	**Population**	**Intervention**	**Comparison**	**Outcomes**	**Comments**
			of their ulcerative colitis was 21 ± 8.6 years.			(p = 0.705 and p = 0.581, respectively). There was no significant difference in the number of detected neoplastic lesions between the 2 techniques (9 for NBI vs. 12 for WLE, p = 0.672). Only the number of false-positive lesions was significantly higher for NBI than is was for WLE (43 vs. 16, p = 0.015)	experienced endoscopists, who were blinded with respect to the endoscopic and histopathological findings of the first procedure. The NBI system used in this study was a first generation prototype, which might explain the low yield of NBI.
Rex (1995)	RCT		One hundred and forty-nine patients aged 40 years or more with symptoms suggestive of colonic disease were randomised. Mean age was 63 years.	Flexible sigmoidoscopy (FSIG) plus air-contrast barium enema (ACBE).	Colonoscopy	More of the patients undergoing colonoscopy first had at least one adenoma, and this difference approached significance (OR 2.07; 95% CI 0.90 to 4.92). More large adenomas (≥ 5 mm and ≥ 1 cm) were detected in patients undergoing colonoscopy first, but these differences did not reach significance. Patients initially undergoing FSIG plus ACBE were more likely to require the alternative procedure (colonoscopy) than were patients initially undergoing colonoscopy to	Patient with incomplete initial colonoscopy and patients with polyps seen on FSIG plus barium enema underwent alternative procedure (barium enema or colonoscopy). No significant differences were noted in demographic, historical, clinical, or biochemical variables between the two groups. The strategy of initial FSIG plus ACBE detected more patient with diverticulosis than did initial colonoscopy, whereas the strategy of initial colonoscopy detected more patients with adenomas (p = 0.06)

Evidence table for review question 2A (a, b): Is colonoscopic surveillance for prevention and/or early detection of colorectal cancer in adults with inflammatory bowel disease or polyps clinically effective compared with comparators?							
Study ID	**Study design**	**Follow-up**	**Population**	**Intervention**	**Comparison**	**Outcomes**	**Comments**
						require ACBE (OR 4.46; 95% CI 1.47 to 16.4).	
Mulhall (2005)	Systematic review and meta-Analysis on CT colonography	Prospective studies of adults undergoing CT colonography after full bowel preparation, with colonoscopy as the gold standard were selected. Data on sensitivity and specificity overall and for detection of polyps less than 6 mm, 6 to 9 mm, and greater than 9 mm in size were reported. Thirty three studies provided data on 6393 patients. **Overall pooled per patient sensitivity:** for CT colonography was 70% (95% CI 53% to 87%). Sensitivity increased progressively as polyp size increased: It was 48% (95% CI 25% to 70%) (range 14–86%) for detection of polyps smaller than 6 mm, 70% (95% CI 55% to 84%) (range 30–95%) for polyps 6 to 9 mm, and 85% (95% CI 79% to 91%) (range 48–100%) for polyps larger than 9 mm. Each of these analyses was statistically heterogeneous. **Overall pooled per patient specificity:** Specificity was more consistent across polyp sizes. Overall, CT colonography was 86% specific (95% CI 84% to 88%) on the basis of data from 14 studies. Specificity improved as polyp size increased, and the results were homogeneous within each stratum. Four studies reported specificity for detection of polyps smaller than 6 mm, and the pooled specificity from these studies was 91% (95% CI 89% to 95%). For polyps 6 to 9 mm in size (6 studies), specificity was 93% (95% CI 91% to 95%) and to 97% (95% CI 96% to 97%) for polyps larger than 9 mm (15 studies).					Characteristics of the CT colonography scanner, including width of collimation, type of detector, and mode of imaging, explained some of the heterogeneity. Limitations: the studies differed widely, and the extractable variables explained only a small amount of the heterogeneity. Only a few studies examined the newest CT colonography.
Winawer (2000)	Controlled trial comparing colonoscopy and double-contrast barium enema (DCBE)		Nine hundred and seventy three patients underwent one or more colonoscopic examinations for surveillance. In 580 of these patients, 862 paired colonoscopic examinations and barium enema was performed.	Colonoscopic and barium enema examination.	Colonoscopic examination without barium enema.	Polyps were detected in 392 of 862 colonoscopic examinations (45%); adenomas were detected in 242 colonoscopic examinations (28%). Findings on barium enema were positive in 222 of the 862 paired examinations (26%) and in 139 of the 392 colonoscopic examinations in	The study design permitted a direct blinded comparison of colonoscopic examination with barium enema without interfering with complete colonoscopy in each patient. Colonoscopy was used as the reference measure with the knowledge that it is not perfect and does miss polyps. In this

Evidence table for review question 2A (a, b): Is colonoscopic surveillance for prevention and/or early detection of colorectal cancer in adults with inflammatory bowel disease or polyps clinically effective compared with comparators?							
Study ID	**Study design**	**Follow-up**	**Population**	**Intervention**	**Comparison**	**Outcomes**	**Comments**
						which one or more polyps were detected (rate of detection of polyps, 35%; 95% CI 31% to 40%). Half of these polyps were adenomas, and the remainder were primarily normal mucosal tags, with some hyperplastic polyps.	study, the rate of missed adenomas was 20% for colonoscopic examination, and all missed polyps were ≤ 1.0 cm.

1

Review question 2B: People with inflammatory bowel disease

Evidence table for review question 2B: Is colonoscopic surveillance with a dye (chromoscopy) for prevention and/or early detection of colorectal cancer in adults with inflammatory bowel disease clinically effective compared with colonoscopic surveillance without dye (conventional colonoscopy)?

Study ID	Study design	Follow up	Population	Intervention	Comparison	Outcomes	Comments
Kiesslich et al. (2003)	Prospective randomised trial. Randomised 1:1 into two groups A or B – for chromo-endoscopy (with the use of a dye) or for conventional endoscopy respectively. The randomisation was done using a computer-aided system and the results were kept in a sealed envelope and opened only before the colonoscopy by an	None	Total (N = 165): group A (chromo-endoscopy; n = 84) and group B (conventional endoscopy; n = 81). 263 consecutive patients with clinically inactive, long standing ulcerative colitis (≥ 8 years) were recruited from an outpatient clinic in the University of Mainz, Germany. The sample size was calculated to be 170 patients (85 in each group) using alpha as 0.05 and a	Chromoscopy using 0.1% methylene blue (A; n = 84). For group A the colon was stained in a segmented fashion, 30 cm at a time using a spraying catheter (Olympus PW-IL, Hamburg, Germany). After 1-minute excess dye was removed by suction and staining was considered complete when the tiny glandular duct openings of the mucosa (pits) were clearly visible. Magnification	Conventional colonoscopy (B; n = 81). In group B colonoscopy was performed using conventional video colonoscopy. The average duration for the procedure was 35±9.3 minutes (range 19–59 minutes).	***Targeted biopsies*** An average of 40.8 biopsies was taken per patient: 42.2 biopsies per patient in group A and 38.2 in group B. For A, 14.4/42.2 biopsies were targeted compared with 4.3/38.2 biopsies in group B (P = 0.044). ***Colorectal neoplasia*** A total of 46 neoplastic lesions were seen in 19 patients. 42 of these lesions were intraepithelial neoplasia (32 LGD, 10 HGD and 4 invasive cancers). More dysplasia was detected in group A compared with group B (32 versus 10; P = 0.003). Group A / Group B / P value N: 84 / 81 / - Patients with IN: 13 / 6 / NS Total number IN lesions: 32 / 10 / 0.00315 LGD lesions: 24 / 8 / - HGD lesions: 8 / 2 / - Invasive cancers: 3 / 1 / NS Polypoid lesions: 8 / 6 / NS IN in flat mucosa (Fisher exact test): 24 / 4 / 0.0007 NS: not significant; IN: intraepithelial neoplasia Adapted from table 5 in Kiesslich (2003) **Extent of disease/inflammation - not relevant for guideline** There was a significantly better correlation between the	RCT with well reported blinding, concealment, inclusion and exclusion criteria with a consort chart explaining the same. Sample size calculated to be 85 required in each arm, 87 recruited but because of insufficient bowel preparation each arm had less participants than required. The two arms were compared for age, duration of UC, body mass index, stool frequency, rectal bleeding, temperature, haemoglobin, prevalence of primary

Evidence table for review question 2B: Is colonoscopic surveillance with a dye (chromoscopy) for prevention and/or early detection of colorectal cancer in adults with inflammatory bowel disease clinically effective compared with colonoscopic surveillance without dye (conventional colonoscopy)?							
Study ID	**Study design**	**Follow up**	**Population**	**Intervention**	**Comparison**	**Outcomes**	**Comments**
	independent person who was blinded to the study question.		power of 90% and a 3-fold increase in the yield of neoplasia detection for chromo-endoscopy compared with conventional colonoscopy (which was found to be 10% from literature). 174 patients were recruited but 9 had insufficient bowel preparation (3 in group A and 6 in group B) and were excluded.	endoscopy with the Pentax zoom colonoscope and the Olympus extra magnification colonoscope was used to classify the lesions. The average duration for the procedure was 44±12.2 minutes (range 28–68 minutes).		endoscopic assessment of degree (P = 0.0002) and extent (89% vs 52%; P < 0.0001) of colonic inflammation and the histopathologic findings compared with the conventional colonoscopy group. **Diagnostic accuracy** The use of dye allowed for differentiation of neoplastic lesions with a sensitivity of 93%, specificity of 93%, positive predictive value of 83% and negative predictive value of 98%.	sclerosing cholangitis, family history of colorectal cancer, maintenance mesalamine therapy and no statistically significant differences were seen.
Kiesslich et al. (2007)	Prospective randomised trial. Randomised 1:1 into two groups A or B – for chromo-endoscopy with endomicroscopy (with the use of a dye)	None	Total (N = 161): group A (chromo-endoscopy; n = 80) and group B (conventional endoscopy; n = 73). 192 consecutive patients with long standing	Chromoscopy using 0.1% methylene blue with endomicroscopy (A; n = 80). The confocal laser endoscope was advanced into the ileum or caecum and 5 ml of	Conventional colonoscopy (B; n = 73). Colonoscopy was performed using conventional video endoscopes (Pentax EC 3830FK).	**Biopsy specimens** About 50% less biopsies were needed per patient in group A versus group B, 21.2 compared with 42.2 respectively (P = 0.008). Significantly less number of biopsies were needed for group A: 1688 compared to 3081 (P = 0.008) The total number of biopsy specimens containing intraepithelial neoplasia was 57 in group A compared to 7 in group B (P < 0.0001). **Targeted biopsies** The total number of targeted biopsies was 312 for group A	RCT with well reported blinding, concealment, inclusion and exclusion criteria with a consort chart available from a supplement. Sample size calculated to be 54 required in

Evidence table for review question 2B: Is colonoscopic surveillance with a dye (chromoscopy) for prevention and/or early detection of colorectal cancer in adults with inflammatory bowel disease clinically effective compared with colonoscopic surveillance without dye (conventional colonoscopy)?

<table>
<tr><th>Study ID</th><th>Study design</th><th>Follow up</th><th>Population</th><th>Intervention</th><th>Comparison</th><th>Outcomes</th><th>Comments</th></tr>
<tr>
<td></td>
<td>or with confocal laser endoscopy respectively.

The randomisation was done using a computer-aided system and the results were kept in a sealed envelope and opened only before the colonoscopy by an independent person who was blinded to the study question.</td>
<td></td>
<td>ulcerative colitis (≥ 8 years) in clinical remission were recruited from an outpatient clinic in the University of Mainz, Germany.

The sample size was calculated to be 114 patients (57 in each group) using alpha as 0.05 and a power of 90% and a 3.5-fold increase in the yield of neoplasia detection for chromo-endoscopy.

161 patients were recruited but 8 had insufficient bowel preparation and were excluded and 153 completed the study protocol.</td>
<td>fluorescein was injected at a final concentration of 10%. 0.1% of methylene blue was then used for in a segmented fashion, 30 cm at a time using a spraying catheter (Olympus PW-IL, Hamburg, Germany) and excess dye was removed by suction. Staining was considered complete when the tiny glandular duct openings of the mucosa (pits) were clearly visible. Random (10–15 cm) and targeted biopsies were taken – taking 42 minutes (range 29–64).</td>
<td>Four biopsy specimens were taken every 10 cm for random biopsies and targeted biopsies were also taken whenever possible.

The average duration for the procedure was
31 minutes (range 18–48 minutes).</td>
<td>versus 227 for group B (P < 0.0001)

The total number of targeted biopsy specimens containing intraepithelial neoplasia was 57 in group A compared with 13 in group B (P < 0.0001).
Colorectal neoplasia
A total of 23 neoplastic lesions were seen in 15 patients. All of these lesions were intraepithelial neoplasia (15 LGD, 8 HGD).

Group A detected 4.75-fold more neoplasia compared with group B (19 versus 4; P = 0.005).

Group A detected significantly more flat neoplasia compared with B (16 versus 2; P = 0.002).

<table>
<tr><th></th><th>Group A</th><th>Group B</th><th>P value</th></tr>
<tr><td>N</td><td>80</td><td>73</td><td>-</td></tr>
<tr><td>Patients with IN</td><td>11</td><td>4</td><td>0.097 NS</td></tr>
<tr><td>Total number IN lesions</td><td>19</td><td>4</td><td>0.005</td></tr>
<tr><td>LGD lesions</td><td>12</td><td>3</td><td>-</td></tr>
<tr><td>HGD lesions</td><td>7</td><td>1</td><td>-</td></tr>
<tr><td>Polypoid lesions</td><td>3</td><td>2</td><td>-</td></tr>
<tr><td>IN in flat mucosa (Fisher exact test)</td><td>16</td><td>2</td><td>0.002</td></tr>
<tr><td colspan="4">NS: not significant; IN: intraepithelial neoplasia</td></tr>
</table>
Adapted from table 6 in Kiesslich et al. (2007)

Diagnostic accuracy
The presence of neoplastic changes could be predicted by endomicroscopy with a sensitivity of 94.7%, specificity of 98.3%, accuracy 97.8%.</td>
<td>each arm, and 80 and 73 were recruited in the two arms. The two arms were compared for age, duration of UC, body mass index, stool frequency, rectal bleeding, temperature, haemoglobin, prevalence of primary sclerosing cholangitis, family history of colorectal cancer, maintenance mesalamine therapy and no statistically significant differences were seen. However, in spite of clinically inactive UC in all patients, on average there was more extended colonic inflammation in group B compared with</td>
</tr>
</table>

Evidence table for review question 2B: Is colonoscopic surveillance with a dye (chromoscopy) for prevention and/or early detection of colorectal cancer in adults with inflammatory bowel disease clinically effective compared with colonoscopic surveillance without dye (conventional colonoscopy)?							
Study ID	**Study design**	**Follow up**	**Population**	**Intervention**	**Comparison**	**Outcomes**	**Comments**
							group A.
Marion et al. (2008)	Prospective single blind trial with three methods within the same patient population. Because of limited evidence in the area, no sample size calculation was done but from other studies (Kiesslich et al. 2007 and Rutter et al. 2004) 200 patients were planned, but interim analysis (after about 100 patients) was done and this article reports the results from the interim analysis.	None	People with ulcerative or Crohn's colitis (N = 102, 64 male and 34 female) were included in the study at Mount Sinai Medical Centre, New York, USA. People more than 18 years of age with a confirmed diagnosis of extensive ulcerative colitis defined as at least left sided (n = 79) or Crohn's colitis involving at least one-third of the colon (n = 23). The median age of onset was 27 years (range 3–65) and the median duration of disease was 21.5 years (range 5–75) and all had	Chromoscopy with 0.1% methylene blue dye. A dye sprayer was used to spray 0.1% methylene blue dye during reintubation to the caecum. After reinsertion to the caecum, the scope was withdrawn slowly and the mucosa examined after dye spray and any visible lesions were biopsied or removed by endoscopic resection. The method took 15 minutes and 12 seconds (range 5:09–28:35).	1) Random non-targeted conventional colonoscopy – the colon was examined and four quadrant random biopsies were taken from segments defined by the endoscopist using multibite forceps. 2) Targeted conventional colonoscopy – additionally any visible lesions were identified, described and were either biopsied or removed by endoscopic resection. The two methods took a median time of 22 minutes, 11 seconds (range 5:27–	The number of positive findings of LGD and HGD was compared among the different methods using exact two-tailed McNemar's test. **Dysplasia yield by method (per patient)** The combination of targeted colonoscopy and chromoscopy was significantly more effective than random biopsy, 20 people with dysplasia were found compared with 3 after random biopsy ($P < 0.0002$), but 2 patients were found to have dysplasia only by random biopsy and not by any of the two targeted methods. Chromoscopy was significantly more effective than random biopsy, 17 people with dysplasia were found compared with 3 after random biopsy ($P < 0.001$). Chromoscopy showed a higher yield of dysplasia than targeted conventional colonoscopy, 17 people with dysplasia were found compared with 9 after conventional colonoscopy, but this did not reach statistical significance ($P = 0.057$). **Dysplasia yield by method (per biopsy)** With random conventional colonoscopy 3264 biopsies were obtained and 3245 (98.8%) were negative for dysplasia, 16 (0.4%) were indefinite for dysplasia and 3 (0.09%) showed LGD, therefore 19 biopsies were definite or indefinite for dysplasia (0.58%). With targeted conventional colonoscopy 50 biopsies were done, of which 35 (70%) were negative for dysplasia, 2 (4%) were indefinite for dysplasia, 12 (24%) showed LGD and 1 (2%) showed HGD, therefore there were 15 biopsies definite or indefinite for dysplasia (30%). The mean size of dysplastic lesions detected was 0.49cm^2 With chromoscopy a total of 82 additional biopsies were taken, of which 47 (57%) were negative, 13 (16%) were indefinite for	The different techniques were performed on the patients back-to-back and the pathology specimens were analysed by an expert gastrointestinal pathologist who was blinded to he method of collection. There was no long-term follow up and the authors stated that methylene blue may cause DNA damage with white light exposure and therefore the long-term implications of single stranded DNA breaks and oxidative changes in patients with colitis are unknown.

Evidence table for review question 2B: Is colonoscopic surveillance with a dye (chromoscopy) for prevention and/or early detection of colorectal cancer in adults with inflammatory bowel disease clinically effective compared with colonoscopic surveillance without dye (conventional colonoscopy)?

<table>
<tr><th>Study ID</th><th>Study design</th><th>Follow up</th><th>Population</th><th>Intervention</th><th>Comparison</th><th>Outcomes</th><th>Comments</th></tr>
<tr><td></td><td></td><td></td><td>enrolled in a surveillance programme at time of study. 39% had previous documented dysplasia (38 LGD, 2 HGD, 10 indefinite for dysplasia). Four had polyploid lesions, others had uncharacterised or not visible lesions (detected using random biopsy).

All patients received standard bowel preparation (Fleets Phosphoda, Miralax, or Citrate of Magnesia-based preps) and each patient acted as his or her own control.</td><td>The authors reported that the only significant equipment expense was the dye spray catheter ($185) which can be sterilised and used up to 20 times, and the study used the cheaper methylene blue dye over the indigo carmine dye.</td><td>55:29).</td><td>dysplasia, 21 (26%) had LGD and 1 (1%) had HGD; therefore there were 35 biopsies definite or indefinite for dysplasia (43%). The mean size of dysplastic lesions detected was 1.3cm^2

Dysplasia yield by method per patient

<table>
<tr><td></td><td colspan="3">Random non-targeted</td></tr>
<tr><td>Targeted with and without dye</td><td>(D)</td><td>(ND)</td><td>Total</td></tr>
<tr><td>Dysplasia (D)</td><td>1</td><td>19</td><td>20</td></tr>
<tr><td>No dysplasia (ND)</td><td>2</td><td>83</td><td>85</td></tr>
<tr><td>Total</td><td>3</td><td>99</td><td>P<0.0002</td></tr>
<tr><td>Chromoscopy</td><td colspan="3">Random non-targeted</td></tr>
<tr><td>Dysplasia</td><td>1</td><td>16</td><td>17</td></tr>
<tr><td>No dysplasia</td><td>2</td><td>83</td><td>85</td></tr>
<tr><td>Total</td><td>3</td><td>99</td><td>P<0.001</td></tr>
<tr><td>Chromoscopy</td><td colspan="3">Targeted conventional colonoscopy</td></tr>
<tr><td>Dysplasia</td><td>6</td><td>11</td><td>17</td></tr>
<tr><td>No dysplasia</td><td>3</td><td>82</td><td>85</td></tr>
<tr><td>Total</td><td>9</td><td>93</td><td>P=0.057 NS</td></tr>
</table>
Adapted from tables 2 and 3 from Marion 2008

Agreement between chromoscopy findings and colectomy for the 4 patients that had colectomy: 3 with dysplasia and 1 without (though 1/3 was HGD, not all LGD as detected by chromoscopy.</td><td></td></tr>
<tr><td>Rutter et al. (2004a)</td><td>Prospective single blind trial with three</td><td>None</td><td>Patients (N = 100) with longstanding extensive</td><td>Chromoscopy with 0.1% indigo carmine</td><td>1) Non-targeted quadrantic – on initial</td><td>Dysplasia yield by method (per biopsy)

Non-targeted quadrantic biopsies
A total of 2904 non-targeted biopsies were taken, a mean of</td><td>The different techniques were performed on the patients back-to-</td></tr>
</table>

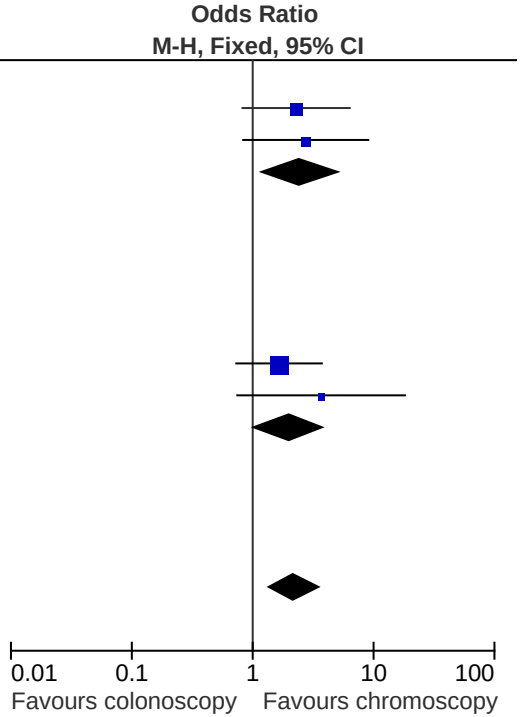
Evidence table for review question 2B: Is colonoscopic surveillance with a dye (chromoscopy) for prevention and/or early detection of colorectal cancer in adults with inflammatory bowel disease clinically effective compared with colonoscopic surveillance without dye (conventional colonoscopy)?							
Study ID	**Study design**	**Follow up**	**Population**	**Intervention**	**Comparison**	**Outcomes**	**Comments**
	methods within the same patient population. Each patient underwent back-to-back colonoscopic examination: first with random colonoscopic surveillance, followed by targeted colonoscopic surveillance and then using pancolonic indigo carmine dye spray.		ulcerative colitis [UC] attending routine colonoscopic surveillance for ulcerative colitis at St Mark's Hospital, UK. There were 61 male and 39 female patients. Median age was 53 years (range 33–79); median age at onset of UC was 27 years (range 7–67); and the median duration of colitis was 24 years (range 8–52). For 11 patients this was their index screening and 89 patients had undergone surveillance previously. The documented proximal extent of macroscopic inflammation was the transverse colon in 12 patients, hepatic flexure	The indigo carmine dye was delivered by a specially designed dye spray catheter (Olympus PW-5V1). After allowing a few seconds for the dye to settle onto the mucosal surface, excess pools of indigo carmine were suctioned. The mucosa was then scrutinised, and any abnormalities not identified on initial examination were biopsied or removed. The median time for the procedure was 10 minutes (range 4–22).	intubation, inspection of the entire colonic mucosa was done on withdrawal. At 10 cm intervals, the mucosa was photographed and quadrantic non-targeted colonic biopsies taken as per the ASG guidelines (about 2–40 per colon). 2) Pre-dye spray targeted –in addition, any suspicious area of mucosa was photographed and biopsied or removed, as clinically indicated. Suspicious areas were defined as any mucosal irregularity that	29 per patient. No dysplasia was detected in any of these biopsies. **Targeted biopsies** Overall, 157 suspicious mucosal areas were detected in 61 patients. 43 abnormalities (from 20 patients) were detected during the pre-dye spray colonoscopy, and following indigo carmine dye spraying 114 additional abnormalities (in 55 patients) were detected. Median size was 4 mm (range 1–40). Six of the abnormalities were pedunculated, 69 were sessile, 75 were flat topped elevated abnormalities, and 7 abnormalities were described as irregular appearing mucosa. **Pre-dye spray targeted biopsies** Of the 43 abnormalities detected during the pre-dye spray colonoscopy, 9 lesions were hyperplastic polyps and 32 were inflammatory or post-inflammatory polyps. Two patients had dysplastic lesions (a 20 mm sessile lesion on quiescent mucosa at the hepatic flexure in a 71 year old male with no previous dysplasia and a 15 mm sessile lesion on mildly inflamed mucosa in the sigmoid colon in an 80 year old female with previous dysplasia, who has repeatedly declined surgery unless cancer was detected). Targeted biopsies showed low-grade dysplasia, confirming the endoscopist's impression that these were dysplasia-associated lesions/masses [DALMs]. **Dye spray targeted biopsies** Both DALM lesions were visible after indigo carmine dye spraying. Of the 114 additional abnormalities detected following dye spraying, seven were dysplastic (from 5 patients). Five of these abnormalities were tubular adenomas with LGD, and two were serrated adenomas with LGD. Three of the lesions were described as flat lesions and four were sessile. The size of these well circumscribed adenomas ranged from 2 to 6 mm. Two adenomas were found in the caecum, two at the hepatic flexure, two in the transverse colon, and one in the descending colon. Two of the adenomas occurred proximal to the extent of colitis	back and all biopsy specimens were analysed by one of two experienced gastrointesinal histopathologists, who were blinded to the protocol used. Any specimen showing dysplasia was independently reported by both, and in the event of inter-observer variation a consensus opinion was reached. According to the authors, despite being back-to-back colonoscopies, the lesions detected by the dye were not missed lesions as that would give a missed rate of 350% and felt they

Evidence table for review question 2B: Is colonoscopic surveillance with a dye (chromoscopy) for prevention and/or early detection of colorectal cancer in adults with inflammatory bowel disease clinically effective compared with colonoscopic surveillance without dye (conventional colonoscopy)?							
Study ID	**Study design**	**Follow up**	**Population**	**Intervention**	**Comparison**	**Outcomes**	**Comments**
			in 4 patients, ascending colon in 1 patient, and pancolonic in 83 patients. The study size was calculated to be 100 based on a pre-dye spray dysplasia detection rate of 8% and an assumption of using dye doubling the rate (power of 90% and alpha of 0.05). 108 consecutive people were invited and 101 consented but one test was abandoned at the patient's request.		was not felt to be entirely consistent with chronic or active ulcerative colitis, regardless of whether or not it was felt to be dysplastic. The median time for the procedure was 11 minutes (range 4–18).	and five were within the UC extent (four in well healed disease, one in an area of mild inflammation). Of the other 107 abnormalities detected following dye spraying, 41 were hyperplastic polyps, 65 post-inflammatory and inflammatory polyps, and one was described as villiform mucosa but without dysplasia. **Dysplasia detection summary** With regard to dysplasia detection, the non-targeted biopsy protocol (2904 biopsies) detected no dysplasia from 100 patients, the pre-dye spray targeted biopsy protocol (43 biopsies) detected two dysplastic lesions in two of the 100 patients, and the dye spray targeted biopsy protocol (114 biopsies) detected these two dysplastic lesions plus seven additional dysplastic lesions in five more of the 100 patients. Thus overall, dysplasia was detected in 7% of patients. There was a strong statistical trend towards an increase in dysplasia detection with dye spraying (7/100 patients v 2/100 patients; p = 0.06, paired exact test). Compared with the non-targeted biopsy protocol, the targeted biopsies detected dysplasia in significantly more patients (7/100 patients v 0/100 patients; p = 0.02, paired exact test).	minimised this by doing a meticulous examination.

Forest plots: people with inflammatory bowel disease

Outcome 1: Total number of patients with intraepithelial neoplasia detected

Study or Subgroup	Chromoscopy Events	Chromoscopy Total	Conventional colonoscopy Events	Conventional colonoscopy Total	Weight	Odds Ratio M-H, Fixed, 95% CI
3.1.1 Randomised studies						
Kiesslich 2003	13	84	6	81	26.1%	2.29 [0.83, 6.35]
Kiesslich 2007	11	80	4	73	18.2%	2.75 [0.83, 9.06]
Subtotal (95% CI)		**164**		**154**	**44.3%**	**2.48 [1.14, 5.38]**
Total events	24		10			
Heterogeneity: Chi² = 0.05, df = 1 (P = 0.82); I² = 0%						
Test for overall effect: Z = 2.30 (P = 0.02)						
3.1.2 Back to back studies						
Marion 2008	17	102	11	102	46.3%	1.65 [0.73, 3.73]
Rutter 2004	7	100	2	100	9.4%	3.69 [0.75, 18.21]
Subtotal (95% CI)		**202**		**202**	**55.7%**	**2.00 [0.98, 4.09]**
Total events	24		13			
Heterogeneity: Chi² = 0.77, df = 1 (P = 0.38); I² = 0%						
Test for overall effect: Z = 1.89 (P = 0.06)						
Total (95% CI)		**366**		**356**	**100.0%**	**2.21 [1.31, 3.74]**
Total events	48		23			
Heterogeneity: Chi² = 1.01, df = 3 (P = 0.80); I² = 0%						
Test for overall effect: Z = 2.96 (P = 0.003)						
Test for subgroup differences: Not applicable						



Review question 2B: People with adenomas

Evidence table for review question 2B (b): Is colonoscopic surveillance with a dye (chromoscopy) for prevention and/or early detection of colorectal cancer in adults with adenomas clinically effective compared with colonoscopic surveillance without dye (conventional colonoscopy)?

Study ID	Study design	Follow up	Population	Intervention	Comparison	Outcomes	Comments
Brown et al. (2007)	Systematic review of RCTs. Cochrane review – included four RCTs: Brooker et al. (2002); Hurlstone et al. (2004); Lapalus et al. (2006); Le Rhun et al. (2004) (total of 1009 participants)	Databases searched from 1966-October 2006	**Included:** participants undergoing chromoscopic or conventional colonoscopy for investigation of gastrointestinal symptoms or as apart of a screening programme. **Excluded:** patients undergoing surveillance for IBD or patients undergoing surveillance for known polyposis syndromes; familial adenomatous polyposis (FAP) or hereditary non polyposis colorectal cancer (HNPCC).	Chromoscopy	Conventional colonoscopy	Detection outcomes based on number of polyps and neoplastic lesions detected. All significantly in favour of chromoscopy. **Primary outcomes** The number of polyps (neoplastic and non-neoplastic) detected was statistically significantly greater for all studies and highly significant when the studies were combined (WMD fixed 0.77; 95% CI 0.52 to 1.01). This enhanced yield was maintained even if neoplastic lesions only were considered (WMD fixed 0.35; 95% CI 0.23 to 0.47). However, tests for heterogeneity were significant in this analysis group. This may be indicative of the yield of neoplastic lesions, which varied significantly between studies. Almost all patients had either no polyps or 1 polyp. It was therefore estimated that over 95% of patients would have 0, 1 or 2 polyps and that a standard deviation of 2.00 for polyps and 1.00 for neoplastic lesions was reasonable and in agreement with the data from the one study that gave that data. Again there was a significant difference in favour of the chromoscopy group (OR [fixed] 2.13: 95% CI 1.47 to 3.10) which was maintained when considering neoplastic lesions only (OR [fixed] 1.61: 95% CI 1.24 to 2.09). ***Secondary outcomes*** With regard to secondary outcomes the number of diminutive neoplastic lesions and the number of patients with at least 1 diminutive neoplastic lesion were all increased in favour of chromoscopy compared with conventional colonoscopy (WMD fixed 0.27; 95% CI 0.14 to 0.40) and OR [fixed] 1.71; 95% CI 1.23 to 2.37) respectively. In addition, the number of	Good Cochrane review – The two UK studies were single pass chromoscopy and the two French studies were 'back-to-back', which is known to increase polyp yield (Hixson 1990; Rex 1997). The number of neoplastic lesions detected in the control group for the power calculation was miscalculated. After their removal (due to heterogeneity) - chromoscopy was still favoured. Heterogeneity was not seen when the results were pooled for patients with at least 1 polyp or 1 neoplastic lesion, rather than considered separately. Chromoscopy was

Evidence table for review question 2B (b): Is colonoscopic surveillance with a dye (chromoscopy) for prevention and/or early detection of colorectal cancer in adults with adenomas clinically effective compared with colonoscopic surveillance without dye (conventional colonoscopy)?							
Study ID	**Study design**	**Follow up**	**Population**	**Intervention**	**Comparison**	**Outcomes**	**Comments**
						patients with 3 or more neoplastic lesions was more than twice as likely to be detected using chromoscopy (OR [fixed] 2.55; 95% CI 1.49 to 4.36). The trend of enhanced detection of polyps (neoplastic and nonneoplastic) with chromoscopy was maintained even if outcome measures were considered for the proximal and distal colon separately. Although also showing this trend, two outcome variables failed to show a significant difference: total number of neoplastic lesions and diminutive neoplastic lesions detected in the distal colon.	favoured in all outcomes studied, with more than twice as much detection for patients with 3 or more polyps. This was maintained for both distal and proximal colon. The authors conclude that chromoscopy should be the gold standard test for polyp detection until further research is done on the newer techniques. Data from the Hurlstone et al. (2004) study was not included for this guideline.

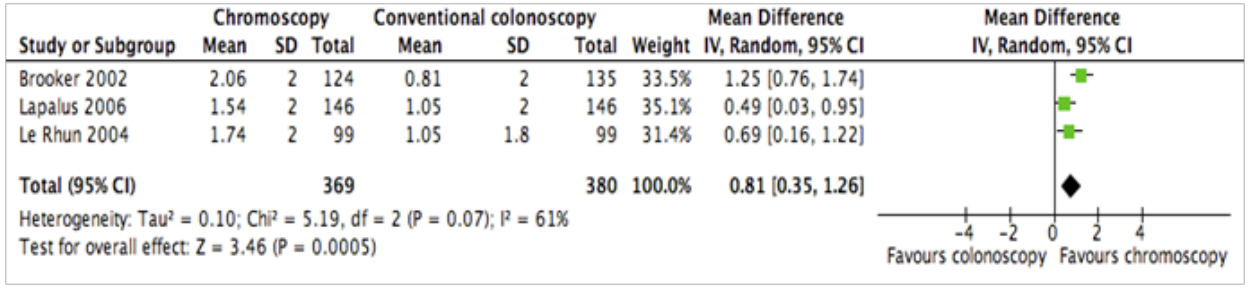
1

2

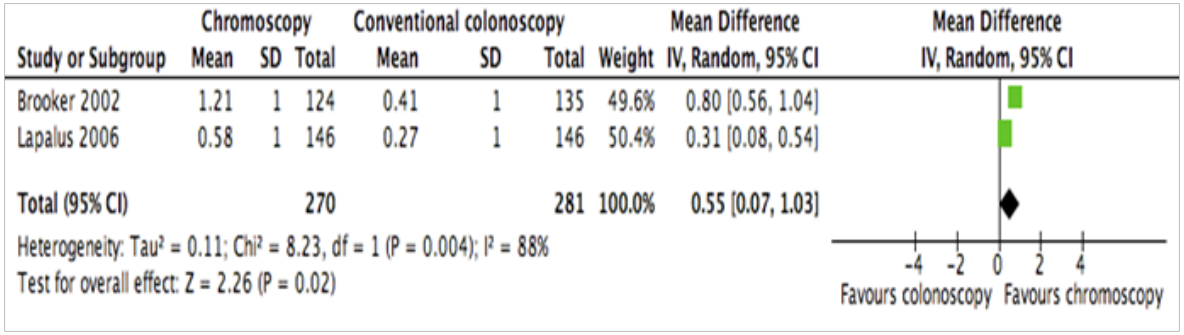
Forest Plots: People with adenomatous polyps (revised from Brown 2007 Cochrane Review)

Removed Hurlstone 2004 as noted above. Also applied random effects model if heterogeneity 50% or greater.

Outcome 1: Total number of polyps detected



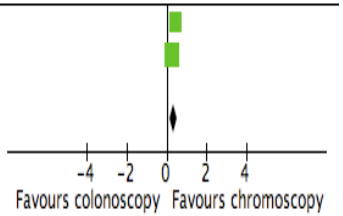
Outcome 2: Total number of polyps detected in the proximal colon



Outcome 3: Total number of polyps detected in the distal colon

Study or Subgroup	Chromoscopy Mean	SD	Total	Conventional colonoscopy Mean	SD	Total	Weight	Mean Difference IV, Fixed, 95% CI
Brooker 2002	0.85	1	124	0.39	1	135	47.0%	0.46 [0.22, 0.70]
Lapalus 2006	0.96	1	146	0.67	1	146	53.0%	0.29 [0.06, 0.52]
Total (95% CI)			**270**			**281**	**100.0%**	**0.37 [0.20, 0.54]**

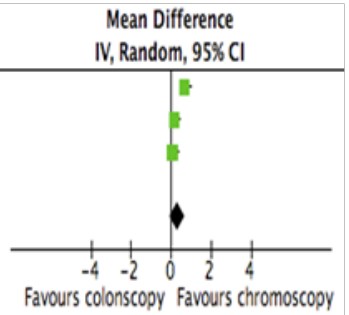
Heterogeneity: Chi² = 0.99, df = 1 (P = 0.32); I² = 0%
Test for overall effect: Z = 4.34 (P < 0.0001)



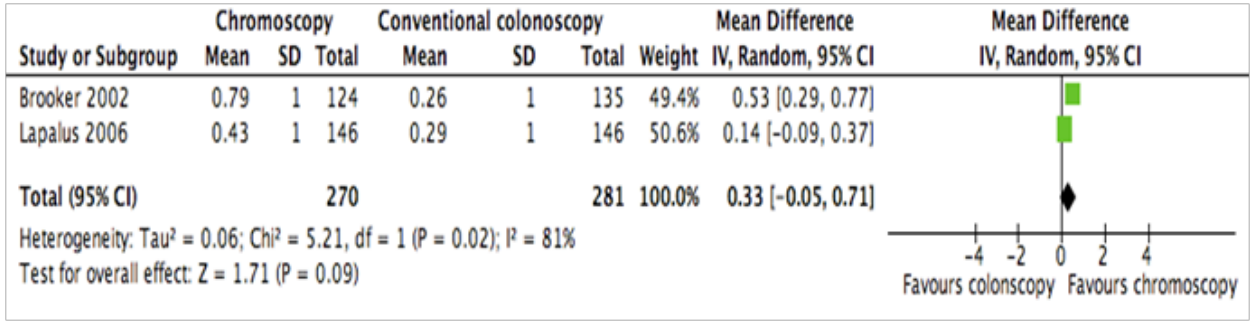
Outcome 4: Total number of neoplastic lesions detected

Study or Subgroup	Chromoscopy Mean	SD	Total	Conventional colonoscopy Mean	SD	Total	Weight	Mean Difference IV, Random, 95% CI
Brooker 2002	1.01	1	124	0.3	1	135	33.4%	0.71 [0.47, 0.95]
Lapalus 2006	0.79	1	146	0.6	1	146	34.0%	0.19 [-0.04, 0.42]
Le Rhun 2004	0.6	1	99	0.5	0.9	99	32.6%	0.10 [-0.17, 0.37]
Total (95% CI)			**369**			**380**	**100.0%**	**0.33 [-0.04, 0.71]**

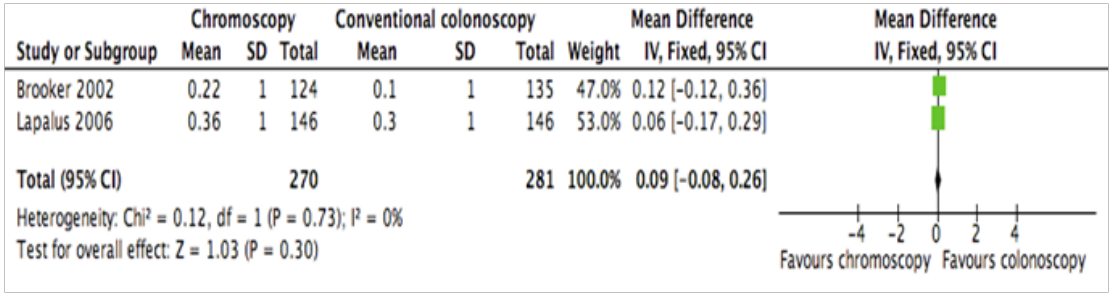
Heterogeneity: Tau² = 0.09; Chi² = 13.64, df = 2 (P = 0.001); I² = 85%
Test for overall effect: Z = 1.77 (P = 0.08)



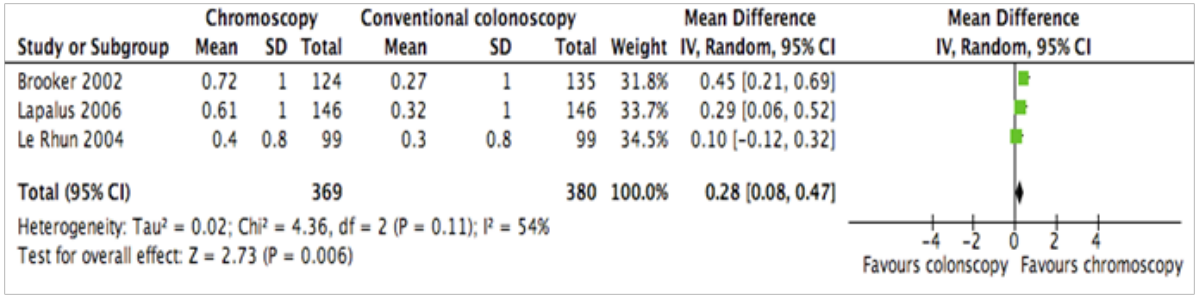
Outcome 5: Total number of neoplastic lesions detected in the proximal colon



Outcome 6: Total number of neoplastic lesions detected in the distal colon



Outcome 7: Total number of diminutive adenomas detected



Review question 3: People with Inflammatory bowel disease

Evidence table for review question 3: When should colonoscopic surveillance be started and what should be the frequency of surveillance?

Study ID	Study design	Follow-up	Population	Prognostic factors or surveillance	Comments
Eaden et al. (2001)	Meta-analysis of 116 studies	…	24,478 people with UC 1698 cases of CRC	**Duration of disease 0 to 10 years (all UC)**: **Cumulative probability of CRC 1.6% (1.2 to 2) by 10 years** **Duration of disease 11 to 20 years (all UC)**: **Cumulative probability of CRC 8.3% (4.8 to 11.7) by 20 years** **Duration of disease 21 to 30 years (all UC)**: **Cumulative probability of CRC 18.4% (15.3 to 21.5) by 30 years** **Extent of disease**: **Total UC only Cumulative probability of CRC 2.1% (1.0 to 3.2) by 10 years 8.5% (3.8 to 13.3) by 20 years 17.8% (8.3 to 27.4) by 30 years**	…
Jess et al. (2005)	Meta-analysis of 6 studies	…	6538 people with CD 55 cases of CRC	**Extent of disease**: Meta-regression of 4 studies showed no significant influence of disease extent on SIR for CRC. Noted, however, that the prevalence was similar across the included studies.	…
Soetikno et al. (2002)	Meta-analysis of 11 studies	…	16,844 people with UC 564 with UC and PSC 560 cases of CRC, including 60 in people with UC and PSC	**PSC**: OR 4.79 (3.58 to 6.41) of colorectal neoplasia (dysplasia or carcinoma) if UC and PSC compared with UC alone OR 4.09 (2.89 to 5.76) of CRC if UC and PSC compared with UC alone Results for fixed effect model presented. Similar results were found for the random effects model.	…
Thomas et al. (2007)	Meta-analysis of 20 studies	…	Over 2,677 people with UC 508 cases of LGD 31 cases of CRC	**Progression of LGD to CRC**: **OR 9.0 (4.0 to 20.5) of CRC if LGD diagnosis compared with no dysplasia Meta-regression showed no significant effect of duration of disease on CRC risk (p = 0.57)** **Progression of LGD to HGD or CRC**: **OR 11.9 (5.2 to 27) of HGD or CRC if LGD diagnosis compared with no dysplasia**	

Evidence table for review question 3: When should colonoscopic surveillance be started and what should be the frequency of surveillance?					
Study ID	**Study design**	**Follow-up**	**Population**	**Prognostic factors or surveillance**	**Comments**
Askling et al. (2001)	Retrospective (assumed) cohort, with nested case control	**169,333 person yesrs**	19,876 people with UC or CD 143 cases of CRC	**Extent of disease**: RR 3.5 (1.2 to 20) of CRC if pancolitis or colorectal CD compared with UC or CD. This did not significantly modify the association with FH of CRC (p = 0.51 interaction) **Family history At least one first-degree relative with CRC**: **RR 2.5 (1.4 to 4.4) of CRC if FH with CRC compared with no FH with CRC** **Family history Relative aged <50 at diagnosis of CRC**: **RR 9.2 (3.7 to 23) of CRC if relative aged <50 at diagnosis of CRC compared with no FH with CRC** **Family history Relative aged ≥50 at diagnosis of CRC**: RR 1.7 (0.8 to 3.4) of CRC if relative aged ≥50 at diagnosis of CRC compared with no FH with CRC	…
Brentnall et al. (1996)	Prospective cohort	**?9 years**	45 people with UC 20 with PSC 13 cases of dysplasia	**□uration□of disease**: No signficant association of duration of disease with development of dysplasia (indefinite, LGD, HGD) (logistic coefficient 0.07; p = 0.35) **Age at diagnosis or onset**: No signficant association of age at onset of UC with development of dysplasia (indefinite, LGD, HGD) (logistic coefficient –0.03; p=0.58) **PSC**: Risk of CRC associated with PSC and UC included in Soetikno (2002) analysis	…
Broome et al. (1992)	Retrospective (assumed) cohort	**?15 years**	72 people with UC 5 with PSC 17 cases of dysplasia, carcinoma, and/or DNA aneuploidy	**Duration of disease**: **Signficant association of duration of disease with development of dysplasia and/or DNA aneuploidy (logistic coefficient 0.051; p = 0.038)** **Age at diagnosis or onset**: No signficant association of age at onset of UC with development of dysplasia and/or DNA aneuploidy (logistic coefficient–-0.041; p = 0.153) **PSC**: Risk of CRC associated with PSC and UC included in Soetikno (2002) analysis	…
Broome et al. (1995)	Retrospective (assumed) cohort	**Mean observation time 9 years**	120 people with UC 40 with PSC and UC 7 cases of CRC	**PSC**: Risk of CRC associated with PSC and UC included in Soetikno (2002) analysis Cumulative risk of dysplasia or CRC with PSC and UC of 9% after 10 years; 31% after 20 years; 50% after 25 years compared with 2%, 5% and 10% for UC alone (comparison of life table curves [p < 0.001])	…

Evidence table for review question 3: When should colonoscopic surveillance be started and what should be the frequency of surveillance?					
Study ID	**Study design**	**Follow-up**	**Population**	**Prognostic factors or surveillance**	**Comments**
D'Haens et al. (1993)	Retrospective case control	**Not clear**	58 people with UC 29 with PSC 9 cases of CRC	**Age at diagnosis or onset**: **OR 1.04 (1.00 to 1.08) for association of risk of dysplasia or CRC with age at onset of symptoms in years (conditional logistic regression)** **PSC**: **OR 9.00 (1.14 to 71.04) for association of risk of dysplasia or CRC with pericholangitis or PSC (conditional logistic regression)**	…
Ekbom et al. (1990)	Retrospective (assumed) cohort	**Over 20 years (max)**	1655 people with CD 12 cases of CRC	**Gender**: SIR for CRC 2.8 (1.1 to 5.8) in men; 2.1 (0.7 to 4.8) in women. Not direct comparison. **Duration of disease 0 to 10 years (all UC)**: SIR for CRC 2.5 (1.0 to 5.1) for duration of follow-up <10 years. Not direct comparison – compared with the general population **Duration of disease 11 to 20 years (all UC)**: SIR for CRC 2.0 (0.4 to 6.0) for duration of follow-up 10 to 19 years. Not direct comparison – compared with the general population **Duration of disease 21 to 30 years (all UC)**: SIR for CRC 3.2 (0.4 to 11.4) for duration of follow-up of 19 years or more. Not direct comparison – compared with the general population **Age at diagnosis or onset**: SIR 9.5 (3.1 to 23.2) for CRC if aged <30 years at diagnosis; 1.6 (0.6 to 3.3) if aged 30 years or more. Not direct comparison – compared with the general population. **Extent of disease**: SIR 1.0 (0.1 to 3.4) for risk of CRC if disease confined to the terminal ileum; 3.2 (0.7 to 9.2) for terminal ileum and part of the colon; 5.6 (2.1 to 12.2) for the colon alone; 1.2 (0.0 to 5.9) for other; 4.4 (2.0 to 8.4) for any colonic involvement. Not direct comparison – compared with the general population.	…
Florin et al. (2004)	Retrospective case control	**Not clear**	384 people with UC 90 with PSC 8 cases of CRC	**PSC**: **OR 3.6 (1.3 to 10.2) for risk of HGD or CRC in PSC-IBD compared with UC**	…

Evidence table for review question 3: When should colonoscopic surveillance be started and what should be the frequency of surveillance?						
Study ID	**Study design**	**Follow-up**	**Population**	**Prognostic factors or surveillance**		**Comments**
Friedman et al. (2001)	Retrospective (assumed) cohort	**Not clear**	259 people with CD 5 cases of CRC	**Age**	**Risk of neoplasia (LGD, HGD, CRC) identified on surveillance was higher in people aged over 45 years (p = 0.048) compared with people aged 45 years and younger. This remained significant when adjusted for duration of disease.**	…
Gilat et al. (1988)	Prospective (assumed) cohort	**Mean 11.5 years (SD 8.3)**	1035 people with UC Number of cases of CRC not reported	**Duration of disease**	Association of duration with risk of CRC included in Eaden (2001) analysis **Cumulative incidence of CRC with total colitis 0% at 10 years; 9.3% at 15 years; 13.8% at 20 years**	…
Gupta et al. (2007)	Retrospective cohort	**Median 6.7 years**	418 people with UC 65 cases of any neoplasia 15 progressed to advanced neoplasia	**Gender**	**HR 1.5 (0.9 to 2.4) for association of gender (male) with any neoplasia HR 2.5 (0.8 to 7.8) for advanced neoplasia (univariate only)**	…
				Duration of disease	**HR 1.6 (0.9 to 2.8) for association of duration of disease (>15 years) with any neoplasia HR 2.0 (0.6 to 6.3) for advanced neoplasia (univariate only)**	
				Age at diagnosis or onset	**HR 0.7 (0.4 to 1.2) for association of age (<25 years) with any neoplasia HR 1.6 (0.6 to 4.5) for advanced neoplasia (univariate only)**	
				Extent of disease	HR 1.1 (0.4 to 3.5) for association of extent of disease with any neoplasia No extensive disease in advanced neoplasia group (univariate only)	
				PSC	HR 1.1 (0.2 to 8.0) for association of PSC with any neoplasia No PSC in advanced neoplasia group (univariate only)	
				Severity of inflammation Inflammation score (mean)	**HR 1.4 (0.9 to 2.3) for association of inflammation with any neoplasia HR 3.0 (1.4 to 6.3) for advanced neoplasia Remained signficant for advanced neoplasis when adjusted for frequency of colonoscopy**	
				Severity of inflammation Inflammation score (cumulative mean)	**HR 1.7 (0.9 to 3.1) for association of inflammation with any neoplasia HR 3.4 (1.1 to 10.4) for advanced neoplasia Similar results when adjusted for frequency**	

Evidence table for review question 3: When should colonoscopic surveillance be started and what should be the frequency of surveillance?						
Study ID	**Study design**	**Follow-up**	**Population**	**Prognostic factors or surveillance**		**Comments**
					of colonoscopy	
				Severity of inflammation Inflammation score (maximum)	**HR 1.0 (0.7 to 1.5) for association of inflammation with any neoplasia HR 2.2 (1.2 to 4.2) for advanced neoplasia Similar results when adjusted for frequency of colonoscopy**	
				Frequency of colonscopy	**HR 1.7 (0.9 to 3.0) for association of frequency of colonoscopy (1 or more per year) with any neoplasia HR 3.9 (1.3 to 11.4) for advanced neoplasia (univariate only)**	
Gyde et al. (1988)	Retrospective cohort	**16,928 patient years at risk**	823 people with UC 38 cases of CRC	**Gender**	No difference between RR of CRC in men and women (p = NS)	…
				Duration of disease	Association of duration with risk of CRC included in Eaden et al. (2001) analysis	
				Age at diagnosis or onset	**RR 1071 (observed/expected; 55.3 to 187.2) for extensive colitis with age of onset 15 to 24 years compared to the general population RR 27.9 (observed/expected; 15.2 to 46.8) for extensive colitis with age of onset 25 to 39 years compared to the general population RR 3.3 (observed/expected; 0.7 to 9.8) for extensive colitis with age of onset aged 40 and over compared to the general population**	
				Extent of disease	**RR 19.2 (observed/expected; no CI reported, p = 0.001) of CRC in extensive colitis compared with the general population RR 3.6 (observed/expected; no CI reported, p=0.01) of CRC in left sided colitis and proctitis compared with the general population**	

Evidence table for review question 3: When should colonoscopic surveillance be started and what should be the frequency of surveillance?						
Study ID	**Study design**	**Follow-up**	**Population**	**Prognostic factors or surveillance**		**Comments**
Hendriksen et al. (1985)	Retrospective (assumed) cohort	**Mean 6.7 years**	783 people with UC 7 cases of colonic cancer	**Duration of disease 0 to 10 years (all UC)**	**Cumulative risk of CRC 0.8% (no CI reported) by 10 years**	…
				Duration of disease 11 to 20 years (all UC)	**Cumulative risk of CRC 1.1% (no CI reported) by 15 years, and 1.4% (0.7 to 2.8) by 18 years**	
				Extent of disease	Cumulative risk of CRC not influenced by initial extent of the colon. Cumulative risk after 18 years was 1.3%.	
Jess et al. (2006)	Retrospective (assumed) cohort	**Median 14 years**	692 people with IBD 29 cases of CR dysplasia	**Disease – IBD**	HR 0.7 (0.2 to 3.0) for risk of recurrence and progression of dysplasia in CD compared with UC	…
				Gender	HR 2.8 (0.3 to 23) for risk of recurrence and progression of dysplasia in men compared with women	
				Age at diagnosis or onset	HR 0.7 (0.2 to 2.9) for risk of recurrence and progression of dysplasia for age of IBD diagnosis at over 40 years compared with 40 years and younger HR 0.7 (0.2 to 3.3) for risk of recurrence and progression of dysplasia for age of dysplasia diagnosis at over 50 years compared with 50 years and younger	
				Extent of disease	HR 0.9 (0.2 to 4.6) for risk of recurrence and progression of dysplasia in pancolitis or pure colonic CD compared with other extent	
				PSC	**HR 5.0 (1.1 to 23) for risk of recurrence and progression of dysplasia in PSC compared with no PSC**	
				Location of dysplasia	**HR 5.4 (1.0 to 28) for risk of recurrence and progression of dysplasia in dysplasia distal to splenic flexure compared with proximal**	

Evidence table for review question 3: When should colonoscopic surveillance be started and what should be the frequency of surveillance?						
Study ID	**Study design**	**Follow-up**	**Population**	**Prognostic factors or surveillance**		**Comments**
Jess et al. (2007)	Retrospective (assumed) cohort, with nested case control	**Not clear**	145 people with IBD 43 cases of neoplasia	**PSC**	**Adjusted OR 6.9 (1.2 to 40 for colorectal neoplasia if PSC compared with no PSC (includes cases from Jess 2006)**	…
				Family history At least one first-degree relative with CRC	Adjusted OR 1.4 (0.3 to 5.9) for colorectal neoplasia if first degree relative with CRC compared with no relative with CRC	
				Severity of inflammation Inflammation score (mean)	Adjusted OR 1.3 (0.6 to 2.9) for association of mean macroscopic inflammation score with colorectal neoplasia Adjusted OR 0.7 (0.3 to 1.5) for association of mean microscopic inflammation score with CR neoplasia	
				Frequency of colonscopy	**Adjusted OR 5.3 (1.4 to 20) for colorectal neoplasia if 1 or more colonscopic surveillances during the disease course compared with no surveillance**	
Karlén et al. (1998)	Retrospective cohort, with nested case control	**Not clear**	142 people with UC 40 cases of CRC (deaths)	**Frequency of colonoscopy**	RR 0.29 (0.06 to 1.31) for risk of CRC mortality if colonscopic surveillance ever compared with never RR 0.43 (0.05 to 3.76) for risk of CRC mortality if 1 colonscopic surveillance compared with never RR 0.22 (0.03 to 1.74) for risk of CRC mortality if 2 or more colonscopic surveillances compared with never	…
Kvist et al. (1989)	Retrospective (assumed) cohort	**Median 11 years**	759 people with UC 17 cases of CRC	**Duration of disease**	Association of duration of disease with CRC risk included in Eaden et al. (2001) analysis	…
				Extent of disease	Crude CRC rates for 'left-sided' (proctosigmoiditis and left-sided disease) and universal disease were 'virtually the same' at 3% Time courses for duration of disease in the two groups were 'indistiguishable'	
Langholz et al. (1992)	Retrospective (assumed) cohort	**Median 11.7 years**	1161 people with UC 6 cases of CRC	**Duration of disease**	Association of duration with risk of CRC included in Eaden et al. (2001) analysis **Cumulative incidence of CRC with extensive disease 1.8% at 25 years**	…

Evidence table for review question 3: When should colonoscopic surveillance be started and what should be the frequency of surveillance?					
Study ID	**Study design**	**Follow-up**	**Population**	**Prognostic factors or surveillance**	**Comments**
Lennard-Jones et al. (1990)	Prospective cohort	**3,706 patient years**	401 people with extensive UC 22 cases of CRC	**Duration of disease**: Association of duration of disease with CRC risk included in Eaden et al. (2001) analysis **Duration of disease 11 to 20 years (all UC)**: **Cumulative risk of HGD or CRC at 15 years 4% Cumulative risk of HGD or CRC at 20 years 7%** **Duration of disease 21 to 30 years (all UC)**: **Cumulative risk of HGD or CRC at 25 years 13%**	…
Loftus et al. (2005)	Prospective cohort (with matched controls)	**Not clear**	213 people with IBD/UC 71 with PSC-IBD 11 cases of CRC	**Duration of disease 0 to 10 years (all UC)**: **Cumulative risk of dysplasia or CRC at 5 years 33% (17 to 46) for PSC-IBD compared with 13% (2 to 21) for UC (p = 0.054) Cumulative risk of CRC at 5 years 14% (3 to 25) for PSC-IBD compared with 4% (0 to 10) for UC (p = 0.13)** **PSC**: HR 1.7 (0.6 to 4.9) for dysplasia or CRC in PSC-IBD compared with UC HR 1.9 (0.3 to 11.9) for CRC in PSC-IBD compared with UC Both adjusted for age, duration of IBD, date of IBD diagnosis	…
Nuako et al. (1998) FH	Retrospective (assumed) case control	**Not clear**	297 people with UC 31 cases of CRC	**Family history At least one first-degree relative with CRC**: **Adjusted OR 2.31 (1.03 to 5.18) for CRC in FH comapred with no FH Adjusted for sex, age, and year of UC diagnosis**	…
Nuako et al. (1998) PSC	Prospective (assumed) case control	**Not clear**	342 people with UC 171 with CRC	**PSC**: Adjusted OR 1.23 (0.62 to 2.42) for risk of CRC in PSC compared with no PSC	…
Rutter et al. (2004b, 2004c)	Retrospective case control	**Not clear**	204 people with UC 68 cases of CR neoplasia	**Severity of inflammation Inflammation score (mean)**: **Adjusted OR 4.69 (2.10 to 10.48) for association between histological inflammation score and colorectal neoplasia** **Colonoscopic appearance**: **OR 0.38 (0.19 to 0.73) for risk of CRC on a normal appearance compared with not normal** **Post-inflammatory polyps**: **OR 2.29 (1.28 to 4.11) for risk of CRC with post-inflammatory polyps compared with no polyps** **Colonic stricture**: **OR 4.62 (1.03 to 20.8) for risk of CRC with colonic stricture compared with no stricture**	…

Evidence table for review question 3: When should colonoscopic surveillance be started and what should be the frequency of surveillance?						
Study ID	**Study design**	**Follow-up**	**Population**	**Prognostic factors or surveillance**		**Comments**
Rutter et al. (2006)	Retrospective (assumed) cohort	**Mean 8.5 years**	354 people with UC 215 cases of dysplasia or CRC	**Duration of disease 0 to 10 years (all UC)**	**Cumulative incidence of neoplasia at 10 years 1.5%; 0% for CRC**	…
				Duration of disease 11 to 20 years (all UC)	**Cumulative incidence of neoplasia at 20 years 7.7%; 2.5% for CRC**	
				Duration of disease 21 to 30 years (all UC)	**Cumulative incidence of neoplasia at 30 years 15.8%; 7.6% for CRC**	
				Duration of disease over 30 years (all UC)	**Cumulative incidence of neoplasia at 40 years 22.7%; 10.8% for CRC** **Cumulative incidence of neoplasia at 45 years 27.5%; 13.5% for CRC**	
Stewenius et al. (1995)	Retrospective (assumed) cohort	**Mean follow-up 14.8 years mortality; 14.5 years cancer incidence**	471 people with UC 9 cases of CRC	**Duration of disease**	Association of duration with risk of CRC included in Eaden et al. (2001) analysis **Cumulative incidence of CRC with total colitis at diagnosis 5% at 15 years; 8% at 20 years; 8% at 25 years** **Cumulative incidence of CRC with initial or later total colitis 6% at 15 years; 8% at 20 years; 10% at 25 years**	…
Velayos et al. (2006)	Retrospective case control	**Not clear**	356 people with UC 188 cases of CRC	**PSC**	**OR 1.1 (0.5 to 2.3) for risk of CRC in PSC compared with no PSC**	…
				Family history At least one first-degree relative with CRC	**Adjusted OR 3.7 (1.0 to 13.2) for risk of CRC in FH compared with no FH**	
				Post-inflammatory polyps	**Adjusted OR 2.5 (1.4 to 4.6) for risk of CRC with pseudopolyps compared with none**	
				Frequency of colonscopy	**Adjusted OR 0.4 (0.2 to 0.7) for risk of CRC with 1 or 2 colonscopies compared with none** **Adjusted OR 0.3 (0.1 to 0.8) for risk of CRC with 2 colonscopies compared with none**	

1
2

Review question 3: People with adenomas

Evidence table for review question 3: When should colonoscopic surveillance be started and what should be the frequency of surveillance?						
Study ID	**Study design**	**Follow up**	**Population**	**Prognostic factors or surveillance programmes**	**Outcomes**	**Comments**
Kronborg et al. (2006)	Randomised surveillance study. The groups were compared for patient characteristics. Size was measured immediately after polypectomy Years of observation were calculated from the first polypectomy to the most recently performed surveillance, or to censoring because of death, refusal to undergo surveillance, or emigration. Proportions were	10 years	Between 1981 and 1991 a total of 673 patients (382 men, 291 women; age, 28-77 years) with newly diagnosed adenomas were allocated at random to either 24 months (group A) or 48 months years (group B) between surveillance examinations. From 1981 to 1987, 73 patients with flat and sessile adenomas (more than 5 mm in diameter) and villous adenomas were randomly allocated to either intervals of 6 months (group C) or 12 months (group	Colonoscopic surveillance: group A = 2 years, group B = 4 years, group C = 6 months, group D = 12 months, E= 12 months and F= 24 months, between surveillance examinations. Different surveillance intervals, 6, 12, 24 months. Double-contrast barium enema (DCBE) was added if colonoscopy was incomplete. In patients with multiple polyps or unsatisfactory bowel preparation, colonoscopy was repeated within 3 months. Surveillance examinations were done mainly	**Colorectal neoplasia and adenoma detection** *B versus A* After the first follow-up period (24 months in A and 48 months in B) fewer patients had adenomas detected in group A than in group B but it was not statistically significant (58 of 292 versus 64 of 232; RR = 0.7, 95% CI 0.5 to1.0), and the number of patients with significant neoplasia did not differ (10 of 292 versus 13 of 232; RR = –0.6, 95% CI 0.3 to 1.4). Overall, adenomas were detected in a smaller proportion of surveillance examinations in group A than in group B (123 of 684 versus 83 of 300; RR = 0.7, 95% CI 0.5 to 0.8). The same was true of significant new neoplasia (18 of 684 versus 17 of 300; RR = 0.5, 95% CI 0.2 to -0.9). In group A the total number of patients having new adenomas and new significant neoplasia was 95 and 16, respectively. In group B the figures were 77 and 17, respectively. New adenomas tended to be detected more often in group A, but advanced new adenomas appeared equally as frequently in groups A and B. Overall, larger size contributed mainly to the advanced state (19 and 21 patients), whereas severe dysplasia and villousness was seen in 3 patients in both arms. However, CRC was diagnosed significantly more often in group B. *D versus C* The number of patients was limited, but the cumulative number of surveillance years was 10 years on average in both groups. Advanced new adenomas tended to be more frequent in the D group (p = 0.08), but the one case of cancer was detected in group C at a planned examination 6 months after a 'clean colon'. The cancer was at an early stage and the patient developed another early CRC more than 5 years later. Nearly all new adenomas were at an advanced stage because of large size alone. *F versus E* The two groups were similar initially and the average time of	The age, sex, and polyp characteristics of the patients were distributed evenly in the two groups. The study was randomised by random numbers but no details of concealment or blinding of pathologists is mentioned. Advanced adenomas were defined as those with severe dysplasia or being at least 10 mm in diameter or villous.

<table>
<tr><th colspan="7">Evidence table for review question 3: When should colonoscopic surveillance be started and what should be the frequency of surveillance?</th></tr>
<tr><th>Study ID</th><th>Study design</th><th>Follow up</th><th>Population</th><th>Prognostic factors or surveillance programmes</th><th>Outcomes</th><th>Comments</th></tr>
<tr><td></td><td>compared as relative risks (RR) with 95% confidence intervals. RR was calculated as the risk in the group with the longest interval of surveillance.</td><td></td><td>D) between examinations during the first 5 years and then every year in all.

Finally, 200 patients with similar adenomas to those in groups C and D were randomised to intervals of 12 months (group E) or 24 months (group F), the intake being from 1988 to 2000.

Patients were excluded if colorectal cancer (CRC) was detected at the initial examination, or if they had a history of previous colorectal neoplasia (carcinoma or adenoma), familial</td><td>by colonoscopy, but DCBE was used if the patient refused colonoscopy. If a surveillance examination was done more than 3 months after the date planned, the examination was considered 'in between'.

Patients without complete colonoscopy and less than optimal compliance were kept in the study</td><td>surveillance was 5 years. The number of colonoscopies was nearly twice as high in group E, but the number of new adenomas regardless of state was similar. There was no significant difference in risk of CRC but the two cancers in group E were both early stage, one being detected 12 months after a ‘clean colon’ (a mucinous tumour), the other, 57 months after a ‘clean colon’ and the patient's refusal to undergo further examinations. In group F the cancers were more advanced. Three of the four patients had a ’clean colon’ 24 months before the CRC was detected during a planned examination, but one had many recurrences at the site of the original large sessile adenoma in the rectum, before the cancer was detected (Dukes' B).
<table>
<tr><th></th><th colspan="3">Relative risks of new adenomas and carcinomas during surveillance with 95% CI</th></tr>
<tr><th></th><th>B versus A</th><th>D versus C</th><th>F versus E</th></tr>
<tr><td>New adenomas</td><td>0.88 (0.69 to 1.12)</td><td>0.82 (0.43 to 1.52)</td><td>0.88 (0.57 to 1.34)</td></tr>
<tr><td>Advanced new adenomas</td><td>1.15 (0.61 to 2.15)</td><td>3.12 (0.87 to 14.50)*</td><td>0.97 (0.40 to 2.35)</td></tr>
<tr><td>Colorectal carcinomas</td><td>6.22 (1.06 to 117, 48)**</td><td>-</td><td>1.93 (0.38-13.94)</td></tr>
<tr><td colspan="4">*p = 0.08; **p = 0.04</td></tr>
</table>
Adapted from table V in Kronborg (2006)

Adverse events
B versus A
Seven complications to colonoscopy were minor and treated without surgery, six during surveillance. The perforations occurred during surveillance in each of the two groups and were treated successfully with suture alone. A perforation during initial colonoscopy in group A proved fatal, the patient dying of septicemia after inadequate closure of a temporary colostomy. A: two diagnostic perforations and two therapeutic perforations and B: one diagnostic perforation and one polypectomy syndrome.
D versus C</td><td></td></tr>
</table>

Evidence table for review question 3: When should colonoscopic surveillance be started and what should be the frequency of surveillance?						
Study ID	**Study design**	**Follow up**	**Population**	**Prognostic factors or surveillance programmes**	**Outcomes**	**Comments**
			adenomatous polyposis (FAP) or hereditary non-polyposis colorectal cancer (HNPCC).		Two severe complications (1 diagnostic perforation and 1 polypectomy syndrome) were seen in the C group, but both patients fully recovered. No severe complications were found in group D. *F versus E* Two colonoscopic perforations were seen, both patients fully recovered after surgery (one diagnostic perforation in each group).	
Lieberman et al. (2007)	Patients with cancer or adenomas with high-grade dysplasia had follow-up based on clinician decisions. 501 participants with no neoplasia at baseline were matched by age to patients with adenomas ≥10 mm and assigned to surveillance at 5 years.	5.5 years	Participants were enrolled in 13 Veterans Affairs Medical Centres between February 1994 and January 1997. 24 centres were selected to achieve geographic and racial diversity. Among patients who met the eligibility criteria, 1463 (31.4%) declined to participate, 3196 eligible patients were enrolled, and 3121 had complete colonoscopy examinations to	Surveillance intervals of 2 or 5 years and adenoma detection in groups based on index colonoscopy results: according to the following hierarchy: no neoplasia, hyperplastic polyp, 1 or 2 tubular adenomas <10 mm, 3 or more tubular adenomas <10 mm, tubular adenoma ≥10 mm, adenoma with villous histology (25% or more), adenoma with high-grade dysplasia, invasive cancer.	1171 patients with neoplasia and 501 with no neoplasia at baseline were scheduled to have at least 1 follow-up colonoscopy within 5.5 years. **Neoplasia detection** The relative risk in patients with baseline neoplasia was 1.92 (95% CI 0.83 to 4.42) with 1 or 2 tubular adenomas <10 mm, 5.01 (95% CI 2.10 to11.96) with 3 or more tubular adenomas <10 mm, 6.40 (95% CI 2.74 to14.94) with tubular adenomas >10 mm, 6.05 (95% CI 2.48 to14.71) for villous adenomas, and 6.87 (95% CI 2.61 to18.07) for adenomas with high-grade dysplasia. The most serious outcome was the finding of invasive cancer or high-grade dysplasia. The rates of interval high-grade dysplasia or cancer per 1000 person-years of follow-up. The risk of high-grade dysplasia or cancer per 1000 person-years of follow-up was 0.7 with no neoplasia at baseline, 1.5 with tubular adenomas <10 mm, 6.4 with large tubular adenomas (>10 mm), 6.2 with villous adenomas, 26.0 with high-grade dysplasia.	All pathology was reviewed locally and sent for blinded central pathology review. When there was a discrepancy, a third referee pathologist reviewed the material. The authors compared demographic factors (age, race) and possible risk factors for advanced neoplasia (family history, smoking, use of non-steroidal anti-inflammatory drugs) to determine whether the surveillance cohort was similar to patients who did not receive surveillance. In the neoplasia group, the rate of active smoking was higher in patients

Evidence table for review question 3: When should colonoscopic surveillance be started and what should be the frequency of surveillance?						
Study ID	**Study design**	**Follow up**	**Population**	**Prognostic factors or surveillance programmes**	**Outcomes**	**Comments**
			the caecum.			who had no surveillance compared with those with surveillance (33.8% vs 21.7%, respectively, ($p < 0.001$). There were no significant differences in the control group.
Lieberman et al. (2008)	During the study period, the Clinical Outcomes Research Initiative repository (CORI) consortium included 65 practice sites in 25 states. Ten sites contributed more than 500 reports, 6 sites contributed 100–500 reports, and 1 site contributed less than 100 reports.	Retrospective, registry	Patients were asymptomatic adults receiving colonoscopy for screening during 2005 from 17 practice sites, which provide both colonoscopy and pathology reports to the Clinical Outcomes Research Initiative repository. Patients were included in this analysis if they were over age 20 years undergoing screening with no symptoms of lower gastrointestinal	Colonoscopic surveillance for polyps less than 10 mm. Size of polyp and location of polyp's association with advanced histology.	Three asymptomatic groups were included: average risk, family history of CRC or adenoma, and patients receiving colonoscopy for a positive faecal occult blood test or polyp found at screening sigmoidoscopy. Patients were stratified by indication group. Among 13,992 asymptomatic patients who had screening colonoscopy, 6360 patients (45%) had polyps, with complete histology available in 5977 (94%) patients. **Advanced histology** The proportion with advanced histology (defined as an adenoma with villous or serrated histology, high-grade dysplasia, or an invasive cancer) was 1.7% in the 1 to 5 mm group, 6.6% in the 6 to 9 mm group, 30.6% in the greater than 10 mm group. **Distal location** Distal location was associated with advanced histology in the 6 to 9 mm group ($p = 0.04$) and in the greater than 10-mm group ($p = 0.002$).	Sensitivity analysis was done to determine how misclassification of polyp size would impact the outcome. The analysis assumed that polyps were either overestimated in size by 1 mm (for example, a 10 mm polyp is reclassified as 9 mm) or underestimated (a 9 mm polyp is reclassified as 10 mm). Advanced histology was defined as an adenoma with villous or serrated histology, high-grade dysplasia, or an invasive cancer. The risk factors compared were age,

Evidence table for review question 3: When should colonoscopic surveillance be started and what should be the frequency of surveillance?						
Study ID	**Study design**	**Follow up**	**Population**	**Prognostic factors or surveillance programmes**	**Outcomes**	**Comments**
			pathology.			sex, race, indication for colonoscopy (that were similar) and location of largest polyp
Lund et al. (2001)	RCT to investigate whether regular endoscopic surveillance and polypectomy would decrease the incidence of colorectal cancer and to determine if identification of low- and high-risk groups would allow less frequent surveillance in the low-risk group.	Total person years follow up was 5148 years	Included if undergoing colonoscopy for: (i) colorectal symptoms, including rectal bleeding; (ii) possible polyp or other incidental findings on barium enema; or (iii) investigation of positive faecal occult bloods.	Those found to have colonic adenomas between June 1984 and January 1995 were considered for recruitment to one of six surveillance strategies involving either colonoscopy every 2 or five years or flexible sigmoidoscopy every year, every 2 years, or every 5 years.	NOTE: reported only those outcomes related to interval of surveillance for colonoscopy (other outcomes either included in the Saini 2001 review or not relevant for this question) Early termination because of low rates of adenoma recurrence meant that the trial was underpowered to detect differences in the effect of the various surveillance intervals. However, the authors reported that 'follow up endoscopy for colonic adenomas can be reduced safely to five yearly intervals for the vast majority of patients (excluding patients with hereditary non-polyposis colorectal cancer and familial adenomatous polyposis)'.	Significant limitations because of early termination and lack of power.
Martinez et al. (2009)	Pooled analysis of eight North American studies (six were randomised controlled trials).	Median fol-low-up period of 47.2 months	Individual patients: included people at average with a first-time diagnosis of adenomatous polyps. Study inclusion	Determining the actual risk of developing advanced adenomas and cancer after polypectomy or the factors that determine risk.	Advanced colorectal neoplasia was diagnosed in 1082 (11.8%) of the patients, 58 of whom (0.6%) had invasive cancer. **Definitions** Definitions for adenomas were as follows: tubular ≤25% villous component), tubulovillous (26–75% villous component), or villous (>75% villous component). They considered advanced adenomas to be those that had one or more of the following features: 10 mm in diameter or larger, presence of high-grade dysplasia, or greater than 25% villous features (also classified as tubulovillous or villous	Patient level data was used from the included studies. Of the 10,021 men and women who were enrolled in the individual studies, we excluded patients who had a colorectal cancer present at

Evidence table for review question 3: When should colonoscopic surveillance be started and what should be the frequency of surveillance?						
Study ID	**Study design**	**Follow up**	**Population**	**Prognostic factors or surveillance programmes**	**Outcomes**	**Comments**
	Schatzkin et al. (2000); Baron et al. (1999, 2003); Winawer et al. (1993b); Alberts et al. (2000, 2005); Greenberg et al. (1994); Lieberman et al. (2000)		studies: (1) 800 or more study participants; (2) complete baseline colonoscopy with removal of one or more adenomas and removal of all visualised lesions; (3) a specified schedule of sur-veillance follow-up; (4) end point data regarding the number, size, and histopathology of adenomas and colorectal cancers detected.		histology). They then combined advanced adenomas and invasive cancer into an end point of advanced colorectal neoplasia or metachronous advanced neoplasia. **Risk factors for advanced metachronous adenomas** Risk of a metachronous advanced adenoma was higher among patients with 5 or more baseline adenomas (24.1%; standard error, 2.2) and those with an adenoma 20 mm in size or greater (19.3%; standard error, 1.5). Risk factor patterns were similar for advanced adenomas and invasive cancer. **Risk factors for metachronous advanced neoplasia** Multivariate analyses: older age ($p < 0.0001$ for trend) and male sex (odds ratio [OR], 1.40; 95% confidence interval [CI], 1.19 to 1.65) were significantly associated with an increased risk for metachronous advanced neoplasia, as were the number and size of previous adenomas ($p < .0001$ for trend), the presence of villous features (OR, 1.28; 95% CI, 1.07 to 1.52), and proximal location (OR, 1.68; 95% CI, 1.43 to 1.98). High-grade dysplasia was not associated independently with metachronous advanced neoplasia after adjustment for other adenoma characteristics.	baseline (n = 27) and those who did not have a follow-up colonoscopy performed after the first 6 months of the study (n = 827) because these were likely people who were not under typical postpolypectomy surveillance. Thus, data for 9167 (91.5%) patients remained for inclusion in our pooled analyses.
Nusko et al. (2002)	Follow-up records of 1159 patients undergoing surveillance examination. The following statistical procedures were performed: (1) multiple	Records from 1978 to 1996	A total of 3134 patients undergoing endoscopic removal of colorectal adenomas were prospectively recorded on the Erlangen Registry of Colorectal	Identifying risk factors determining surveillance intervals for patients with metachronous adenomas of advanced pathology	A total of 3134 patients undergoing endoscopic removal of colorectal adenomas between 1978 and 1996. Single adenomas were found in 1052 patients (53.6%) and 797 (46.4%) had multiple initial lesions. Mean age at the initial clearing examination for patients who were followed up was 57.08 years (SD 11.25) compared with 59.74 (SD 11.61) for those who were not followed up. A total of 1159 patients underwent regular follow-up examinations: 747 (64%) of these patients were males and 412 (36%) were females. 100 patients (8.6%) had a parental history of colorectal carcinoma while in 24 patients (2.1%) the relevant data were not available. **Risk factors for advanced metachronous adenomas**	Large registry data, studying risk factors. All patients were offered a chance to participate in a scheduled follow-up programme, however 1849 patients either refused follow-up or underwent examinations at other endoscopy

Evidence table for review question 3: When should colonoscopic surveillance be started and what should be the frequency of surveillance?						
Study ID	**Study design**	**Follow up**	**Population**	**Prognostic factors or surveillance programmes**	**Outcomes**	**Comments**
	regression analysis; (2) likelihood ratio tests; (3) calculation of the times t0.05, t0.10, and t0.20 for the relevant risk groups based on their hazard functions; (4) 1000 bootstrap samples		Polyps between 1978 and 1996. The patients had no previous history of colorectal adenomas or carcinomas. Patients with a familial history of adenomatous polyposis or hereditary non-polyposis colon cancer syndrome, or inflammatory bowel disease were excluded.		Considering only patients with tubular adenomas at the initial clearing procedure, a multivariate model for related observations revealed that adenoma size ($p < 0.0001$), multiplicity ($p = 0.021$), parental history of colorectal carcinoma ($p = 0.0168$), and an interactive effect between size and sex ($p = 0.00392$) were significant predictive variables. Male patients with large adenomas had a significantly higher risk of developing advanced metachronous adenomas than other patients. **Stratification** *Low-risk group* containing patients with no parental history of colorectal carcinoma and with only small (<10 mm) tubular adenomas at the initial clearing examination: 12.2 (95% CI 10.1 to 15.2) years were needed for advanced adenomas to develop in more than 10% of patients. The estimate for 5% was 10.4 years (95% CI 4.1 to 13.2) and for 20% was16.2 years (95% CI 10.5 to 19.2). *High-risk group* containing all other patients: those with multiple or large adenomas, tubulovillous or villous adenomas, or a parental history of colorectal carcinoma: 6.1 (95% CI 3.2 to 11.5) years were needed for advanced adenomas to develop in more than 10% of patients. The estimate for 5% was 0.5 years (95% CI 0.1 to 1.6) and for 20% was15.6 years (95% CI 11.5 to 18.2).	departments. There were no statistically significant differences in baseline patient or adenoma characteristics between patients who underwent surveillance and those who did not. Bivariate analyses done apart from univariate analyses to adjust for confounding covariates. Sensitivity analyses done using bootstrapping. Kept despite Saini et al. (2006) as the outcomes used in their study did not include the ones extracted from this primary paper.
Saini et al. (2006)	Systematic review and meta analysis Studies included: Baron et al. (1999),	Three electronic databases (MEDLIN, PREMEDLINE, and EMBASE) were searched	Study population was patients with a personal history of adenomas. Studies enrolling	Nine hundred seventy-one references were identified but fifteen primary studies were included.	Bonithon-Kopp et al. (2000) showed that the only RR that was statistically significant was for number of adenomas only: RR 3.26 (95% CI 1.81 to 5.89). Martinez et al. (2001) showed that the only RR that was statistically significant was for size only: RR 1.77 (95% CI 1.30 to 2.41) Van Stolk et al. (1998) did not find any statistically significant RR for	All Mesh and free key words used for the searches were given in the paper. The PRISMA chart was available.

Evidence table for review question 3: When should colonoscopic surveillance be started and what should be the frequency of surveillance?						
Study ID	**Study design**	**Follow up**	**Population**	**Prognostic factors or surveillance programmes**	**Outcomes**	**Comments**
	Bonithon-Kopp et al. (2000), Cordero et al. (1999), Fornasarig et al. (1998), Fossi et al. (2001), Hixson et al. (1994), Jørgensen et. al. (1995), Lund et al. (2001), Martinez et al. (2001), Noshirwani et al. (2000), Nusko et al. (2002), Paspatis et al. (1995), Schatzkin et al. (2000), Van Stolk et al. (1998), Winawer et al. (1993b)	from January 1980 to January 2003	patients with a personal history of hereditary nonpolyposis colorectal cancer (HNPCC), familial adenomatous polyposis (FAP), CRC, or inflammatory bowel disease (IBD) were excluded.	Identifying risk factors associated with advanced adenomas.	any factors. Winawer et al. (1993) found the incidence of advanced adenomas at 3-year surveillance colonoscopy was 1.4% in the low-risk patients versus 5–4% in the high-risk patients: RR 3.87 (95% CI 1.09 to13.66). Advanced adenomas defined as adenomas ≥1 cm, villous histological features, or with cancer. **Number and size** Four trials: Bonithon-Kopp et al. (2000), Martinez et al. (2001), Van Stolk et al. (1998), Winawer et al. (1993): provided adequate data to determine the incidence of recurrent advanced adenomas at surveillance colonoscopy on the basis of: (1) the number of adenomas at index colonoscopy (>3 vs 1 or 2) the pooled RR was 2.52 (95% CI 1.07 to 5.97), and the pooled absolute risk difference was 5% (95% CI 1% to 10%); and (2) the size of the largest adenoma at index colonoscopy (≥1 cm [large] vs <1 cm [small]) the pooled RR was 1.39 (95% CI 0.86 to 2.26), and the pooled absolute risk difference was 2% (95% CI –2% to 6%) The heterogeneity was significant for both cases, $p < 0.001$ and $p < 0.05$. **Histological diagnosis** Three trials: Bonithon-Kopp et al. (2000), Martinez et al. (2001), Van Stolk et al. (1998): provided adequate data to determine the incidence of recurrent advanced adenomas at surveillance colonoscopy on the basis of adenoma histologic features (tubulovillous/villous vs tubular). The pooled RR was 1.26 (95% CI 0.95 to 1.66), and the pooled absolute risk difference was 2% (95% CI –1% to 4%). The test of heterogeneity for the pooled RR was not significant ($p > 0.2$), indicating that the individual studies did not demonstrate significant differences in the RR of recurrent advanced adenomas. **Dysplasia** Two studies: Bonithon-Kopp et al. (2000) and Van Stolk et al. (1998) provided adequate data to determine the incidence of recurrent advanced adenomas on the basis of the degree of dysplasia at index	

<table>
<tr><th colspan="6">Evidence table for review question 3: When should colonoscopic surveillance be started and what should be the frequency of surveillance?</th></tr>
<tr><th>Study ID</th><th>Study design</th><th>Follow up</th><th>Population</th><th>Prognostic factors or surveillance programmes</th><th>Outcomes</th><th>Comments</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>colonoscopy (high grade vs no high-grade dysplasia). The pooled RR was 1.84 (95% CI 1.06 to 3.19), and the pooled absolute risk difference was 4% (95%CI 0 to 8%). The test of heterogeneity for the pooled RR was not significant (p > 0 .2)

Risk factors for advanced adenomas at surveillance
Nine studies identified a total of 5 risk factors that were associated with advanced adenomas at surveillance colonoscopy: (1) number of adenomas, (2) size of largest adenoma, (3) incomplete index colonoscopy, (4) concurrent proximal and distal adenomas, and (5) parental history of CRC.

Risk factors for recurrence of adenomas
14 studies reported a total of 6 risk factors: (1) number of adenomas, (2) size of largest adenoma, (3) patient age, (4) tubulovillous/villous features or severe dysplasia, (5) advanced adenoma, and (6) adenoma in the proximal colon.</td><td></td></tr>
<tr><td>Winawer et al. (1993b)</td><td>RCT to compare follow-up colonoscopy at 3 years and follow-up colonoscopy at both 1 and 3 years in people with newly diagnosed adenomatous polyps.</td><td>Median interval between enrollment and initial follow-up examination was 1.15 years in the two-examination group; 3.15 years in the one-examination group. Follow-up clinical status was determined for 97.2% (1379/1418).</td><td>9112 patients referred for colonoscopy who had no history of polypectomy, IBD, familial polyposis, or colorectal cancer identified at 7 clinical centres. Of 3778 patients in whom polyps were detected, 2632 (69%) had adenomas and were eligible for randomisation;</td><td>Participants were randomly assigned to a follow-up examination either 1 and 3 years after colonoscopy (the two-examination group) or 3 years after colonoscopy (the one-examination group). Follow-up colonoscopy 6 years after the examination at entry was also offered to both groups.</td><td>NOTE: reported only those outcomes related to interval of surveillance for colonoscopy (other outcomes either included in the Saini 2001 review or not relevant for this question)

<table><tr><th></th><th>2-exam group (N=338)</th><th>1-exam group (N=428)</th><th>RR (95% CI)</th><th></th></tr><tr><td>Any adenomas</td><td>141 (41.7%)</td><td>137 (32.0%)</td><td>1.3 (1.1 to 1.6)</td><td>p = 0.006</td></tr><tr><td>Adenoma with advanced pathological feature (<1.0 cm, HGD, or invasive cancer)</td><td>11 (3.3%)</td><td>14 (3.3%)</td><td>1.0 (0.5 to 2.2)</td><td>p = 0.99</td></tr></table></td><td>…</td></tr>
</table>

Evidence table for review question 3: When should colonoscopic surveillance be started and what should be the frequency of surveillance?						
Study ID	**Study design**	**Follow up**	**Population**	**Prognostic factors or surveillance programmes**	**Outcomes**	**Comments**
			1418 (53.9%) of eligible patients with adenomas consented to participate.			

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Review question 4: People with Inflammatory bowel disease or adenomas

Evidence table for review question 4: What are the information and support needs of people, or the carers of people, undergoing or considering undergoing colonoscopic surveillance?					
Study ID	**Study design**	**Population**	**Intervention**	**Outcomes**	**Comments**
Sequist et al. (2009)[a]	A randomisd controlled trial (RCT) to promote colorectal cancer (CRC) screening	Participants included 21,860 patients aged 50 to 80 years who were overdue for CRC screening. Allocated to patient intervention group: 10,930 patients (all received allocation intervention). Allocated to patient control group: 10,930.	Patients overdue for CRC screening received a mailing, which included the following: (1) an educational pamphlet detailing screening options, (2) a dedicated telephone number to schedule FSIG or colonoscopy. The initial mailing occurred during the first month of the intervention and a second mailing was sent to patients still overdue for screening 6 months later.	The primary study outcome was completion of one of the following three options during the 15-month study period: FOBT, FSIG, or colonoscopy. The secondary outcome was detection of colorectal adenomas. **Screening rates** Patients who received the mailing were significantly more likely to complete colorectal cancer screening than those who did not (44.0% versus 38.1%; $p < 0.001$). The impact of the mailing did not differ between women and men. **Detection of adenomas** Detection of adenomas tended to be greater among patients who received mailings compared with the control group (5.7% vs 5.2%; $p = 0.10$).	All data were collected from the electronic record, and study outcomes were assessed 15 months after the start of the intervention for all randomised patients.
Rutter et al. (2006)	A 58-question self-administered postal questionnaire design looking at : • The quality of life of patients on surveillance. • Colonoscopy • Kranz health opinion survey • surveillance	281 of 329 patients (85.4%) responded. Median age was 55 (range 26–84) years. 167 patients were male and 114 female (no significant difference from nonrespondents:$p = 0.88$). Median duration of colitis was 25 (range 10–53) years. Patients had undergone a median of six surveillance colonoscopies	**Colonoscopy:** • Convenience. 39% respondents found the bowel preparation difficult to take. • Experience of colonoscopy. 60.2% respondents found their last colonoscopy comfortable or very comfortable, 30.1% found it uncomfortable, and 9.7% found it very uncomfortable. Patients expressed less discomfort with more experienced colonoscopists ($r = 0.20$, $p = 0.0007$). There was a correlation between comfort and pethidine dose ($r = 0.16$, $p = 0.007$, i.e. those with more discomfort were given more pethidine) • Complications: 16.4% respondents experienced abdominal pain (attributed to the procedure) in the week following their last		

Evidence table for review question 4: What are the information and support needs of people, or the carers of people, undergoing or considering undergoing colonoscopic surveillance?					
Study ID	**Study design**	**Population**	**Intervention**	**Outcomes**	**Comments**
		(range 1–15; total number 1777).	colonoscopy of which 3.7% stated that the pain interfered with everyday activities. Post-procedural pain was strongly related to the Hospital Anxiety and Depression Scale (HADS) anxiety score ($p < 0.0001$) but not with the drug doses used during the procedure. Five patients (1.7%) reported complications after previous colonoscopies. **Surveillance:** • Information: when asked about the level of involvement in the treatment decision-making, 65.5% reported being content with their current involvement, whereas 34.2% preferred to be more involved and only 0.4% wished to be less involved. Asked about the amount of information they had received about the surveillance programme, 83.8% thought they had received the right amount of information, 16.2% thought they had received too little, and no patient thought they had received too much. 35.8% had sought other sources of information. 91.4% described the information given as easy to understand, 2.6% thought it was difficult and 6.1% could not remember being given information. • The surveillance program: 97.8% of the patients felt that the surveillance was important for them. • Cancer concern: 96.4% of respondents thought that the surveillance program gave them reassurance, while 3.6% stated that the programme made them more anxious. When asked about the effect of the surveillance programme on reducing the risk of colorectal cancer, 1.8% of patients believed it completely removed the risk, 67.9% believed it greatly reduced the risk, 24.4% believed it moderately reduced the risk, and 5.9% believed it slightly reduced the risk.		

<table>
<tr><th>Study ID</th><th>Study design</th><th>Population</th><th>Intervention</th><th>Outcomes</th><th>Comments</th></tr>
<tr>
<td>Makoul et al. (2009)[b]</td>
<td>A pretest–posttest design to assess a multimedia patient Education Program (PEP) that provides information about CRC and CRC screening, and encourages people to talk with their physicians about getting screened.</td>
<td>A total of 270 adults, age 50–80 years, participated in Spanish for all phases of the pretest–posttest design.</td>
<td>Patients were randomly assigned to a version of the multimedia program that opened with either a positive or a negative introductory appeal. Structured interviews assessed screening behaviour, willingness to consider screening options, intention to disscuss CRC screening with the doctor. Two versions of a 5-minute PEP in both Spanish and English (using information gained through a series of structured interviews and focus groups in a primarily Spanish-speaking community) were developed.</td>
<td>Screening relevant knowledge[c]
<table>
<tr><td>Screening options</td><td>Pretest (%)</td><td>Posttest (%)</td><td>p</td></tr>
<tr><td>FSIG
Colonoscopy</td><td>11.5
23.3</td><td>53
57</td><td><0.001
<0.001</td></tr>
</table>
Willingness to consider CRC screening[d]
<table>
<tr><td>Screening options</td><td>Pretest (%)</td><td>Posttest (%)</td><td>p</td></tr>
<tr><td>FSIG
Colonoscopy</td><td>54.1
64.8</td><td>78.1
84.4</td><td><0.001
<0.001</td></tr>
</table>
The tables above show increases in the participants' knowledge of the primary screening options and willingness to consider CRC screening after exposure to the patient education program.
The program made more than 90% of patients want to discuss CRC with their doctors. There was no significant difference between response to the positive and negative introductory appeals in terms of this intention (90.4% and 94.5% respectively).</td>
<td>The paper refers to patient/community education. The program involved the patients/community on how to make screening information and options easier. Information was tailored to the community/patient needs.
Overall, there was no difference in participant response to both positive and negative appeals.

Limitations:
focus was on Spanish-speaking adults in a Hispanic/latino community which precludes generalisation to a broader audience.</td>
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Study ID	Study design	Population	Intervention	Outcomes	Comments
Sheikh et al. (2004)	A questionnaire design study to determine patients' screening preferences.	Adult patients attending the internal medicine and family practice clinics were chosen on the basis of availability and ease of collecting data. 193 patients responded to the questionnaire.	A description of screening procedures given in a packet.	154 (79.8%) of the 193 patients preferred some sort of screening. Of those who had had a previous colonoscopy, 55% preferred a repeat screening compared with only 30% of those who had never had a colonoscopy (p = 0.017). Of those who had had a previous sigmoidoscopy, 53% preferred a repeat screening compared with only 33% of those who had never had a sigmoidoscopy, although the differences were not statistically significant.	The study demonstrates diversity in patient choices for CRC screening.
Brotherstone et al. (2006)	Randomly allocating people to study the effectiveness of visual illustrations in improving people's understanding of the preventive aim of flexible sigmoidoscopy (FSIG) screening	318 people aged 60–64 were sent a timed, dated appointment to attend FSIG screening.	They were randomised either to be sent a written leaflet alone (n = 151) or a written leaflet along with a set of illustrations showing the development of cancer from polyps and removal of polyps during FSIG (n = 167). A sample of 123 (39%) of the 318 people to whom the information was sent were selected at random for a telephone interview within 2 to 4 weeks of the information materials being sent out. The interviews were recorded and transcribed, and coded by two	The primary outcome was awareness of the preventive aim of FSIG screening. Of the 123 randomly selected for interview, 25 could not be contacted, 16 telephone numbers were incorrect, 2 respondents had communication difficulties, 4 were on holiday during the interview period, and 3 of the interviews were terminated prematurely. 8 people declined to be interviewed. 65 (53%) interviews were completed and recorded, 35 (54%) with participants who were sent the written information only and 30 (46%) with those who had been sent illustrations as well. There was no significant difference in age, gender or socioeconomic status between people who were interviewed (n = 65) and those who were not (n = 58).	The leaflet was based on materials that had been piloted and were used in the UK FSIG Trial. The leaflet contained comprehensive information about FSIG screening, risk factors for colorectal cancer, how screening works, what the test involves, what happens if pre-cancers are found, whether there are risks associated with having the test, and the reliability of the

<table>
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<tr><td></td><td></td><td></td><td>independent raters who were blind to the condition (leaflet only or leaflet and illustrations). Logistic regression was used to see whether the illustrations enhanced understanding of the preventive aim of FSIG screening.</td><td>In the written information group, 57% had s good understanding of the aims of the test, while in the group who were sent written information and illustrations, 84% had s good understanding. The addition of the illustrations resulted in significantly better understanding (OR = 3.75; CI 1.16 to 12.09; p = 0.027) which remained significant after controlling for age, gender and socioeconomic status (OR = 10.85; CI 1.72 to 68.43; p = 0.011).</td><td>test.

There was a wide CI that was not accounted for in the study</td></tr>
<tr><td>Thiis-Evensen et al. (1999)</td><td>Postal questionnaire design aimed to study the psychologic effect of attending a screening program.</td><td>451 people were invited for a colonoscopic examination to detect and remove colorectal polyps. Mean age was 67.2 years (range 63–72 years), and 48% were women.
As controls for those subjected to endoscopy, a group of 447 matched for age and sex were randomly drawn from the population registry.</td><td>Fourteen days and 3 and 17 months after the examination, the attendees received a questionnaire by mail composed of Goldberg's General Health Questionnaire (GHQ-28), the Hospital Anxiety and Depression Scale (HADS) and questions designed to evaluate how the attendees had experienced the colonoscopic screening examination and to register whether polyps had been detected. Questionnaires were sent to a total of 429 individuals.The same questionnaire was also mailed to the control group (matched for age and sex) who did not enrol in the endoscopic screening</td><td>Replies given in 409 returned questionnaires of 429 that were mailed to the screened group 14 days after the examination (%).
<table><tr><th>Questions</th><th>Replies (%)</th></tr><tr><td>Were polyps found at the examination?
Yes
No
Do not remember</td><td>
294 (72)
96 (24)
16 (4)</td></tr><tr><td>Did you find the examination uncomfortable?
Yes, very
Moderately
No</td><td>
21 (5)
184 (45)
204 (50)</td></tr><tr><td>Would you attend a repeat examination in 5 years' time?
Yes
No
I am not sure</td><td>
368 (90)
9 (2)
31 (7.6)</td></tr><tr><td>Are you content to have attended this endoscopic examination?
Yes
No
I am not sure</td><td>
405 (99.3)
2 (0.5)
1 (0.2)</td></tr></table></td><td>The lower and more favourable scores for GHQ-28 and HADS in the screened group compared with controls may be due to a sense of relief lasting for several months after successful participation with no serious findings.</td></tr>
</table>

Study ID	Study design	Population	Intervention	Outcomes	Comments
			study.	The scores for both GHQ-28 and HADS were lower, indicating a lower level of psychiatric morbidity among those attending the examination than the controls. There was a trend towards higher scores with increasing time after the examination in the screened group.	
Miles et al. (2009)	Postal survey examining the psychological impact of being assigned to colonoscopic surveillance following detection of adenomatous polyps at FSIG screening.	Participants were men and women aged 55–64 years, at average risk of getting CRC. People with no polyp = 26,573, lower risk polyps removed at flexible sigmoidoscopy = 7401 and higher risk polyps who underwent colonoscopy and were either assigned to CS = 1543 or discharged = 183 (n = 35,700). A sub-sample (n = 6389) had also completed a detailed questionnaire prior to screening attendance making it possible to compare pre- and postscreening results in this group.	Participants were sent a detailed questionnaire 3–6 months after screening, by which time they had been told whether or not they needed colonoscopic surveillance. The response rate to the questionnaire was 90%.	**Primary outcome variables** *Bowel cancer worry* was assessed before and after *screening* with the question: 'How worried are you about getting bowel cancer' (response options on a 4-point Likert scale: 'not worried at all, a bit worried, quite worried, very worried') **Psychological distress** was measured after screening using the 12-item version of the General Health Questionnaire (GHQ-12) *Positive psychological consequences of screening* were assessed after screening using three items from the positive emotional subscale of the Psychological Consequences of screening Questionnaire (PCQ) **Secondary outcome variables** *Reassurance* was assessed after screening using a single item on reassurance from the PCQ. *Bowel symptoms* were assessed before and after screening with questions related to bowel movement. *GP attendance* was measured before and after screening using one question: 'About how many times have you been to see your GP in the last 3months. It was scored so that high scores	

Study ID	Study design	Population	Intervention	Outcomes	Comments
				indicated more visits. **Results** People offered surveillance reported lower psychological distress and anxiety than those with either no polyp ($p < 0.05$) or lower risk polyps ($p < 0.01$). The surveillance group also reported more positive emotional benefits of screening than the other outcome groups. Post screening bowel cancer worry and bowel symptoms were higher in people assigned to surveillance, but both declined over time, reaching levels observed in either one or both of the other two groups found to have polyps, suggesting these results were a consequence of polyp detection rather than surveillance.	

[a] The screening options in this study also looked at FOBT and the results reported included FOBT screening.
[b] The screening options in this study also looked at FOBT.
[c] The results report the percentage of participants at pretest and posttest who provided correct answers. Pretest–posttest differences were evaluated with McNemar's test.
[d] The results report the percentage of participants at pretest and posttest indicating willingness to consider primary screening options. Pretest–posttest differences were evaluated with McNemar's test.

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