**Affiliation**  
Cancer Council Australia

**Role**  
Project Manager, Clinical Guidelines Network

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### List of links to templates, forms and relevant pages

#### Useful wiki pages


#### Creating comment pages

Create Comment pages for all content pages.

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### Documentation wiki

This has 'how to' manuals for many tasks that you might need to do on the wiki. See here:
Help pages on documentation wiki

Some links that might come in handy:

User accounts

Create user account for new user
Put user in correct user group
Update group form

Record literature search

Upload references

Pubmed importer or Manual citation form

References are created according to the NEJM citation rules

Surveillance colonoscopy - draft content Nov 2017

Advances in colonoscopy, CT colonography and other methods (Lead author: Gregor Brown)

Colonoscopic surveillance after polypectomy (Lead author: Karen Barclay)

The role of surveillance colonoscopy after curative resection for colorectal cancer (Lead author: Tarik Sammour & James Moore)

AT WHAT TIME POINTS AFTER CRC RESECTION SHOULD SURVEILLANCE COLONOSCOPY BE PERFORMED?(FUC1)

Recommendations about the timing of colonoscopy after CRC resection should be based upon the “natural history” of metachronous colonic neoplasia, in order to meet the objectives of surveillance, namely early detection of metachronous cancer and timely polypectomy for metachronous adenomas.
The natural history of metachronous cancer and polyps is best estimated by studies of the yields of colonoscopy at various time points after surgery, when pre- or peri-operative colonoscopy has excluded synchronous cancer and cleared synchronous polyps.

The US Guidelines for Colonoscopy Surveillance after Cancer Resection referenced in the last clinical practice guidelines\(^1\) have since been updated to include additional data from 2005 to 2015.\(^2\) The literature was summarised with regard to metachronous cancer development. Reporting pooled data from over 15000 patients, 253 (1.6%) metachronous cancers were detected, 30% of these within 2 years of the index malignancy. While it could be argued that second cancers found so soon after surgery were in many instances missed synchronous (rather than metachronous) lesions, the importance of detecting them remains undiminished. Thus, the US Guidelines’ re-iterated previous recommendations to perform post-operative colonoscopy at an interval of one year (with subsequent colonoscopies after an interval of three years and then five years, if all surveillance examinations were normal).

In the US Guidelines for Colonoscopy Surveillance after Cancer Resection \(^1\), the literature to 2005 was summarised with regard to metachronous cancer development. In studies incorporating more than 9000 patients, 137 metachronous cancers were detected, 57 of which were found within 24 months of surgery. It could be argued that second cancers found so soon after surgery were in many instances missed synchronous (rather than metachronous) lesions but the importance of detecting them remains undiminished. The authors argued that such a rate of cancer detection (157 colonoscopies per metachronous cancer found) was comparable to the rate of prevalent cancer detection in the setting of screening colonoscopy (as practised in the US). It was this relatively high incidence of metachronous cancers within two years of surgery that led to the Guidelines’ recommendation to perform post-operative colonoscopy at an interval of one year (with subsequent colonoscopies after an interval of three years and then five years, if all surveillance examinations were normal).

In the literature prior to 2005, Barillari\(^3\) and Neugut\(^4\) found that more than one-half of metachronous adenomas and cancers arose within the first twenty four months after surgery. In a 2000 study, Togashi et al\(^5\) detected twenty-two metachronous colorectal cancers in 19 out of 341 patients after CRC surgery, 14 (64 %) of them within five years of surgery. Most were small, 10 mm or less in size, and many had a flat endoscopic appearance. In a study of 174 patients reported by Juhl et al in 1990\(^6\), three-quarters of the colonoscopically detected neoplasms (adenomatous polyps and cancers) occurred within the first 24 months. In the period 12-30 months after surgery, four metachronous cancers and 37 advanced adenomas were detected. A retrospective review by Khoury et al\(^7\) concluded that annual follow-up colonoscopy for two years after CRC surgery was beneficial and that the interval between subsequent examinations be increased depending on the result of the most recent examination\(^7\).

However, not all of these earlier studies advocated colonoscopy within one to two years of surgery. Among 175 patients who underwent a curative resection for CRC between 1986 and 1992, colonoscopies performed one year after surgery and then at two-year intervals revealed no metachronous cancers or advanced adenomas.\(^7\) The authors suggested that only patients who had had synchronous adenomas at pre-operative colonoscopy should undergo follow-up colonoscopy at three years.\(^8\) Similarly, Stigliano et al\(^9\) conducted a retrospective study of 322 patients and found no metachronous cancers within the first two years after surgery. In their 2002 review, Berman et al\(^10\) suggested that there were insufficient data to support the routine use of annual or more frequent colonoscopy to identify metachronous or recurrent CRC and they suggested post-operative...
coloscopy be limited to every three to five years. The value of a large retrospective audit of patients after CRC resection by McFall et al, which concluded that most patients are at very low risk of developing significant colonic pathology in the five years after resection, was limited by the fact that less than one-third of the patients underwent post-operative colonoscopy\(^{11}\) and the mean interval between surgery and colonoscopy was more than four years. Similar reservations about the need for follow-up colonoscopy earlier than two to three years were expressed by Mathew et al\(^{12}\), even though 10 out of 14 patients with neoplastic findings at surveillance colonoscopy were detected two years post-operatively.

A Western Australian study by Yusoff et al audited all patients who underwent surgical resection of CRC from 1989 to 2001\(^{13}\) and found that no metachronous cancers (and only 1 of 11 recurrent anastomotic cancers) were found by surveillance of asymptomatic patients. The three metachronous cancers were all detected in symptomatic patients, at four, eight and nine years after surgery. In a subset of their patients, the yields for adenoma were 10 % at one year post-operatively, 28 % at two years and none at three years.

Another Australian study published in 2005 by Platell et al specifically evaluated the clinical utility of performing a colonoscopy 12 months after curative resection for CRC\(^{14}\). In 253 patients who had undergone complete colonoscopy prior to resection, 90 % received their first post-operative colonoscopy at a mean of 1.1 years. Although no recurrent or metachronous cancers were found, 149 polyps were detected in 30 % of patients, 42 % of which were adenomas and 13 % of which were villous or tubulovillous adenomas. Having observed such a high prevalence of advanced adenomas at 12 months (7.9 % of patients), the authors raised the possibility that, in contrast to recommendations in the Clinical Practice Guidelines for the Prevention, Early Detection and Management of Colorectal Cancer 2005\(^{15}\), that post-operative colonoscopy be performed at three to five years, a variably intense colonoscopy surveillance schedule might be justifiable. Similarly, the large study from Taipei mentioned earlier\(^{16}\) concluded that a lifelong schedule of post-operative colonoscopic surveillance was necessary.

According to Hassan et al\(^{17}\), who used a decision analysis model, early surveillance colonoscopy performed one year following CRC resection was clinically efficient and cost-effective in terms of cancer detection and prevention of cancer-specific death\(^{17}\). Compared to “no early colonoscopy” following surgery, the number of one-year colonoscopies required to find one CRC was 143 and the number needed to prevent one CRC-related death was 926. In a 2007 analysis of 1002 operated CRC patients, Rulyak et al\(^{18}\) concluded that surveillance colonoscopy within one year of surgery was warranted because (i) 9 of the 20 metachronous cancers detected during the study period were found within 18 months of surgery and (ii) the rate of metachronous advanced neoplasia was significantly lower if colonoscopy was performed within 18 months of surgery (6.9 %) than if colonoscopy was delayed for three years or more (15.5 %).

In a 2009 study from China, Wang et al compared “intensive colonoscopic surveillance” (three monthly colonoscopy for the first year after surgery, then six monthly for the following two years and annually thereafter) with “routine colonoscopic surveillance” (at six, thirty and sixty months after surgery).\(^{19}\) In the intensive surveillance group, one metachronous cancer was detected in the second year of surveillance, one in the fourth year and the third more than five years after initial surgery. In the routine surveillance group, no metachronous cancers were found at six months, four were found at 30 months, one was found at five years and one was found thereafter. The authors concluded that the routine schedule of surveillance was acceptable, with follow-up colonoscopy at one and two years after surgery and then three to five years thereafter.
Thus, while not all of the published evidence is in agreement, most studies demonstrate a significant incidence of metachronous cancers, advanced adenomas and other types of polyps after curative resection for CRC. In many studies, a high proportion of the metachronous neoplasia was detected within the first two years after surgery.

Careful, high-quality colonoscopy at 12 months after surgery would be expected to detect the vast majority of metachronous neoplasia. In turn, this should improve survival in patients operated on for CRC, by finding second cancers at a stage early enough to be cured by re-operation, and by removing metachronous adenomas while still benign. As a result, the weight of evidence from the literature would seem to support performing the initial post-operative surveillance colonoscopy at an interval of one year. If this examination does not reveal a metachronous cancer, the intervals between subsequent colonoscopies should probably be three and then five years, depending on the number, size and histologic type of polyps (if any) removed (following NHMRC guidelines).

Evidence summary and recommendations

<table>
<thead>
<tr>
<th>Evidence summary</th>
<th>Level</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Follow-up colonoscopy reduces the mortality rate of patients after CRC resection. Most studies demonstrate a significant incidence of metachronous cancers, advanced adenomas and other types of polyps after curative resection for CRC.</td>
<td>II</td>
<td>[16], [18], [13], [3], [7], [5], [20], [21], [22], [23], [24], [4], [14], [17], [19]</td>
</tr>
<tr>
<td>In many studies, a high proportion of the metachronous neoplasia occurred within the first two years after surgery.</td>
<td>IV</td>
<td>[25]</td>
</tr>
</tbody>
</table>

Colonoscopy should be performed one year after the resection of a sporadic cancer, unless a complete post-operative colonoscopy has been performed sooner. 

- “A — one or more level I studies with a low risk of bias, or several level II studies with a low risk of bias” is not in the list of possible values (A — one or more level I studies with a low risk of bias, or several level II studies with a low risk of bias, B — one or two level II studies with a low risk of bias or a systematic review/several level III studies with a low risk of bias, C — one or two level III studies with a low risk of bias, or level I or II studies with a moderate risk of bias, D — level IV studies, or level I to III studies/systematic reviews with a high risk of bias) for this property.
"B — most studies consistent and inconsistency may be explained" is not in the list of possible values (A — all studies consistent, B — most studies consistent and inconsistency may be explained, C — some inconsistency reflecting genuine uncertainty around clinical question, D — evidence is inconsistent, n/a — select if there is only one study) for this property.

"B — substantial" is not in the list of possible values (A — very large, B — substantial, C — moderate, D — slight or restricted) for this property.

"B — population/s studied in the body of evidence are similar to the target population for the guideline" is not in the list of possible values (A — population/s studied in the body of evidence are the same as the target population for the guideline, B — population/s studied in the body of evidence are similar to the target population for the guideline, C — population/s studied in the body of evidence differ to the target population for the guideline, but it is clinically sensible to apply this evidence to the target population, D — population/s studied in the body of evidence are different to the target population and it is hard to judge whether or not it is sensible to apply this evidence to the target population) for this property.

"B — applicable to an Australian healthcare context with few caveats" is not in the list of possible values (A — directly applicable to an Australian healthcare context, B — applicable to an Australian healthcare context with few caveats, C — probably applicable to an Australian healthcare context with some caveats, D — not applicable to an Australian healthcare context) for this property.

<table>
<thead>
<tr>
<th>Evidence-based recommendation</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>If the peri-operative colonoscopy or the colonoscopy performed at one year reveals adenoma, then the interval before the next colonoscopy should be guided by NHMRC guidelines for polyp surveillance.</td>
<td>C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Evidence-based recommendation</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>If the colonoscopy performed at one year is normal or identifies no advanced adenomas, then the interval before the next colonoscopy should be three years, and then five years (i.e. colonoscopies at 1, 4, and 9 years after resection).</td>
<td>C</td>
</tr>
</tbody>
</table>
Consensus-based recommendation

As described above, if surveillance colonoscopy reveals adenoma, then the interval before the next colonoscopy should be guided by NHMRC guidelines for polyp surveillance (Grade C). However, if subsequent colonoscopy is normal, then surveillance should revert back to initial cancer surveillance recommended intervals (colonoscopy at 4 and 9 years post resection).

Consensus-based recommendation

If the patient has normal colonoscopies out to 9 year mark, then the consensus recommendation is to perform biennial FOBT OR a further colonoscopy at 10 years.

Consensus-based recommendation

No age cut-off can be recommended for ceasing colonoscopy surveillance. In patients who are elderly with significant medical co-morbidity, or functional deficit, the risk : benefit of surveillance colonoscopy should be individualized and a shared-decision making approach discussed with the patient (or power of attorney) and clearly documented.

Practice point

Patients undergoing either local excision (including transanal endoscopic microsurgery) of rectal cancer or advanced adenomas or ultra-low anterior resection for rectal cancer should be considered for periodic examination of the rectum at six monthly intervals for two or three years using either digital rectal examination, rigid proctoscopy, flexible proctoscopy, and/or rectal endoscopic ultrasound. These examinations are considered to be independent of the colonoscopic examination schedule described above.
**Practice point**

Patients with incomplete colonoscopy pre-operatively (due to impassable distal lesion for example) should have a semi-urgent elective post-operative colonoscopy when feasible, independent of surveillance intervals.

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**References**


**WHAT IS THE ROLE OF PRE OR PERI-OPERATIVE COLONOSCOPY IN CRC PATIENTS? (COL1)**

**Background**

In patients with a diagnosed colorectal cancer, what is the role of a complete pre or peri-operative colonoscopy to evaluate for synchronous malignancy and synchronous polyps? An updated systematic review was performed to answer this question.

**Evidence**

**Methods**

**Guidelines**

Relevant recent guidelines (2010 onwards) were identified by scanning the citations identified by the literature search and searching the National Guideline Clearinghouse ([http://guideline.gov/](http://guideline.gov)) and the Guidelines Resource Centre (www.cancerview.ca). To be considered for adoption guidelines had to meet the pre-specified criteria of scores of greater or equal to 70% for the domains rigour of development, clarity of presentation and editorial independence of the AGREE II instrument ([http://www.agreetrust.org/resource-centre/agree-ii/](http://www.agreetrust.org/resource-centre/agree-ii)).

**Literature Search**

PubMed (01/01/2010-30/06/2017), Embase (01/01/2010-30/06/2017), CINAHL (01/01/2010-30/06/2017), PsycINFO (01/01/2010-30/06/2017), Cochrane Database of Systematic Reviews (2010 – 2017), Database of Abstracts of Reviews of Effects and Health Technology Assessment databases (up until June 2017) were searched using text terms and, where available, database specific subject headings. Each database was searched for articles dealing with colorectal cancer. To identify studies which considered Aboriginal and Torres Strait Islanders (ATSI) these searches were then coupled with search terms for ATSI. A complete list of the terms used for all search strategies are included as Appendix A. Reference lists of all relevant articles were checked for potential additional articles.

**Inclusion and Exclusion Criteria**

<table>
<thead>
<tr>
<th>Study type</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study design</td>
<td>Retrospective or prospective cohort study, case control study, case series</td>
</tr>
<tr>
<td>Population</td>
<td>Colorectal cancer patients</td>
</tr>
<tr>
<td>Intervention</td>
<td>Colonoscopy performed peri-operatively including * pre-operatively *post-operatively</td>
</tr>
<tr>
<td>Comparator</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Diagnostic yield, adenoma detection rate, synchronous cancer rate, quality of life, adenomas
Results

Evidence from previous NHMRC guideline (2010)

A synchronous cancer is found in up to 5% of patients and synchronous adenomatous polyps in 20-40% of patients.\cite{1-3} Clearance of synchronous lesions at perioperative colonoscopy reduces the rate of metachronous CRC.\cite{4-6}

Results of updated meta-analysis

- Search results and study selection

Only one relevant guideline was identified, that of the US Multi-Society Task Force on Colorectal Cancer. They recommended that patients with CRC undergo high-quality perioperative clearing with colonoscopy and that the procedure should be performed preoperatively, or within a 3- to 6-month interval after surgery in the case of obstructive CRC. The goals of perioperative clearing colonoscopy were stated to be detection of synchronous cancer and detection and complete resection of precancerous polyps (Strong recommendation, low-quality evidence). The combined PubMed and PsycINFO search identified 741 citations, the Embase search an additional 302 citations, the CINAHL search 6 citations and the search of the Cochrane Database of Systematic Reviews, Database of Abstracts of Reviews of Effects and Health Technology Assessment database identified an additional 9 citations, resulting in a total of 1058 citations. Titles and abstracts were examined and 27 articles were retrieved for a more detailed evaluation. No additional potential citations were identified from the reference list of retrieved articles. Nine studies met the inclusion criteria and were included in the review.\cite{1,2,3,4,5,6,7,8,9} There were no studies of ATSI men that met the inclusion criteria. Most articles were excluded because they were not relevant, had inappropriate study design or inappropriate population.

- Levels of evidence summary

Of the 9 studies selected, five studies were level III-2,\cite{1,3,6,7,8} two studies were level III-3 evidence,\cite{5,9} and two studies were level IV.\cite{2,4} None of the studies were considered level I, II, or III-1 evidence.

- Consistency

Successfully completed preoperative colonoscopy: Three studies reported the percentage of patients who successfully completed preoperative colonoscopy. In those who failed to have a complete colonoscopy, obstruction due to tumour was the most common reason documented. Johnstone reported 79.7% success in a cohort of 79.\cite{3} Kim reported 62.5% success in a cohort of 48,\cite{4} and Lim reported 88.9% success in a cohort of 73.\cite{5}
Lesion localisation accuracy: Four studies reported the accuracy of primary colorectal tumour identified by preoperative colonoscopy with the location of the primary tumour during surgical resection.\(^1\)\(^3\)\(^6\)\(^9\) All studies reported high accuracy, varying from 81-96%.

Synchronous lesions: Five studies report synchronous lesions rates.\(^4\)\(^5\)\(^6\)\(^7\)\(^8\) Kim, Lim, and Sasaki reported synchronous adenomas rates varying from 22-42%, across a combined cohort of 800 patients.\(^4\)\(^5\)\(^8\) Only Lim reported a high grade dysplasia rate of 2.2% in 45 patients.\(^5\) Synchronous carcinoma rates were relatively low at 2.2-4.1%.\(^4\)\(^5\)\(^8\) Paik 2015 only reported polyp numbers and number the percentage of patients.\(^7\)

Post-operative lesions: Two studies reported postoperative lesions detected during surveillance scopes after tumour resection.\(^2\)\(^7\) In a study of 116 patients, Paik reported a polyp pickup rate of 53% during a 3-15 month follow-up period.\(^7\) In a large study including over 850 patients, Couch 2013 reported adenoma and carcinoma detection rates in 2 cohorts, with one cohort having up to 5 years of follow-up.\(^2\) Adenoma rates were higher in those who had no preoperative colonoscopy, but never reached more than 17% per year, per cohort. Carcinoma rates were below 3% per year in patients that had a surveillance colonoscopy. The mean time to polyp detection in this cohort ranged from 12 to 40 months.\(^2\)

Preoperative imaging unable to locate tumour: Two studies reported the percentage of patients in which preoperative radiological imaging was unable to locate the primary colorectal tumour.\(^1\)\(^3\) Both studies reported 22-23% of patients, across a combined total of 189 patients.

Surgery requiring modification intraoperatively due to preoperative non-concordance: Four studies reported the percentage of patients requiring a modification to planned surgery due to non-concordance with preoperative colonoscopy finding.\(^1\)\(^3\)\(^8\)\(^9\) In a study be Bryce, 6.3% of a 111 cohort required an altered surgical management plan.\(^1\) In a large cohort of 374 patients, Vaziri reported 2.9% of patients requiring a modification of their planned operative procedure.\(^9\) Sasaki reported 8.9% of a 715 patient cohort required intraoperative on-table changes in their surgical procedure.\(^8\) In a small study, Johnstone reported 1.6% of patients required an intraoperative surgical management change, in a cohort of 79.\(^3\)

Clinical Impact

Successfully completed preoperative colonoscopy: Consistent evidence reported that preoperative colonoscopy was highly successful, and failure to complete colonoscopy was mainly due to obstructing / stenosing tumours, or poor bowel prep.\(^3\)\(^4\)\(^5\) In the study by Kim 2014, when the passage of colonoscope was not feasible due to narrow expanded lumen, gastroscope was used instead of colonoscope.\(^4\)

Lesion localisation accuracy: Colonoscopic accuracy preoperatively was high (81 – 96%), but is dependent on its success rate, which may be hindered by tumour obstruction.\(^1\)\(^3\)\(^6\)\(^9\)

Synchronous lesions: Synchronous adenoma rate were up to 40% in these studies, but synchronous carcinoma rates were below 5%.\(^4\)\(^5\)\(^6\)\(^7\)\(^8\)
Postoperative lesions: Postoperative lesion detection rates after surgical resection were significant in the 2 studies which reported data. Adenomas rates were much higher than carcinoma rates, and were still detected up to 5 years post-surgery in those who had a surveillance colonoscopy. As not all participants had a surveillance scope, exact recurrence rates are difficult to establish.

Preoperative imaging unable to locate tumour: In just over 1 in every 5 patients, pre-operative radiological imaging is unable to locate the primary tumour. Surgery requiring modification intraoperatively due to preoperative non-concordance: There was consistent evidence that a small percentage of patients (<10%) will require a modification to their planned tumour surgery as result of non-concordance between the colonoscopy and the intra-operative tumour location.

- **Generalisability**

In total, 44% of included studies were based in either South Korea or Japan, where colorectal and adenoma rates are significantly lower than western populations and the remaining studies were either from the UK/Scotland, or the USA. 7-15 No Australian studies were included.

- **Applicability**

Evidence is directly applicable to the Australia healthcare system, were the expertise and equipment is available to perform high quality colonoscopy.

**Evidence summary and recommendations**

<table>
<thead>
<tr>
<th>Evidence summary</th>
<th>Level</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>The value of colonoscopic surveillance after curative resection for colorectal cancer or synchronous adenomatous polyps</td>
<td>II</td>
<td>[10], [11], [12], [13], [4], [5], [6], [7], [8]</td>
</tr>
<tr>
<td>Between 2 and 9% of colorectal cancer procedures are modified because of inaccurate lesion localisation at colonoscopy</td>
<td>II</td>
<td></td>
</tr>
</tbody>
</table>

Evidence-based recommendation A pre-operative colonoscopy should be attempted in all patients with a newly diagnosed colorectal cancer (CRC). Grade B

Evidence-based recommendation Colonoscopy should be performed three to six months after resection for patients with obstructive CRC in whom a complete perioperative colonoscopy was not able to be performed and in whom there is residual colon proximal to the location of the pre-operatively obstructing CRC. Grade B

Evidence-based recommendation Insert recommendation here. Grade X
Consensus-based recommendation

In cases of a colorectal cancer that may be difficult to identify at surgery, particularly using the laparoscopic approach, submucosal tattoo should be placed in three places approximately 2cm distal to the lesion at the time of colonoscopy. This should be clearly documented in the colonoscopy report.

Practice point

If the index CRC obstructs the lumen and prevents passage of a colonoscope, consideration should be given to specific pre-operative assessment of the proximal colon by alternative means. CT colonography can be considered, however, its role in this clinical scenario requires further analysis. Proximal visualisation is unnecessary if the colon proximal to the cancer is to be included in the resection specimen. In patients with residual un-visualised, colonoscopy should be performed three to six months after surgery, providing no unresectable distant metastases are found.

Practice point

In patients with a defunctioning loop ileostomy, it is preferable to undertake colonoscopy after this is reversed in order to be able to administer adequate bowel preparation.

Health system implications

Clinical practice

Would this change the way that care is currently organised or would the implementation of recommendations have particular effect/s?

Resourcing

Explain any relevant points about resourcing.
Barriers to implementation

Insert any barriers to implementation, or may state: No barriers to the implementation of these recommendations are envisaged.

Discussion

Unresolved issues

Please note any unresolved issues about this topic.

Studies currently underway

Are there any studies currently underway which, when published, may provide more information on this topic? If so, provide brief synopsis here.

Future research priorities

Write if there are any important unresolved questions in regards to this topic and make suggestions about research priorities for future.

References

Colonoscopic surveillance and management of dysplasia in inflammatory bowel disease (IBD) (Lead Author: Rupert Leong)

DYSPLASIA SECTION

Preamble

New consensus in the nomenclature used to describe dysplasia in inflammatory bowel diseases has been developed. Modern descriptors classify lesions based on the Paris classification of endoscopically-detected lesions and whether they can be managed by endoscopic resection or not. The availability of high-definition colonoscopy and chroendoendoscopy has resulted in greater appreciation of flat and indistinct dysplastic lesions that were previously missed on standard-definition colonoscopy. The inability to identify subtle lesions in previous decades led to the need for taking random biopsies every 10cm in the colon in an attempt to identify dysplasia. The finding of dysplasia through random biopsies was often a late event signifying the presence of widespread multi-focal dysplasia. Many of these patients then were treated by proctocolectomy due to the high likelihood of missed invasive colorectal cancer or high risk of developing cancer. The modern surveillance paradigm is to manage endoscopically-identified lesions by endoscopic removal of these lesions where possible. High quality colonoscopy and the use of high definition colonoscopes are pre-requisites in identifying subtle often dysplasia. When confirmed as dysplasia without invasion, they can be removed using endoscopic
resection or polypectomy, monitored through close colonoscopic surveillance, with protocolectomy advised if there is evidence of invasion, when dysplastic lesions cannot be removed, or with multi-focal dysplasia. Individualisation of treatment is also important. The new surveillance paradigm accepts the move away from taking random biopsies towards targeted biopsies based on high-definition colonoscopy with other image-enhancement technologies. The most established image enhancement technology remains dye-spray chromoendoscopy, which has high level evidence of superiority over white light colonoscopy in the yield of dysplasia identification. [Laine Gastroenterol 2015] Random biopsies typically have a low yield of dysplasia identification [Leong Gastroentero 2017], however, are still advocated in those with high risk factors for invisible dysplasia (those with prior dysplasia, primary sclerosing cholangitis and foreshortened tubular colon) [Moussata Gut 2017]. Ultimately prevention of IBD dysplasia should be the primary goal. This is through improved medical management and achievement of mucosal healing. Histological remission might be an emerging treatment paradigm in the prevention of dysplasia development. [Bryant, Winer, Travis, Riddell. Clin Gastroenterol Hepatol 2014].

WHAT SHOULD BE THE PROTOCOL TO MANAGE ELEVATED DYSPLASIA IN IBD? (MNG1)

*What should be the protocol to manage elevated dysplasia in IBD?*

**Background**

Elevated dysplastic lesions should be classified as either endoscopically-resectable or endoscopically irresectable. Endoscopically resectable methods include conventional polypectomy and endoscopic mucosal resection. Endoscopic submucosal dissection or full-thickness resection might be possible in some situations. When lesions are removed endoscopically, ensure that the surrounding flat mucosal does not harbour dysplasia either by visualisation or by biopsies. Tattooing is recommended to permit easier identification for future surveillance colonoscopies. Endoscopically irresectable dysplastic lesions would require surgical resection, typically by colectomy. Referral to an experienced colorectal surgeon or an IBD centre multidisciplinary meeting can be recommended.

**Systematic review evidence**

Historically, elevated lesions containing dysplasia in IBD were referred to as DALM’s (dysplasia associated lesion or mass). These lesions were strongly associated with synchronous or metachronous colorectal cancer. A diagnosis of DALM was therefore an indication for colectomy. In the present era of high-definition colonoscopy, the term DALM should no longer be used. Visible dysplastic lesions that can often be resected endoscopically with clear resection margins can be followed by close surveillance colonoscopy with good outcomes. Conversely, if the dysplastic lesion cannot be entirely removed, or multifocal dysplasia is present indicating a more widespread ‘field-effect’, referral for surgical management is recommended.
Non-systematic review evidence

A recent Meta-analysis looking at the cancer risk after resection of polypoid dysplasia in patients with longstanding Ulcerative Colitis, found the pooled incidence of colorectal cancer to be 5.3 (95% CI, 2.7–10.1) per 1000 years of patient follow-up. Colorectal Cancer/ high grade dysplasia combined and all forms of dysplasia were 7.0 (95% CI, 4.0–12.4) and 65 (95% CI, 54–78) per 1000 years of patients follow up.[7]

Evidence summary and recommendations

<table>
<thead>
<tr>
<th>Evidence summary</th>
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<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long-term follow up data are reassuring that localised dysplastic lesions in IBD can be treated effectively endoscopically.</td>
<td>IV</td>
<td>[2] [6]</td>
</tr>
</tbody>
</table>

Evidence-based recommendation

Raised lesions containing dysplasia may be treated endoscopically provided the entire lesion is removed and there is no dysplasia in flat mucosa elsewhere in the colon.

- "B — most studies consistent and inconsistency may be explained" is not in the list of possible values (A — all studies consistent, B — most studies consistent and inconsistency may be explained, C — some inconsistency reflecting genuine uncertainty around clinical question, D — evidence is inconsistent, n/a — select if there is only one study) for this property.
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### Evidence-based recommendation

If a raised dysplastic lesion cannot be completely removed, or if there is dysplasia elsewhere in the colon, surgical intervention is strongly recommended.

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### Consensus-based recommendation

Surveillance colonoscopy with chromoendoscopy within 3-6 months should be carried out after endoscopic resection of an elevated dysplasitic lesion in IBD.

### Practice point

The important distinction for the endoscopist who is performing surveillance procedures, is to identify lesions that are safely and completely resectable endoscopically. This is based on endoscopic features of the identified lesion and elsewhere in the colon.

### Practice point

Nomenclature should reflect the SCENIC guidelines and the term DALM should not be used.

### Practice point

Consider referral to an experienced endoscopist to perform IBD surveillance using chromoendoscopy to exclude multi-focal dysplasia followed by endoscopic resection of the dysplastic lesion.
Practice point

Close colonoscopic surveillance is required following endoscopic resection of dysplasia given the risk of multifocal dysplasia and metachronous dysplasia.

Health system implications

Dedicated IBD services that can provide advanced imaging techniques offering high quality colonoscopy using advanced endoscopic imaging technologies is recommended. Expert referral centres that can perform endoscopic mucosal resection, endoscopic submucosal dissection and full-thickness resections are required to reduce the need for colectomy. Dedicated training of advanced imaging techniques used in IBD surveillance is recommended. Confirmation of dysplasia with a second experienced GI pathologist is required to confirm diagnosis and establish the grade of dysplasia.

Clinical practice

Would this change the way that care is currently organised or would the implementation of recommendations have particular effect/s? Systematic reviews and guidelines support surveillance colonoscopy as it can identify dysplasia at an earlier stage prior to the development of invasive cancer. Resection of dysplasia endoscopically followed by close surveillance can reduce the need for colectomy. Treatment should be individualised according to patients' wishes. Recommendations should be provided following a multi-disciplinary discussion incorporating colorectal surgeon, gastroenterologist and pathologist.

Resourcing

IBD centres should be resourced to conduct advanced endoscopic resection. Dedicated training in IBD surveillance should be available. Expert GI pathologists experienced in dysplasia diagnosis are required. Colorectal surgical units experienced in managing IBD surgery are required.

Barriers to implementation

Poor awareness of surveillance guidelines Low quality surveillance colonoscopy Too frequent surveillance colonoscopies or performing surveillance on those with a low yield of dysplasia eg proctitis or ileitis.

Discussion

Unresolved issues IBD dysplasia nomenclature need to be standardised, allowing physicians to communicate findings effectively. Ongoing use of descriptions such as DALM and ALM is impractical and does not guide management of dysplasia in IBD and should be discouraged. Long term data is needed to assess the impact of endoscopic resection with close surveillance on the natural history.
Studies currently underway'

None currently

Future research priorities

Longitudinal cohort studies with long term outcomes of patients undergoing endoscopic resection and surveillance is required. Randomised controlled studies of colectomy versus endoscopic resection are unlikely to be performed given the need to individualise therapy.

WHAT SHOULD BE THE PROTOCOL TO MANAGE HIGH GRADE DYSPLASIA IN IBD? (MNG2)

*What should be the protocol to manage high grade dysplasia in IBD? (MNG2)*

WHAT SHOULD BE THE PROTOCOL TO MANAGE LOW GRADE DYSPLASIA IN IBD? (MNG3)

*What should be the protocol to manage low grade dysplasia in IBD? (MNG3)*

Background

In light of the recent SCENIC guidelines, flat mucosal dysplasia should be differentiated into visible and invisible. Invisible dysplasia cannot be visualised on high-definition white-light endoscopy even after chromoendoscopy enhancement, making resection impossible.

Systematic review evidence

The significance of low grade dysplasia (LGD) in flat mucosa is controversial. Tertiary referral data have generally shown it is associated with progression to high grade dysplasia or cancer. Of 47 patients who were diagnosed with LGD at St Mark’s Hospital, 20% eventually developed CRC and 39% developed either HGD or cancer. At Mount Sinai Hospital, the rate of progression to higher grades of neoplasia was 53% at five years. These results contrast with other data which show progression from LGD to advanced neoplasia is slow, and is not invariable. A meta-analysis of 20 surveillance studies involving 508 cases of low grade dysplasia in flat mucosa or dysplastic mass lesions found the cancer incidence to be 14 per 1000 person years duration, and the incidence of any advanced lesion was 30 per 1000 person years duration. The positive predictive value of LGD for concurrent cancer was 25% and for progression to cancer was 8%. Of 159 subjects with LGD followed longitudinally, 10 were found to progress to advanced dysplasia on follow up (5 HGD, 5 cancer) with an overall incidence of 1.34 cases in 100 patient-years. Of 89 subjects with visible LGD that was completely removed (52 were identified with standard definition white-light endoscopy, 17 with high definition white-light endoscopy and 20 with chromoendoscopy), 5 patients developed advanced neoplasia (0.97 cases per 100 patient-years), all of whom had undergone surveillance with standard definition white light endoscopy. These data support the role of high definition endoscopy and/ or chromoendoscopy in the surveillance of subjects following discovery of LGD.
More lesions can be detected by chromoendoscopy but the impact in the reduction of cancer remains less certain.6B Patients identified to have invisible dysplasia should be referred to an endoscopist with expertise in IBD surveillance for chromoendoscopy surveillance. If a visible dysplasia is identified, it should be resected endoscopically if possible. After successful endoscopic resection, initial surveillance colonoscopy should be performed in three to six months. There are currently no studies comparing surveillance colonoscopy to colectomy in this setting.7

Because of the uncertainty about the predictive value of invisible LGD, it is recommended that surgery be considered if it is multifocal. However, patients with LGD in flat mucosa who wish to avoid an operation require repeat colonoscopy at three to six months, preferably with chromoendoscopy, and thereafter at yearly intervals. A finding of unifocal low grade dysplasia in flat mucosa is less likely to be associated with imminent cancer, and follow-up colonoscopy is reasonable within six months in these cases.

**Non-systematic review evidence**

Two retrospective studies featuring a total of 223 patients with low grade dysplasia, demonstrated that rates of progression to high grade dysplasia or colorectal cancer was generally low (5-12%) over a median follow-up period of 3-5 years. Flat dysplasia located in the distal colon is associated with higher risk of progression.8, 9

**Evidence summary and recommendations**

<table>
<thead>
<tr>
<th>Evidence summary</th>
<th>Level</th>
<th>References</th>
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<tbody>
<tr>
<td>The predictive value of low grade dysplasia in flat mucosa for future cancer is controversial, but probably higher if it is located in multiple synchronous sites.</td>
<td>III-2</td>
<td></td>
</tr>
<tr>
<td>Low grade dysplasia in flat mucosa should be evaluated for multifocal dysplasia by an endoscopist with expertise in IBD surveillance using high definition endoscopy and / or chromoendoscopy.</td>
<td>III-3</td>
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</tr>
<tr>
<td>Following endoscopic resection of low grade dysplasia, close surveillance is recommended due to the increased risk of synchronous and metachronous dysplasia.</td>
<td>III-3</td>
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</table>

<table>
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<th>Evidence-based recommendation</th>
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<tr>
<td>Multifocal low grade dysplasia is associated with a sufficiently high risk of future cancer that colectomy is usually recommended. Patients who elect to avoid surgery require follow up surveillance at three months, preferably with chromoendoscopy and high definition white light endoscopy, and if this examination is normal, annually.</td>
<td>C</td>
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<td>Unifocal low grade dysplasia may be followed by ongoing surveillance using high definition white light endoscopy and chromoendoscopy at six months, and if this examination is normal, annually.</td>
<td>C</td>
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<th>Consensus-based recommendation</th>
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<tr>
<td>Visible dysplasia should be resected endoscopically and then followed up with surveillance colonoscopy with high definition white light endoscopy and chromoendoscopy within 3-6 months</td>
</tr>
</tbody>
</table>
Practice point

Consider shorter surveillance intervals for flat dysplasia located in the distal colon, as this is associated with higher risk of progression.

Health system implications

Clinical practice

Surveillance for IBD-associated dysplasia should be performed in dedicated tertiary centres by endoscopists with expertise in IBD surveillance. These centres should have access to high-definition white-light endoscopy and chromoendoscopy. IBD patients with high risk of dysplasia including with concurrent primary sclerosing cholangitis or prior flat dysplasia might benefit from panoramic imaging such as with Full Spectrum Endoscopy combined with chromoendoscopy. This would ensure a standardised high level of care, constitute a platform for education and training, as well as permit data-collection and creation of centralised database of IBD-associated dysplasia.

Resourcing

Resource will need to be allocated towards the following:

1. Hiring and training of additional medical, nursing and supporting personnel to operate dedicated surveillance endoscopy lists
2. Purchase and installation of high-resolution endoscopes, dye and pump sets for chromoendoscopy
3. Purchase endoscopy systems that can provide panoramic imaging to reduce miss rates of dysplasia behind colonic folds and in blind spots.

Barriers to implementation

1. Resource shortage
2. Attitudes of gastroenterologists will determine willingness to refer patients to a centralised endoscopy unit for a service they themselves can provide.
3. Inconsistency with knowledge of dysplasia surveillance and lack of established IBD centres that provide dysplasia surveillance.
Discussion=

Unresolved issues

The recommendations for surveillance over colectomy are largely individualised. To date there are no studies comparing surveillance colonoscopy to colectomy for low grade dysplasia, or informing the natural history for visible dysplastic lesions after endoscopic resection.

Studies currently underway

None currently

Future research priorities

Longitudinal cohort studies of outcomes from surveillance versus colectomy are necessary. The formation of a centralised database could assist in this endeavour.

WHAT SHOULD BE THE PROTOCOL TO MANAGE INDEFINITE DYSPLASIA IN IBD? (MNG4)

What should be the protocol to manage indefinite dysplasia in IBD? (MNG4)

Background

Dysplasia in colitis surveillance is classified as low grade (LGD) or high grade (HGD). Rarely, following expert pathologist review, the histologic changes fall short of those required to make a diagnosis of LGD, and are termed indefinite dysplasia (ID). Typically, the diagnosis of ID is made when there is active colitis that might induce changes of atypia and interfere with a definitive diagnosis of dysplasia. Frequently, repeat colonoscopy is performed following induction of mucosal healing and repeat endoscopic biopsies are required to determine whether the ID changes have resolved, remain or progress towards LGD or HGD. It is helpful to note whether the dysplasia is within an endoscopically visible lesion, or in endoscopically normal mucosa, ideally with the assistance of enhanced endoscopic imaging. The rates of progression if ID to LGD or beyond are unknown, with a paucity of literature referring to ID and outcomes.
**Systematic review evidence**

**Outcomes of ID**

If ID is diagnosed, progression to a higher grade of dysplasia or carcinoma is unusual. In a large series, at a single tertiary referral centre, 1/23 patients with ID (4%) eventually developed carcinoma and five (22%) developed LGD after nine years follow-up.1 In contrast, data from New York showed that the five year rate of progression from indefinite dysplasia to HGD or cancer was 9%.2 If a biopsy is diagnosed as indefinite for dysplasia by two sub-specialised gastrointestinal pathologists, follow-up surveillance colonoscopy, preferably with chromoendoscopy, at six months is reasonable, and thereafter at annual intervals.

**Evidence summary and recommendations**

<table>
<thead>
<tr>
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<th>References</th>
</tr>
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<tbody>
<tr>
<td>The predictive value of indefinite dysplasia in flat mucosa for imminent cancer is low.</td>
<td>II</td>
<td>[8], [9]</td>
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</table>

**Evidence-based recommendation**

Indefinite dysplasia in flat mucosa does not require surgery, but follow-up colonoscopic surveillance is justified, preferably with chromoendoscopy, at more frequent intervals.

- "B — one or two level II studies with a low risk of bias or a systematic review/several level III studies with a low risk of bias" is not in the list of possible values (A — one or more level I studies with a low risk of bias, or several level II studies with a low risk of bias, B — one or two level II studies with a low risk of bias or a systematic review/several level III studies with a low risk of bias, C — one or two level III studies with a low risk of bias, or level I or II studies with a moderate risk of bias, D — level IV studies, or level I to III studies/systematic reviews with a high risk of bias) for this property.
- "B — most studies consistent and inconsistency may be explained" is not in the list of possible values (A — all studies consistent, B — most studies consistent and inconsistency may be explained, C — some inconsistency reflecting genuine uncertainty around clinical question, D — evidence is inconsistent, n/a — select if there is only one study) for this property.
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Consensus-based recommendation

Indefinite dysplasia should be reviewed by a second gastro-intestinal pathologist.

Consensus-based recommendation

Consider treating inflammation and repeating colonoscopy after detecting ID in the context of active inflammation

Practice point

If ID is detected at random biopsy, repeat colonoscopy with enhanced imaging techniques may assist in defining an endoscopically removable lesion, or a lesion amenable to further targeted biopsies.

Practice point

If there are features of active inflammation, repeat colonoscopy following escalation of therapy may assist in further defining ID.[reference = giving prednisolone prior to colonoscopy can reduce inflammation and interpretation of dysplasia. Prednisolone 20mg from memory]

Health system implications

Clinical practice

There are no changes to current best practice from this consensus.
Resourcing

No issues regarding resourcing are raised, as this fits within practice rebated by medicare, and uses no new equipment is required.

Barriers to implementation

No barriers to the implementation of these recommendations are envisaged.

Discussion

Unresolved issues

Histologic features of ID may be present because of ongoing low grade inflammation, and it is important to evaluate ID whilst considering the extent of ongoing inflammation. Repeat examination after treating inflammation can be helpful in this case. The natural history of ID is unknown, and the risk for progression to cancer appears low. Studies on ID do not routinely report the presence of associated inflammation and, in the past, have not used current methods of classifying flat/polypoid dysplasia.

Studies currently underway

No large prospective trials on ID are underway. Some larger units periodically report on UC surveillance outcomes that are collected prospectively, and these reports may add insight regarding long term outcomes of ID.

Future research priorities

Clarification of the long term outcomes for ID is required. Prospective evidence demonstrating that repeat examination with enhanced imaging techniques improves lesion detection or outcomes (or otherwise) is needed.

Psychosocial aspects (Lead Author: Afaf Girgis & Phyllis Butow)

ANXIETY AND COLONOSCOPY, APPROACHES TO MINIMISE ANXIETY AND PAIN FALL OUT

*What approaches can be successfully incorporated into an efficient surveillance colonoscopy program to minimise anxiety and pain fall out?*

Introduction

While the literature on colonoscopy is extensive, fewer studies explore its association with anxiety.[1]
**Target groups for interventions to minimise anxiety**

The evidence suggests three target groups for interventions to minimize anxiety: those with low socio-economic status, those undergoing colonoscopy and those who generally tend to be anxious. In addition, intervention research (see below) has identified women as being more anxious than men. Researchers have observed differences by socioeconomic status (SES) in coping with stressful medical procedures. In a large participant subgroup (N = 3535) from the United Kingdom’s Flexible Sigmoidoscopy (FS) Trial, anxiety and worry about bowel cancer pre-screening were higher in lower SES participants. Their worry and anxiety reduced after screening, but not to a significantly greater extent than the high SES group. However, the low SES subgroup did report more positive psychological consequences of screening in the post-FS sample (N = 40,534), with an SES gradient for anxiety but not distress measures.[2] In a study investigating the procedural experience of patients undergoing endoscopy,[7] researchers assessed 88 consecutive patients undergoing colonoscopy (n = 55) or gastroscopy (n = 33) one week prior to the investigation, while awaiting procedure commencement and 24 to 72 hours after recovering from sedation post-procedure. Before the procedure, the colonoscopy group anticipated significantly more pain and had significantly lower pre-procedural acceptance than the gastroscopy group. However, the colonoscopy group reported lower pain and significant decreases in scope concerns and anxiety after the procedure. Despite this, their acceptance of the procedure did not significantly improve after the procedure, while there was near universal acceptance of the test in the gastroscopy group. Anticipated pain was the strongest predictor of pretest acceptance of colonoscopy.

State but not trait anxiety was found to be moderately increased in patients undergoing outpatient diagnostic endoscopy relative to those undergoing colonoscopy.[9] (Definitions: “Trait anxiety” is the tendency to experience anxiety and is considered a stable personality trait. “State anxiety” is temporary discomfort when feeling threatened by a situation).[4] This state anxiety about the procedure did not differ by age, sex, source of referral, procedure type or perceived procedural knowledge, but it was positively associated with trait anxiety[9]. Thus people who tended to be anxious overall were also more anxious immediately before the procedure. The authors notably found that physician estimates of patient anxiety were not significantly associated with either procedural state anxiety or changes in state anxiety between baseline and the procedure. The study authors speculate that physician estimates are unrelated due to increases in state anxiety being mild.

**Evidence**

**Anxiety level before and during colonoscopy**

Overall, the evidence suggests that 16-20% of people undergoing colonoscopy have severe anxiety, usually related to pain and discomfort. A cross-sectional study[3] examined the possible relationship between state (i.e., situational) and trait (i.e., stable) anxiety in 52 gastrointestinal endoscopy (gastroscopy) and 46 colonoscopy outpatients. The researchers observed a small but statistically significant increase in state anxiety before elective upper gastroscopy and colonoscopy, but no changes in trait anxiety. Females had higher anxiety levels in both procedures. Overall, anxiety levels were not related to type of procedure.

A service evaluation based in the UK was conducted to determine patients’ (N = 216) attitudes, preferences and expectations for day case colonoscopy [18]. Patients attending for elective colonoscopy completed and returned a composite patient pre-procedure questionnaire which was comprised of Likert scale questions examining patient levels of anxiety pre-procedure and the causes of anxiety, demographic characteristics, previous
colonoscopy experience, preferred staff roles and patient preferences for a single-sex colonoscopy department. A 15-point preference (ranking) scale was also included which addressed the domains of endoscopy care that were considered most important to least important as contributing to satisfactory experience. Additionally, a sample of 19 patients from the study cohort completed the 15-point ranking questionnaire post-procedure. Pre-procedure, 43.5% of patients reported none or mild anxiety, 40.3% reported moderate anxiety and 16.2% reported severe or very severe anxiety (p = 0.066). The anticipation of pain (40.8%), nature of the results (37.3%) and potential complications and sedation (21.9%) were reported as the main sources of their anxiety; and similar levels of moderate to severe anxiety were reported irrespective of previous experience of having a colonoscopy (59.8% vs. 52.9%, p = 0.3). However, patients who reported having previous experience of pain or discomfort during a colonoscopy (n=64) were more likely to report moderate to severe anxiety (73.4% vs. 36.5%, p < 0.01), particularly related to procedure-associated pain (51.6% vs. 19.2%, p < 0.01) and expectation of severe or moderate pain (50% vs. 19.2%, p = 0.01). Hence, whilst the use of sedation and analgesia reduce the experience of pain during a colonoscopy, pain and discomfort are often identified as contributing factors to unwillingness to return for a repeat procedure, with associated increased anxiety prior to future examinations.

A sex and age matched case-control, cross-sectional study of 100 patients with inflammatory bowel disease (IBD) and 100 patients without IBD (control group) examined whether the quality and tolerance of bowel cleansing (BC) was associated with anxiety levels immediately prior to ileocolonoscopy (IC) [19]. Prior to the endoscopic procedure, patients completed a questionnaire consisting of the Hospital Anxiety and Depression Scale (HADS-A/HADS-D), Visceral Sensitivity Index, State Trait Anxiety Inventory (STAI-S) and self-assessed their BC and abdominal pain and nausea during BC. Endoscopist-reported measures included the Mayo score, Harvey Bradshaw Index (HBI), simple endoscopic score for Crohn’s disease, and the Boston Bowel Preparation Scale (BBPS). A multiple linear regression model identified that nausea (p = 0.0071), abdominal pain during BC (p = 0.0029) and a lower number of previous ICs (p = 0.032) were independently associated with anxiety prior to IC (assessed by STAI-S), after controlling for age, gender, and endoscopist-related quality of BC. Based on these findings, the authors suggested that taking measures to reduce anxiety could improve IC and BC tolerance.

Patients who undergo direct colonoscopy, also referred to as “open access colonoscopy”, may do so without clinical consultation with an endoscopist prior to the day of the procedure. An observational study of 409 colonoscopy-naïve patients compared the pre-endoscopy information seeking behaviours and levels of anxiety about the procedure (using a single question using a 10-item rating scale) of patients in the Direct group (34% of total sample) to patients who had received a pre-procedure consultation with the endoscopist (Consult group) [28]. The study found no differences between the two groups in pre-procedure anxiety levels [Direct group mean 4.7 (95% CI: 4.3-5.2) vs. Consult group 5.0 (95% CI: 4.6-5.3)], but undergoing a colonoscopy for symptoms rather than for screening was associated with greater anxiety. Furthermore, 20% of participants overall reported high pre-procedure anxiety, suggesting a need for measures to reduce anxiety including providing detailed information about the procedure.

A prospective qualitative study of 13 patients in Australia [29] examined the effect of colonoscopies on patients’ anxiety about their initial colonoscopy. The researchers interviewed patients one week prior to and one week, two weeks and 12 months after their colonoscopy. Participants reported that the procedure was associated with stigma, and discussing it was stressful, embarrassing and anxiety-provoking. The researchers reported that contributors to patient anxiety included irrational expectations of the procedure, limited perceptions of control and power imbalances with doctors. Prior to procedures, anxiety was elicited by fear of a serious diagnosis while
an unclear or functional diagnosis seemingly increased anxiety after the procedure. The authors noted that anticipating the preparation before the procedure was reportedly important to manage anxiety during this stage. The authors advocated for increased shared decision-making as part of a shift towards the biopsychosocial model of healthcare to reduce patient anxiety. They notably recommended developing and using neutral language for colonoscopy procedures to reduce the stigma of colonoscopies and bowel health issues.

A 2013 systematic review [30] examined patients’ experiences of colonoscopy in the screening context. From 56 included studies, most patients reported that the most burdensome aspect of a colonoscopy was the laxative bowel preparation. Patients also reported anxiety, pain anticipation and feeling embarrassed and vulnerable. Obstacles to screening colonoscopies included inadequate knowledge of the procedure and fear of finding cancer. The reviewers found that physician recommendations, family history, knowing a person with cancer and perceiving the test to be accurate motivated having a colonoscopy.

Anxiety levels in children and adolescents

While colonoscopy is most frequently performed on adults, it may be used in the diagnostic evaluation of children and adolescents with colonic disease. Adolescents with inflammatory bowel disease (IBD) will usually require colonoscopy from time to time. A study designed to compare adolescents aged 10-18 years with either IBD or functional gastrointestinal disease (FGID) undergoing their first colonoscopy recorded the levels of pain or anxiety that they experienced. These levels were assessed by means of a questionnaire recorded immediately before the procedure and through a second questionnaire 48 hours later. While no differences in anxiety were reported, it was noted that higher levels of anxiety accompanied by higher pain scores were experienced by children with IBD at the time of colonoscopy. Adolescents with FGID experience common pain symptoms during colonoscopy and may describe more post-colonoscopic pain than those with IBD. It was concluded that anxiety is associated with severity of pain after colonoscopy in children with IBD, while not observed to be a factor in children with FGID.[8]

Reducing anxiety about colonoscopy

Studies have investigated the efficacy of information in various formats, aromatherapy, and audio or visual distraction in reducing anxiety, increasing satisfaction and reducing pain, with variable outcomes.

An Australian study[1] assessed the response of 80 patients to information consistent with their coping style. The researchers classified coping style as either information seekers or information avoiders. The researchers administered an information intervention that included a general description of colonoscopy and procedural events like the potential complications of and instructions about preparing for the procedure. This information was provided orally and in writing. There was also a sensory information condition that described in depth what the patient might see, hear, or feel during each part of the procedure, such as during hospital admission procedures, in the endoscopy room, during intravenous line insertion, when affected by intravenous sedation, and during the colonoscopy and recovery. This information was also provided orally and in writing.
The researchers found that information seekers receiving sensory information (more information overall) self-reported less anxiety than information seekers receiving information on the procedure. In contrast, information avoiders receiving procedural information (less information overall) self-reported lower anxiety than avoiders receiving sensory information. Those groups who received the amount of information consistent with their preferences also reported more satisfaction with the intervention, were observed to experience less pain and exited recovery 12-16 minutes earlier. There were, however, no differences on perceptions of pain or dosages of sedative medications.

An RCT [10] explored the ability of an information intervention provided before clinical procedures to improve procedural knowledge and consequently reduce anxiety related to it. The investigators randomly assigned patients to either viewing or not viewing an information video before colonoscopy. The study enlisted 150 patients; 72 video-watchers and 78 non-video-watchers. The groups were generally similar on age, sex, education levels and initial anxiety scores, but female patients had higher baseline anxiety scores than male patients. Patients who had previously had colonoscopies had lower baseline anxiety scores than those with no previous experience. The authors found that patients who watched the video reported significantly less anxiety than control group participants. The intervention group reported significantly more knowledge on items assessing the purpose, details and potential complications of colonoscopies. A commentary on the RCT [11] argues that the intervention may be cost-effective by reducing cost of sedation and post-operative recovery time, although it does not appear that cost-effectiveness has been evaluated for this intervention.

In a study of 201 patients undergoing colonoscopy [12], patients were randomised into three groups: those provided with pre-procedure information by video plus discussion, video alone or discussion alone. Patients in both groups who viewed the videos had significantly higher scores on knowledge than those in the discussion alone group, but there were no statistically significant differences in knowledge scores between the two groups viewing the video. Increased understanding of the benefits and risks of colonoscopy was not associated with increases in anxiety.

Another RCT [13] of 162 colonoscopy patients included an information video as part of pre-procedure preparation, with control patients not watching the video. The trialists found no differences between the groups on situational, pain ratings, procedure tolerability or willingness to have future colonoscopies. All staff rated outcomes in the two groups equally. The two groups did not differ in midazolam dosages, but patients in the video condition used significantly higher fentanyl doses. Women had significantly higher situational anxiety ratings, and also reported less satisfaction with the procedure and more pain from it.

An RCT [20] of the effect of aromatherapy on alleviating anxiety, stress and physiological parameters of colonoscopy randomised 27 patients into groups inhaling neroli oil (experimental group, n = 14) or sunflower oil (control group, n = 13). The researchers found no significant differences in state procedural anxiety or procedural pain scores before and after aromatherapy, although neroli oil was significantly more effective in reducing systolic blood pressure than sunflower oil. A non-randomised controlled trial investigated the effects of written and oral information versus oral information alone on pre-colonoscopy anxiety [25]. Patients in group one (n = 51) received written and oral information and group two (n = 53) received only oral information. The written information discussed preparation, the process of colonoscopy and potential issues needing attention following the procedure. The oral information was identical to the written information. Patients completed
questionnaires 24 hours prior to and on the day of the colonoscopy. State anxiety scores after the colonoscopy lowered, but this was not statistically significant and there were no between-group differences at either time point. The study author suggested that written information potentially increased anxiety in patients with high baseline trait anxiety, as too much detailed information made them more aware of the risks and insertion process. Furthermore, information was provided to patients a day before their procedure, which may not have allowed sufficient time for patients to adequately process the information.

An RCT investigated the effects of visual and audiovisual distraction on pain, anxiety, and procedure tolerance in 180 colonoscopy patients [26]. Participants were randomly allocated to one of three groups: Group A (n = 60) received visual distraction (DVD with no sound and earphones on), Group B (n = 60) received audio-visual distraction (DVD with sound and earphones on), and Group C (n = 60) received routine care. Before the procedure, patients were permitted to select their preferred DVD (e.g., landscape scenery, animation, comedy, Chinese Kung Fu). The groups did not differ significantly on state and trait anxiety before the procedure. The researchers observed lower pain scores in the visual and audio-visual distraction groups relative to the control group, but not to a statistically significant extent. Patients in the visual and audio-visual distraction groups reported more willingness to repeat the procedure.

Another RCT examined using information videos before colonoscopy on patient satisfaction and anxiety [27]. The authors recruited 227 patients from an endoscopy unit and randomly assigned them to either the video group (n = 124) or verbal group (n = 130). Patients in the video group viewed a 10-minute video about the colonoscopy procedure and had their questions about the procedure answered, while patients in the verbal group listened to a text version of the video spoken by physicians uninvolved in the colonoscopy procedure and subsequently also had their questions answered. Low state anxiety levels and communication by video were significantly associated with communication success. The state anxiety levels were notably significantly higher in women than men at baseline. An endoscopist-blinded RCT in Japan [33] assessed the intervention of relaxing visual distraction on patient pain, anxiety and satisfaction during colonoscopy. Patients (N = 60) were randomly allocated to one of two groups, with the first group (n = 28 in final analysis) viewing a silent movie wearing a head-mounted display and the second group (n = 29 in final analysis) wearing only the display. Patients in the first group reported significantly higher median post-procedural satisfaction levels than patients in the second group. In patients who had anxiety scores of 50 or higher before the procedure, the anxiety and pain scores during the procedure were significantly lower in the group receiving the visual distraction intervention.

Use of Anaesthesia to Reduce Anxiety and Pain

Multiple guidelines strongly recommend administering medication for endoscopic procedures [22]. Frequently used approaches include Propofol deep sedation or conscious sedation induced by combining benzodiazepines and opioids. Alfentanil, Fospropofol, Remifentanil and Remimazolam are also used for colonoscopy sedation. Although the optimal sedative for colonoscopy is ideally safe, fast-acting and easy to administer with minimal side effects, this sedative does not yet exist. Using nitrous oxide gas is emerging as a promising alternative to IV sedoanalgesia, with two systematic reviews [23,24] suggesting that nitrous oxide gas enables shorter recovery times and greater safety compared to analgesia-sedation methods during colonoscopy.
An RCT of 100 patients scheduled to undergo elective surgery under general anaesthesia [21] randomly assigned to either Group I (n = 50) who received Propofol (2mg/kg of body weight) or Group II (n = 50) who received Etomidate (0.3mg/kg of body weight). The medications were injected before surgery and any pain induced on injection was recorded. Anaesthesia was maintained during the surgery with oxygen, nitrous oxide and vecuronium. The researchers found that 50% of patients who received Propofol complained of pain while only 4% of patients receiving etomidate reported pain. Severity of pain was also significantly higher with Propofol. While Etomidate may be a better option for patients in terms of lower incidences of pain on injection, the study population did not include patients undergoing colonoscopy.

Another RCT [30] evaluated the efficacy, safety and outcome of Penthrox for colonoscopy. Penthrox (portable inhaled methoxyflurane) is available as an analgesic agent outside of the hospital environment and administered through an inhaler. The researchers recruited 251 patients to receive either Penthrox (n = 125) or intravenous midazolam and fentanyl (n = 126). Patients who were randomised to the fentanyl and midazolam group were given doses via intravenous injection, while patients receiving Penthrox were educated about the use of the Penthrox inhaler by a research nurse. The patients were instructed to inhale Penthrox for approximately two minutes to become accustomed to its smell, and once the colonoscopy had started, the patient was instructed to take a deeper inhalation to provide sufficient analgesia. While no differences between pain scores emerged before, during, and after colonoscopy between patients who received IV sedation and Penthrox, both Penthrox and IV sedation interventions reduced the nervousness score in all patients after administration. The lack of differences suggests that Penthrox is an equally viable method as IV sedation, but it is safer than sedation as no adverse effect on respiratory function occurs. However, caution should be exercised as the use of Penthrox may not be suitable for all patients, particularly those who have significant anxiety disorders or visceral hypersensitivity, who require a deeper level of sedation during the procedure.

A prospective study [31] investigated the effects of pre-procedure anxiety on patient sedative requirements in 135 patients undergoing sedation for colonoscopy. Before the procedure, Propofol was administered through IV until patients exhibited no responses to verbal commands (loss of consciousness). Colonoscopy then began. The endoscopist assessed procedural time, spasm score and difficulty score for colonoscopy immediately after the procedure. The researchers observed no association between pre-procedural anxiety and sedative requirements for deep sedation in patients receiving colonoscopies, suggesting that the two are unrelated.

A cross-sectional, mixed-methods study [32] explored the experience of anxiety in colonoscopy outpatients by evaluating whether any differences in state anxiety existed between pre- and post-colonoscopy patients, and whether problem-focused, emotion-focused, and maladaptive coping styles were significantly associated with this anxiety. The researchers recruited 26 pre-procedure participants and 24 post-procedure participants, and found a strong, positive relationship between maladaptive coping and state anxiety in the entire sample. This relationship also existed in both pre-procedure and post-procedure samples. The interviews indicated that clinicians and endoscopy nurses needed to be aware that some patients do not correctly process information about colonoscopy, specifically the knowledge that they may be conscious or experience pain during the procedure. The study authors recommended that clinicians ensure that patients understand the standard practice of the hospital, and that more attention be given to pain management as it may not be adequate during conscious sedation.
Practice points

✓ Practice point

Pre-colonoscopic advice to patients by means of educational material, video and clinical explanation can assist in improving patient experience with the procedure and in reducing anxiety.

✓ Practice point

Endoscopists should aim to control pain and discomfort during a colonoscopy procedure in order to reduce patient anxiety. [18]

✓ Practice point

Use of etomidate (instead of propofol) as an anaesthetic may be more effective in reducing pain. [21]

✓ Practice point

Providing informational videos prior to the colonoscopy can help in decreasing anxiety and abdominal pain during the procedure. [27]

✓ Practice point

Physicians should be able to provide accurate and relevant information about colonoscopy for patients who are undergoing open access colonoscopy (without prior consultation with an endoscopist). [28]
Practice point

Gastroenterology clinics are recommended to evaluate shifting towards a biopsychosocial approach to healthcare and encouraging patients to participate in decision making in order to provide them with a greater sense of control, thus reducing anxiety. [29]

Practice point

The use of neutral language around colonoscopy may be useful in order to break down the stigma and taboo surrounding the procedure and bowel health issues, [29]

Practice point

Penthrox may be used as an alternative to IV sedation where it is both feasible and effective at relieving pain and anxiety without affecting procedural success or patient respiratory function. However, caution should be exercised when using Penthrox as it may not be suitable for patients with significant anxiety disorders or hypersensitivity. [30]

Practice point

Clinicians should ensure that patients understand the standard practice and convey information about the procedure as clearly as possible (e.g., whether they will be conscious, pain experience, etc.) [32]

ROLE OF MUSIC

CAN MUSIC BE AN ADDITIONAL AID TO REDUCE ANXIETY, PAIN ETC WITH SURVEILLANCE COLONOSCOPY? There is increasing evidence that music may be an effective strategy to reduce anxiety during colonoscopy.
Background

About 20% of patients undergoing colonoscopy suffer high anxiety, particularly if they have experienced pain or discomfort during previous colonoscopies. Thus finding interventions to reduce anxiety is a priority.

Evidence

A single-blind RCT was used to assess the efficacy of music for patients undergoing colonoscopy.[1] In this study, 109 patients were randomised and fitted with mute or music-delivery headphones. Clinicians were blinded to the trial and sedation was provided if requested. Primary outcome was the measurement of pain and secondary endpoints were recorded as need for sedation, patient satisfaction and willingness to repeat the procedure. Those wearing music headphones recorded statistically significant reduction in pain and in the proportion of patients requiring sedation. Clinicians perceived less difficulty and multivariate analysis confirmed a significant beneficial effect of music. The introduction of music during colonoscopy significantly reduces discomfort.

A meta-analysis of RCTs on the effect of music on patients undergoing colonoscopy, assessed procedure time, dose of sedation, pain scores and willingness to repeat the procedure in the future. Eight studies met the criteria and observed that patients’ overall experience was statistically significantly improved when music was used during the procedure. There were significant differences in pain scores, sedation levels, procedure time and willingness to repeat the procedure. Music was stated to “improve patients’ overall experience with colonoscopy”. [2]

In another randomised study in a US Veterans Gi Diagnostic facility,[3] 198 patients were randomised. Ninety-eight (98) comprised a control group, who had 25 minutes of quiet time before endoscopy while the study group (100) had music selected by the investigators, who were nurses, for 25 minutes before having endoscopy. All were evaluated by the State Trait Anxiety Inventory.[4] Both groups experienced reduced anxiety scores but, after controlling for trait anxiety, there was a statistically different outcome between the groups, with those listening to music having a greater reduction in anxiety. It is suggested that music, a non-invasive nursing intervention may reduce anxiety if provided prior to gastrointestinal investigative procedures.

Practice points

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<td>Music provided to patients during colonoscopy may reduce their discomfort.</td>
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<td>Music may be administered by nurses prior to and during the procedure.</td>
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Socio-economic factors (Lead Author: Anne Duggan)

Draft content for public consultation

The following draft content is available for public consultation from **XX September 2017 to XX October 2017**. Please see the instructions on how to provide feedback.

Please note the links in this box are the only questions open for review and public consultation. The questions on clinical features of melanoma, biopsy, sentinel node biopsy, definitive excision margins, diagnostic aids for melanoma, and treatment for macroscopic nodal metastasis (appearing outside of this orange box) have already undergone a public consultation process and are published.

**Investigations and follow-up for melanoma patients:**

- What investigations should be performed following a diagnosis of primary cutaneous melanoma for asymptomatic Stage I and II patients?
- What investigations should be performed when in transit and/or regional node disease (Stage III melanoma) is diagnosed?
- What investigations should be performed when Stage IV melanoma is diagnosed?
- How should patients at each stage of melanoma be followed after initial definitive treatment?
- What are the ideal settings, duration and frequency of follow-up for melanoma patients?
Identification and management of high-risk individuals

- Identification and management of high-risk individuals
  - What are the genetic determinants of high risk for new primary melanoma?
  - What validated models integrate genetic and clinical risk factors into an overall measurement of high risk from new primary melanoma?
  - What interventions have been shown to provide clinical benefit in those assessed to be at high risk of new primary melanoma?

Total body photography

- What is the role of skin surface imaging in the early diagnosis of patients at high risk of developing melanoma? (Total body photography)

Clinical information

- What clinical information should the clinician give the pathologist to aid diagnosis of melanoma?

Lymphadenectomy

- Should all patients with a positive sentinel lymph node biopsy have a complete node dissection?

Radiotherapy

- When is radiotherapy indicated for patients with distant metastasis?


