



Journal of Coloproctology

www.jcol.org.br



Original Article

Adherence to post colorectal cancer surveillance colonoscopy guidelines at a tertiary care center



Nabeeha Mohy-ud-din ^{a,*}, Shifa Umar^b, Aslam Syed^b, Dulabh Monga^c

^a Allegheny Health Network, Medicine Institute, Pittsburgh, PA, United States

^b Allegheny Health Network, Division of Gastroenterology and Hepatology, Pittsburgh, PA, United States

^c Allegheny Health Network, Division of Hematology and Oncology, Pittsburgh, PA, United States

ARTICLE INFO

Article history:

Received 22 April 2019

Accepted 10 July 2019

Available online 6 August 2019

Keywords:

Colonoscopy

Colorectal cancer

Surveillance

Resection

Guidelines

ABSTRACT

Background: Surveillance colonoscopy 1 year after resection of colorectal cancer is recommended by all major societies, including National Comprehensive Cancer Network and United States Multi Society Task Force.

Study objectives: Our study assesses adherence to post colorectal cancer resection surveillance colonoscopy guidelines at a large tertiary care center and aims to identify reasons for non-adherence.

Methods: A retrospective study was conducted for patients who underwent curative resection for colorectal cancer between January 2016 and June 2017. Adherence to surveillance colonoscopy for non-obstructed or partially obstructed colon and rectal cancers was defined as performance of colonoscopy 11–14 months and 11–15 months after surgery, respectively. **Results:** A total of 80 patients were identified. Mean age was 66 ± 13 years and 58% ($n=46$) were males. 60% ($n=48$) had colon cancer and 40% ($n=32$) had rectal cancer. 69% ($n=24$) of patients with colon cancer and 42% ($n=8$) of patients with rectal cancer adhered to surveillance colonoscopy guidelines and the mean time to colonoscopy was 315 ± 44 days and 369 ± 103 days, respectively. The most commonly identified reasons for non-adherence to surveillance colonoscopy included metastases (10.9%) and patients' refusal to undergo surveillance (6.5%).

Conclusion: Overall, post colorectal cancer resection to follow up surveillance is inadequate. There is a need to identify barriers to surveillance post colorectal cancer resection and address them.

© 2019 Sociedade Brasileira de Coloproctologia. Published by Elsevier Editora Ltda. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

* Corresponding author.

E-mail: nabeeha.mohy-ud-din@ahn.org (N. Mohy-ud-din).

<https://doi.org/10.1016/j.jcol.2019.07.001>

2237-9363/© 2019 Sociedade Brasileira de Coloproctologia. Published by Elsevier Editora Ltda. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Adesão às diretrizes de colonoscopia para rastreamento após câncer colorretal em um centro de atendimento terciário

R E S U M O

Palavras-chave:
Colonoscopia
Câncer colorretal
Rastreamento
Ressecção
Diretrizes

Introdução: A colonoscopia de rastreamento um ano após a ressecção do câncer colorretal é recomendada por todas as principais sociedades, incluindo a National Comprehensive Cancer Network e a Multi Society Task Force dos Estados Unidos.

Objetivos do estudo: Avaliar a adesão às diretrizes de colonoscopia de rastreamento após ressecção de câncer colorretal em um grande centro de atendimento terciário e identificar razões para a não adesão.

Métodos: Um estudo retrospectivo foi realizado em pacientes submetidos a ressecção curativa de câncer colorretal entre janeiro de 2016 a junho de 2017. Adesão à colonoscopia de rastreamento em cânceres de cólon e reto não obstruídos ou parcialmente obstruídos foi definida como a realização do procedimento entre 11 a 14 meses e 11 a 15 meses após a cirurgia, respectivamente.

Resultados: Um total de 80 pacientes foram identificados. A média de idade foi de 66 ± 13 anos; 58% ($n = 46$) eram do sexo masculino, 60% ($n = 48$) tinham câncer de cólon e 40% ($n = 32$) tinham câncer de reto. Aderência às diretrizes de colonoscopia de rastreamento foi observada em 69% ($n = 24$) dos pacientes com câncer de cólon e 42% ($n = 8$) dos pacientes com câncer retal; o tempo médio até a realização da colonoscopia foi de 315 ± 44 dias e 369 ± 103 dias, respectivamente. Os motivos mais frequentemente identificados para a não adesão à colonoscopia de rastreamento incluíram metástases (10,9%) e recusa dos pacientes (6,5%).

Conclusão: De forma geral, o rastreamento após a ressecção de câncer colorretal é inadequado. É necessário identificar barreiras ao rastreamento após a ressecção do câncer colorretal e abordá-las.

© 2019 Sociedade Brasileira de Coloproctologia. Publicado por Elsevier Editora Ltda. Este é um artigo Open Access sob uma licença CC BY-NC-ND (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Introduction

Colorectal Cancer (CRC) is the third most common cause of cancer death in the United States; an estimated 140,000 new cases are diagnosed each year, of which about 97,000 are colon and the remainder are rectal cancers.¹ Surgical resection is the primary treatment for CRCs that present with non-metastatic disease. There is considerable variability among physicians in the use of follow up studies for surveillance after potentially curative resection of CRC.

Surveillance colonoscopy 1 year after resection of colon cancer is recommended by National Comprehensive Cancer Network (NCCN), American Cancer Society (ACS), American Society of Clinical Oncology (ASCO) and US Multi Society Task Force (USMSTF). Most expert groups also recommend checking carcinoembryonic antigen (CEA) levels every 3–6 months for at least the first 3 years. For rectal cancers that have not received pelvic radiation, proctosigmoidoscopy every 6 months for 2–5 years is currently recommended by ASCO. NCCN recommends flexible sigmoidoscopy with Endoscopic Ultrasound (EUS) or Magnetic Resonance Imaging (MRI) every 3–6 months for 2 years, then every 6 months to complete 5 years for patients with rectal cancer undergoing trans-anal excision only.^{2–11} There is wide variability in adherence to these guidelines, with rates between 12% and 87%.¹² This wide range could be due a multiple reasons: updates in guidelines, variability in physician practice and differences among patient populations.

Our study assesses adherence to post CRC resection surveillance guidelines for colonoscopy and CEA levels at a large tertiary care center. We aimed to look at factors associated with adherence and non-adherence to these guidelines.

Methods

Data collection

A retrospective chart review was conducted for patients who underwent resection for CRC between January 2016 and June 2017 at a large tertiary care center in Pittsburgh, Pennsylvania. Institutional Review Board approval was obtained for this study. Data on adult patients (>18 years of age) with resected, non-metastatic CRC (Stages 2 and 3) at diagnosis was collected retrospectively from medical records. Our electronic health record was screened for the following keywords “Colonoscopy” in Procedures, “Colorectal cancer” in Diagnosis and care team specialty of “Colon and Rectal Surgery”. Only patients with a diagnosis of Stage 2 and 3 CRC at diagnosis who underwent resection were included in the study. Patient demographics including age and sex, personal history of adenomas, family history of colon cancers, type of insurance, timing and performance of diagnostic colonoscopy, gross pathology at diagnosis (obstructed vs. non-obstructed cancers), type of surgical resection performed, timing and performance of surveillance colonoscopy were reviewed and

Table 1 – Characteristics of patients with colon cancer (adhered to guidelines vs non-adherence).

Colon cancer (n = 48)	Adhered (n = 24)	Non-adhered (n = 24)	p-Value
Age	65.2 ± 14.2	71.2 ± 12.2	0.74
Sex (Male)	12 (50%)	16 (67%)	0.38
Laterality (Left)	13 (54%)	16 (67%)	0.55
Stage at diagnosis			1
2	9 (38%)	9 (37.5%)	
3	15 (62%)	15 (62.5%)	
Gross pathology			0.26
Obstructed	2 (8%)	5 (21%)	
Partially obstructed	6 (25%)	6 (25%)	
Non obstructed	16 (67%)	13 (54%)	
Personal history of adenomas (Yes)	4 (17%)	1 (4%)	0.34
Family history of cancer (Yes)	9 (38%)	7 (29%)	0.76
Insurance			1
Highmark BCBS	16 (67%)	16 (67%)	
Aetna	1 (4%)	0 (0%)	
Medicare	4 (17%)	4 (17%)	
Others	2 (8%)	2 (8%)	
Unknown	1 (4%)	2 (8%)	

Highmark BCBS, Highmark Blue Cross Blue Shield.
Others: United Healthcare, Medicare generic assist.

recorded. Information from outside hospitals where colonoscopies were performed for the patient were also reviewed.

Definitions of adherence to surveillance

Adherence to surveillance colonoscopy for colon cancers

For patients with obstructed cancers at the time of diagnosis: surveillance colonoscopy within 12 months from surgery.

For patients with non-obstructed or partially obstructed cancers: surveillance colonoscopy 11–14 months from surgery.

Proportion of patients who adhered to surveillance colonoscopy guidelines were calculated after exclusion of patients who did not undergo surveillance colonoscopy because of advanced age, presence of metastases, choosing palliative route, refusal to undergo surveillance or death.

Adherence to surveillance colonoscopy for rectal cancers

For patients with obstructed cancers at the time of diagnosis: surveillance colonoscopy within 12 months from surgery.

For patients with non-obstructed or partially obstructed cancers: surveillance colonoscopy 11–15 months from surgery.

Proportion of patients who adhered to surveillance colonoscopy guidelines were calculated after exclusion of patients who did not undergo surveillance colonoscopy because of advanced age, presence of metastases, choosing palliative route, refusal to undergo surveillance or death.

Statistical analysis

Descriptive analysis has been reported using mean and standard deviation or median and inter-quartile range as appropriate. Inter group comparisons were performed using Chi-Square or paired t tests. Multivariable logistic regression was performed to identify independent predictors of adherence and non-adherence to guidelines. All statistical analysis

was performed using SPSS 23 (IBM, Armonk, NY). A *p*-value of <0.05 was considered to be significant.

Results

A total of 136 patients were identified using a keyword search as described in the methods. Eighty patients met our inclusion criteria. Fifty-six patients were excluded from the study as these were either Stage 1 or Stage 4 colon cancer at diagnosis, hence, did not meet inclusion criteria. Mean age was 66 ± 13 years and 58% (*n* = 46) were males. About 12.5% (*n* = 10) had a personal history of adenoma and 29% (*n* = 23) had a family history of CRC. Sixty percent (*n* = 48) had colon cancer and 40% (*n* = 32) had rectal cancer.

Thirty eight percent (*n* = 18) of colon cancers had Stage 2 at diagnosis and 62.5% (*n* = 30) had Stage 3 at diagnosis. Eighty-five percent (*n* = 41) of colon cancers were non-obstructed or partially obstructed at diagnosis while 15% (*n* = 7) were completely obstructed. The most common surgical procedure to treat colon cancer was partial colectomy 72.7% (*n* = 8). Demographic, clinical and treatment characteristics of patients with colon cancer (adhered vs. non-adhered) have been described in Table 1. Sixty-nine percent (*n* = 24) of patients adhered to surveillance colonoscopy guidelines and the mean time to colonoscopy was 315 ± 44 days. In colon cancer patients who underwent surveillance colonoscopy post resection, 18% (*n* = 6) had normal colonoscopy, 40% (*n* = 13) were found to have diverticuli, 27% (*n* = 9) polyps and 3% (*n* = 1) had a mass present.

Twenty-two% (*n* = 7) of rectal cancers had Stage 2 at diagnosis and 78% (*n* = 25) had Stage 3 at diagnosis. Eighty-four percent (*n* = 27) of rectal cancers were either non-obstructed or partially obstructed at diagnosis while 16% (*n* = 5) were completely obstructed at diagnosis. Demographic, clinical and treatment characteristics of patients with rectal cancer have been described in Table 2. Forty-two percent (*n* = 8) of patients

Table 2 – Characteristics of patients with rectal cancer (adhered to guidelines vs. non-adhered).

Rectal cancer (n = 32)	Adhered (n = 10)	Non-adhered (n = 22)	p-Value
Age	61.4 ± 14.5	65.0 ± 13.3	0.49
Sex (Male)	8 (80%)	10 (45%)	0.12
Stage at diagnosis			1.0
2	2 (20%)	5 (23%)	
3	8 (80%)	17 (77%)	
Gross pathology			0.19
Obstructed	2 (20%)	3 (13.6%)	
Partially obstructed	4 (40%)	3 (13.6%)	
Non obstructed	4 (40%)	16 (72.7%)	
Personal history of adenomas (Yes)	2 (20%)	3 (14%)	1
Family history of cancer (Yes)	4 (40%)	3 (14%)	0.16
Insurance			0.74
Highmark blue cross blue shield	7 (70%)	11 (50%)	
Aetna	0 (0%)	2 (9%)	
Medicare	2 (20%)	5 (23%)	
Others	0 (0%)	2 (9%)	
Unknown	1 (10%)	2 (9%)	

Highmark BCBS, Highmark Blue Cross Blue Shield.
Others: United Healthcare, Medicare generic assist.

Table 3 – Reasons for non-adherence to surveillance colonoscopy.

Reasons for non-adherence	Overall (n = 46)	Colon cancer (n = 24)	Rectal cancer (n = 22)
Death	2 (4.35%)	1 (4.2%)	1 (4.5%)
Lost to follow up	2 (4.35%)	2 (8.3%)	0 (0%)
Palliative route	2 (4.35%)	1 (4.2%)	1 (4.5%)
Advanced age	1 (2.2%)	1 (4.2%)	0 (0%)
Others (Surgery)	2 (4.3%)	1 (4.2%)	1 (4.5%)
Patient refused surveillance	3 (6.5%)	0 (0%)	3 (13.6%)
Metastasis	5 (10.9%)	2 (8.3%)	3 (13.6%)
Unknown	29 (63%)	16 (66.7%)	13 (59%)

adhered to surveillance colonoscopy guidelines and the mean time to colonoscopy was 369 ± 103 days. In rectal cancer patients who underwent surveillance colonoscopy post resection, 73% (n = 14) had a normal colonoscopy, 16% (n = 3) polyps, 10% (n = 2) diverticuli.

Reasons for non-adherence to surveillance colonoscopy are detailed in Table 3. Eleven percent (n = 5) were found to have wide-spread metastases and a combined decision between the patient and the provider was made to not undergo further surveillance colonoscopies. Seven percent (n = 3) patients refused surveillance colonoscopies. 4% (n = 2) died, 4% (n = 2) chose the palliative route, 2% (n = 1) had advanced age and hence did not undergo surveillance colonoscopy. A reason for not undergoing surveillance colonoscopy could not be identified in 63% (n = 46) of patients.

Discussion

The main finding of this study is that only 69% of colon cancers and 42% of rectal cancers adhered (as per definition outlined in Methods) to guidelines for surveillance colonoscopy. Overall, post CRC resection follow up surveillance is inadequate. There

is a need to identify barriers to surveillance post CRC resection and address them.

Current guidelines from all major societies as mentioned above recommend surveillance colonoscopy 1 year after CRC colon cancer resection. However, current ASCO, USPSTF and NCCN guidelines state that patients with rectal cancer with high risk of local recurrence should undergo local surveillance with flexible sigmoidoscopy or Endoscopic Ultrasound (EUS) every 3–6 months for the first 2–3 years after surgery.² However, opinion about this remains mixed with societies such as ESMO not recommending this and none of the patients in our study with rectal cancer underwent increased surveillance with the above stated measures. We also noted that most societies including ASCO, Cancer Care Ontario (CCO) and European Society for Medical Oncology (ESMO) do not comment on surveillance colonoscopy guidelines for resected Stage 4 disease. NCCN guidelines suggest following the same surveillance strategy for resected Stage 2 or 3 disease.⁴ Adherence to guidelines may lead to early identification of recurrence of cancer or new primary lesions. It is debatable how beneficial intensive surveillance can be, and multiple meta-analysis have been performed that show an increased survival benefit and increased rates of curative surgeries.^{3–17} However, the recent COLOFOL trial contested this and noted that there

was no significant difference in any key outcomes (time to detection of recurrence, overall survival, likelihood of undergoing surgical resection for recurrence) for patients treated at high-versus low-intensity imaging facilities or high-versus low-intensity CEA facilities.¹⁸

Vargas et al.¹⁹ reported overall compliance with guidelines (including testing for CEA, colonoscopy and physician visits) post CRC resection to be only 25.1% in patients who survived 3 years. They noted that compliance and use of non-recommended testing is markedly increased in patients seen by a medical oncologist (61.5% vs. 8.8% for those not seen by a medical oncologist). Singh et al.²⁰ noted that many medicare patients who have undergone curative resection for CRC undergo surveillance colonoscopy earlier than indicated as per guidelines. Sisler et al.²¹ performed a population based analysis in Canada to assess adherence to ASCO 2005 surveillance guidelines and noted that 80.4% of patients adhered to guidelines i.e. underwent at least one colonoscopy in 3 years after curative treatment of CRC.

In this study, we aimed to identify reasons for non-adherence to surveillance colonoscopy. These can be grouped as patient related and physician related factors. Patient related factors include refusal for surveillance, opting to take palliative route, loss to follow up, advanced age, detection of metastasis and death. Physician related factors include not placing a referral order for colonoscopy and loss of patients to follow-up (i.e. not reaching out to the patient by the staff to ensure that a surveillance colonoscopy is scheduled or documentation/telephone encounters stating above). However, we recognize that surveillance colonoscopies can be performed by colorectal surgeons performing the resection, and in those instances, a referral order would not be placed as it is the surgeon himself who will then perform the colonoscopy. We also noted that the mean time to colonoscopy for colon cancer patients was 315 ± 44 days. Too early surveillance could pose a considerable burden on available resources and it could be argued that too early surveillance is also “non-adherence” to guidelines which recommend surveillance at one year from CRC resection. Our study did not identify any predictors of adherence to guidelines for surveillance colonoscopy. Age, gender, race, stage at diagnosis, type of surgical resection performed, personal history of adenomas, family history of adenomas and insurance were all found to not be predictors of adherence to guidelines.

Various interventions have been carried out at other sites to improve adherence to surveillance colonoscopy guidelines. A Randomized Controlled Trial (RCT) involving 358 patients showed that physician reminders increased adherence to surveillance colonoscopy following adenoma removal.²² The role of a nurse coordinator and dissemination of guidelines to all specialists has also been shown to improve adherence.²³ A RCT in Australia utilized paper-based educational interventions for both patients and surgeons, and this was shown to not improve adherence to CRC surveillance guidelines.²⁴

Our suggestions for improving adherence include an electronic reminder popping up in the patient’s chart at the one-year mark from curative resection and follow-up phone calls made by clinical staff at the 1 year mark with subsequent

notes documented in patient chart to encourage compliance with these guidelines.

The strengths of our study included assessing consecutive patients over a one-and-a-half-year period at a single large academic tertiary care center. Patients from diverse backgrounds were included. Our study is limited by its retrospective design and relatively small sample size. Our limitations also included inability to find a reason for non-adherence to surveillance colonoscopy in a large percentage of patients, and this was primarily due to the nature of the study. Our data and findings cannot be generalized because it’s a single tertiary care institution and may not apply to other practices/areas.

Conclusion

Adherence to surveillance guidelines post CRC resection is inadequate and include physician and patient related factors. This study identifies important targets of intervention to improve adherence to guidelines.

Conflicts of interest

The authors declare no conflicts of interest.

REFERENCES

1. Siegel RL, Miller KD, Jemal A. Cancer statistics, 2018. *CA Cancer J Clin.* 2018;68:7–30.
2. Meyerhardt JA, Mangu PB, Flynn PJ, Korde L, Loprinzi CL, Minsky BD, et al. American Society of Clinical Oncology Follow-up care, surveillance protocol, and secondary prevention measures for survivors of colorectal cancer: American Society of Clinical Oncology clinical practice guideline endorsement. *J Clin Oncol Off J Am Soc Clin Oncol.* 2013;31:4465–70.
3. Cancer Care Ontario. Cancer Care Ontario. <https://www.cancercareontario.ca/en> [accessed 12.03.19].
4. NCCN – Evidence-based cancer guidelines, oncology drug compendium, oncology continuing medical education. <https://www.nccn.org/> [accessed 12.03.19].
5. Labianca R, Nordlinger B, Beretta GD, Mosconi S, Mandalà M, Cervantes A, et al. ESMO Guidelines Working Group Early colon cancer: ESMO Clinical Practice Guidelines for diagnosis, treatment and follow-up. *Ann Oncol Off J Eur Soc Med Oncol.* 2013;24 Suppl. 6:vi64–72.
6. Glynne-Jones R, Wyrwicz L, Tiret E, Brown G, Rödel C, Cervantes A, et al. ESMO Guidelines Committee Rectal cancer: ESMO Clinical Practice Guidelines for diagnosis, treatment and follow-up. *Ann Oncol Off J Eur Soc Med Oncol.* 2017;28 Suppl. 4:iv22–40.
7. Guidance on Surveillance for People at Increased Risk of Colorectal Cancer. Ministry of Health NZ. <https://www.health.govt.nz/publication/guidance-surveillance-people-increased-risk-colorectal-cancer> [accessed 12.03.19].
8. Health M of. BC Guidelines – Province of British Columbia. <https://www2.gov.bc.ca/gov/content/health/practitioner-professional-resources/bc-guidelines> [accessed 10.04.19].
9. El-Shami K, Oeffinger KC, Erb NL, Willis A, Bretsch JK, Pratt-Chapman ML, et al. American cancer society colorectal cancer survivorship care guidelines. *CA Cancer J Clin.* 2015;65:428–55.

10. Colonoscopy Surveillance after Colorectal Cancer Resection: Recommendations of the US Multi-Society Task Force on Colorectal Cancer | American College of Gastroenterology. <https://gi.org/guideline/colonoscopy-surveillance-after-colorectal-cancer-resection-recommendations-of-the-us-multi-society-task-force-on-colorectal-cancer/> [accessed 12.03.19].
11. Guidelines for Colonoscopy Surveillance After Screening and Polypectomy: A Consensus Update by the US Multi-Society Task Force on Colorectal Cancer | American College of Gastroenterology. <https://gi.org/guideline/guidelines-for-colonoscopy-surveillance-after-screening-and-polypectomy-a-consensus-update-by-the-us-multi-society-task-force-on-colorectal-cancer/> [accessed 12.03.19].
12. Carpentier MY, Vernon SW, Bartholomew LK, Murphy CC, Bluethmann SM. Receipt of recommended surveillance among colorectal cancer survivors: a systematic review. *J Cancer Surviv Res Pract.* 2013;7:464–83.
13. Pita-Fernández S, Alhayek-Aí M, González-Martín C, López-Calviño B, Seoane-Pillado T, Pértega-Díaz S. Intensive follow-up strategies improve outcomes in nonmetastatic colorectal cancer patients after curative surgery: a systematic review and meta-analysis. *Ann Oncol Off J Eur Soc Med Oncol.* 2015;26:644–56.
14. Renehan AG, Egger M, Saunders MP, O'Dwyer ST. Impact on survival of intensive follow up after curative resection for colorectal cancer: systematic review and meta-analysis of randomised trials. *BMJ.* 2002;324:813.
15. Figueredo A, Rumble RB, Maroun J, Earle CC, Cummings B, McLeod R, et al. Gastrointestinal Cancer Disease Site Group of Cancer Care Ontario's Program in Evidence-based Care Follow-up of patients with curatively resected colorectal cancer: a practice guideline. *BMC Cancer.* 2003;3:26.
16. Jeffery M, Hickey BE, Hider PN, See AM. Follow-up strategies for patients treated for non-metastatic colorectal cancer. *Cochrane Database Syst Rev.* 2016;11:CD002200.
17. Tjandra JJ, Chan MKY. Follow-up after curative resection of colorectal cancer: a meta-analysis. *Dis Colon Rectum.* 2007;50:1783–99.
18. Effect of More vs. Less Frequent Follow-up Testing on Overall and Colorectal Cancer-Specific Mortality in Patients With Stage II or III Colorectal Cancer: The COLOFOL Randomized Clinical Trial. *Colorectal Cancer JAMA. JAMA Network.* <https://jamanetwork.com/journals/jama/fullarticle/2681744> [accessed 10.04.19].
19. Vargas GM, Sheffield KM, Parmar AD, Han Y, Brown KM, Riall TS. Physician follow-up and observation of guidelines in the post treatment surveillance of colorectal cancer. *Surgery.* 2013;154:244–55.
20. Singh A, Kuo Y-F, Goodwin JS. Many patients who undergo surgery for colorectal cancer receive surveillance colonoscopies earlier than recommended by guidelines. *Clin Gastroenterol Hepatol Off Clin Pract J Am Gastroenterol Assoc.* 2013;11:65–72, e1.
21. Sisler JJ, Seo B, Katz A, Shu E, Chateau D, Czaykowski P, et al. Concordance with ASCO guidelines for surveillance after colorectal cancer treatment: a population-based analysis. *J Oncol Pract.* 2012;8:e69–79.
22. Ayanian JZ, Sequist TD, Zaslavsky AM, Johannes RS. Physician reminders to promote surveillance colonoscopy for colorectal adenomas: a randomized controlled trial. *J Gen Intern Med.* 2008;23:762–7.
23. Bampton PA, Sandford JJ, Young GP. Applying evidence-based guidelines improves use of colonoscopy resources in patients with a moderate risk of colorectal neoplasia. *Med J Aust.* 2002;176:155–7.
24. Carey M, Sanson-Fisher R, Macrae F, Cameron E, Hill D, D'Este C, et al. Improving adherence to colorectal cancer surveillance guidelines: results of a randomised controlled trial. *BMC Cancer.* 2017;17:106.