

Physician adherence to societal guidelines following colonoscopy with polypectomy

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Abstract

Background Colorectal cancer is a significant cause of mortality and morbidity in western countries. Polypectomy reduces the incidence and mortality of colorectal cancer. Following polypectomy, recommendations regarding the frequency and duration of surveillance rely mostly on features of the resected polyps and are summarized in various gastroenterological societal guidelines. In this study, we aimed to delineate the accuracy of current post-polypectomy surveillance recommendations and to check whether active intervention would lead to an improvement in accuracy and consistency with societal guidelines.

Methods We prospectively collected polypectomy reports over a 3-month period in 2 tertiary medical centers. We then performed an intervention that included: 1) presentation of results from 1st phase; 2) re-affirming the guidelines in a departmental meeting; 3) addition of a dedicated reporting form for post-polypectomy surveillance recommendations in the patients' electronic medical file. Finally, we conducted a second prospective collection of post-polypectomy recommendations, over a second 3-month period.

Results Prior to the intervention, 76% of the colonoscopies with polypectomy had a recommendation for surveillance, compared to 85% after the intervention ($P=0.003$). Prior to the intervention, 65% of patients received a recommendation consistent with societal guidelines, compared with 78% after the intervention ($P=0.001$).

Conclusion Intervention, including re-affirmation of the current guidelines and creation of a dedicated reporting platform, significantly increases the number of follow-up recommendations after polypectomy and their consistency with societal guidelines.

Keywords Adherence to guidelines, polypectomy, polyp surveillance recommendation, bowel preparation, polyp surveillance intervals

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Introduction

Colorectal cancer (CRC) is a leading cause of cancer-related morbidity and mortality worldwide [1]. Most colon cancers develop from benign adenomatous/serrated polyps; however, less than 5% of the polyps become cancer [2]. Transformation of a polyp into an adenocarcinoma is a gradual process that occurs over 5-10 years and involves acquired genetic, epigenetic and molecular changes [3]. This gradual process creates the opportunity for intervention and prevention.

Most CRCs are sporadic and risk factors include family history, age, environmental risk factors, excessive alcohol consumption, smoking, and certain foods [4]. A very important risk factor for CRC is the presence of polyps (especially advanced polyps) during the index colonoscopy [3]. Studies have shown that colonoscopy with polypectomy reduces the

relative risk of CRC by 53% [5], reduces the incidence of CRC by 48%, and reduces mortality from CRC by 65% [6,7].

Guidelines of gastroenterological societies recommend surveillance following polypectomy, according to the patient's risk of developing additional polyps. The degree of risk is determined by the polyp size, its histological characteristics and the level of dysplasia. These risk factors form the basis for surveillance recommendations (Supplementary Table 1). Too stringent recommendations (shorter intervals between colonoscopies) will impose a significant burden on the patient and the healthcare system, while recommendations that are too lenient (long intervals between colonoscopies) can lead to missed pre-cancerous polyps and the development of cancer [8,9].

Materials and methods

Study design and participants

This was a prospective observational and interventional study conducted at 2 academic centers in Israel. The study population were consultant gastroenterologists who perform elective colonoscopies with polypectomy. The study protocol conformed to the ethical guidelines of the 1975 Declaration of Helsinki, as reflected in *a priori* approval by the institution's human research committee.

In the first phase of the study, we examined current practices. Reports of colonoscopies with polypectomies were prospectively collected over a period of 3 months, and the endoscopist's recommendations after the colonoscopy were reviewed and compared with the guidelines. We included patients undergoing colonoscopy with polypectomy and excluded patients with a history of CRC, patients with inflammatory bowel disease, and patients with familial adenomatous polyposis, Lynch syndrome, MYH-associated polyposis, or juvenile polyposis.

After completing the first phase of the study, we conducted an intervention that included several components. First,

each physician received a personal report regarding his post-polypectomy recommendations and their concordance with societal guidelines. Second, we presented (in an anonymous form) the results from the first phase in a departmental meeting and reaffirmed current guidelines, including a reference chart to help with decision making (Fig. 1). We then initiated a discussion of the steps that could be taken in order to increase the overall number of recommendations and improve adherence to guidelines. We updated the electronic form (Fig. 2) and, finally, we sent an e-mail with an explanation of the new system and the guidelines reference chart to all participating physicians (Fig. 1).

In the second phase, following the intervention, we again prospectively collected data over a period of 3 months. The exact time frame for data collection for both phases of the study was not disclosed to the physicians.

Patient data collection

For every patient, we collected the following data: demographic data (age, sex), endoscopic report (indications, morphology, size, location and number of polyps, quality of bowel preparation according to the Boston bowel preparation scale [10]), pathologic report (size and type of polyp, dysplasia, margins) and the physician's recommendation.

Statistical analysis

Descriptive data are presented as percentages and numbers. Categorical variables were describe using frequency and percentage. Pearson's chi-square test was used to compare categorical variables. A P-value <0.05 was considered significant. All statistical analyses were performed using IBM SPSS Statistics for Windows, Version 23.0 (IBM Corp., Armonk, NY).

Table 1 Baseline characteristics of the study population. There was no significant difference between populations (before and after intervention)

Variable	Before intervention (n=349)	After intervention (n=297)	P-value
Age	65.83±10.14	65.48±10.14	0.63
Sex			0.6
Male	231	190	
Female	118	106	
Colonoscopy indication*			0.35
Medical referral for polypectomy	23	17	
Known previous polyps	98	68	
Stomach ache	16	11	
Imaging finding	10	6	
GI bleeding, anemia, positive occult blood test	94	103	
Changes in bowel movements (constipation, diarrhea)	30	20	
Family history of CRC	27	26	
Screening for CRC	57	49	
Unexplained weight lost	12	4	
Other	12	37	

*Some patients had more than one indication

GI, gastrointestinal; CRC, colorectal cancer

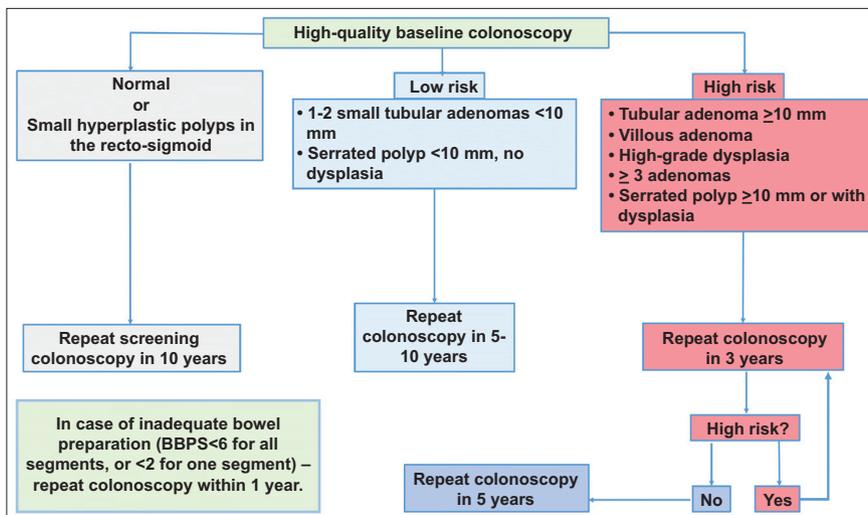


Figure 1 The chart created for the new reporting platform and introduced in the intervention phase, in order to facilitate more accurate recommendations
BBPS, Boston bowel preparation score

Dear _____,

In your colonoscopy, we found and removed benign polyps:

- Normal tissue or recto-sigmoid small hyperplastic polyps
- 1-2 tubular adenoma, size < 10 mm
- Tubular adenoma, size > 10 mm
- Villous adenoma
- High grade dysplasia adenoma
- More than 3 adenomas
- Serrated polyp, no dysplasia, size < 10 mm
- Serrated polyp, dysplasia or size > 10 mm
- Piecemeal EMR – large polyp
- Inadequate preparation – total BBPS < 6, or one segment of 1.

[Link to guidelines](#)

In accordance with the above findings, we recommend:

- Repeat colonoscopy in 10 years
- Repeat colonoscopy in 5-10 years
- Repeat colonoscopy in 3 years
- Repeat colonoscopy in 1 years
- Repeat colonoscopy in 3-6 months

Best regards
 Dr _____

Figure 2 Example of the dedicated page for post-polypectomy recommendations in the medical file. The physician can select the appropriate recommendation for each polyp type and can also view a page with the guidelines (Fig. 1). The computer then automatically generates a letter, mailed to the patient along with the pathology report
BBPS, Boston bowel preparation score; EMR, endoscopic mucosal resection

Results

A total of 646 patients who underwent colonoscopy with polypectomy were included in the study, 349 cases in the first phase and 297 in the second phase. In this population, 65% were male and the average age was 65.67±10.01 years. Table 1 shows the baseline demographic and clinical characteristics of our cohort.

In the first phase of the study, 266/349 patients (76%) received a clearly documented written recommendation for

surveillance colonoscopy. A recommendation consistent with societal guidelines was given in 174/266 (65%) patients. Compared with the guidelines, the recommended timing of surveillance was too early in 66 patients (25%) and too late in 26 patients (10%) (Table 2).

In the second phase of the study, 254/297 patients (86%) received a recommendation for surveillance colonoscopy. A recommendation consistent with societal guidelines was given in 199/254 (78%) patients. Compared with the guidelines, the recommended timing of surveillance was too early in 48 patients (19%) and too late in 7 patients (3%) (Table 2).

The patients who did not receive any documented recommendation in the first and second phases might not have received any recommendation, or they might have received a recommendation not documented. Some recommendations were given by telephone or in handwriting on the pathological report sent to the patient. These data were unfortunately not available.

After the intervention, patients received significantly more recommendations (86% vs. 76%, P=0.003), and these were much more consistent with societal guidelines (78% vs. 65%, P=0.001), (Table 2, Fig. 3).

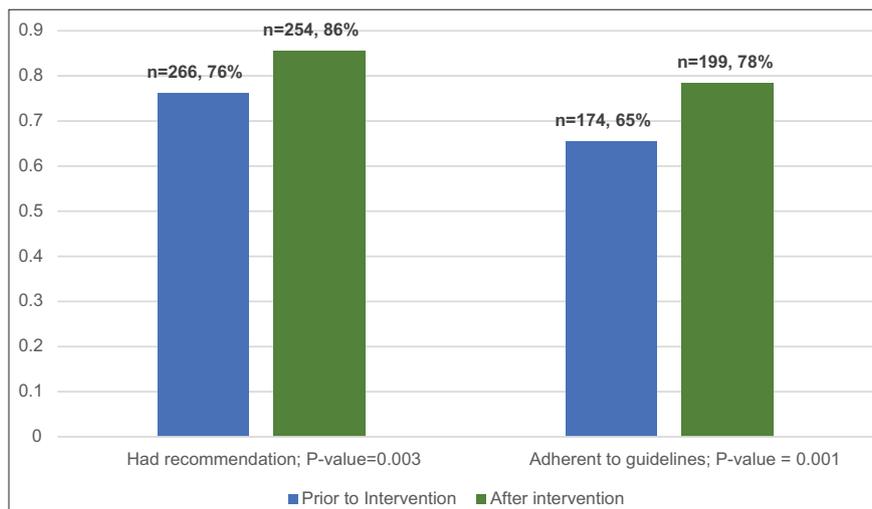
We compared different variables between adherent and non-adherent groups (Supplementary Table 2). We found that bowel preparation (P=0.001), pathologic size of polyp (P=0.001), dysplasia (P=0.003), and high-risk polyps (P=0.01) had a statistically significant influence on adherence, both before and after intervention.

Discussion

Recommendation for surveillance colonoscopy should balance the need for preventing CRC, while maintaining adequate use of medical resources and minimizing patient discomfort and morbidity. Previous data on compliance with

Table 2 Physicians' recommendations to guidelines between before and after intervention. Dark grey represents too early recommendations, light gray represent too late recommendations, and medium gray represents consistent recommendations

		Prior to intervention					
		Time recommendation – Physicians					
		within 1 year	2 years	3 years	5 years	10 years	
Time recommendation – Guidelines	1 year	59	1	9	2	0	
	3 years	41	2	49	14	0	
	5 years	6	0	17	66	0	
	10 years	0	0	0	0	0	
		After intervention					
		Time recommendation – Physicians					
		within 1 year	2 years	3 years	4 years	5 years	10 years
Time recommendation – Guidelines	1 year	50	1	0	0	1	0
	3 years	26	2	66	0	5	0
	5 years	4	0	14	2	80	0
	10 years	0	0	0	0	0	3

**Figure 3** Comparison between recommendations and adherence to guidelines prior and after intervention

guidelines are conflicting and, to the best of our knowledge, none of the previous studies examined the effect of intervention on adherence to guidelines.

In a large observational study, including 25 centers in the United States, 36% of physicians were non-compliant with guidelines, with a variation of 3-80% between institutions. This study also showed that, in 94.6% of the cases, physicians recommended surveillance colonoscopy earlier than required according to the guidelines. In that study, recommendations were mainly influenced by the histologic nature of the resected polyp and by the quality of bowel preparation [11]. In another study, more than 50% of physicians recommended repeat colonoscopy after 3 years or less for small adenomas, which

according to the guidelines should have been after 5 years. In that study, unnecessary short intervals for repeat colonoscopy were also recommended for hyperplastic polyps in 24% of cases [12]. On the other hand, Menees SB *et al* evaluated physician compliance with guideline recommendations in average-risk patients undergoing colonoscopy with polypectomy of 1-2 small polyps. They found that more than 90% of the recommendations were consistent with the guidelines, and that this was again significantly influenced by the quality of bowel preparation [13]. These studies had several limitations, including their retrospective design, reliance on physicians' reports, which can promote recall bias, and the small number of cases.

We performed a 2-phase prospective study, which also included an intervention session in 2 academic centers. Similar to previous reports, the results from our first phase of the study showed that 35% of physicians were non-compliant with guidelines; however, following an intervention we were able to decrease non-compliance to 22%. Our intervention also resulted in a significant increase in the number of patients who received a clear, well documented written recommendation.

Previous studies showed that age, bowel preparation quality, and number/types of polyps were associated with adherence to guidelines [11,13]. In our study, inadequate bowel preparation was associated with an accurate recommendation for early repeat colonoscopy (within 1 year). This is probably because an inadequate preparation warrants repeat colonoscopy regardless of other parameters, as stipulated in societal guidelines.

High-risk polyps (high-grade dysplasia, more than 3 polyps, polyps size >1 cm) were associated with non-adherent recommendations. This might be because of bad estimation of polyp size during colonoscopy, or because recommendations were issued prior to the pathological report.

Our revised electronic reporting platform allowed the physicians to fill in the recommended time for interval colonoscopy, based on the guidelines, the endoscopic report, and the final pathologic report. This user-friendly platform facilitated better compliance by our physicians, which resulted in more accurate recommendations.

Summary Box

What is already known:

- Colorectal cancer is a significant cause of mortality and morbidity
- Colonoscopy with polypectomy reduces the incidence of colorectal cancer and the associated mortality
- Recommendations for post-polypectomy surveillance intervals balance the risks and benefits of additional procedures
- Previous studies found that 10-50% of physicians are non-adherent to societal guidelines

What the new findings are:

- Absence of a structured reporting platform results in many cases without recorded recommendations
- Intervention significantly increases the number of recorded follow-up recommendations after polypectomy
- Intervention significantly increases the consistency of recommendations with societal guidelines

Our study had several limitations: we checked the electronic form for a short period, and only a few months after using it. Long-term follow up is required in order to better understand the long-term impact. Our platform is suitable for the specific reporting software we use in our hospitals; different electronic forms should be developed for different reporting platforms. Our platform was developed for hospital settings, but a different approach may be needed for community medicine.

In conclusion, we have shown that poor adherence to societal guidelines for post-polypectomy surveillance can be overcome by a simple intervention in the form of guideline reaffirmation and a structured reporting platform.

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Supplementary material

Supplementary Table 1 Summary of ESGE, AGA and ASGE guidelines for post-polypectomy surveillance

Association	ESGE – European society of gastrointestinal endoscopy [11]	AGA – American gastroenterological Association [10] and ASGE – American society of gastrointestinal endoscopy
Conditions	Good bowel preparation, with complete removal of all polyps	
No polyps	10 years	10 years
Hyperplastic small polyps (<10 mm) in recto-sigmoid	10 years	10 years
1-2 small (<10 mm) tubular adenomas	10 years	5-10 years
3-10 tubular adenomas	3 years	3 years
10 or more tubular adenomas	3 years	3 years or less
1 or more large (>10 mm) tubular adenomas	3 years	3 years
1 or more villous adenoma	3 years	3 years
High-grade dysplasia adenomas	3 years	3 years
Small sessile serrated (<10 mm) with no dysplasia	5 years	5 years
Large sessile serrated adenoma (>10mm) or dysplastic sessile serrated or traditional serrated adenoma	3 years	3 years
Comments	Patients who had high-risk adenoma in previous colonoscopy remain at high risk, and should have surveillance colonoscopy after 5 years, even with no adenoma in the colonoscopy	
Bad preparation	In case of bad preparation (Boston <6), a repeat colonoscopy within 1 year	

Supplementary Table 2 Relation between different variables and adherence to guidelines

Variable		Prior to intervention			After intervention			Total		
		Adherent	Not adherent	Total	Adherent	Not adherent	Total	Adherent	Not adherent	Total
Preparation	Good preparation	138	81	219	168	54	222	306	135	441
	Bad preparation	31	7	38	31	1	32	62	8	70
	Total	169	88	257	199	55	254	368	143	511
	P-value		0.03			0.007			0.0009	
Endoscopic size	< 1 cm	127	59	186	154	28	182	281	87	368
	> 1 cm	45	33	78	45	27	72	90	60	150
	Total	172	92	264	199	55	254	371	147	518
	P-value		0.10			0.0001			0.0002	
Pathologic size	< 1 cm	138	60	198	155	35	190	293	95	388
	> 1 cm	34	32	66	44	20	64	78	52	130
	Total	172	92	264	199	55	254	371	147	518
	P-value		0.01			0.03			0.001	
Quantity of polyps	1-2 polyps	123	58	181	134	37	171	257	95	352
	3 + polyps	49	34	83	65	18	83	114	52	166
	Total	172	92	264	200	55	254	372	147	518
	P-value		0.16			0.99			0.31	
Dysplasia	None	94	63	157	89	24	113	183	87	270
	Low grade	70	23	93	106	25	131	176	48	224
	High grade	10	6	16	4	6	10	14	12	26
	Total	174	92	266	199	55	254	373	147	520
P-value		0.05			0.01			0.003		
Polyp type	Non-villous	123	46	169	153	38	191	276	84	360
	Villous	51	46	97	46	17	63	97	63	160
	Total	174	92	266	199	55	254	373	147	520
	P-value		0.01			0.24			0.0002	
High-risk vs. low-risk polyps	Low risk	82	25	107	88	11	99	170	36	206
	High risk	92	67	159	111	44	155	203	111	314
	Total	174	92	266	199	55	254	373	147	520
	P-value		0.02			0.01			0.01	
Age	Under 50	13	5	18	11	2	13	24	7	31
	50-60	34	18	52	47	6	53	81	24	105
	60-70	74	42	116	78	26	104	152	68	220
	70-80	43	23	66	52	19	71	95	42	137
	80+	10	4	14	11	2	13	21	6	27
	Total	174	92	266	199	55	254	373	147	520
	P-value		0.95			0.21			0.45	
Physicians' experience	<5 years	47	24	71	66	16	82	113	40	153
	>5 years	127	68	195	133	39	172	260	107	367
	Total	174	92	266	199	55	254	373	147	520
	P-value		0.87			0.57			0.49	