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Recommendations for Post-Polypectomy Surveillance in Community Practice

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Abstract

Background—After colon cancer screening, large numbers of persons discovered with colon polyps may receive post-polypectomy surveillance with multiple colonoscopy examinations over time. Decisions about surveillance interval are based in part on polyp size, histology, and number.

Aims—To learn physicians' recommendations for post-polypectomy surveillance from physicians' office charts.

Methods—Among 322 physicians performing colonoscopy in 126 practices in N. Carolina, offices of 152 physicians in 55 practices were visited to extract chart data, for each physician, on 125 consecutive persons having colonoscopy in 2003. Subjects included persons with first-time colonoscopy and no positive family history or other indication beyond colonoscopy findings that might affect postpolypectomy surveillance recommendations. Data were extracted about demographics, reason for colonoscopy, family history, symptoms, bowel prep, extent of examination, and features of each polyp including location, size, histology. Recommendations for post-polypectomy surveillance were noted.

Results—Among 10,089 first-time colonoscopy examinations, hyperplastic polyps were found in 4.5% of subjects, in whom follow-up by 4–6 years was recommended in 24%, sooner than recommended in guidelines. Of the 6.6% of persons with only small adenomas, 35% were recommended to return in 1–3 years (sooner than recommended in some guidelines) and 77% by 6 years. Surveillance interval tended to be shorter if colon prep was less than "excellent." Prep quality was not reported for 32% of examinations.

Conclusions—Surveillance intervals after polypectomy of low-risk polyps may be more aggressive than guidelines recommend. The quality of post-polypectomy surveillance might be improved by increased attention to guidelines, bowel prep, and reporting.

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Disclosures None.

Keywords

Colonoscopy screening; Colon cancer surveillance; Colonoscopy guidelines; Colonoscopy quality

Introduction

As colonoscopy is increasingly used in colorectal cancer (CRC) screening, many persons are being enrolled in postpolypectomy surveillance. When colonoscopy discovers polyps either in primary screening or in work-up of a positive fecal occult blood test (FOBT), sigmoidoscopy or another test, a person may become a candidate for postpolypectomy surveillance. Because persons over age 50 have a risk of 25% or more of at least one adenomatous polyp and a risk of approximately 10% of a hyperplastic polyp [1–5], large numbers of persons with “polyps” may become candidates for post-polypectomy surveillance. Intervals eventually recommended for surveillance depend on physicians’ decisions that are based, in part, on interpretation of what kinds of polyps indicate an increased future risk of CRC.

The contribution of post-polypectomy surveillance to the total use of colonoscopy [6] has resulted in policymakers’ concern about whether physician manpower and resources are adequate to meet demand for colonoscopy screening [6–12]. One problem is over-use of colonoscopy among persons with lesions that do not indicate an increased future risk of CRC. For example, most hyper-plastic polyps or small adenomas are considered to indicate no increased future risk of CRC [6, 13–15]. Excessive use of colonoscopy among patients who do not have increased risk of CRC produces proportionately less benefit and could result in a cumulative risk of complications resulting in possible net harm for those with non-significant lesions [16]. From a societal perspective, it has been suggested that, in order to increase the overall impact of CRC screening and surveillance programs, resources be redirected away from low-risk persons to high-risk persons [14].

Recommendations for colonoscopic follow-up after polypectomy have been assessed by a survey of physicians’ self-reports [17] and by patients’ self-reports after polyps were found during a clinical trial of sigmoidoscopy screening [18]. This study assesses practicing physicians’ recommendations for surveillance interval, based on findings at screening colonoscopy, determined by examination of physicians’ charts in their offices.

Methods

Study Population

Our objective was to identify all physicians in NC who perform colonoscopy and invite them to participate in the study. Candidate physicians were identified by use of the North Carolina Health Professions Data System that contains data from licensing boards and classifies physicians by specialty (http://www.shepscenter.unc.edu/data/nchpds/ncptoc.html). We used internet searches (search terms “North Carolina” and “gastroenterologist”), telephone yellow pages, and an endoscope manufacturer’s list of physicians performing colonoscopy in NC. We contacted a consortium of 52 NC-based independent endoscopy groups that collaborate on administrative and legislative matters. We sent a recruitment packet describing the study to 126 practices located in 51 of NC’s 100 counties. The principal investigator (DFR) called each practice to explain details of the study, learn whether physicians were eligible, answer questions, and enroll consenting physicians. The study was approved by the Office of Human Research Ethics of the University of North Carolina at Chapel Hill.

Identification of Candidate Subjects

We visited each practice that agreed to participate and worked with staff to identify 125 consecutive colonoscopy exams for each physician, starting with patients seen Jan 1, 2003. Data were collected during 2003–5. Computer data bases or billing records were used to create patient lists. We identified subjects receiving a first-time screening colonoscopy, so that the decision about follow-up would be made on the basis of a colonoscopy finding.

We abstracted data on the identified patients seen by each participating physician, to identify first-time colonoscopies in persons with a negative family history—and with no other indication for an early return colonoscopy examination—so that the recommended surveillance interval would be based on the findings of that colonoscopy examination. We searched the colonoscopy report, physicians' notes, and referral letters for any indication of a previous colonoscopy or a family history positive for CRC. We excluded persons who might have a GI disease, for example ulcerative colitis, that would prompt near-term colonoscopy. We did not exclude persons whose reason for colonoscopy was non-specific and would not affect surveillance interval. For example, if the reason for colonoscopy was abdominal pain, constipation, or rectal bleeding, and if no GI pathology other than a polyp was found at colonoscopy, then the exam was considered to have constituted a "screening" exam whose recommended surveillance interval would be based primarily on polyp findings.

Study Data Collection

We extracted data from identified charts for information on sex, race, report of family history of CRC, personal history of CRC or colon polyp, and previous colonoscopy. We noted the reason for the colonoscopy including: screening, bleeding, diarrhea, family history, anemia, constipation, pain, or change in bowel habits. In addition, we collected data on findings at colonoscopy including: quality of prep (based on whatever categories each physician used), extent of exam, and features of each polyp including location, shape, size, and histology. We recorded the colonoscopist's recommendations for follow-up, as noted below.

Classification of Polyp Pathology

We recorded the location and size of all polyps by examining the endoscopy reports, and recorded histology by examining the pathology reports. When there were multiple polyps, we used information about all polyps to classify the patient in a category of "most severe polyp." We developed four categories, based on guidelines and on how clinicians assess risk:

1. "hyperplastic polyps" if there were no more than three polyps, all hyperplastic <1 cm in size and on the left side of the colon (i.e. no further than 25 cm);
2. "small" adenoma if there were one or two adenomas, all <0.5 cm;
3. "medium" adenoma if there were one or two adenomas, with the largest ≥0.5–0.9 cm; and
4. "large" adenoma if any was ≥1.0 cm.

Outcome

The main outcome was recommended time for next colonoscopy. We recorded recommendations for follow-up, including the time interval to the next colonoscopy. We searched the chart for information about whether the recommendation was made after the pathology report was returned, as indicated by a letter to the patient several days after the

procedure was done and noting pathology, or by a hand-written note on the endoscopy report indicating the pathology result and noting a return recommendation. We recorded the exact time interval recommended in years and created range of intervals for analysis, centered on the published guidelines [19–21] as follows: ≤3 years, 4–6 years, or 7–10 years. Recommendations within each group strongly clustered around one number, and we used that number to represent all in that category. In the ≤3 years category the recommendation of exactly 3 years was made 76.4% (70.9–82.0%) of the time; in the 4–6 years category a recommendation of exactly 5 years was made 93.4% (91.0–95.8%) of the time; and in the 7–10 years category the recommendation of 10 years was made 96.2% (94.8–97.6%) of the time. If a recommendation spanned two categories, we used the longer category.

Statistical Analysis

We used simple statistics including percentages, mean, median, and ranges of percentages across and within practices to describe and summarize colonoscopy findings and surveillance interval. All estimates of errors and 95% confidence intervals presented for all percentages were adjusted for the effects of clustering within providers. We examined variations in surveillance interval among 26 practices (25 multi-physician practices plus 30 solo practices combined, for analysis, into one “practice”) for the no polyp finding. We tested homogeneity of surveillance interval across colonoscopy findings using the Rao–Scott chi-square test that takes into account the clustered nature of data at the physician level. Similarly, we examined variations in surveillance interval within practices for no polyp, no polyp plus hyperplastic, and no polyp plus small polyps. We also examined relationships between the quality of bowel prep and surveillance interval for all categories and within each category, using the Rao–Scott chi-square test, and we calculated results for all prep quality categories. (The “no data” category was excluded in the calculation of chi-square tests.) In a separate analysis, prep quality was dichotomized to excellent versus good, fair, or poor, in order to assess the effect of any prep that was less than excellent; surveillance intervals for these two groups were compared for all polyp categories and within each category.

Results

Practices and Physicians

From the original list of 378 physicians, we could not confirm location or practice for 56. We contacted 322 physicians located in 126 practices in 51 of North Carolina’s 100 counties. Of the 126 practices identified, 44 (with 95 physicians) declined to participate; 27 practices (with 69 physicians) discussed participation but were eventually lost to follow-up after multiple phone calls and letters. We enrolled 55 practices with 152 participating physicians. (We included only gastroenterologists because so few non-gastroenterologists were doing colonoscopy). In a few practices not all the physicians in the practice participated. Of the 55 practices, 30 involved one gastroenterologist, eight had two, and 17 had three or more. Of those 17, three had 11 or more doctors and accounted for approximately a quarter of all patients included in the study.

Patients

There were 12,771 patients meeting our criteria among the 55 practices. We excluded 2,682 patients for the following reasons:

1. a colonoscopy finding of cancer (n = 69);
2. positive family history (n = 1,058);

3. the reason for colonoscopy included symptoms that might affect surveillance interval (n = 1,355);
4. notation of a finding requiring immediate follow-up (e.g. notation of “see surgeon” or “barium enema”) (n = 178);
5. when another disease was noted in the recommendation and no surveillance interval was specified (n = 118); and
6. when a follow-up interval of less than 1 year was noted (n = 80).

Of these 2,682 excluded records, 158 had two of the reasons and nine had three of the reasons stated above. Thus we had 10,089 records to examine surveillance interval for colonoscopy findings and variations across practices and within practices.

Extent and Quality of Examination

The cecum or terminal ileum was reported to be reached in 9,752 of 10,089 or 96.7% (95.4–97.9%) of examinations, not reached in 310 or 3.1% (1.9–4.3%), and not reported in 27 or 0.3% (0.1–0.4%). The quality of prep was excellent in 17.5% (13.3–21.8%) and was excellent or good in 58.6% (52.7–64.7%) of examinations and fair or poor in 9.3% (7.3–11.2%); quality was not reported in 32.1% (25.8–38.3%).

Surveillance Recommendations

Clinicians’ recommendations for post-polypectomy follow-up for persons with first-time screening colonoscopy are shown in Table 1, based on the most advanced polyp or category in each patient, and based on quality of bowel prep. Hyperplastic polyps are clearly treated as less “ominous” than a finding of an adenoma, but almost one-quarter (24%) of persons with hyperplastic polyps are recommended to have follow-up in ≤4–6 years, (Table 1) even among persons with excellent prep. Of persons with small adenomas, about three-quarters (77%) were recommended to have follow-up by 4–6 years, half of whom were recommended to have follow-up in 1–3 years. Within the group with small adenomas, persons with only a single small adenoma (i.e. ≤5 mm) were recommended to return within 1–3 years 30% of the time and within 6 years or less almost 75% of the time. The surveillance interval recommended for high-risk adenomas was longer than the three years that guidelines recommend for about 26% of persons overall, as reported by others [11]. We found variations in surveillance interval both among practices and among physicians within the same practice for every category of polyp, and for the “no polyp” category (results not shown). In only one practice did physicians seem to recommend similar surveillance intervals for persons with no findings or small adenomas. In other words, physicians generally did not seem to behave the same way within practices. Recommendations were made after pathology was considered in 21.4% (18.4–24.3%) of cases and before pathology was considered in 4.6% (3.4–5.8%) of cases; for the rest of the cases it was unknown, on the basis of the information in the chart.

Surveillance interval distributions for each bowel prep quality category by colonoscopy finding are also summarized in Table 1. Relationships between bowel prep quality (excluding the “no data category”) and surveillance intervals were significantly associated for all findings (P = 0.0031), no polyp (P < 0.0001), and medium adenoma (P = 0.0049); statistically significant relationships were not found for other categories. In comparisons of surveillance intervals for excellent prep versus good, fair, and poor combined, we found that bowel prep less than excellent tended to be associated with more-aggressive surveillance interval for the categories no polyp (P = < 0.001), small (< 0.5 cm) adenoma (P = 0.046), and medium (0.5–0.9 cm) adenoma (P = 0.0059).

Discussion

These results raise issues about the quality of post-polypectomy surveillance regarding the appropriateness of endoscopists' recommendations, quality of bowel prep, and quality of reporting. Physicians' recommendations for post-polypectomy surveillance are somewhat aggressive for low-risk hyperplastic and small or medium adenomas, even single small adenomas less than 0.5 cm in size; such lesions are important because they make up such a large portion of colonoscopy findings. Bowel prep that is less than excellent may affect recommendations, because such persons tended to have shorter surveillance intervals for low-risk lesions. This finding might be particularly important because only 17.5% of bowel preps were considered excellent. The lack a statistically significant difference for prep quality on "all findings" for hyperplastic polyps or for single small adenoma might be a result of small sample sizes and large errors (design effect) for testing because of the clustered nature of the data. Similarly, the finding of no statistically significant difference based on prep quality for persons with high-risk adenoma might be because the surveillance interval was already aggressive for that category. Last, quality of reporting was an issue in that 32.1% of persons had no data reported about bowel prep, and in most cases it was unclear whether a recommendation was made before or after pathology had been reported back to the physician.

Are Physicians' Recommendations Becoming More Aggressive Over Time?

The intensity of post-polypectomy surveillance for small lesions may be increasing over time. A recent report of surveillance behavior around the year 2000 was based on a study in which persons discovered to have polyps before January 2000 were asked, after an interval of 5 years or longer had passed (e.g. in 2005 or later), whether follow-up surveillance colonoscopy had been done [18]. The current study, describing behavior around 2003 and based on review of in-office records, shows more-aggressive follow-up, although one of several guidelines had changed around that time.

Comparing Physicians' Recommendations with Guidelines

Follow-up recommendations must be interpreted in the light of guidelines for post-polypectomy surveillance that may disagree with one another at any one point in time and that may vary over time, sometimes making it difficult to understand which guidelines are "in effect."

Despite some variation, however, virtually all recommending organizations have agreed that small hyperplastic polyps confer no increased future risk of CRC and so require no increased follow-up. Thus the practice described in this study may be seen as somewhat aggressive compared with those guidelines. Our category "hyperplastic polyps" (i.e. small size, small number, and in the left colon only) was intended to comprise only those persons that all observers would agree are at "low risk."

For small adenomas, however, guidelines have sometimes disagreed with one another at any one point in time. While the initial polyp guidelines [22] recommended no special follow-up for persons with one small adenoma, beyond the "routine" 10-year interval for persons with average risk (Table 2), in 1997 guidelines started to become more aggressive, with several organizations then recommending follow-up after 5 years for a single small adenoma. After 1997, only one major organization, the American Cancer Society in 2001, recommended a moreintense follow-up interval (3–6 years). That ACS recommendation was, then, "in effect" during the time of this study as were the 5-year recommendations of both the American College of Gastroenterology and the American Society for Gastrointestinal Endoscopy (Table 2). Then, in 2006 and 2008, the guidelines of several organizations,

including the American Cancer Society [15, 23], reverted back to a longer surveillance period, noting that "follow-up intervals … have been lengthened," becoming more similar to earlier guidelines [23]. The current study's results, showing that for 35% of persons with small adenomas follow-up by three years was recommended, would be considered "overly-aggressive" by two of the guidelines but technically "within guidelines"—though at the aggressive end—of the ACS at that time.

Determinants of Physician Behavior

While this study suggests that physicians may behave at the aggressive end of guidelines recommendations, specific determinants for this behavior are not understood [24]. Physicians might disagree with guidelines or not trust them [25], or be unfamiliar with them, or they might consider other factors in making decisions, for example suboptimum colon prep, or patient preference or worry, or potential legal liability of "missed cancers." Pressures to be aggressive in diagnosis and treatment have been described for other cancers [26].

Future Considerations

Recommendations about post-polypectomy surveillance, particularly for small adenomatous polyps, may have substantial implications for clinical practice, because approximately 90% of all adenomas are under 1 cm, and approximately half of persons with adenoma have a single small adenoma. Although recent recommendations for follow-up of small adenomas have become less aggressive, recent reports about the potential importance of "flat lesions" [27], missed lesions [28, 29], and concern about "quality" of examination and polyp-detection rates [30] might cause physicians to be more aggressive both in finding very small adenomas, and in making surveillance recommendations. The use of high-resolution colonoscopes may result in more frequent discovery of very small adenomas whose natural history is not known.

Deciding appropriate intervals for post-polypectomy surveillance requires consideration of evidence about the future risk of CRC after polypectomy. Such data are hard to obtain because of the need to follow people who have had polyps removed but do not have periodic surveillance colonoscopy. Such natural history data will be provided in the recent UK clinical trial of sigmoidoscopy screening, at least for persons who had small adenomas in the left colon [31]. In that study, persons with one or two small adenomas (defined as under 1 cm) were considered to be in a "low-risk group" (with persons with no polyps found by sigmoidoscopy) that did not receive either an initial colonoscopic workup or post-polypectomy colonoscopic surveillance. In 10 years of follow-up, the "low-risk" group had a CRC incidence of only 0.02–0.04% per year, suggesting that having one or two small adenomas (in the left colon) is not associated with a high future CRC risk in the left colon. Whether such results apply to the right colon is not known. In the meantime, the perhaps unexpected low incidence of CRC after polypectomy in this RCT highlights the importance of obtaining empirical data about future risk of CRC among persons who have had adenomas, and it suggests that there may be no connection between what many persons currently believe (high future risk of CRC for anyone with an adenoma, requiring aggressive surveillance) and what cohort data may eventually show.

Limitations

Limitations of this study include the low participation. On the one hand, we were surprised and gratified that so many physicians did participate, considering that the study involved on-site auditing of patient records. On the other hand, we do not know whether physicians who did not participate would have had the same frequency distribution of recommendations compared to those who participated. Another limitation is that we relied totally on the

patient medical record in the practice for information, and information in the medical record was not always complete. However, we did not classify a lesion without data being present and only used recommendations that were noted. If data are more likely to be missing when the recommendation was more aggressive, that could bias our results, but we doubt this to be the case. Also we were not able to identify possible "predictors" of different surveillance behavior (for example, such patient features as race, gender, or insurance status; or features of physicians or of practices), using bivariate and multivariate analyses, because data were not collected or were not available uniformly in charts. Although we think such details may be interesting, we believe that the "bigger picture" behavior, documented in this study by examination of in-practice medical records, is of primary importance. Another limitation is that geographic area is limited to one state. Last, it is possible that practice has changed since the time of this study, and this study's results can be assessed only in light of the recommendations that were "in effect" at the time of the study.

In conclusion, these results highlight issues of quality in post-polypectomy surveillance. First, there is disparity between physician recommendations and guidelines, such that many patients with low-risk polyps are advised to have surveillance at shorter intervals than suggested by evidence and guidelines, thus exposing patients to unnecessary risk and cost. Second, there are problems in endoscopic reporting if bowel prep quality is not described in nearly one-third of reports, making it difficult to determine the thoroughness of an exam. Future research should explore reasons for physicians' decisions and the possible disparity between recommendations and guidelines, and these findings should be considered in developing quality-improvement initiatives for post-polypectomy surveillance.

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Table 1

Surveillance recommendations based on most advanced polyp type and bowel prep quality

Category most advanced polyp, and bowel prep	Recommended surveillance interval[a]							
	1–3 years		4–6 years		7–10 years		Total	
	N	% (95% C.I.)	*N*	% (95% C.I.)	*N*	% (95% C.I.)	*N*	% (95% C.I.)
All findings	1,355	13.4 (11.8–15.1)	1,592	15.8 (13.9–17.7)	7,142	70.8 (68.3–70.8)	10,089	100
Excellent (colon prep)	171	9.7 (7.4–11.9)	264	14.9 (12.4–17.4)	1,335	75.4 (72.0–78.8)	1,770	*17.5 (13.3–21.8)*
Good	576	13.9 (11.8–15.9)	735	17.7 (15.0–20.4)	2,838	68.4 (64.9–71.9)	4,149	*41.1 (35.3–46.9)*
Fair/poor	146	15.6 (12.0–19.2)	143	15.3 (11.4–19.2)	646	69.1 (63.5–74.7)	935	*9.3(7.3–11.2)*
No data	462	14.3 (10.9–17.7)	450	13.9 (10.4–17.4)	2,323	71.8 (67.3–76.3)	3,235	*32.1 (25.8–38.3)*
None (no polyp)	66	1.0 (0.7–1.4)	613	9.7 (7.5–12.0)	5,619	89.2 (86.8–91.6)	6,298	*62.4 (59.3–65.5)*
Excellent	2	0.2 (0.0–0.4)	76	6.6 (4.6–8.6)	1,072	93.2 (91.2–95.2)	1,150	*18.3 (13.6–22.9)*
Good	9	0.4 (0.1–0.6)	272	11.3 (8.1–14.4)	2,136	88.4 (85.2–91.5)	2,417	*38.4 (32.5–44.3)*
Fair/poor	34	5.4 (2.8–8.0)	70	11.1 (2.0–7.2)	530	83.6 (78.4–88.8)	634	*10.1 (7.8–12.4)*
No data	21	1.0 (0.3–1.7)	195	9.3 (4.1–13.9)	1,881	89.7 (85.0–94.4)	2,097	*33.3 (26.2–40.4)*
Hyperplastic ($N \leq 3$, all on left, all < 1.0 cm)	14	3.1 (1.3–4.9)	94	20.6 (14.5–26.8)	348	76.3 (70.1–82.6)	456	4.5 (3.7–5.3)
Excellent	1	1.2 (0–3.5)	12	14.0 (4.1–23.8)	73	84.9 (74.9–94.8)	86	*18.9 (12.1–25.6)*
Good	7	3.0 (0.6–5.5)	50	21.6 (11.9–31.4)	174	75.4 (65.4–85.2)	231	*50.7 (42.1–59.2)*
Fair/poor	1	2.8 (0.0–8.0)	13	36.1 (17.4–54.8)	22	61.1 (43.6–78.6)	36	*7.9 (4.7–11.0)*
No data	5	4.9 (0.0–9.7)	19	18.4 (8.7–28.2)	79	76.7 (66.6–86.8)	103	*22.6 (15.5–29.7)*
Hyperplastic, other	93	8.0 (5.9–10.1)	282	24.2 (19.1–29.3)	789	67.8 (62.3–73.3)	1,164	11.5 (10.2–12.9)
Excellent	9	5.9 (1.1–10.6)	29	19.0 (8.9–29.9)	115	75.2 (64.1–86.2)	153	*13.1 (8.9–17.4)*
Good	29	5.3 (3.1–7.5)	142	26.0 (18.4–33.7)	375	68.7 (60.5–76.9)	546	*46.9 (38.9–54.9)*
Fair/poor	11	13.6 (4.5–22.7)	16	19.8 (10.0–29.5)	54	66.7 (54.5–76.8)	81	*7.0 (4.3–9.6)*
No data	44	11.5 (7.3–15.7)	95	24.7 (16.7–32.8)	245	63.8 (55.2–72.4)	384	*33.0 (24.9–41.1)*
Small adenoma (N < 3, all <0.5 cm)	234	35.1 (27.5–42.7)	280	42.0 (34.8–49.2)	153	22.9 (16.5–29.4)	667	6.6 (5.6–7.7)
Excellent	31	21.2 (11.0–31.4)	76	52.1 (38.6–65.5)	39	26.7 (14.8–38.6)	146	*21.9 (14.4–29.4)*
Good	117	39.1 (27.5–50.7)	125	41.8 (32.2–51.4)	57	19.1 (9.9–28.2)	299	*44.8 (36.1–53.5)*
Fair/poor	22	36.1 (24.5–47.7)	27	44.3 (32.3–56.2)	12	19.7 (8.5–30.9)	61	*9.1 (6.2–12.1)*
No data	64	39.8 (26.6–52.9)	52	32.3 (21.7–42.9)	45	28.0 (15.5–40.4)	161	*24.1 (16.8–31.4)*

Category most advanced polyp, and bowel prep	Recommended surveillance interval[a]							
	1–3 years		4–6 years		7–10 years		Total	
	N	% (95% C.I.)	*N*	% (95% C.I.)	*N*	% (95% C.I.)	*N*	% (95% C.I.)
Single small adenoma	108	30.7 (22.4–39.0)	150	42.6 (34.5–50.7)	94	26.7 (19.0–34.4)	352	3.5 (2.9–4.1)
Excellent	10	15.6 (4.2–27.1)	37	57.8 (41.9–73.7)	17	26.6 (13.9–39.2)	64	*18.2 (11.4–25.0)*
Good	59	35.3 (22.8–47.8)	69	41.3 (31.4–51.3)	39	23.4 (12.5–34.2)	167	*47.4 (38.0–56.9)*
Fair/poor	14	36.8 (20.9–52.8)	19	50.0 (33.0–67.0)	5	13.2 (1.4–24.9)	38	*10.8 (6.7–14.9)*
No data	25	30.1 (16.5–43.7)	25	30.1 (18.1–42.1)	33	39.8 (24.9–54.6)	83	*23.6 (15.9–31.2)*
Medium adenoma (*N* < 3, all <1.0 cm)	391	52.5 (46.0–59.0)	223	29.9 (23.8–36.0)	131	17.6 (13.4–24.7)	745	7.4 (6.4–8.3)
Excellent	30	31.3 (21.0–41.5)	44	45.8 (33.7–58.0)	22	22.9 (13.9–32.0)	96	*12.9 (9.0–16.8)*
Good	158	49.2 (41.6–56.9)	109	34.0 (22.6–42.3)	54	16.8 (10.6–23.1)	321	*43.1 (34.6–51.6)*
Fair/poor	39	61.9 (43.6–80.3)	10	15.9 (4.7–27.0)	14	22.2 (8.5–35.9)	63	*8.5 (5.0–11.9)*
No data	164	61.9 (51.9–71.9)	60	22.6 (14.5–30.9)	41	15.5 (9.9–21.1)	265	*35.6 (27.3–43.8)*
High-risk adenoma (any ≥ 1.0 cm, *N* > 2)	557	73.4 (68.2–78.6)	100	13.2 (9.9–16.4)	102	13.4 (9.1–17.7)	759	7.5 (6.5–8.5)
Excellent	98	70.5 (61.5–79.5)	27	19.4 (12.7–26.1)	14	10.1 (2.8–17.4)	139	*18.3 (12.2–24.4)*
Good	256	76.4 (69.5–83.3)	37	11.0 (6.5–15.6)	42	12.5 (6.3–18.8)	335	*44.1 (36.3–56.0)*
Fair/poor	39	65.0 (53.6–76.4)	7	11.7 (3.7–19.7)	14	23.3 (11.8–34.9)	60	*7.9 (5.2–10.6)*
No data	164	72.9 (63.8–82.9)	29	12.9 (6.6–19.2)	32	14.2 (7.9–20.6)	225	*29.6 (22.1–37.2)*

[a]Within each category, the most-commonly used interval was 3, 5, and 10 years, respectively; for details, see text. C.I. denotes confidence interval. All 95% C.I.s take into account effect of clustering within providers

Table 2

Guidelines for post-polypectomy surveillance

Type of polyp	Polyp Guideline, American College of Gastroenterology 1993 [22]	Consortium Guidelines 1997 [13]	American Society for Gastrointestinal Endoscopy 1997 [19]	Polyp Guideline, American College of Gastroenterology 2000 [20]	American Cancer Society 2001 [21]	Multi-Society Task Force 2006 [23]	Joint ACS and Multi-Society Task Force 2008 [15]
Hyperplastic	None	None	None	None	None	None	None
One small (<1 cm) adenoma	None[a]	None[b]	5 Years	5 Years	3–6 Years	5–10 Years	5–10 Years
Large (≥ 1 cm) adenoma	3 Years	3 Years	3 Years	3 Years	3 Years	3 Years	3 Years

[a] Text from the Polyp Guideline: “follow-up surveillance may not be indicated”

[b] Text from the Consortium Guidelines: “Small, tubular adenomas… are associated with a risk of CRC no greater than the general population” (page 616), and “[p]atients with tubular adenomas <1 cm… should decide with their physicians whether to undergo colonoscopy.” (page 597) [13]