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## Histology, size and number of advanced polyps are associated with guideline-discordant surveillance recommendations

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### Keywords

adenoma; advanced adenoma; sessile serrated polyp; advanced colorectal polyp; colorectal cancer; surveillance

### Introduction

Surveillance guidelines following polypectomy promote cost-effective reductions in future colorectal cancer (CRC) risk, but high non-adherence rates<sup>1</sup> can have negative consequences on costs and effectiveness. Professional societies recommend a 3-year interval for patients with advanced colorectal polyps (ACPs), though relatively few studies report provider adherence to surveillance intervals.<sup>2</sup> This study evaluated rates and predictors of guideline-discordant recommendations for patients with ACPs.

### Methods

This retrospective cohort study included patients with removal of 1 ACP at University of Colorado Hospital from 6/2012–6/2017. Patients were excluded for: personal history of CRC, hereditary CRC syndrome, inflammatory bowel disease, life-limiting medical problem that impacted surveillance, poor prep, and age>85 years. An ACP was defined as 1)tubular adenoma (TA) or sessile serrated polyp (SSP) ≥10mm; 2)TA with villous histology or high-grade dysplasia, or SSP with dysplasia; 3) traditional serrated adenoma of any size.<sup>3</sup>

The surveillance interval captured was provided by the endoscopist after the pathology resulted. The primary outcome was the proportion of patients who received a surveillance

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Study Concept and design: JMK, GLA. Data acquisition and drafting of manuscript: JMK. Data Analysis and critical revision of the manuscript for important intellectual content: GLA. All authors have approved the final draft.

**Conflicts of Interest:** none

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interval recommendation discordant from the 2012 USMSTF guidelines and whether it was shorter or longer than recommended.<sup>2</sup> Of note, the 2020 USMSTF guidelines provide the same recommendations (3 year interval) for advanced polyps.<sup>4</sup> Multivariable logistic regression analyses that included available polyp and patient factors was performed. A sensitivity analysis on size of the largest polyp and total number of polyps was performed to determine the cutoffs in the multivariable models. Alpha level was 0.05 and all tests were two-tailed.

## Results

This study included 1120 patients: 38.8% had 1–2 total polyps, 27.6% had 1 SSP, 24.2% had a histologically advanced polyp, 16.3% 1 polyp resected piecemeal, and 59.4% had all polyps  $\geq$  12mm. The median size of the largest polyp was 12mm, and this cutoff was used in analyses. The indications for colonoscopy were screening (52%), surveillance (26.8%), and diagnostic (21.2%).

### Guideline-discordant surveillance intervals

There were 207 patients (18.5%) who received a guideline discordant surveillance interval. These patients were more likely to have had HGD (OR 2.50, 95%CI: 1.33–4.70), flat polyps (OR 1.54, 95%CI: 1.04–2.28), or all polyps  $\geq$  12mm (OR 1.64, 95%CI: 1.14–2.36). Patients with polyps removed piecemeal (OR 0.22, 95%CI: 0.11–0.44), with villous histology (OR 0.49, 95%CI: 0.28–0.84), and where a fellow was involved (OR 0.41, 95%CI 0.24–0.68) were less likely to receive a guideline-discordant surveillance interval. Patients had lower odds of receiving an inaccurate interval with increasing number of polyps. Sex, age, BMI, and bowel preparation quality were not associated with recommendation concordance.

### Predictors of surveillance intervals longer than recommended

There were 175 patients (15.6%) who received an interval longer than recommended. Having  $\geq$  2 total polyps (OR 3.00; 95%CI: 2.11–4.25), all polyps  $\geq$  12mm (OR 1.91, 95%CI: 1.28–2.84), or a flat polyp (OR 1.65, 95%CI: 1.09–2.49) were predictive of an inappropriately long interval (Figure 1). Factors associated with lower odds of receiving an interval longer than recommended were villous histology (OR 0.49, 95%CI: 0.27–0.89), piecemeal resection (OR 0.25, 95%CI: 0.12–0.52), and fellow involvement in the procedure (OR 0.44, 95%CI: 0.25–0.77).

### Predictors of surveillance intervals shorter than recommended

There were 32 patients (2.8%) who received an interval shorter than recommended. The presence of multiple ACPs (OR 2.28, 95%CI: 1.01–5.18) or HGD (OR 4.33, 95%CI: 1.75–10.72) were associated with an inappropriately short surveillance interval (Figure 1).

## Discussion

In the largest reported cohort of only patients with ACPs, gastroenterologists provided guideline discordant surveillance recommendations in 18% of patients. We identified novel predictors of this non-adherence, uniquely identifying that endoscopists appeared to be

assessing factors related to overall polyp burden when making their recommendation. Specifically, patients with  $\geq 2$  total polyps and those whose largest polyp was  $\geq 12$ mm were more likely to receive an interval longer than recommended (almost always 5 years), while those with  $\geq 2$  ACPs were more likely to receive an interval shorter than recommended. Additionally, HGD was associated with intervals that were too short, whereas the absence of advanced histology was associated with intervals that were too long. Compared to a recent meta-analysis,<sup>1</sup> our rate of intervals that were too long was similar while the rate of intervals that were too short was lower.

The present study highlights the importance of guideline-discordant surveillance recommendations given the high future CRC risk in patients with an ACP<sup>5, 6</sup> and surveillance colonoscopy as a risk reduction strategy.<sup>7-9</sup> Additional strengths of our study include accounting for more lenient recommendations for polyps resected piecemeal (up to 12 months per guidelines, which may explain why our rate of non-adherence to interval guidelines was lower than other publications) and those with suboptimal (but not poor) bowel preparations. A limitation is that we cannot account for individual provider clinical judgment. This study identified novel predictors that can inform quality improvement initiatives to promote stronger guideline adherence. This is critical to optimize resource utilization, limit cost to society, and prevent CRC.

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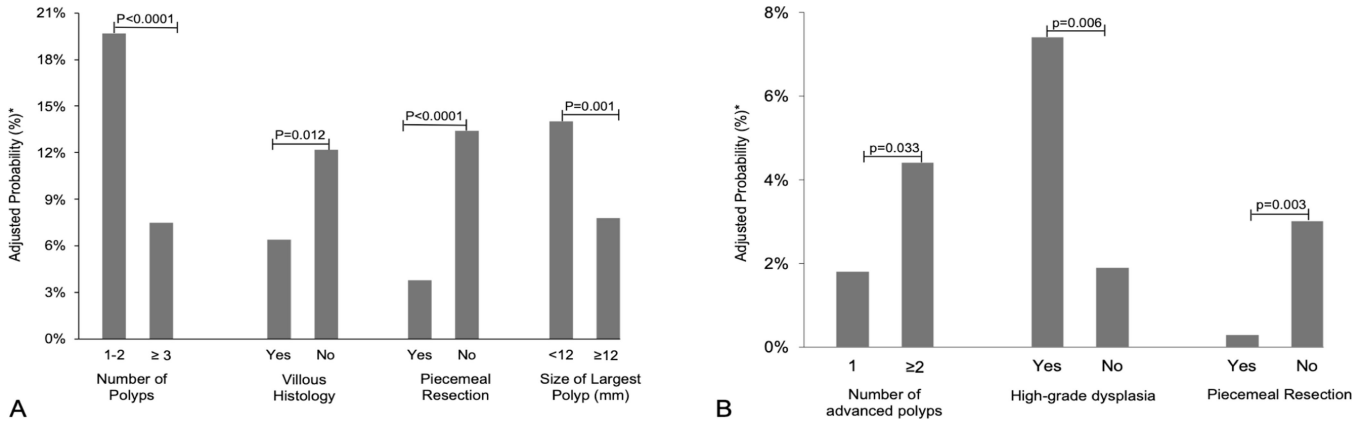
### Abbreviations:

<b>CRC</b>	colorectal cancer
<b>ACP</b>	advanced colorectal polyp
<b>AA</b>	advanced adenoma
<b>ASP</b>	advanced serrated polyp
<b>SSP</b>	sessile serrated polyp
<b>TSA</b>	traditional serrated adenoma

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**Figure 1. Adjusted probabilities for predictors of surveillance intervals longer (A\*) and shorter (B\*\*) than USMSTF recommendations**

\*Adjusted for number of polyps, size of largest polyp, villous histology, high grade histology, morphology (flat, pedunculated), piecemeal resection, fellow involvement, & bowel preparation quality

\*\*Adjusted for number of polyps, high-grade dysplasia, and piecemeal resection