QUALITY OF BOWEL PREPARATION DOES NOT INFLUENCE ADENOMA DETECTION RATE

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Abstract

Background: Colonic neoplasms can be missed on screening colonoscopies as the result of poor bowel preparation, however the association between bowel preparation quality and adenoma detection rate (ADR) is not clearly understood. The aim of this study was to investigate the influence of bowel preparation on ADR in screening colonoscopies.

Methods: All screening colonoscopies conducted at Banner University Medical Center – Phoenix between March 2018 and September 2018 were included in the study. Patient age, gender, ASA score and quality measures including the Boston Bowel Preparation Score (BBPS) and ADR were obtained from each colonoscopy. The study period was divided into good bowel preparation (BBPS $\geq$7) and poor bowel preparation (BBPS <7). A Fisher's exact analysis was used to evaluate the association between good or poor bowel preparation and ADR.

Results: 244 screening colonoscopies were analyzed. The average age was 60 years and 52.8% were male. Colonoscopy reports showed 69.6% of patients with good bowel preparation and 30.3% of patients with poor bowel preparation. The ADR for all colonoscopies was 44.3%. The ADR for good bowel preparation and poor bowel preparation were 42.9% and 45.9%, respectively (p=0.67).

Conclusion: There was no significant difference noted in ADR between good or poor bowel preparations. These findings suggest that high quality bowel preparation is not a crucial quality measure for detecting colonic lesions. It is important to physicians to continue with detailed inspection regardless of quality of colonic preparation.

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Introduction

Colorectal cancer is the third most common cancer and second leading cause of cancer death in the United States [1]. The United States Preventative Services Task Force recommends that average risk individuals between the ages of fifty to seventy-five undergo colorectal cancer (CRC) screening which can be assessed through multiple varying modalities including colonoscopy, computed tomography colonography, sigmoidoscopy, or various stool based tests[2]. Colonoscopy is the most preferred and standard method of CRC screening due to its ability to simultaneously detect and remove potential premalignant polyps. The quality of screening colonoscopies has an association with the risk of development of interval cancer[3]. In order to ensure safe and effective screening, several quality measures such as withdrawal time of 6 minutes or more, cecal intubation, and adequate bowel preparation should be achieved. Adenoma detection rate (ADR) continues to be the gold standard and quality measure for screening colonoscopies[4]. A recent systematic review from Nally DM et al., further confirmed that the adenoma detection rate (ADR) of endoscopists is the most significant factor in reducing the rates of interval cancers[5].

Adequate bowel preparation is essential for optimizing visualization during CRC screening to allow for proper detection of polyps within the colonic mucosa. Poor bowel preparation can make colonoscopies more difficult by leading to decreases in in speed and completeness of the procedure[6]. Study data shows that almost one-quarter of patients undergoing screening colonoscopies have inadequate bowel preparation[7]. However, results from studies evaluating bowel preparation and adenoma detection rate have been mixed [6-10]. One study noted that poor bowel preparation was associated with decreased detection of colonic lesions[8]. Another study indicated that inadequate preparation only affected detecting smaller lesions $\leq$9mm rather than lesions of all sizes[7]. Although bowel preparation has been shown to be associated with higher rates of completion, there was no difference noted between quality of preparation and ADR [8,9]. In a review of our practice, we aimed to study the adenoma detection rate of endoscopists as the Banner University Medical Center – Phoenix and its association with bowel preparation as a part of a quality improvement measure.

Methods

Patients. All Screening colonoscopy exams conducted at the Banner University Medical Center - Phoenix between March 2018 and September 2018 were included in the study. Data was collected from Cerner, Provation, using custom dCFs in redcap. Statistical analysis was done using STATA v 15.1 Data collected included patient age, sex, ASA score, Boston Bowel Preparation Scale (BBPS) score, and the presence, type and location of all polyps.

Bowel Preparation. All colonoscopies were performed as outpatient procedures. Patients were instructed to complete a split-dose bowel preparation with PEG-3350 and all intake ceasing 3-4 hours prior to the procedure. Patients were provided with detailed instructions on how to complete the bowel preparation prior to the procedure. Bowel preparation quality was scored using the BBPS score[11]. Using the BBPS scores, three separate portions of the colon are independently rated from 0-3 and then the scores are summed. A score of 0, 1, 2, or 3 per colon segment corresponds to unprepared, only portions of colon seen, minor residue present, or entire segment visualized well, respectively. Total BBPS scores$\geq$ 7 were considered good bowel prep and those less than 7 were categorized as poor.

Diagnostic Criteria. Adenomas reported include tubular adenomas, tubulovillous adenomas, villous adenomas, sessile serrated polyp, sessile serrated adenoma, and traditional sessile adenoma. ADR was defined as percentage of screening colonoscopies in which at least one adenoma was detected.

Results

A total of 244 screening colonoscopies were evaluated in this study. Of the 244 patients, the median age ($\pm$SD) was 60 $\pm$ 9.5 years and 130 (52.8%) were male and 116 (47.2%) were female. Patients with an ASA score of 1, 2, 3, or 4, were 13 (5.3%), 66 (26.9%), 150 (61.2%) and 16 (6.5%), respectively.

Patients with good or poor bowel preparation was 170 (69.6%) and 74 (30.3%), respectively. Figure 1 displays the distribution of BBPS scores for the total screening colonoscopies. The overall ADR, regardless of bowel preparation was 44.3%. The ADR with good or poor bowel preparation was 42.9% and 45.9%, respectively (Figs 2 and 3). There was no statistically significant associations between good or poor bowel preparation quality and ADR in screening colonoscopies (p=0.67).

ADR was reported for each BBPS score (Fig 4). BBPS scores of 3 and 4 has the highest detection rate of adenomas, however this was not statistically significant.

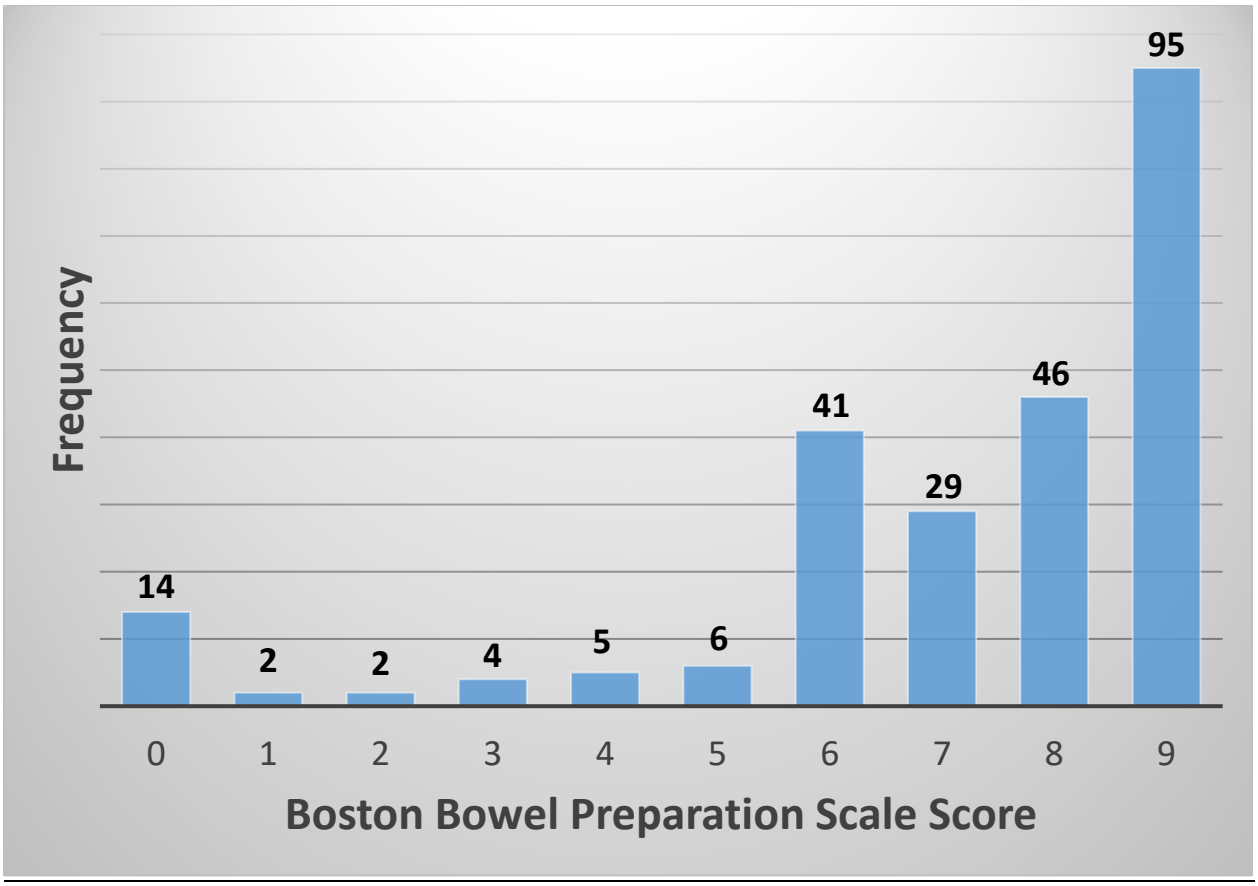

Figure 1. Distribution of Boston Bowel Preparation Scale (BBPS) Scores for 244 colonoscopies

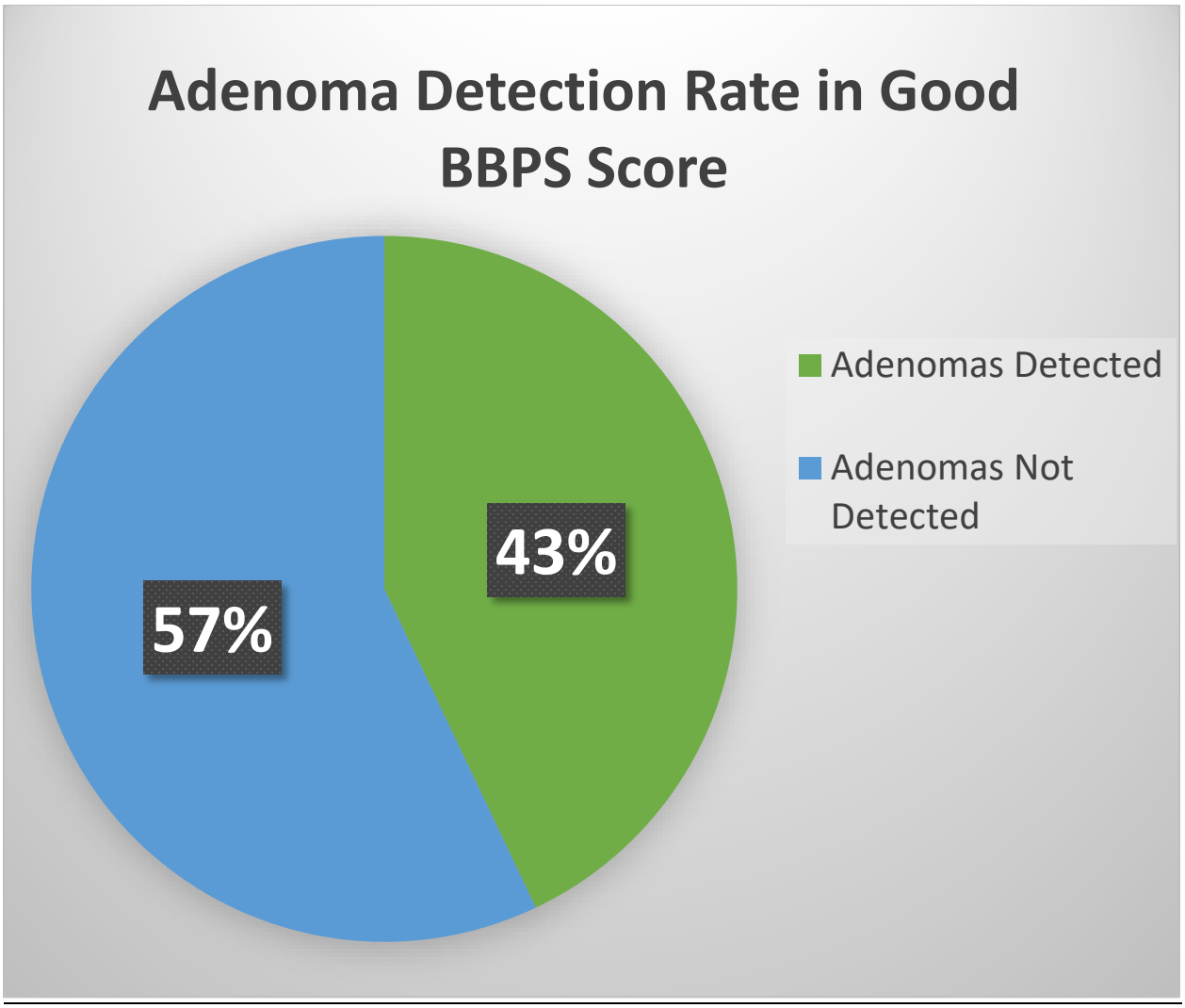

Figure 2. Adenoma detection rate (ADR) with good bowel preparation quality (BBPS ≥7)

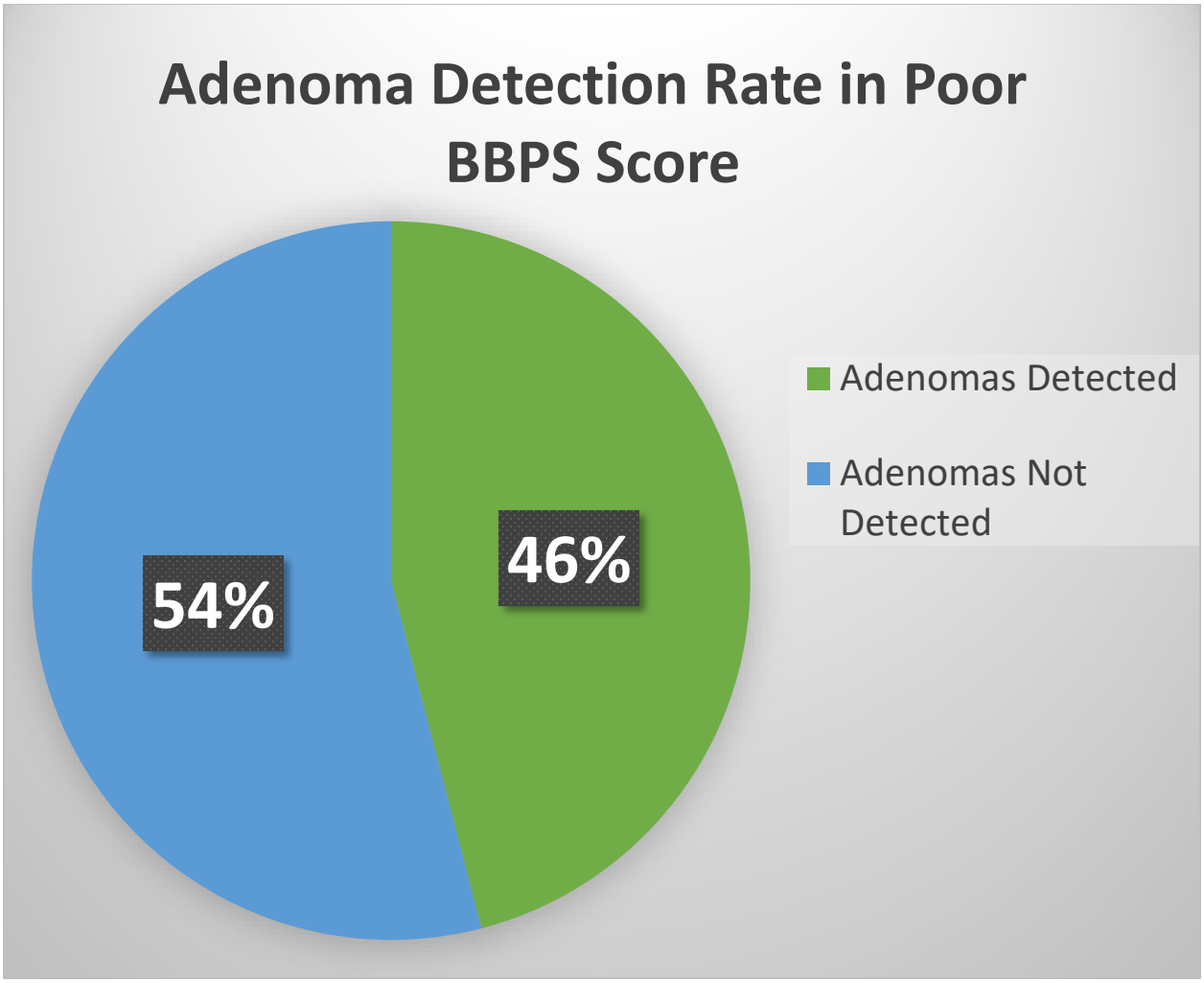

Figure 3. Adenoma detection rate with poor bowel preparation quality (BBPS <7).

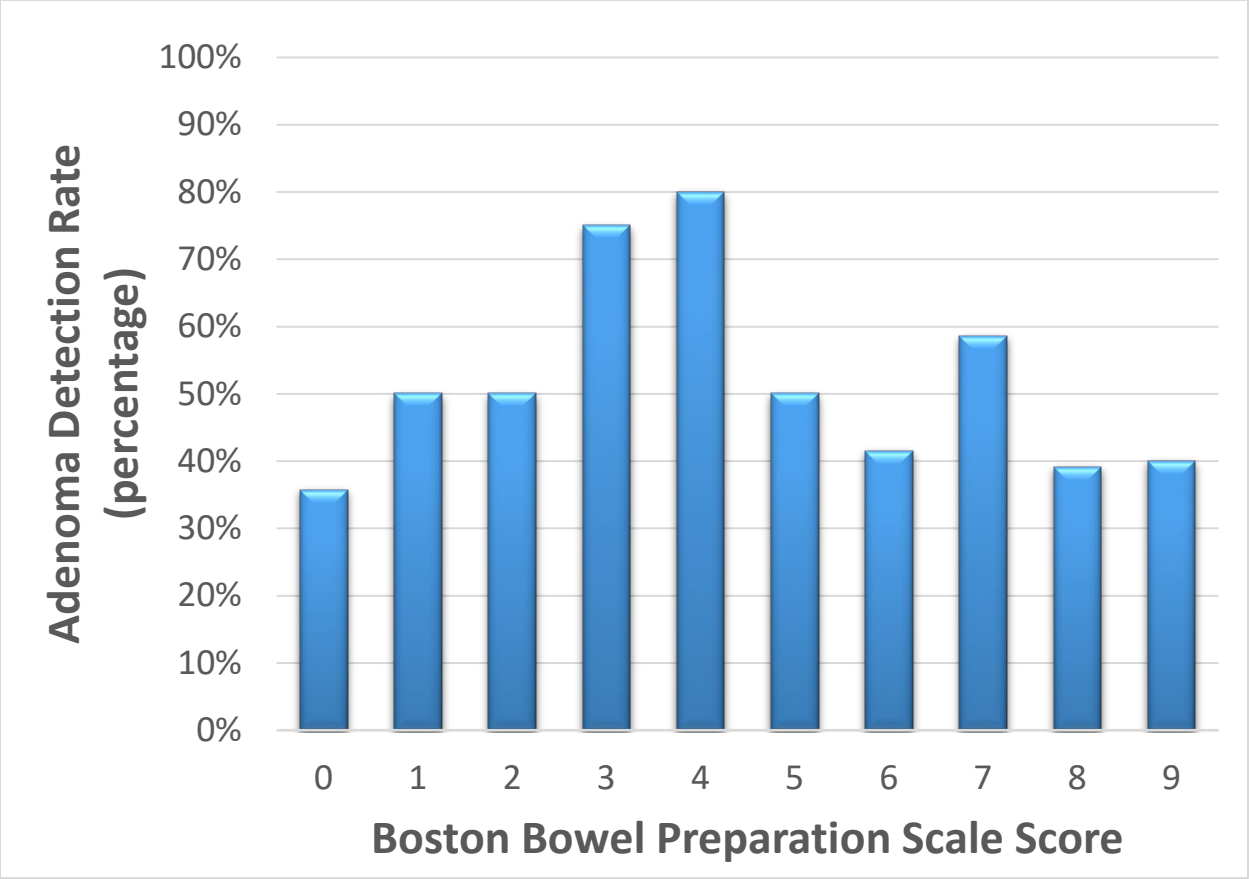

Figure 4. Adenoma detection rate at each Boston Bowel Preparation Scale (BBPS) score

Discussion

This study assesses the impact of bowel preparation on detecting colonic neoplasms during screening colonoscopies at the Banner University Medical Center – Phoenix. Using the BBPS score to evaluate quality of bowel preparation, our findings demonstrate that there is no significant difference noted in ADR between good or poor bowel preparation. This suggests that high quality bowel preparation is not a crucial quality measure for detecting colonic neoplasms in screening colonoscopies.

ADR is the current gold standard and quality measure for screening colonoscopies [4]. It is defined as the number of colonoscopies in which one adenoma is detected, divided by the total number of screening colonoscopies performed. Because adenomatous polyps have been shown to increase risk in developing into cancerous lesions, their identification and subsequent removal during screening colonoscopies results in decreased interval cancer rates [12]. According to the American Journal of gastroenterology, the current standard for ADR is 25% [4]. Our study demonstrated an overall ADR above the recommendation at 44.3%.

Another quality indicator that is heavily relied upon is bowel preparation. Poor quality of bowel preparation has been shown to have effect increase procedure duration, increase complication risk, and increase number of incomplete procedures [7,13]. The current benchmark recommendation by the US Multi-Society Task Force on Colorectal Cancer and American Society of Gastrointestinal Endoscopy is for adequate preparation to be achieved in 85% of screening procedures [14-15]. There are various scoring techniques that are utilized to report quality of bowel preparation. In this study, we utilized the BBPS score. It is the most commonly used grading system and has been extensively validated while providing both segmental and overall preparation scores with excellent intra- and interobserver reliability [16].

Although quality of bowel prep has an evident role in various aspects of screening colonoscopies, there is discrepancy on whether bowel preparation has direct effects on detecting colonic neoplasms [6-10]. In our study, good or poor bowel prep did not have any statistically significant impact on the ability to detect colonic lesions. ADR reported to be the

highest at BBPS scores of 3 or 4, though this did not show any statistical significance. One explanation for this is the possibility that endoscopists spent a longer time inspecting colons that had suboptimal preparation in order to ensure they were not missing any lesions, thus leading to an increased ADR. Our findings highlight the importance of continued detailed inspection during screening colonoscopies regardless of quality of colonic bowel preparation.

There are several limitations to this study. It is a retrospective study that takes place at a single institution. Additionally, the sample is very small and the study duration was short, taking place only over the course of several months. Another limitation is that withdrawal time and rate of completion were not included in the study which would have helped to better investigate an explanation behind the finding of increased ADR is patients with suboptimal bowel preparation. Future directions include further prospective studies with a larger sample size.

In conclusion, there was no significant difference noted in ADR between good or poor bowel preparations. These findings suggest that high quality bowel preparation is not a crucial quality measure for detecting colonic lesions. However, physicians should continue to practice detailed inspection regardless of quality of colonic preparation. It remains important to ensure patients achieve adequate bowel preparation to avoid other negative implications that poor bowel prep has on the screening colonoscopy process and efficiency.

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