

Experience of a Nurse Practitioner Performing Colonoscopy at a Tertiary Center in the United States

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Abstract

Background: The majority of the literature that involves non-physician endoscopists pertains to the performance of flexible sigmoidoscopy, with only limited reports of their performance of colonoscopy. Recent ASGE guidelines stated that there is insufficient data to support non-physician endoscopists to perform colonoscopy.

Objective: To assess the performance of a fellowship-trained nurse practitioner (NP) in colonoscopy.

Methods: The NP's performance was evaluated using quality indicators for colonoscopy as defined by the ASGE/ACG Taskforce, including appropriate indication, informed consent, appropriate surveillance interval, documentation of bowel preparation quality, photo documentation of cecal landmarks, cecal intubation rate, adenoma detection rate (ADR), withdrawal time, and incidence of procedure-related complications.

Results: The study included 300 consecutive subjects (mean age 55.4 years, female 48.3%, African American 84.6%) who underwent average risk screening colonoscopies. A total of 385 polyps were detected for a mean polyp detection rate of 1.28 per colonoscopy. The overall adenoma detection rate was 35.0%, with 41.3% detection in men and 28.3% detection in females. Cecal intubation was successful in 297 (99.0%) subjects. The mean withdrawal time was 19.3 minutes (range 6.7-66.7 minutes). There were no adverse events including colonic perforations or post-polypectomy bleeding.

Conclusion: We describe the technical and cognitive performance of a non-physician in colonoscopy in the United States. The NP adequately satisfied all of the quality indicators proposed by the ASG/ACG Taskforce. With the demand for screening colonoscopies exceeding the supply of qualified providers, non-physicians could be a potential solution to increasing the capacity of endoscopists needed to perform CRC screening. However, non-physicians, similar to physicians, should be subjected to a quality monitoring program.

Keywords: Colonoscopy; Nurse practitioner; Competency; CRC Screening

Introduction

Colorectal cancer (CRC) is the second leading cause of cancer-related deaths in the United States, having significant health implications [1]. These deaths can be prevented through the use of CRC screening modalities, with one of the predominate screening tools being colonoscopy [2,3]. The use of colonoscopy for CRC screening has also been shown to be cost-effective in reducing disease and healthcare costs [4-6]. Unfortunately, the demand for colonoscopy outweighs the supply of adequately trained endoscopists [7-9]. One proposed solution to this problem is to expand endoscopy training to non-physicians. However, recent guidelines published by the American Society for Gastrointestinal Endoscopy (ASGE) Taskforce states that "there is insufficient data to support the use of non-physician endoscopists to perform colonoscopy" [10].

The aim of our study was to assess the performance of a nurse practitioner in colonoscopy after completion of an intensive one-year gastroenterology training program, utilizing quality indicators for colonoscopy as defined by the American Society for Gastrointestinal Endoscopy and the American College of Gastroenterology (ASGE/ACG) Taskforce.

Methods

This study analyzed 300 consecutive screening colonoscopies performed by a single nurse practitioner after completion of 147 supervised colonoscopies performed during a one-year gastroenterology training program. The training program included both didactic and endoscopy training, identical to first-year gastroenterology fellow trainees at Johns Hopkins Hospital. This study aimed to evaluate the independent performance of the nurse practitioner in colonoscopy immediately following her training period.

This study was conducted at a large outpatient endoscopy center at John Hopkins Hospital between July, 2010 and December, 2012. Inclusion criteria were patients undergoing colonoscopy for average-risk CRC screening. Exclusion criteria included patients undergoing colonoscopy for an indication other than average-risk CRC screening and procedures that were aborted due to extremely poor bowel preparation. All patients received procedural sedation with the use of either anesthesia-administered propofol or proceduralist-administered fentanyl and versed.

The nurse practitioner's performance was evaluated by an experienced senior endoscopist who compared the nurse practitioner's outcome measures to the quality standards for colonoscopy proposed by the ASGE/ACG Taskforce to draw study conclusions [11]. Primary measures included adenoma detection rate, cecal intubation rate, mean withdrawal time, and procedure-related adverse events including colonic perforation or delayed post-polypectomy bleeding events. Secondary measures included appropriate indication, informed

consent, appropriate use of postpolypectomy surveillance intervals, documentation of bowel preparation quality, and photo documentation of colonic landmarks. Adenoma detection rate was histologically confirmed. Withdrawal times were determined using time stamps of cecal images and retroflexion images. Procedure-related adverse events were determined by review of procedure reports and electronic medical records. Photo documentation of cecal landmarks and retroflexion images were corroborated independently by the senior investigator.

Results

27 procedures were excluded from the study evaluation due to procedure indications other than average-risk CRC screening (n=19) or extremely poor bowel preparations resulting in the procedure being aborted (n=8).

Total number of patients	300
Age (yr), mean ± SD	55.4 ± 5.46
Gender	
Female	145 (48.3%)
Male	155 (51.7%)
Race	
African American	255 (85.0%)
Caucasian	37 (12.3%)
Asian	5 (1.7%)
Hispanic	3 (1.0%)

Table 1: Demographic characteristics of study population.

A total of 300 consecutive colonoscopies that met the inclusion criteria were included for analysis. The mean age of the patients was 55 years (SD=5.46), 48% were female, and 85% were African American (Table 1).

Informed consent was obtained from all patients (100%). Cecal intubation was successful in 297 (99.0%) subjects, with the proposed standard being 95%. A total of 385 polyps were detected for a mean polyp detection rate of 1.28 per colonoscopy. The overall adenoma detection rate was 35.0%, with the proposed standard being >30%.

More specifically, the adenoma detection rate was 41.3% in males and 28.3% in females, with the proposed standard being over 30% in males and over 20% in females. The mean adenoma size was 5.8 mm (range 3-40 mm). A 50 mm rectal mass was detected in one patient, determined to be an invasive adenocarcinoma. The mean withdrawal time was 19.3 minutes (range 6.7-66.7 min), with the proposed standard being greater than 6 minutes. There were no procedure-related adverse events, with the proposed standard being no greater than 1 perforation in 500 procedures.

ASGE/ACG Quality Indication	NP Statistics	Proposed SGE/ACG Standard
Appropriate indication	100%	
Informed consent	100%	
Photo documentation of landmarks (cecum, retroflexion)	99.3%, 100%	100%
Cecal intubation rate	99.00%	>95% in healthy adults
Adenoma detection rate	35.0% overall;	>25% overall
	41.3% men, 28.3% women	>30% men and >20% women

Mean withdrawal time	19.3 min	> 6 min
Incidence of perforation	0	No greater than 1 in 500 patients
Incidence of post-polypectomy bleeding	0	< 1%
Appropriate surveillance interval	99.70%	
Documentation of bowel preparation quality	100%	

Table 2: Nurse practitioner colonoscopy performance.

Post-polypectomy recommendations were appropriate in all but one procedure (99.7%). Images of cecal landmarks were documented in all but 2 procedure reports (99.3%). Retroflexion images were documented in all procedure reports (100%). The nurse practitioner met and exceeded all of the proposed ASGE/ACG Taskforce quality standards for colonoscopy (Table 2).

Discussion

The Agency for Health Research and Quality (AHRQ) report, commissioned for the 2010 National Institutes of Health State-of-the-Science Conference on Colorectal Cancer Screening, found that the capacity of providers to perform colonoscopy would need to be substantially increased to continue to perform screening colonoscopies at the current rate [7]. Several studies have estimated the number of additional endoscopists needed to meet the projected demands. One study published in 2004 estimated that 1,000 additional endoscopists would be needed to meet the demand for colonoscopy if 70% of the 2004 population were to be screened [8]. Notably, at that time there were only 59 million Americans between the ages of 50-74 needing to be screened compared to 80.5 million in 2010 [1]. Similarly, an independent report estimated an additional 1,000 endoscopists would be needed by 2020 to meet the rising demand for colonoscopy for colorectal cancer screening [9]. To add to the growing demand, an increasing number of physicians are expected to retire over the next 10-15 years, with one in three practicing physicians being over the age of 55 in the United States [12].

As stated by the AHRQ, there needs to be a focus on strategies to increase the supply of qualified endoscopists who are able to perform colonoscopy [7]. One proposed solution is to increase the number of gastroenterology fellowship positions. However, these positions are costly, likely being the reason that the number of gastroenterology fellowship positions increased by only 50 between 2004 and 2009 [13]. Another proposed solution is to expand high-quality endoscopy training to non-physicians, such as nurse practitioners [14].

Expanding endoscopy training to non-physicians could also help to meet the rising demand for female endoscopists, as 91% of nurse practitioners are currently women [15]. Studies have shown that almost half of female patients would prefer to have their colonoscopy performed by a female endoscopist [16-18]. Male patients do not report a strong preference between the two, yet those who do, also tend to prefer a female endoscopist. With only 10% of practicing gastroenterologists currently being female there are a limited number of females trained in colonoscopy, which has been shown to be a barrier to CRC screening [16,17].

Though non-physician endoscopists are not frequently utilized in the United States at this time, this practice is now being widely

adopted internationally. The United Kingdom (UK) forged the movement of training non-physicians in endoscopy, with approximately 200 nurse practitioners being trained to perform colonoscopy in 2005 [19]. This was primarily fueled by the launch of a national colorectal cancer screening initiation aimed to increase CRC screening rates. Since the adoption of nurse practitioners performing colonoscopy in the UK, they have demonstrated the ability to perform this procedure safely and effectively, with high patient acceptability and improved patient care [19-22].

One UK study analyzed 100 colonoscopies performed by a nurse practitioner after training and demonstrated the ability of the nurse practitioner to perform colonoscopies safely and effectively, with a cecal intubation rate of 92%, no procedure-related adverse events, and a high degree of patient satisfaction [19]. The nurse practitioner also demonstrated competency in polypectomy skills and administration of conscious sedation. Similar subsequent studies have been conducted in the UK with comparable results, with findings that nurse practitioners had similar efficacy, safety, and patient satisfaction scores compared to physicians [21,22]. Nurse practitioners continue to be trained in colonoscopy in the UK, where they have also established strategic guidelines for training and monitoring of non-physician endoscopists [19].

One Canadian study utilized the UK's training guidelines to establish their own nurse practitioner colonoscopy training program as a potential solution to their similar problem of having an inadequate number of endoscopists to perform colonoscopy. They implemented a 2-year training program to teach a single nurse practitioner both cognitive and technical skills in colonoscopy, during which time quality measures were collected. The nurse practitioner's first 225 independent but supervised colonoscopies were analyzed, with findings that the nurse practitioner was as effective as gastroenterologists in performing colonoscopy [23]. The nurse practitioner was found to have a cecal intubation rate of 92% and a polyp detection rate of 39%, with one minor adverse post-polypectomy bleeding event.

Studies on nurses being trained in colonoscopy have also been performed in the Netherlands with similar results. Two endoscopy nurses at a Dutch center were trained to perform colonoscopies, after which their efficacy, safety and patient satisfaction scores were compared to those of both a gastroenterology fellow and an experienced gastroenterologist. After 150 colonoscopies, cecal intubation rates, time to cecum, and adverse event rates were similar in all groups [24]. Patients also reported similar degrees of pain, levels of satisfaction, and willingness to undergo a future colonoscopy among groups.

A larger prospective multi-center study in the Netherlands analyzed the performance of 10 nurse endoscopists after being trained in

colonoscopy. The study included each of the nurses first 100 consecutive colonoscopies after their initial training, totaling 1,000 colonoscopies, with findings that all of the nurses met the international quality standards with high patient satisfaction, average cecal intubation rate of 94%, adenoma detection rate of 26.7%, adverse event rate of 0.2%, and patient satisfaction of 95% [25].

Though most studies on non-physician performance in colonoscopy have been conducted internationally, this practice is starting to get traction in the United States. One US study compared 50 colonoscopies performed by a trained nurse practitioner to 50 colonoscopies performed by two experienced gastroenterologists [26]. The study was performed at a freestanding endoscopy center using a consecutive sample of patients undergoing average risk CRC screening colonoscopies. The patients were randomized to have their procedure performed by the nurse practitioner or by one of the two physician endoscopists. Prior to the study, the nurse practitioner had completed a training program during which time she performed 140 colonoscopies and 40 snare polypectomies under direct supervision. By the time the study was initiated, the nurse practitioner had performed approximately 1,000 colonoscopies compared to over 20,000 combined colonoscopies by the physician endoscopists. During the study, the nurse practitioner demonstrated a higher adenoma detection rate and higher patient satisfaction scores compared to the physician endoscopists. Cecal intubation rates, duration of procedures, sedative use, and procedural pain scores were not statistically different between groups. The nurse practitioner demonstrated an adenoma detection rate of 42%, cecal intubation rate of 100%, mean withdrawal time of 8.5 minutes, and had no procedure-related adverse events.

With healthcare policy changing toward increasing access to medical insurance and coverage of preventive services, the demand for additional endoscopists may be more pressing than ever. In addition to being able to increase the number of colonoscopies able to be performed, non-physician endoscopists could also provide a means to lowering healthcare spending. A recent New York Times article highlighted the significant cost burden of screening colonoscopy, increasing public awareness of this issue [27].

In 2011, the American Academy of Nurse Practitioners (AANP) published a Medicare update authorizing nurse practitioners the ability to order and perform screening colonoscopies on Medicare patients [28]. Currently, Medicare reimbursements for colonoscopies performed by a nurse practitioner are 85% of the rate performed by a physician [29]. With the average cost of a colonoscopy being \$1,185 in the US, if all screening colonoscopies for Medicare patients were performed by nurse practitioners at this reduced cost it would equate to about \$5 billion in cost savings, given that about 65% of the 40 million Americans over age 65 get screened [30]. Additionally, nurse practitioners generally earn lower salaries compared to physicians, also contributing to cost savings with the utilization of this workforce.

If the use of non-physician endoscopists were to be more widely adopted in the United States, there are still several issues that would need to be addressed. Colonoscopy training programs for non-physician endoscopists are currently limited, with appropriate training guidelines yet to be clearly defined. In the setting of this study, the nurse practitioner was trained using the same curriculum as first-year gastroenterology fellows. Given the results of this study, similar training guidelines for medical fellows could be recommended for non-physician endoscopists. Furthermore, it will be vital that continual quality and safety evaluations are performed on non-physician endoscopists. This study utilized the quality indicators

defined by the ASGE/ACG Taskforce on Quality Endoscopy, which could be an option for performance evaluation across practice settings.

One limitation of this study is that only one nurse practitioner was trained at a single-center site, limiting generalizability. However, our results were consistent with similar studies evaluating the performance of non-physician endoscopists, adding to the strength of evidence supporting this practice. The outcome measure of withdrawal time was also a limitation of this study being that it did not account for withdrawal time spent performing polypectomy and cleaning maneuvers, potentially overestimating the time spent solely on colonic examination. This could potentially be improved upon in future studies with the use of a dedicated timer to measure this outcome. Furthermore, this study did not include a comparator group. However, the outcome measures utilized were based upon internationally recognized quality standards in endoscopy, thought to be appropriate for comparison. Even so, future studies utilizing randomized design, preferably with a larger number of non-physician endoscopists, would provide a higher strength of evidence.

Similar to previous studies, this study demonstrates that appropriately trained nurse practitioners can perform colonoscopy safely and effectively based on the proposed standards of endoscopy quality measures defined by the ASGE/ACG Taskforce. This study, however, adds to the limited body of evidence about non-physician performance in colonoscopy in the United States. Our findings support the use of non-physicians being trained in colonoscopy as a solution to meeting the rising demands of endoscopists needed for CRC screening.

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