

Colorectal cancer screening aims to detect colorectal cancer at an early stage, when treatment is more likely to be curative. Lack of participation in such screening is a major issue in primary care practices, where nurse practitioners (NPs) often provide care. This study aimed to determine whether an educational intervention for NPs would increase their awareness of, and increase patients' participation in, colorectal cancer screening.

#### AT A GLANCE

- Colorectal cancer screening guidelines recommend four methods of screening to meet the needs of adults aged older than 50 years.
- An educational intervention focused on increasing nurse practitioner knowledge of colorectal cancer screening guidelines is feasible.
- Primary care providers play an important role in educating patients regarding colorectal cancer screening.

#### KEYWORDS

colorectal cancer; prevention and detection; screening guidelines; advanced practice

#### DIGITAL OBJECT IDENTIFIER

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# Colorectal Cancer Screening

An educational intervention for nurse practitioners to increase screening awareness and participation

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Colorectal cancer continues to be the second leading cause of cancer-related deaths in the United States and the third most common cancer diagnosis in men and women (Baker et al., 2013; Centers for Disease Control and Prevention [CDC], 2017c). In 2014, more than 139,000 people in the United States were diagnosed with colorectal cancer, and more than 51,000 died from the disease (CDC, 2017c). However, as of 2014, only 66% of U.S. adults reported being up-to-date with colorectal cancer screening (CDC, 2017a). Missed opportunities to prevent the disease, or to diagnose it prior to metastasis or its progression to a life-threatening condition, are responsible for morbidity and mortality in colorectal cancer. Research has shown a strong association between provider communication with patients about colorectal cancer screening and increased compliance with such screening (Underhill & Kiviniemi, 2012).

Accountable care organizations (ACOs) are healthcare organizations characterized by a payment and care delivery model that ties providers' reimbursement to quality metrics. In 2013, ACOs made colorectal cancer screening a quality measure in individuals aged 50–75 years (Levy, Daly, Schmidt, & Xu, 2012). The goal for the colorectal cancer screening quality measure is to develop and deliver seamless, high-quality care for those aged 50–75 years.

The current colorectal cancer screening guideline recommends screening with

one of the following tests: flexible sigmoidoscopy every 5 years, colonoscopy every 10 years, double-contrast barium enema every 5 years, or computed tomography colonography every 5 years (American Cancer Society, 2017). In recognizing that primary care is an essential access point for high-performing healthcare systems, Sarfaty et al. (2013) reported that colonoscopy is the most promising method to address the burden of chronic disease, improve health outcomes, and reduce healthcare spending. Given the ongoing changes in colorectal cancer technologies, colorectal cancer screening practice guidelines require monitoring and updating (Sarfaty et al., 2013). Consequently, providers must be knowledgeable about colorectal cancer screening guidelines and recommend screening to patients to improve health outcomes.

Because nurse practitioners (NPs) provide primary care services, they also should remain informed about current colorectal cancer screening guidelines to encourage timely screening, which may improve health outcomes. NPs in New Hampshire, a full licensure state, are permitted to practice independently and autonomously and are required to provide evidence-based care that is grounded in current guidelines for colorectal cancer screening, as well as in established preventive screening guidelines for other diseases. The percentage of adults aged 50–75 years who reported receiving colorectal cancer screening is generally higher in the northern states (70%) than in the southern states (60%)

(CDC, 2017b). Few studies have explored the use of screening guidelines by NPs who assume the role of primary care provider in the northeastern United States. Quality improvement opportunities exist concerning exploration of methods to increase awareness of colorectal cancer screening practices and actual screening compliance by patients. This pilot study addressed whether an educational intervention for NPs about current colorectal cancer screening guidelines increased their knowledge and screening rates in their patients. The aims of this study were to (a) evaluate NP retention of knowledge about colorectal cancer screening guidelines and (b) examine the impact of an NP educational intervention on colorectal cancer screening rates.

## Methods

The project was approved by the institutional review boards of the University of Massachusetts Lowell and a medical center in southern New Hampshire. The medical center has 10 medical facilities, and 12 NPs participated in the intervention. All participants were Caucasian women with an average age of 42.5 years ( $SD = 2.8$  years) and were prepared at a master's degree level.

The investigator sent an opt-in email to potential participants. After obtaining consent from those who responded, baseline surveys were given prior to delivery of the educational intervention. The intervention consisted of a presentation on the CDC's colorectal cancer screening guidelines, and all participants were provided with laminated New Hampshire Colorectal Cancer Screening Program guidelines. (This is a statewide effort to increase colorectal cancer screening rates among New Hampshire residents.) Immediately postintervention, a survey was administered, and all participants were re-surveyed at 90 days after the intervention, with a response rate of 100%.

The survey used, which examined primary care physicians' cancer screening recommendations and practice,

was obtained from the National Cancer Institute's ([NCI's] 2006) website, and it was developed by the NCI in collaboration with the Agency for Healthcare Research and Quality and the CDC. The widely used survey assesses knowledge and attitudes regarding current colorectal cancer screening guidelines.

## Colorectal Cancer Screening Rates

Data regarding colorectal cancer screening rates among patients served by the NPs in the study were collected by the medical center's quality department. Preintervention data were collected for all four quarters of 2014 and for the first two quarters of 2015. Two quarters of colorectal cancer screening data (the last two quarters of 2015) were provided after the

compared for colorectal cancer screening compliance rates before and after the educational intervention.

## Results

Aggregate preintervention, immediate postintervention, and 90-day postintervention survey scores indicated a significant difference between preintervention and 90-day postintervention scores ( $p = 0.09$ ); results demonstrate that NPs were able to better recall the current colorectal cancer screening guidelines after the intervention. The preintervention mean score was 55.89 ( $SD = 0.27$ ) and the 90-day postintervention mean score was 66.2 ( $SD = 0.22$ ). No significant difference was noted between preintervention and immediate postintervention scores.

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"Research has shown an association between healthcare provider communication with patients about colorectal cancer screening and increased compliance."

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educational intervention was completed. Data were deidentified.

## Data Analysis

Descriptive analyses were used to characterize sample demographics. The significance level for analyzing the survey was set at 0.1 or less, considering the effect size, sample, and study design (Wasserman, 2016). Aggregate preintervention, immediate postintervention, and 90-day postintervention survey scores were compared using a one-way analysis of variance. Individual questions related to the perception of effectiveness of four types of screening options were evaluated separately for differences in perceived effectiveness. Electronic health records of primary care patients aged 50–75 years who were treated by the NPs were

Changes in NP perception of effectiveness regarding the four screening options (colonoscopy, guaiac-based fecal occult blood test [gFOBT], immunochemical fecal test, sigmoidoscopy) were evaluated separately prior to the intervention, immediately after the intervention, and at 90 days after the intervention. A significant change was observed in NP perception regarding gFOBT screening ( $p = 0.092$ ) and immunochemical fecal test screening ( $p > 0.001$ ) from preintervention to 90 days postintervention. No significant differences were noted between preintervention and immediate postintervention scores. The mean score for gFOBT screening was 2.16 preintervention ( $SD = 0.57$ ), 1.83 ( $SD = 0.38$ ) immediately postintervention, and 1.16

(SD = 0.3) 90 days postintervention. No significant change was observed in NPs' perception of the effectiveness of colonoscopy or sigmoidoscopy screening for colorectal cancer from preintervention, immediate postintervention, and 90-day postintervention. Of the 11,483 medical records reviewed, 8,230 patients (72%) had complied with colorectal cancer screening recommendations before the educational intervention. After the educational intervention, 3,851 of 5,160 patients (75%) complied with colorectal cancer screening recommendations. An improvement of 4% in colorectal cancer screening rates was observed (see Figure 1).

### Colorectal Cancer Screening Rate Compliance by Nurse Practitioner Demographics

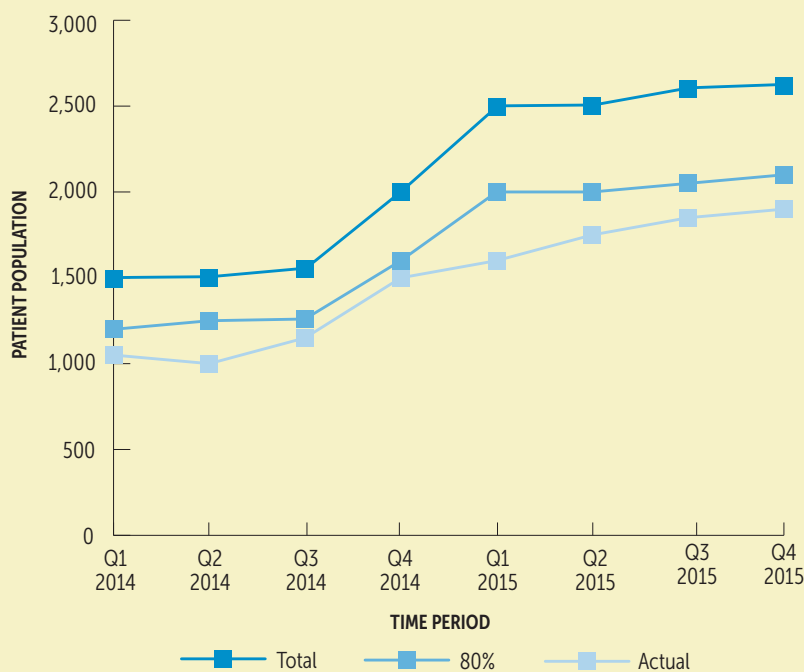
A 3% difference was observed in patient screening rates for NPs with less than 10 years of practice experience as compared to those with more than 10 years of experience ( $n = 2$ ). However, the three NPs with 5–10 years of practice experience showed the highest increase in rates of colorectal cancer screening (seven NPs had fewer than five years of practice experience). A 3% difference in screening rates for NPs aged younger than 40 years as compared to those aged older than 40 years was also noted (no NPs were aged younger than 30 years, seven were aged 30–40 years, one was aged 41–50 years, and four were aged older than 50 years). Older and more experienced NPs had the highest screening rates and met or exceeded the medical center goal rate of 80%. There was no difference in the number of patients screened across all NPs' age groups.

### Discussion

This pilot study demonstrated that a colorectal cancer screening educational intervention increased participants' knowledge and subsequently increased their patients' screening rates. Specifically, NP participants retained knowledge that the four screening procedures are effective options, per CDC guidelines. With

**FIGURE 1.**

COLORECTAL CANCER SCREENING COMPLIANCE RATES PRE- AND POSTINTERVENTION BY QUARTER (Q)



**Note.** The intervention was delivered between Q2 and Q3 in 2015.

**Note.** Total refers to the total number of patients seen by medical center nurse practitioners participating in the study, 80% refers to the stated goal of the medical center, and actual refers to the number of patients who completed colorectal cancer screening.

this focused intervention, NPs discussed screening with patients; as a result, patient compliance increased, as demonstrated by a 4% rise in colorectal cancer screening rates.

Retention of knowledge can be explained by the cognitive theory of meaningful learning, as opposed to rote verbal learning (Ausubel, 2000). This theory defines meaningful learning as the process of integrating new information into an existing knowledge system and when actions become automatic. This project demonstrated that an educational intervention involving NP review of CDC guidelines for colorectal cancer screening can improve knowledge and actual screening rates. An increase in colorectal cancer screening rates was noted across all ages of NPs and all levels of experience. Although the rea-

son is not clear, age and experience may have an effect on encouraging patients to become compliant with screening recommendations.

### Limitations

A major limitation for generalizability is that the study was conducted at one medical center in New Hampshire, with a focus on its primary care practices. Postintervention colorectal cancer screening data for patient screening rates were collected over a short duration; additional data collection may provide better insight regarding compliance rates. Additional limitations pertain to the small sample size and the allowance of NPs to explore all colorectal cancer screening recommendations rather than a single screening mechanism. Because

NPs in New Hampshire are permitted to practice autonomously, the educational intervention would benefit all primary care providers who discuss colorectal cancer screening with their patients; this would demonstrate generalizability and, ultimately, increase screening compliance rates.

## Implications for Practice and Conclusion

This study can be used as a model to improve compliance with other preventive screening recommendations, such as mammography for breast cancer and Papanicolaou tests for cervical cancer, as well as immunizations. This educational model can also help to meet ACO quality measures, drive outcomes, and affect hospital reimbursement. Annual education about current colorectal cancer screening guidelines will support current standards and, as in this pilot study, increase participation in screening as a result of primary providers' increased knowledge. This study determined that an educational intervention involving NPs who reviewed current colorectal cancer screening guidelines can improve knowledge and actual patient participation in colorectal cancer screening.

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