

## Observational Study

## Colorectal cancer screening in an academic center compared to the national average

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### Abstract

**AIM:** To investigate if the increased emphases on training and education on current colorectal cancer (CRC) screening guidelines has resulted in improved national CRC screening rates in an internal medicine training program, and to determine if the doctor's post graduate year (PGY) level of training affected CRC screening rates.

**METHODS:** We conducted a cross sectional study of every patient who presented to the outpatient clinic of New York Methodist Hospital, Brooklyn, NY, over the span of six continuous weeks in 2011. A questionnaire was integrated into every patient's medical interview that helped determine that patient's current CRC screening status, screening mammography status if applicable, Papanicolaou smear status if applicable, and current pneumococcal vaccination status. At the same time, patient demographics were also obtained. All of the questionnaire data was collected at the end of each medical visit and was compiled by a designated researcher. After all the data points were collected, it was ensured that the patient has been seen by his or her continuity care resident at least twice in the past. Data was then compiled into a secure, encrypted database to then be analyzed by our statistician.

**RESULTS:** Data from 547 consecutive clinic visits were obtained. Of these, we reviewed 483 charts that met all of the inclusion criteria and did not meet the exclusion criteria. The data was then analyzed for differences between PGY levels, patient's sex, race, and educational level. The study population consisted of 138 men and 345 women. 35 patients were white (7.40%), 174 were black (39.79%) and 264 were Hispanic (55.81%). Our CRC screening rates were: 66% for PGY-1's, 72% for PGY-2's and 77% for PGY-3's. There was no statistical difference noted between the three groups ( $P \leq 0.05$ ) or was there any difference sex, insurance status or educational level. Overall CRC screening rate was 72% which was not different from the New York State average ( $P < 0.05$ ). There was a statistically significant higher rate of CRC screening amongst Hispanics 76% ( $P = 0.034$ ) and in people within the ages of 70-79, 82% ( $P = 0.015$ ).

**CONCLUSION:** Patients that are followed by internal medicine residents at our urban outpatient teaching clinic did not receive higher rates of CRC screening nor did rates of screening vary with their PGY level.

**Key words:** Screening; Colorectal cancer; Post graduate year; Colorectal cancer; Residency; Urban

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**Core tip:** It is assumed that greater seniority and experience amongst medical residents can equal improved colorectal cancer screening percentage in an outpatient academic center. We not only compare screening rates between different post graduate years but also compare the medical resident's screening rates to the national average.

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## INTRODUCTION

Despite established screening guidelines, national colorectal cancer (CRC) screening rates vary between 54%-75% of the at risk population<sup>[1]</sup>. CRC is the third leading cause of cancer-related deaths in the United States when men and women are considered separately, and the second leading cause when both sexes are combined<sup>[2]</sup>. CRC is expected to cause approximately 49700 deaths during 2015<sup>[2]</sup>. The American Cancer society estimates that there will be 93090 new cases of colon cancer and 39610 new cases of rectal cancer in 2015<sup>[2]</sup>. When diagnosed early, CRC is typically curable. Screening guidelines have been developed to

help reduce the mortality of CRC. For a person without increased risk factors, starting at the age of 50 years, it has been generally accepted that a colonoscopy every 10 years, flexible sigmoidoscopy (FS) every 5 years or annual fecal occult blood test (FOBT) would be considered a sufficient screening technique<sup>[3]</sup>.

Despite these screening strategies and increased efforts by governing bodies to increase awareness of CRC screening in both the medical community and general public, in 2010 only 54.1%-75.2% of the United States population responded that they were "up to date" with their CRC screening, with the state of New York averaging 69%-75.2%<sup>[1]</sup>.

It is assumed that clinical guidelines are observed and followed more often in an academic training setting like a residency program due to the fact that there is more emphasis on education in an academic setting and the medical residents are under constant supervision. However, we have observed that a majority of resident training involves acute disease management in the inpatient setting and little research has attempted to assess the quality of ambulatory education and resident competence especially for disease prevention and health maintenance<sup>[4]</sup>.

We assessed the CRC screening rates at New York Methodist Hospital in 2010 and compared them to the 2010 New York state screening rates as recognized by the Center for Disease Control (CDC). Furthermore, we wanted to try to recognize possible barriers to CRC screening in our community hospital and try to identify ways that we could improve our CRC screening rates. We felt it was important to ascertain if current efforts to educate physicians in training are effective and to help identify ways to improve education efforts.

## MATERIALS AND METHODS

### *Ambulatory care resident education*

The New York Methodist Hospital internal medicine residency program is a traditional, accredited 3 year program consisting of both inpatient and ambulatory based training. At the time of this study there were 106 medical residents providing longitudinal care for patients in the ambulatory clinic. All resident physicians provide patient care in the ambulatory clinic two half days every week throughout all three years of their training. Additionally, residents do 4 to 5 mo solely of ambulatory care without any inpatient responsibilities. During those 4 to 5 mo, residents have a weekly morning rotation in the clinic's gastroenterology clinic and work under the supervision of board certified gastroenterologist. Formal lectures addressing preventive care cancer screening are interspersed throughout the academic year including one lecture focused on colorectal cancer screening in the average risk patient. Throughout their training, residents are given monthly exams; in two of which the primary focus is to test the resident's knowledge on primary prevention and screening strategies.

**Table 1** Study population breakdown

| Population                | Number of patients | Percentage of patients |
|---------------------------|--------------------|------------------------|
| PGY-level                 |                    |                        |
| PGY-1                     | 170                | 35.20%                 |
| PGY-2                     | 160                | 33.13%                 |
| PGY-3                     | 153                | 31.68%                 |
| Sex                       |                    |                        |
| Female                    | 345                | 71.43%                 |
| Male                      | 138                | 28.57%                 |
| Race                      |                    |                        |
| Blacks                    | 174                | 36.02%                 |
| Whites                    | 35                 | 7.25%                  |
| Hispanics                 | 264                | 54.66%                 |
| Other                     | 10                 | 2.07%                  |
| Highest educational level |                    |                        |
| Elementary school         | 28                 | 5.80%                  |
| Middle school             | 63                 | 13.04%                 |
| High school               | 186                | 38.51%                 |
| College or University     | 43                 | 8.90%                  |
| Unknown                   | 163                | 33.75%                 |
| Insurance type            |                    |                        |
| Medicare/Medicaid         | 288                | 59.63%                 |
| Private Insurance         | 32                 | 6.63%                  |
| Unknown                   | 163                | 33.75%                 |
| Age of patient (yr)       |                    |                        |
| 50-59                     | 179                | 37.06%                 |
| 60-69                     | 177                | 36.65%                 |
| 70-79                     | 90                 | 18.63%                 |
| 80-89                     | 34                 | 7.04%                  |
| 90-99                     | 3                  | 0.62%                  |

PGY: Post graduate year.

### Study population

A cross sectional study was taken from patients who received their care at the internal medicine clinic of New York Methodist Hospital over a 6 wk period. Residents were given a questionnaire and integrated it into their clinical data gathering during the patient's clinic visit session. Data was collected after every clinic encounter throughout the six weeks. Exclusion criteria included patients under the age of 50, patients with an increased risk for developing colorectal cancer (family or personal history of adenomatous polyps, CRC, or polyposis syndromes) patients who had previous CRC screening in last 5 years and patients who have been followed by an internal medicine resident for less than 8 mo and had less than 2 clinic visits in which the patient had been seen by their designated resident.

### Data collection

Data from 547 consecutive office visits in the internal medicine resident ambulatory clinic over a span of 6 wk was collected. Four hundred and eighty-three of those charts met the inclusion criteria and were selected and reviewed in further detail. The investigators confirmed that there had been a minimum of two clinic visits with their assigned medical resident. Data recorded included patient demographics, patient's level of education, type of medical insurance, data on the use of screening colonoscopy (SC), fecal occult blood testing (FOBT),

FS, and other preventative health measures such as influenza vaccination, screening mammography and Pap smear. For the purposes of this study, only the data relevant to CRC screening was analyzed. A patient's CRC screening was considered "up to date" if it met any of the following criteria: (1) the patient has had a SC within the last 10 years;(2) the patient has had a screening FS within the last 5 years; and (3) a FOBT within the last 12 mo. These screening modalities are readily available at our institution and generally accepted as appropriate screening tools<sup>[3]</sup>. FS, though a well-accepted screening modality, was not included in our survey as the procedure is not offered at our institution. Finally, the data was also then stratified between the resident's level of training (PGY1, PGY2, and PGY3). This study received IRB approval; IRB reference No. 518027.

### Statistical analysis

Data was analyzed using the binomial test and the  $\chi^2$  distribution test. The binomial statistical test was used to compare the medical resident's screening rate to the New York state's 2010 CDC average of 70.1% and to determine if insurance status, patient's level of education, race, age or sex influenced the results. The  $\chi^2$  distribution test was used to determine if there were any statistical differences between the post graduate year level of training, age groups, sex, educational level, insurance status, or race. Statistical significance was defined as  $P = 0.05$ .

## RESULTS

Four hundred and eighty three patients were considered appropriate for inclusion into the study. Table 1 depicts our patient characteristics. The study population consisted of 138 men with a mean age of 63.5 years (range, 50-88 years) and 345 women with a mean age of 64.17 years (range, 50-92 years). Thirty five patients were white (7.40%), one hundred and seventy four were black (39.79%) and two hundred and sixty four were Hispanic (55.81%). Two hundred and twenty nine (47.41%) responded that they had a high school education or above, ninety one (18.84%) responded that their educational level was below high school level and one hundred and sixty three (33.75%) did not provide their educational level. Table 2 depicts our statistical findings. The overall CRC screening rate at our hospital was 72%. We did not observe statistical difference between the CRC screening rates of our hospital compared to the 2010 United States or New York state screening rates as provided by the CDC<sup>[1]</sup> ( $P = 0.05$ ). There was no observed statistical difference between the screening rates of PGY-1's, PGY-2's, and PGY-3's ( $P = 0.096$ ), sex, insurance status or educational level. There was a statistically significant higher rate of CRC screening amongst Hispanics of 76% ( $P = 0.034$ ) and in people within the ages of 70-79 years of 82% ( $P = 0.015$ ).

**Table 2** Statistical analysis comparing our colorectal cancer screening rates to the 2010 New York State screening rates as determined by the Center for Disease Control

| Variable                  | Screening rate | P value            | P value of the $\chi^2$ distribution test comparing variability within groups |
|---------------------------|----------------|--------------------|---|
| PGY-level                 |                |                    |   |
| PGY-1                     | 0.66           | 0.3                |   |
| PGY-2                     | 0.72           | 0.735              | 0.096   |
| PGY-3                     | 0.77           | 0.061              |   |
| Age of patient (yr)       |                |                    |   |
| 50-59                     | 0.64           | 0.07               |   |
| 60-69                     | 0.77           | 0.58               |   |
| 70-79                     | 0.82           | 0.015 <sup>1</sup> | 0.006 <sup>1</sup>  |
| 80-89                     | 0.61           | 0.255              |   |
| 90-99                     | 0.67           | 1                  |   |
| Sex                       |                |                    |   |
| Female                    | 0.7            | 0.953              | 0.33  |
| Male                      | 0.75           | 0.26               |   |
| Race                      |                |                    |   |
| Black                     | 0.68           | 0.508              |   |
| Hispanic                  | 0.76           | 0.034 <sup>1</sup> | 0.023 <sup>1</sup>  |
| Other                     | 0.8            | 0.733              |   |
| White                     | 0.54           | 0.063              |   |
| Highest educational level |                |                    |   |
| College                   | 0.72           | 0.869              |   |
| Elementary                | 0.75           | 0.682              |   |
| High School               | 0.74           | 0.336              | 0.888   |
| Middle School             | 0.72           | 0.888              |   |
| Undisclosed               | 0.69           | 0.73               |   |
| Insurance type            |                |                    |   |
| Medicare/Medicaid         | 0.73           | 0.245              |   |
| Private insurance         | 0.72           | 1                  | 0.514   |
| Undisclosed               | 0.68           | 0.607              |   |
| Overall screening rate    | 0.72           | 0.48               |   |

<sup>1</sup>Statistical significance is defined as  $P = 0.05$ . New York State screening rate was standardized to a base rate of 0.701 for comparison. Data was analyzed by binomial statistical analysis. PGY: Post graduate year.

## DISCUSSION

Our study did not support the assumption that CRC screening would be offered more frequently at an institution with a residency training program when compared to the state and national average screening rates which include non-teaching outpatient practices. There was a numerical difference between the screening rates of PGY-1 compared to PGY-3 (11%) however statistical significance, possibly due to function of power, was not achieved. Willett *et al*<sup>[5]</sup> had similar findings in 2005 when they compared PGY-1 and PGY-2 residents in their adherence rates to national guidelines for outpatient preventive health services and found no difference between the two groups for breast and colon cancer screening amongst others.

Despite didactics, emphasis on practicing evidence based medicine, and importance of implementing preventative measures with the use of well accepted screening measures CRC screening in our internal medicine residency training program was still found to be comparable to the national and state average CRC screening rates.

Prior studies have indeed shown poor CRC screening rates amongst internal medicine residents<sup>[6]</sup>. Numerous studies have elucidated the deficiency in knowledge of and compliance with CRC screening recommendations amongst internal medicine residents<sup>[6-9]</sup>. Our study however is unique in that we were able to compare the rates of CRC screening at an outpatient clinic of an urban teaching program to state and national rates which include non-teaching practices.

These results highlight the important fact that though we expect and anticipate that teaching programs ingrain the importance of screening and prevention in medicine, for reasons unknown, either fail to do this or just do not seem to reflect this in clinical training practice. If well accepted and proven screening techniques such as CRC screening are not offered more so by physicians in training who are assumed to be "up-to-date" with current screening guidelines and practices through their mandated hours of didactics, this raises the concern that perhaps there needs to be a change in the way both residents and their mentors are trained.

In the future, it is vital that efforts be made to improve education amongst physicians in training regarding CRC guidelines and the importance of CRC screening. A prior study by Gennarelli *et al*<sup>[10]</sup> showed that knowledge of CRC screening guidelines amongst medical professions is low for both average and high risk patients. Internal medicine residents in our program like most others receive weekly didactics in the form of lectures by attending physicians, fellows, and visiting professors averaging approximately 7 h/wk however these lectures span a wide variety of topics and are not focused on primary prevention or screening. Perhaps physicians in training would benefit from a teaching series focused specifically on preventative measures and screening techniques. A retrospective chart review done by Borum showed that internal medicine residents who had increased exposure to and reinforcement of surveillance recommendations through lectures and required documentation as well as formal FS training adhered to guidelines far more than other resident physicians<sup>[7]</sup>.

Additionally, now that medical records are for the most part transitioning to electronic records across the country, clinical prompts incorporated into the standard outpatient note template may help as a reminder tool for physicians who have adequate knowledge of the topic but for the sake of time and other factors may not necessarily remember to ask their patients regarding their screening status. Seres *et al*<sup>[11]</sup> showed that clinical prompts are superior to evidence based lectures when it comes to improving physician CRC screening rates.

Another aspect that must be considered is the patient's role in compliance with recommended screening. 1.5% of our patients had refused CRC screening when offered in the past and it is unknown if they were educated regarding the potential long term consequences of their decision. Residents in training

should learn early on the importance of patient education in both disease prevention and treatment. The realm of primary prevention and screening is one in which patient education regarding the importance of screening and potential dire outcomes of lack of screening become vital. Perhaps implementing use of patient educational tools such as easy-to-read brochures and pamphlets explaining current rates of CRC and screening modalities effect on prevention will help patient's make more educated decisions when it comes to screening. Rowe *et al*<sup>[12]</sup> even implemented use of an educational video while patients were waiting to be seen by residents.

In assessing the need for further investigations and future direction we will review the limitations of our study. Generalizability of our study, which included only residents from our primarily categorical internal medicine residency program, and if our findings are representative of other residency programs especially those which include family medicine or primary care tracks is of concern. Another limitation of the study is that it was conducted over the span of 6 wk and may not be an adequate representation of overall practice. In addition, the patient population was not a good representation of the different races; with 54.66% of patients were Hispanic and 7.25% Whites, this may explain the perception of higher screening rates in Hispanics as compared to Whites.

## COMMENTS

### Background

Routine screening has been proven to be an effective tool at preventing colorectal cancer (CRC). Many efforts have been put forth to educate medical professionals on proper CRC screening. The authors investigate if current efforts on CRC screening education are producing improved CRC screening rates.

### Research frontiers

The Center for Disease Control has been providing a big push in CRC prevention. Current studies center on methods of improving education towards not only patients but health care providers as well.

### Innovations and breakthroughs

This is the only article comparing the screening rate of medical residents compared to the national average and one of the few manuscripts comparing the screening rates between post graduate years (PGY).

### Applications

The study results demonstrate that there is no appreciable difference between PGY or compared to the national average. This exposes potential weaknesses in current educational strategies and opens up some proven ideas that may help increase CRC screening rates.

### Peer-review

This is a well-designed observational study that was tailored to minimize selection bias. The results can be applied to family medicine and internal medicine training programs alike.

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