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Colon Polyp Model Use for Educating About Colorectal Cancer Screening in the Iowa Research Network

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Abstract

Providing a model of a colon segment with an adenomatous polyp and cancer can help to educate patients about the adenoma to carcinoma sequence and how this sequence can be interrupted with appropriate testing. The purpose of this study was to assess the use of a three-dimensional colon model with polyps and cancer provided to family physicians or nurses in some BLINDED family physician offices. Colon models were provided to 117 family medicine healthcare providers interested in colorectal cancer screening. Using a mailed survey and follow-up telephone calls to non-responders, 81 (69%) questionnaires were returned. Thirty-six (44%) of the respondents reported they had used the model, 33 (41%) reported they used the model for a mean 16% of their patients in a month's time, 31 (38%) reported using the model to teach patients about the colon and polyps prior to a colonoscopy. Other model use described by respondents included educating staff to promote patient willingness for colonoscopies, demonstrating the need for colon cancer screening, and teaching patients about annual fecal occult blood tests. Respondents agreed that anatomical models are helpful for patient education, the design of the colon model was good, and that it facilitated demonstration of colon polyps. Possible recommendations for an office-wide adoption of an anatomical model would be an in-service for all employees and a standard location for finding the model.

All national guidelines for colorectal cancer screening include colonoscopy as a possible modality for screening [1]. Providing education to patients regarding colorectal cancer (CRC) screening and documenting patient choices are an important aspect of quality primary care. Providing a model of a colon segment with an adenomatous polyp and cancer can help to educate patients about the adenoma to carcinoma sequence and how this sequence can be interrupted with appropriate testing. CRC is the second leading cause of cancer deaths in the US [2]. Unfortunately, one-third of age-eligible adults have not been screened for CRC [3].

Mechanisms for providing education regarding CRC screening options to patients include discussion, videos, printed materials, photographs, videos, anatomical software, and anatomical models. Effective communication between healthcare providers and their patients has been associated with improved quality of care [4]. Provider recommendation for CRC screening is a strong predictor of CRC screening participation [5,6,7] and patients who feel they had sufficient time with their provider are more likely to be screened [8]. Use of an anatomical model with a polyp or cancerous lesion may be useful for patient education and help the patient understand the adenoma to carcinoma sequence. Adding an anatomical model to provider/patient CRC communication may enhance screening rates compared with communication using words alone.

Anatomical models are available for depicting various parts of the body. Surgeons have developed a flexible eye model to demonstrate surgical procedures such as creating a corneal flap that would be difficult to explain with a hard eye model [9]. For nipple reconstruction, a flexible 3D foam model was developed to illustrate how the flap is harvested and the nipple is then created [10]. Facial surgeons found satisfaction scores improved when cleft lip/palate face models, used for patient education were improved when provided in color and post-surgical scar construction [11]. In another study, patients having maxillofacial surgical treatments found that seeing maxillofacial models improved their confidence in the surgeon and helped them understand the various stages of treatment planning [12].

Marks [13] developed a teaching colon model to simulate a learning environment for a flexible fiberoptic colonoscopy. He felt the ideal characteristics of a teaching colon model included: realistic internal likeness of the colon, important pathologic lesions, elasticity, durability, mobility potential, and reasonable cost. If adapting or expanding Marks' (1979) characteristics for the patient learner, additional important factors to include are distinct polyps to view and ability to clean the model easily.

Searching PUBMED from inception to July 2013, using search terms of colorectal cancer and anatomical model, no research literature was found regarding the use of anatomical models for CRC education of patients. In this project, offices of family physicians were provided with a 3.5 inch model of a colon that had polyps and cancerous lesions. The purpose of this study was to assess the use of a colon model provided to family physicians or nurses in (BLINDED) Research Network (BLINDED) family physician offices.

Methods

Colon models were provided to 117 healthcare providers from 117 offices, 77 who had attended one of nine 4-hour statewide educational training sessions focused on CRC screening, 23 who hosted office "Lunch and Learns" regarding CRC screening, and 22 who had previously participated in blinded Research Network CRC research. For a cancer research infrastructure project, outreach was provided to 23 family medicine offices around the state of BLINDED. During these "Lunch and Learn" sessions, information about BLINDED, cancer control issues with an emphasis on colon cancer screening was provided. The session generally was completed in about an hour or hour and half. Participants were

also instructed how to complete the online human subject program to become certified in human subject education. In addition to the “Lunch and Learn” session, nine four-hour training sessions were held for non-BLINDED and BLINDED members. Family medicine offices who were not BLINDED members but whose office was located near the training site were invited to participate. The four-hour training included presentations on colorectal cancer screening methods, recent research findings using BLINDED, and cancer information resources available for family physicians, and their patients. Training and certification in the protection of human subjects for research was also provided by a staff member from the University of blinded Human Subjects office.

BLINDED is a practice-based research network established in 2001 whose purpose is to enhance the health of Iowans. There are currently 315 active members in 191 primary care offices in 76 of Iowa's 99 Counties. Members of BLINDED have participated in previous CRC research that included predictors of CRC testing [6], a study of office systems for CRC screening [14], and a randomized controlled trial to improve CRC screening [15, 16]. All 22 members participating in these studies who had not received a colon model at a “Lunch and Learns” or training session were sent a colon model.

Colon Model

The colon model with polyps and cancerous lesion (referred to as “colon model”) was purchased from Health Edco (www.healthedco.com) for \$89. It came in a 7 x 9 x 2 inch soft carrying bag. Six colorectal abnormalities, five polyps and one invasive cancer, are displayed in the 3.5 inch long flexible colon model. Both flat and stalk-like polyps and cancer are depicted (See Figure 1). The colon model is for educational purposes and can be cleaned with mild soap and water.

Instrument

A 24-item questionnaire was developed to assess use of the colon model. The questionnaire was developed by the research team and reviewed by the Department of Family Medicine faculty researchers. Question structure was mimicked from previous questionnaires used in CRC research. After Institutional Review Board approval, this questionnaire was mailed to healthcare providers who had received a colon model. Two demographic characteristics, birth year and gender, were asked of the participants. Other questions included use of the model, reasons for use of the model, estimated percentage of eligible patients recommended to have CRC screening per month, and estimated percentage of eligible patients shown the model per month, and 14 questions regarding perceptions about use of the model that were rated on a Likert-like scale, 1 = strongly disagree to 5 = strongly agree.

Mailing

A cover letter, questionnaire, and postage-paid return envelope were mailed in the spring of 2013 to 117 potential subjects who were provided a model. Three envelopes were returned from providers who were no longer in practice at their office and these were eliminated from further consideration. Three weeks later, non-responders were sent a duplicate mailing. Three weeks after the follow-up letter, non-responders were telephoned to complete the questionnaire. The instructions on the questionnaire instructed the recipient of the

questionnaire to give the questionnaire to the person who was using the colon model if the model had been given to another person for their use.

Data Analysis

Questionnaire responses were double-entered in Microsoft Excel and verified using a SAS program. Standard descriptive statistics, such as means and frequencies were calculated, and chi-square was used to compare the frequencies between age groups of respondents. The interaction between age/gender was tested by a logistic model. The perception question responses of strongly agree and agree were collapsed together and the strongly disagree and disagree categories were collapsed together, leaving three categories (agree, neutral, disagree) for analysis. Age groups of the healthcare provider respondents were classified as younger at 26 through 54 years of age, and older at 55 years of age and older as the median age of respondents was 54 years.

Results

Eighty-one (71%) questionnaires of 114 were returned; 50 (62%) from the first mailing, 16 (20%) from the second mailing, and 15 (18%) by telephone. Thirty-six (44%) of the respondents reported they had used the model. The mean age of the 58 (72%) reporting age was 53 years, with a range from 26 to 72 years. Thirty-three (41%) of the respondents were male. Of the 81 respondents, 11 (14%) gave the model to someone else in the office to use, 13 (16%) did not answer the question. Thirty-three (41%) reported using the model a mean of 12 times/month with a range of 2 to 50 times since receiving the model.

Thirty-eight (47%) of respondents who reported recommending CRC screening reported that they recommended CRC screening from 1 to 100% of eligible patients they see each month. One respondent reported they do not recommend CRC screening to patients. The mean percentage of patients recommended for CRC screening per month was 39%. Thirty-three respondents reported they used the model for a mean of 16% of their patients with a range of 1 to 80% of patients in a month's time.

Thirty-nine (48%) respondents reported they knew where to find the model in their office. After the study, three physicians requested additional models so a model would be available in each office room. Thirty-one (38%) respondents reported using the model to teach patients about the colon and polyps prior to a colonoscopy. Eleven (14%) reported demonstrating a polyp in the colon and 10 (12%) reported demonstrating a colon cancer after a colonoscopy had been conducted. Other use described by respondents included educating staff to promote patient willingness for colonoscopies, demonstrating the need for colon cancer screening, and teaching patients about yearly fecal occult blood tests.

Thirty-eight to 39 individuals answered the questions regarding perceptions of the colon model (See Table 1). Ninety percent or higher were in agreement that they discussed CRC screening with patients at average risk, felt confident in their ability to counsel patients on CRC screening, that the polyp model was helpful for patient education and demonstrating polyps, and overall, the model was useful (See Table 1). Twenty-six (68%) respondents felt

the patient was more receptive to getting a colonoscopy after seeing the model (See Table 1).

Older aged persons preferred to have a model available in each office room compared to the younger respondents ($p = .006$). No interaction was found between age groups or gender. No other questions regarding perceptions were answered significantly different by gender or age group.

Discussion

This is the first time we are aware of that the use of a colon model in family physician offices has been assessed. This model realistically depicts polyps and cancer to aid in explaining to patients reasons for undergoing CRC screening. However, it was fairly expensive, and we would not have been able to provide these without grant support, which may be why we were unable to find any papers describing its use. Healthcare providers were offered the opportunity to have a colon model in their office. After accepting the model, they were later sent a survey regarding the model's use. Forty-four percent of the respondents used the model for patient education while 68% felt patients were more receptive to getting a colonoscopy after seeing the model. Approximately 50 to 80% of CRCs are preventable or effectively treated if caught early [17,18] and screening rates are increasing with about half to two-thirds of eligible individuals being tested [19,20]. Using a colon model for patient education is one way to potentially enhance screening rates.

It is well-known that a specific provider recommendation for CRC screening has a positive impact on an individual getting screened for CRC [6,7,21]. Lafata and colleagues evaluated the association of the content of the provider's discussion with CRC screening with a focus on using the 5As approach; assess, advise, agree, assist, and arrange [22]. The likelihood of CRC screening increased as more of the 5A steps were used. Future studies could address whether adding an anatomical model to the 5As discussion or to a specific recommendation for CRC screening would further increase the likelihood of CRC screening.

Healthcare providers are educators and provide patient education. They provide advice to an individual matched to that individual's health problems [23]. The patient education process in the office setting is limited by many factors and for learning to occur the cognitive domain is involved causing a patient to recall, apply, and evaluate facts and information. Advising a patient to receive CRC screening is likely enhanced by showing (seeing in one of the strongest senses) the patient a colon model. The lack of literature providing sufficient support on the impact of use of anatomical models on health outcomes suggests that studies need to be designed to assess this relationship more rigorously. Ultimately, it is essential that these models are actually helpful in improving health overall - as opposed to not reducing health burden and worse, increasing health burden. Many factors influence the provider teaching and the patient learning, but overall imparting knowledge is anticipated to improve patient outcomes (See Figure 1). The model shown in Figure 1 was adapted from Wagner and Walsh and McPhee's work [24,25].

Over 90% of respondents agreed that anatomical models were helpful for patient education, the design of the colon model was good, and it facilitated demonstration of colon polyps. This may indicate that use of the model improved physician-patient discussion which may lead to increased CRC screening. Over two-thirds would use the model to help demonstrate colon cancer to their patients. The models were used primarily for patient education before a colonoscopy or the recommendation for annual fecal occult blood testing. An important finding was that 68% of those using the model felt the patient was more receptive to getting a colonoscopy after seeing the model. Of those recommending CRC screening to patients, less than half used the model for education purposes. The model was also used to teach office staff about CRC screening. For patient education, the respondents did not perceive it took more time to explain a colonoscopy with the use of the model and that felt the model was better than a hand-drawn picture demonstrating polyps. Advantages of using the colon model are many, with disadvantages including inability to find the model and the cost of the colon model.

One hundred and seventeen models were purchased at \$89 each for a total of \$10,413. This was an expensive endeavor with only 32% of the colon model recipients reporting they have used the model. Of those using the model, they seemed to be using it frequently with many saying they used it for those 50 years and older most of the time.

The older respondents preferred to have a model in each office room which is logical and convenient. It may be that younger respondents have more energy to track the model down in a central location. Ideally, such a model would be easily accessible in every exam room. If there was only one model per office, it would have to be kept in a central location for all to use and may not be easily accessible in a time-pressed primary care office. Physicians who asked for additional models were provided those models to have more available.

Strengths of the study were that there was an opportunity to provide colon models demonstrating polyps and cancers to family physicians and the excellent response rate for the questionnaire. Even though the response rate was 71%, not all respondents had used the model nor did they complete the entire survey. There were several limitations to this study. The sample consisted of individuals who were potentially more interested in CRC screening than the average family physician, since the focus of the Lunch and Learns, the training sessions, and the CRC randomized, controlled trial was CRC screening. Another limitation was that we did not ask about reasons and barriers to using the colon model. Another limitation was that our question regarding percentage of patients recommended screening did not have the qualifier using the words “eligible patients” or “patients aged 50 years and older,” which resulted in a large range of answers.

The grant supporting this research had a three-year time period. The training sessions and Lunch and Learns were held over a two-year time period. Intentionally, the questionnaire was mailed to potential subjects towards the end of the funding period. Those receiving the education in the final grant year were mailed the questionnaire four months later than those who received the education earlier in the grant period, so that all would have the models to use for a reasonable length of time in order to be able to answer the questions. The time

periods between having the models and receiving the questionnaire varied by a few months among respondents, based on when the training session was conducted.

Future studies could ascertain the usefulness of the model to the patient in terms of education regarding colon cancer screening and whether this influenced them to be screened. This proposed type of study would need to be longitudinal and include documentation of use of the colon model. In addition, tracking of CRC screening and patient outcomes would need to be noted from a chart review 6 to 12 months after education with the colon model.

Affording the opportunity for family physician offices to be provided a model resulted in its use by 44% of the recipients. Providers who used the model educated their patients about CRC screening, felt confident in their ability to educate, and also felt the patient was more receptive to receiving a colonoscopy. Future studies might provide insights into the non-use of this model. Possible recommendations for an office-wide adoption of an anatomical model would be an inservice for all involved in direct patient care and a standard location for finding the model.

Acknowledgments

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Figure 1. Patient Education Day-to-Day Communication in the Practice Setting

Table 1

Perceptions Regarding the Colon Model.

	Agree n (%)	Neutral n (%)	Disagree n (%)
1. Anatomical models are helpful for patient education. (n = 39)	39 (100)		
2. I'm confident in my ability to counsel patients on colorectal cancer screening. (n = 39)	37 (95)	2 (3)	
3. Overall, I didn't find the colon model helpful. (n = 37)		3 (8)	34 (92)
4. I'm likely to discuss colon cancer screening with patients at average risk for colon cancer. (n = 39)	36 (92)	2 (5)	1 (3)
5. The colon polyp model was helpful in demonstrating polyps to patients. (n = 38)	34 (89)	4 (11)	
6. I couldn't find the colon polyp model when I needed to use it. (n = 39)	3 (8)	2 (5)	34 (87)
7. The design of the colon polyp model was good. (n = 36)	30 (83)	6 (17)	
8. It takes more time to explain a colonoscopy with the colon polyp model than without it. (n = 38)	2 (5)	5 (13)	31 (82)
9. It is easier to draw a picture on paper and depict colon polyps than to use the colon polyp model. (n = 38)	3 (8)	6 (16)	29 (76)
10. After showing the colon polyp model, I feel the patient is more receptive to getting a colonoscopy. (n = 38)	26 (68)	11 (29)	1 (3)
11. I would encourage other healthcare professionals to purchase this colon polyp model. (n = 38)	25 (66)	13 (34)	
12. I'm not likely to use the colon polyp model while discussing colon cancer screening with my patients. (n = 39)	8 (20)	6 (16)	25 (64)
13. The colon polyp model should be available in each office room. (n = 38)	20 (53)	10 (26)	8 (21)
14. If our office didn't have a colon polyp model, I would want to buy a model. (n = 37)	16 (43)	17 (46)	4 (11)

* Numbers following each question are the total responses to that question