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Impact of a Multimedia e-Learning Module on Colon Cancer Literacy: A Community-Based Pilot Study

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Background. **We aimed to determine if an e-learning module could improve colon cancer literacy in a community-based cohort, while obtaining variability estimates for subsequent study.**

Methods. **A convenience sample of subjects attending a health-education fair was surveyed to determine colon cancer literacy before-and-after viewing a colon cancer e-learning module. The difference in cancer literacy scores was assessed for significance using univariate analysis.**

Results. **Twenty-two eligible subjects completed the survey: mean age 77.2 ± 7.5 y, 55% women; 67% had at least some graduate-level education. Baseline colon cancer literacy was 72.6% ± 11.6%; after the e-learning module, the mean colon cancer literacy score was 75.5% ± 12.2%, representing a 3% improvement ($P = 0.33$). After excluding a single problematic item identified by item analysis, the adjusted improvement was 7% ($P = 0.04$). Invasiveness, malignant, and metastatic remained poorly understood concepts, while a large improvement (45%) was seen regarding the role of routine lymphadenectomy. Subject satisfaction with the module was universally (100%) high or very high.**

Conclusions. **Use of an e-learning module is associated with high patient satisfaction, and has potential to improve colon cancer literacy in laypersons. Randomized study is warranted to determine the incremental impact of this and other multimedia educational interventions.**

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Key Words: **colon cancer; patient literacy; multimedia; education; e-learning; computer-assisted instruction; individualized medicine.**

INTRODUCTION

As surgical healthcare providers, our professional responsibilities include not just treating or curing patient disease, but also educating patients and their families about their disease process and how surgical treatment impacts future treatment options. E-learning modules, which are interactive, multimedia educational software programs that can be distributed in a variety of formats, have been shown to quantitatively improve comprehension of difficult to grasp ideas by appealing to multiple learning styles at the same time [1]. These modules have been shown to benefit patients by educating them about their disease. In fact, one study found that multimedia educational tools are the single most effective non-provider educational source for cancer patients [2].

Patient educational level has been shown to be associated with survival after cancer surgery [3]. Patients who are knowledgeable about their illness are more active participants in their care and may be more compliant; increased treatment compliance has been shown to be associated with reduced complication rates and improved long-term outcomes [4]. In addition to improving colorectal cancer outcomes, e-learning modules can help prevent disease: two studies found that patients who used a computer-based module that provided education and specific recommendations about colorectal cancer screening were more likely to discuss colorectal cancer with their provider, and more likely to receive colorectal cancer screening [5, 6].

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These e-learning modules, in the form of interactive CD-ROMs or web-based programs, have been used to support preoperative surgical decision-making for prostate cancer and breast cancer, the two most common cancers in the United States in men and women, respectively [7, 8]. However, limited research in this area has been done for colon cancer, the third most common cancer, and the second leading cause of cancer death in the United States. Similar to breast and prostate cancer patients, many colon cancer patients fail to understand how surgical treatment impacts their future treatment options, and ultimately their survival. Additionally, with the recent entrance of the "baby-boom" generation into their sixth decade, it is projected that colon and rectal surgeons will see a 50% increase in the number of patients requiring inpatient surgery for colon cancer in the next several decades in the United States [9].

Therefore, with the anticipated increase in colon cancer operations, combined with a flat or declining population of surgeons in the United States [10], the development of high-quality, cost-effective, empirically-based educational interventions for colon cancer patients is becoming critically important. Ideally, these educational materials should be tailored to individual patient media preferences and preferred learning styles.

In order to assist surgeons in educating patients, we have developed an e-learning module specifically designed to facilitate patient comprehension of concepts, which were felt by experts to be poorly understood by patients. Our overall hypothesis (to be tested in subsequent study) is that use of this e-learning module will improve colon cancer literacy relative to other educational materials. Thus, the primary aim of this pilot study was to assess the feasibility of, and subject satisfaction with, a multimedia-based educational approach, and to determine the impact of the pilot module on colon cancer literacy in the community, while obtaining variability estimates for subsequent study.

MATERIALS AND METHODS

We developed a multimedia educational module with contributions from a multidisciplinary team. This team consisted of two colorectal surgeons, a colorectal research fellow, a medical oncologist, an ostomy nurse, and two medical illustrators. All members were experienced in the care and treatment of colon cancer patients, and one is a colon cancer survivor. The module is based on a PowerPoint (Microsoft Corp., Redmond WA) presentation and includes illustrations (Fig. 1), custom 3-D animations (Fig. 2), photos, text, and narration. Articulate (Articulate Global, Inc. New York, NY) e-learning authoring software was then used to export the PowerPoint presentation to a Flash-based movie, which can be viewed on any computer with a Web-browser. Features of this module include its user-friendly interactive interface (the user is able to navigate through different chapters using DVD style controls), as well as the use of custom 3-D illustrations and animations based on the Zygote biomedical visualization dataset (Zygote Media Group Inc., Lindon, UT). Importantly, the information contained within this module can be delivered to patients in a variety of formats according to individual patient preference, including an interactive CD-ROM, DVD, enhanced booklet, Podcast/iPod (Apple Computer, Inc., Cupertino CA) movie, or *via* the Internet.

Prior to subject enrollment, Mayo Clinic Institutional Review Board approval was obtained. Informed consent was obtained from all subjects prior to administration of the survey and viewing of the module. Our convenience sample was a community-based group of health-education fair attendees. Inclusion criteria were viewing the entire e-learning module, and completing both the pre-test and post-test. Colon cancer literacy was assessed using a survey that assessed knowledge of basic definitions of cancer-related terms, such as malignancy, metastasis, adjuvant therapy, and treatment implications (see Appendix 1). After anonymous collection of demographics, assessment of baseline colon cancer literacy (pre-test), and health information media preferences, subjects viewed a pilot version of the e-learning module. A post-test assessment of colon cancer literacy

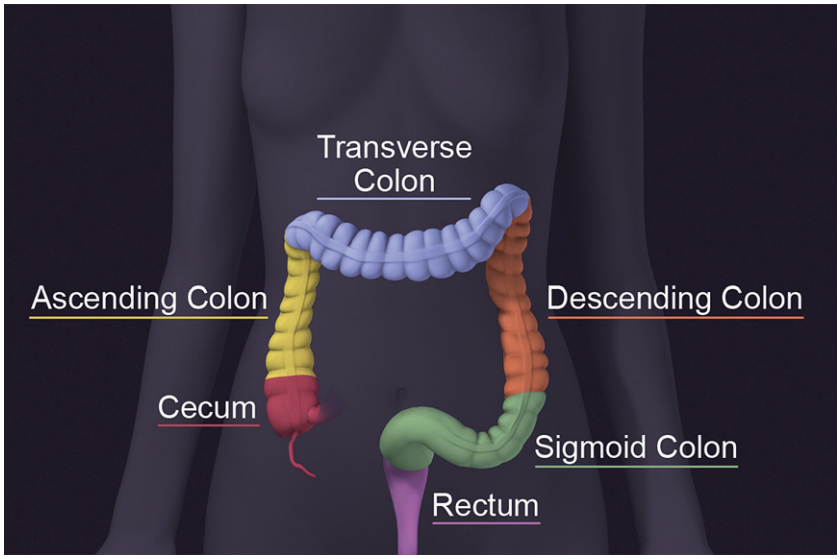

FIG. 1. Sample illustration: Colonic anatomy. (Color version of figure is available online.)