The Impact of a Continuing Education DVD on Rural Physician Cancer Screening Practice Performance

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***Abstract*-This study assessed the impact of an educational DVD containing six current cancer screening guidelines on practice performance of physicians practicing in health professional shortage areas and designated as high cancer cluster regions in Texas. DVDs were delivered to 2,405 physicians in the overarching program, and chart reviews of a subset of 13 physicians were conducted to assess the impact of the DVD. Chart reviews were conducted 12-months after viewing the DVD to assess for screening uptake in an un-screened cohort of patients for breast and colorectal cancer as a proxy measure of the overall impact of the DVD. Results found 33.5% of those who were not adequately screened for breast cancer at baseline were subsequently offered or screened within the year after the physicians viewed the DVD. This was also found in 22.4% of those who were not adequately screened for colorectal cancer. Future studies on multi-modal approaches of cancer screening CE approaches are needed in rural areas.**

Keywords- CE; Cancer Screening; Rural

I. INTRODUCTION

Cancer is a leading cause of death and morbidity in the US, with noted disparities in rural and frontier regions. In Texas, the Cancer in Texas, 2012 report estimated 110,135 Texans will be newly diagnosed with cancer, and 39,072 deaths will be attributable to the disease in the following year [1]. Unfortunately, national and state cancer screening rates do not meet acceptable national standards [2]. Research has documented that while cancer incidence rates in rural versus urban areas are similar, those living in rural areas have higher rates of late-stage cancer at the time of diagnosis [3]. Health care in predominately rural states face unique barriers to healthcare access and educational opportunities for providers. For example, 196 out of 254 counties in Texas are designated rural, comprising approximately 80% of the state total area [4-8]. Geographic distance of rural residents accompanied by the limited number of physicians in rural regions identifies the pressing need to ensure that physicians are prepared and knowledgeable of the most current clinical practice guidelines [9]. The technological limits of some clinics in rural regions and their geographical dispersion result in limited educational opportunities for physicians [10]. Nationally, there is already a slow rate of adoption of prevention guidelines in the clinical practice of medicine [11]. This becomes compounded when access to educational opportunities are limited, especially when recommendations from guidelines frequently change [12].

Research suggests that a face-to-face physician recommendation is the key factor in patient compliance with screening recommendations. Previous work by the authors utilizing national data from the Behavioral Risk Factor Surveillance System of the Centers for Disease Control and Prevention determined that having a personal health care provider is the most important predictor of adequate cervical, breast, and colorectal cancer screening regardless of education or insurance status [13]. These findings underscore the importance of access to primary care providers and ensuring they are up-to-date with current guidelines for adequate cancer screening [14, 15].

Physician continuing education has been shown to be a key factor in the screening and early detection of cancer. Knowledge and awareness of cancer screening guidelines on the part of physicians is a significant predictor of colorectal cancer screening [16-19]. Staff physicians at three university-affiliated hospitals were surveyed to assess knowledge of risk classification and current guidelines for average risk individuals, as well as perceptions of barriers to screening [16]. Results indicated that the physicians lacked knowledge of the recommended screening modalities to appropriately screen average risk individuals [20].

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While adequate cancer screening is impacted by provider, patient, and systems factors, primary care healthcare providers can have a substantial impact when discussing cancer screening with their patients [14, 15], particularly in rural areas that show marked disparities in clinical outcomes for patients. This paper presents data about the impact of an educational DVD containing current cancer screening guidelines on practice performance of physicians practicing in health professional shortage areas that are designated as high cancer cluster regions in Texas.

II. METHODS

A. Program and Evaluation Populations

1) Program Population

The program population included physicians practicing in both whole county Health Professional Shortage Areas (HPSAs) in Texas and high cancer cluster regions of at least one of the following six cancers: skin, lung, colon, breast, prostate, or cervical. These cancers were selected in an effort to match the cancer screening topics on the DVD, which is further explained below. Areas with high cancer mortality rates in Texas were identified by previous work done by Zhan and Lin who conducted a spatial cluster analysis to detect high-risk areas for cancer mortality for 16 common cancers. Based on the HSPAs and high cancer cluster criteria, primary care physicians (family medicine, internal medicine, and obstetrics/gynecology) practicing in 78 counties were targeted for the educational program. A final list of 2,458 practicing primary care physicians with a primary practice address within the 78 counties was obtained from the Texas Medical Board [21].

2) Educational DVD and Distribution

The DVD was 1-hour in duration and contained cancer prevention lectures delivered by selected Tarrant County, Texas specialists for the following seven cancers: colorectal, breast, cervical, ovarian, prostate, lung, and skin. The content of each lecture was standardized by the investigators and included a discussion on the epidemiology of the cancer, risk factors, risk stratification (if applicable), and recommended cancer screening guidelines. The guidelines used for the program were from the United States Preventive Services Task Force (USPSTF) to ensure evidence-based recommendations were provided.

3) Evaluation Population and Sample Size

The funding source of the program precluded research approaches, including randomization and having a control group. Hence, the evaluation was developed for programmatic purposes with a sample size calculation based on an estimated 30% increase in adequate breast and colorectal cancer screening 12-months after providers view the DVD. Since clustering effects are likely, an intra-class correlation coefficient of 0.01 was used to calculate a sample size of 240 chart reviews needed for each cancer. A minimum of 8 providers (i.e., clusters) with 30 charts each was needed to achieve a power of 80% with a two-tailed alpha of 0.05 [22]. A convenience sample of 15 rural physicians was identified and recruited to assess the impact of the DVD on cancer screening behaviors. Oversampling of physicians occurred to address potential physician attrition and the possibility of not achieving 30 charts reviews per physician. Internal or family medicine physicians who were members (non-faculty) of the rural track program at the university practicing in a Texas HPSA designated area were eligible. The list was in random order and each provider was consecutively approached until 15 physicians agreed to participate. Thirteen of these physicians completed the informed consent processes and completed all aspects of the study. Each of these 13 providers serves a practice panel that ranges from approximately 1,000 to 2,500 patients. This cohort of providers is geographically dispersed, and serves as the proxy evaluation method for the DVD's impact and the overall program. Each physician received 1 hour of continuing education credit for their participation. Study procedures were approved by the University of North Texas Health Science Center's and UT Southwestern Medical Center's Institutional Review Boards.

Approximately 1 week before the DVDs were mailed, a one-page letter about the program, DVD, and its purpose were sent to the 2,458 physicians. Based on returned letters, which were assumed to have invalid addresses, 2,405 DVDs were successfully delivered.

B. Evaluation Outcome Procedures and Timeline

All 13 consented physicians received an email invitation to take an online survey about personal and practice characteristics within one week after providing consent. The physicians were given a deadline of 2 weeks to complete the survey once they received the invitation. Upon completion of the survey, the DVD was mailed to physicians and a follow-up phone call was made to ensure it was received. The physicians were given four weeks to watch the DVD and were instructed to contact the program coordinator once they completed watching the DVD.

Changes in physician behavior were assessed for evidence of adequate cancer screening recommendations through medical chart reviews among the 13 physicians for breast and colorectal cancer only. Program staff performed all charts reviews once the clinic staff provided a list of patients meeting age and visit criteria discussed below. These two cancers were used as proxy measures for the overall impact of the DVD as study resources limited the program's ability to review other cancers. Also, these two cancers were chosen as they both included patients 50 years and older and have clear recommendations on frequency of testing. Therefore, it remains unclear if the DVD impact screening procedures of the other cancer that are presented.

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C. Study Measures

1) Demographic and Practice Measures

Physician demographics, practice history, patient population demographics and clinic volume were collected. Physician cancer screening practice was measured in several areas: genetic testing, age of patients at start of screening, patient education, frequency of screening recommendations, amount of screenings ordered, performed, or referred during the past month, types of screening recommended, and the percentage of patients each physician considered current on their cancer screening recommendations.

2) Adequacy of Colorectal or Breast Cancer Screening Chart reviews

Eligible medical charts for the study included patients that were over the age of 50 whom:

1. Had one visit during the 12 months prior to the time the physician completed the pre-test survey
2. Were not considered adequately screened for either colorectal or breast cancer at the time the physician completed the pre-test
3. Had completed at least one clinic visit during the 6 months following the completion of the post-test survey.

Based on these criteria, the evaluation cohort (i.e., patient charts) only represents patients who were not adequately screened at the time the physician viewed the DVD. As a result, 218 and 339 charts were eligible and reviewed for adequacy of breast and colorectal cancer screening, respectively, 12-months after confirming the viewing of the DVD. They were assessed for physicians' recommendation and completion of colorectal and/or mammography screening. Some charts were eligible for both breast cancer and colorectal cancer screening resulting in 422 unique eligible charts. Adequacy of colorectal and breast cancer screening were determined by algorithms using clinical notes, test orders, referrals, and consult notes based on risk status of the patient. A patient's risk was determined as "average risk", "increased risk", or "high risk" by the patient's medical history, and adequate screening was based on recommendations for a patient's specific level of risk determined by age, gender, race/ethnicity, family history of colorectal/breast cancer, smoking history, radiation history to the chest, alcohol consumption, obesity status, and other established risk factors. No identifying information other than age, gender, and race/ethnicity were collected from the medical charts.

Differences in adequate breast and colorectal cancer screening from chart review data were based on the percent increase from baseline since all medical charts represented patients that were inadequately screened before the DVD was provided to physicians.

III. RESULTS

A. Practice Demographics

Participant and clinic demographic characteristics are presented in Table 1. Approximately 85% of physicians had a single-specialty practice, and most (92%) had either a solo-practice or worked with 2-5 other physicians. Eleven (85%) physicians were white, and two (15.4%) were Hispanic. More than a half (53.8%) of physicians saw between 76-100 patients per week. Physicians were on average 50.7 (sd=7.4) years of age with 19.8 (sd=9.0) years of practice experience.

B. Chart Review Results

A total of 218 and 339 charts were identified as having not been adequately screened for breast and colorectal cancer screening, respectively. Seventy-three (33.5%) of those who were not adequately screened for breast cancer prior to when the physician completed the DVD course were offered or ordered the appropriate screening in the year after the physician completed the DVD. Twenty of these women (27%) had no documentation of previous mammograms prior to the study. Seventy-six (22.4%) of those who were not adequately screened for colorectal cancer prior to when the physician completed the DVD course were offered or ordered the appropriate screening in the year after the physician completed the DVD. Sixty-four of these individuals (84%) had no documentation of previous colorectal cancer screening. An accurate estimate of racial/ethnic distribution is not available due to lack of documentation in patient charts.

IV. DISCUSSION

There is a significant need for ongoing educational opportunities on current cancer screening guidelines. One study analyzed the medical records from 24 community-based primary care practices for cancer screening reports (5,124 charts). Completion of all screening tests appropriate for age and sex occurred for only 8.6% of women aged 40-49, 3% of women 50 years and older, and 5% of men 50 years and older [25]. The most significant predictor for documented cancer screening was a health maintenance visit. In another survey of over 400 family practice physicians and internists, 46% reported that they needed more information on how to manage suspicious mammography findings and how to counsel patients about their cancer risk. Additionally, a wide variation in physician awareness and adherence to cervical cancer screening guidelines has been documented in Texas [26]. In a cancer control article on 12 systematic reviews of physician interventions, it was concluded that physician training produced consistent effects on attitudes and knowledge, but inconsistent effects on patient screenings [27]. Our study demonstrated an increase in both breast and colorectal cancer screening among a population of previously

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inadequate screened patients whose physician underwent a DVD education intervention 12 months prior [28].

There has been a debate about continuing education (CE) and its impact on clinical performance measures and physician behavior change. Growing evidence shows that CE can have a significant impact on physician performance and patient outcomes. A series of articles in a 2009 Chest journal supplement presented guidelines and evidence about CE's effect on practice performance and clinical outcomes. CE activities with a single delivery mode, such as the DVD presented in this study, or multiple delivery modes were found to have a positive impact on practice performance measures. Print material had less of an impact according to these studies [29-31]. Individual CE studies on colorectal and breast cancer screening, post-partum depression, palliative oncology, and inappropriate prostate-specific antigen testing have also found significant impacts on either provider behaviors and/or practice performance [16-18, 32, 33].

CE's impact on practice performance and physician knowledge has been shown to be dose and exposure dependent. One study found CE activities that are designed and tailored based on the needs of an individual provider to have the greatest impact [34-39]. Moreover, CE activities that are offered in a multi-modal approach appear to have a greater impact. This was also demonstrated by a meta-analysis utilizing 31 studies. The impact of CE on physician knowledge had, on average, a modest effect size, and even smaller effect sizes for physician performance and patient outcomes. However, the effect size was much greater when CE interventions were interactive, multi-modal, and/or designed in small group settings [36-38].

Our study found increases in both breast and colorectal cancer screening in a previously inadequately screened population. This phenomenon has been demonstrated in other research as well. Cancer prevention knowledge of physicians, in general, is high and studies that try to assess an intervention's impact on physicians' knowledge are limited by the ceiling effect of high baseline scores. A CE study on obstetricians/gynecologists and post-partum depression found that while knowledge, attitudes, and beliefs (KAB) did not change, there were positive changes in practice performance. Another study of 84 primary care physicians found no differences in baseline knowledge of cancer prevention or screening. Hence, it appears that measure of subjective outcomes, especially with survey instruments, in CE research is limited to the discriminating properties of the instruments used and high baseline measures of providers. The small number of providers in the current study precluded the analyses of KAB for this reason. However, the practice performance effect is measureable (i.e., 1,000 to 2,500 patient panel per provider). Hence, the impact of CE interventions is better assessed through measuring practice performance and patient outcome changes [33, 34].

Well positioned and informed primary care providers have a profound impact on both recommendations and completion of cancer screening tests, as indicated in two previous studies by the authors. This finding was persistent after taking into account socioeconomic factors and health insurance status. Individuals with at least 1 personal healthcare provider were approximately 3 times more likely to be adequately screened for colorectal cancer and breast cancer, and 2.5 times more likely to be adequately screened for cervical cancer [14, 15]. Hence, it is imperative that providers, especially in rural regions, are armed with accessible and up-to-date cancer screening guidelines. The growing reliance on technology has changed how CE is offered. Nonetheless, internet-based and electronic CE has been shown to still impact physician performance and patient outcomes, with multi-modal approaches having the greatest impact [36, 39].

There are limitations to the study that must be noted. The cross sectional nature of the program and the lack of a comparative group preclude establishing causation. The small number of providers in the evaluation limits physician-specific measures such as beliefs, attitudes, and knowledge. Only 218 eligible charts were identified for the breast cancer screening evaluation reducing the power to 75%. The results of the study cannot be generalized to the general population due to the rural nature of physician practices evaluated and the lack of a randomized control study design. Another consideration is the Hawthorne effect and potential selection bias by physicians agreeing to participate in the study compared to other physicians who received the DVD. While the current study utilized one CE intervention (i.e., the DVD), future studies and programs must assess the impact of a multi-modal CE approach in cancer screening guidelines, especially for rural providers to meet their specific needs and barriers [40]. Future studies using a comparative methods approach with multi-model CE interventions are needed, especially in vulnerable regions such as rural and frontier regions. There is a lack of quality research on CE and cancer screening practice performance, especially in rural/frontier regions.

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Table 1. Demographic and practice characteristics physician participants

Variable	**N=13**	**(%)**
Practice Arrangement		
Full or part-owner of a physician practice	9	(69.2%)
Employee of a hospital, clinic, or university	2	(15.4%)
Other	2	(15.4%)
Race/Ethnicity		
White/Caucasian	11	(84.6%)
Black/African American	0	(0%)
Hispanic	2	(15.4%)
Other	0	(0%)
Specialty		
Family Practice	12	(92.3%)
Family Practice/Obstetrics	1	(7.7%)
Single/multi-specialty		
Single-specialty	11	(84.6%)
Multi-specialty	2	(15.4%)
Number of physicians in practice		
1	5	(38.5%)
2-5	7	(53.8%)
100+	1	(7.7%)
Percent of Patients 50 or older		
Less than 25%	1	(7.7%)
25-49%	2	(15.4%)
50-74%	10	(76.9%)
Percent of Patients covered by managed care		
1-25%	3	(23.1%)
25-49%	7	(53.8%)
50-74%	3	(23.1%)
Number of patients in a typical week		
76-100	7	(53.8%)
101-125	3	(23.1%)
126 or more	3	(23.1%)

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	Mean	**(sd)***
Physician Age	50.7	7.4
Years in Practice	19.8	9.0
Percent of patients who are female	57.7	6.4

* sd = standard deviation

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