Brief Continuing Medical Education (CME) Module Raises Knowledge of Developing Country Physicians

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Abstract

Breast cancer incidence in Pakistan is the highest reported in any South-Central Asian country. It is the most frequent malignancy in women, where it accounts for 38.5% of all female cancers. About half (43.7%) of all breast cancers are locally advanced. We recruited 183 primary care physicians in Pakistan and invited them to attend educational conferences using an educational module about breast cancer risk factors, diagnosis, and management. We tested the knowledge, attitudes, and practices of physicians. Knowledge was tested before and after the educational module. Data analysis determined the effect of demographics, medical education, and prior training of physicians on modulating the differences in knowledge between pre-test and post-test evaluations. Our analysis showed a statistical significance in overall improvement for all knowledge based questions in detection, management and referral of breast cancer (P=0.0001). The additional knowledge provided from the continuing medical education sessions contributed to improvement in knowledge of the physicians. Improved knowledge about early breast cancer detection may improve patient referral and survival. Results from this study could be used to guide the implementation of future cancer continuing medical education programs for primary care physicians in developing countries.

Key Words: *Professional Education, Primary Care Physicians, Early Detection, Developing countries, Pakistan*

Introduction

Breast cancer is by far the most frequent cancer of women and is a major public health problem in many developed and developing countries[1]. In addition to being a life threatening disease, it has major impact on women's quality of life and on society at large in terms of economic burden, such as reduced productivity and premature death. The average 5-year survival for breast cancer in developed countries is 73% and in developing countries is 57%[2]. Age-adjusted breast cancer death rates have declined in the developed countries, due to screening and early detection practices. Unfortunately, public and professional knowledge, attitudes and practice (KAP) that have helped control cancer in developed countries are often not readily available in developing countries[3].

Advanced breast cancer has high morbidity and mortality and is more resource intensive to treat. Measures to reduce the stage at diagnosis are likely to have the greatest overall benefit in terms of both survival and costs. There is considerable indirect evidence from studies that clinical breast examination (CBE) can be recommended as a method for detecting breast cancer for public health benefit. It is easy to perform, is inexpensive and it can be readily taught to health care providers. CBE should be part of any program for early detection of breast cancer worldwide, provided that follow-up medical and oncology care is available[4]. Continuing medical education (CME) of primary care physicians plays a major role in educating primary care physicians and raising their awareness to recent advances in early detection and cancer control updates[5].

This study was designed to measure the effect of a CME breast cancer educational module on knowledge of primary care physicians in Pakistan.

Methods

We recruited 183 primary care physicians from both public and private practice to attend one of three identical continuing medical education conferences where they were pre- post-tested before and after the presentation of a breast cancer educational module. Our pre- and post-test aimed to measure current knowledge about general, inflammatory (IBC) and locally advanced breast cancer (LABC). Our Powerpoint-based educational module included: breast cancer risk factors, early detection by breast clinical examination and appropriate referral.

Participants

All 183 participating physicians were practicing primary care physicians from 3 selected locations, Gujranwala (56), Faisalabad (53) and Lahore (74)**.** These locations were rural, semi-urban, and metropolitan, respectively. A total of 133 completed both questionnaires. Female to male ratio of participants was 1.26: 1. The male: female ratio of primary care physicians in the study was representative of the physicians' population in the study region and Pakistan **(Table 1)**. It should be noted that the Pakistan government health system has introduced cadres of female health practitioners in response to gender-based constraints on women's access to services[6]. There is increasing desire by women for having their primary care and women's related illnesses seen by female physicians. In communities where inequality of sexes is observed, gender-based limitations on women's access to health care have been identified as important reasons limiting health outcome improvement[7,8]. National programs in Nepal, Bangladesh, India, and Pakistan have recruited large number**s** of women to fill primary health care positions and responded to local women's preferences for female primary health care physicians[9,10].

The three medical schools of graduation by percentage were: Punjab Medical College (30.5%), Allama Iqbal Medical College (20.3%), and Fatima Jinnah Medical College (13.6%). The majority of participants were recent graduates (less than 10 years). Over 37% indicated that they had received post-graduate training. The primary places of practice were university hospitals (39.3%) and urban clinics (35.1%). Participants were made aware of the study protocol verbally by outlining details of the study and they consented to participation in the study. Participants were given personal numerical identifier and consequently completed our English language questionnaires.

The questionnaire

A questionnaire composed of 50 questions solicited information regarding physician's knowledge, attitudes, and practices toward breast cancer. Breast cancer related knowledge was assessed by nine general questions on breast cancer risk, causes, symptoms, and screening methods under the general breast cancer *knowledge* section. Fifteen

questions were assessed exclusively for inflammatory breast cancer (IBC), thirteen questions for IBC and mastitis under the IBC knowledge section. Nine questions were focused on locally advanced breast cancer under the advanced breast cancer knowledge section. Furthermore, five questions assessed attitudes, and four questions measured current breast cancer detection practices. For each knowledge item, the study subjects selected one statement that appeared 'true' or 'false' to them from a provided set of alternatives. An Education Module in PowerPoint format was presented by a local instructor physician. The five-part module included the following: a) introduction, epidemiology, and scope of the breast cancer problem in Pakistan, b) diagnosing and treating breast cancer, c) highlighting self and clinical breast exam, d) emphasizing the importance of referral to appropriate cancer centers and, e) familiarizing participants with breast cancer, including inflammatory breast cancer. The presentation of the educational module was approximately 30 minutes. The pre- and post-questionnaire testing, each required 45 minutes to complete.

We tested the reliability and validity of the educational module and the study questionnaires before conducting this study and others using the same module and questionnaire[11]. Test-retest reliability of the questionnaire on 25 physicians showed agreement on most questions and helped the elimination of 6 questions, not included in this study. The correlation of test and retest scores 2 weeks later was 0.81. A panel of 13 physicians with backgrounds in cancer education, surgical oncology, medical oncology, cancer prevention, nursing, and epidemiology rated the content validity of the module and the questions. Eighty-five percent of the panel members thought that the module did an excellent or very good job covering the important concepts in risk factors, diagnosis, and management of breast cancer. Comments of the panel helped us to improve the module and questions to the final form at its delivery in this study.

Statistical Methods

Univariate analysis, based on McNemar's test, was used to compare the proportion of correct responses for each question on the pre- and post-test evaluations. Based on the results of the univariate analyses, we grouped the questions as follows: (1) those questions on which participants improved (i.e. proportion of correct responses increased) after the educational module, (2) those questions on which participants did not show any significant change after the educational program, and (3) those questions on which participants did worse after the educational program. For questions on which there was a significant change in knowledge after the educational program, we performed logistic regression analyses to determine the effect of demographics, medical school, and prior postdoctoral training.

Results

There was a statistically significant pre- to post-test improvement for all knowledge questions in the general breast cancer, IBC, LABC sections.

General Breast Cancer Knowledge

Regarding general breast cancer related questions, the educational module increased physicians' knowledge on how breast cancer risks may be reduced, how early diagnosis of breast cancer requires less treatment, and when to perform breast self exam. Physicians' knowledge about the importance of early diagnosis of breast cancer also improved from 58% on the pre-test to 74% on the post-test (p= 0.0025). We observed improvement in knowledge about probable risk factors related to breast cancer such as alcohol intake, physical exercise, fruit and vegetable consumption, and body weight (p=0.0001, p=0.0001, p=0.0164, p=0.0001, p=0.0025, respectively).

After controlling for postgraduate education and number of breast cancer cases seen in the prior year, the odds of knowing that exercise may reduce the risk of breast cancer was 4.2 times greater at post-test than at pre-test, (95% CI: 2.6 to 6.9, p=0.0001). After controlling for postgraduate education and number of breast cancer cases seen in the prior year, the odds of knowing that the best time to perform a breast self exam. (BSE) is not 10-15 days after the end of menstruation was 3.3 times greater at post-testing than at pre-testing, (95% CI: 3.0 to 5.6, p=0.0001). After controlling for postgraduate education and number of breast cancer cases seen in the prior year the odds of knowing that KRAS is related to hereditary breast cancer was 4.5 times greater at time 2 than time 1, (95% CI: 2 to 10.1, p=0.0003).

Knowledge of IBC

The majority of physicians had heard of IBC (72%). Physicians' knowledge about a palpable mass not always being present in IBC improved from 41% pre-test to 60% post-test (*P*=0.0004). Physicians' knowledge about permanent change in women developing inverted nipples with IBC improved from 67% on the pre-test to 79% on the post-test (*P*=0.0218). Physicians' knowledge about symptoms

(fever and high white blood cell count) that could not be associated with IBC improved from 11% to 28% for fever (P=0.0124) and 16% to 35% for blood cell count (P=0.0106), on the pre- and post-test, respectively. Physicians' knowledge about not prescribing more antibiotics to patients with symptoms lasting for more than one week of antibiotic treatment improved from 49% on the pre-test to 86% on the post-test (P=0.0001) and appropriate referral to a cancer center improved from 65% on the pre-test to 92% on the post-test (P=0.0001).

The multivariate analysis showed that, in general, time since graduation and seeing more than 50 breast cancer cases in the previous year influenced IBC knowledge gain and general breast cancer knowledge gain (**Table 3**).

LABC

The majority of physicians had heard of LABC (79%). Knowledge of diagnosis, staging, and treatments of LABC measured on the post-test was significantly improved (**Table 2**). Physicians' knowledge about proceeding with a biopsy after an abnormal mammogram on a patient with a lump in the breast improved from 82% on the pre-test to 90% on the post-test (P=0.0348). Physicians' knowledge about the importance of mammography in the presence of nipple discharge, improved from 81% on the pre-test to 95% on the post-test (P=0.0023). Physicians' knowledge about clinical signs was improved for diagnosing LABC, for the following definitions: fungating tumor (P=0.0348), erythema (P=0.0027), supraclavicular lymph nodes (P=0.0029), and low or deep cervical lymph nodes (P=0.0027).

After controlling for postgraduate education and number of breast cancer cases seen in the prior year, the odds of knowing when to perform a biopsy after an abnormal mammogram was 2.1 times greater on the post-test (95% CI: 1.0 to 4.3, P=0.0496). After controlling for postgraduate education and number of breast cancer cases seen in the prior year, the odds of knowing that erythema is part of the definition for LABC was 2.7 times greater on the post-test, (95% CI: 1.3 to 5.6, P=0.0063) and supraclavicular lymph nodes was 2.4 times greater on the post-test (95% CI: 1.2 to 4.9, P=0.0129).

Attitudes

Physicians' attitudes about the importance of physical examination of the breast and BSE were high at both pre- and post-test. It appears that almost the same proportion of physicians believed that they had received adequate training for performing CBE during their medical school education, that since medical school they had improved their performance of CBE with additional training or workshops, and that the absence of mammography prevents them from accurately detecting breast cancer (**Figure 1**).

Clinical Practice

Only 13% of physicians had encountered over 50 breast cancer cases in the past year. In regards to the frequency that physicians practice CBE; 45% said they never performed CBE, 44% did it less than half of the time, and only 1% reported performing it regularly. The male to female ratio was 3:1 among physicians who reported "never performing clinical breast examination". Of those who perform CBE, 98% of physicians said they checked for asymmetry, 100% checked for nipple retraction, 85% checked for dermatitis, 84% checked for edema, and 34% checked for other signs of breast cancer. Forty percent of participants reported never inquiring about family history of breast cancer when examining patients with suspected breast cancer.

Summary of Results

Primary care physicians in Pakistan have a good foundation in understanding the definition, symptoms, and proper management of patients, regarding different types of breast cancer. There was a statistically significant overall improvement for all knowledge-based questions in the general breast cancer, inflammatory breast cancer, and locally advanced breast cancer sections (P=0.0001). In general, physicians with longer time in practice after graduation and those seeing at least 50 breast cancer cases had greater knowledge gain on general breast cancer and IBC sections. On average, over 90% of participants unanimously view clinical and self breast examination as important cancer risk prevention practices, yet less than 50% physicians practice CBE on the majority of their female patients. This practice is not consistent with their view on the importance of screening and prevention practices.

Discussion

This is the first study to assess educational needs for breast cancer diagnosis among primary care physicians in Pakistan, where breast cancer cases are typically diagnosed at advanced disease stages. The study showed that primary care physicians in Pakistan lacked sufficient knowledge in areas related to epidemiology and genetics of breast cancer, and in differential diagnosis between IBC and mastitis. Deficient knowledge was also observed relative to

management and treatment policy, including referral of patients to specialized cancer centers. Our educational program improved physicians' knowledge in the areas of limited knowledge.

Effectiveness of educating primary care physicians in early detection of breast cancer through different educational interventions have been reported in several studies in the United States. For example, Vetto et al.[5], showed that education using silicone breast models aided in improving primary care physicians sensitivity skills in clinical breast examinations in Oregon. Lane and Messina[12], in Long Island, showed that self-taught courses helped in improving family physicians knowledge about breast cancer screening. Furthermore, educational programs, similar to ours, involved small group discussions with faculty in oncology improved Knowledge of primary care physicians about genetic testing for breast cancer[13].

Our study had several strengths and a few limitations. The strengths were: 1) targeting a country with a relatively high frequency of more aggressive type of breast cancer and late-stage presentation for all breast cancer, and 2) a brief and easily implemented educational module and evaluation questionnaire. The cross-sectional nature of the study limited investigating the impact of the educational module on retention of knowledge and change in physicians' attitudes; future longitudinal studies would be beneficial. The conclusions from the attitudes and practice questions of this study are limited. We recognize this point and focus on knowledge as the main factors in this study. The low clinical breast exam rate was an interesting observation, but it may parallel other disease prevention and screening practices in developing countries. The male to female ratio of 3:1 among physicians who reported "never performing clinical breast examination" was also an interesting observation. This point adds to the importance of recruiting female primary care physicians in developing countries. It also adds to the need for investigating the complex social environment and cultural sensitivity between male physicians and female patients in special communities where cultural and religious traditions may constrain access and delivery of essential health care services.

This study provides the first assessment of the KAP of primary care physicians in Pakistan and, as such, represents the best available knowledge on KAP in Pakistan primary care physicians' population at present. In addition, the results from this study could also be used to guide the implement future cancer CME programs for primary care physicians in developing countries with oncology treatment centers. Our resources made a long-term follow-up of knowledge retention impossible. However, physicians are generally among the most intelligent people in the workforce and their ability to retain knowledge is remarkable. We intend to re-evaluate the persistence of change on the same set of physicians in future studies to assess such lasting effect.

We evaluated the educational module in other developing countries[11]. We found a concordance between improving knowledge using this module in Egypt and Tunisia, similar to our results reported here about Pakistan. Certainly, the PowerPoint presentation should not be the only tool to guide future implementation of future cancer education of primary care physicians in developing countries. Clearly, screening and early diagnosis of most diseases is sometimes a low priority in countries with very few resources. However, a large number of developing nations are moving toward disease prevention strategies and this is reflected in changes in the medical school curriculum. However, we learned that these countries rarely have the CME infrastructure to update the KAP for physicians already in practice. Our application of this module in the 3 developing countries showed how eager the practicing physicians were to have the opportunity for this brief educational program. Many developing countries must build an infrastructure for delivering CME on a regular basis. This will require modification of the organizational and training policies in developing countries to achieve the goals of future educational programs.

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Table 1. *Characteristics of Study Population of Physicians in Pakistan*

	N (%)
Participants from Designated Cities	
Faisalabad	53(28.96)
Gujranwala	56(30.60)
Lahore	74(40.44)
Gender	
Female	100(55.87)
Male	79(44.13)
Post-Graduate Education	
Yes	61(37.42)
No	99(60.74)
% Time Spent Practicing Medicine	
<=10%	37(26.06)
25%	61(42.96)
50%	27(19.01)
Years Spent Practicing Medicine	
<=5	70(49.3)
6-10	25(17.61)
Percentage of Time Spent on Clinical Administration	
<=10%	59(52.21)
25%	31(27.43)
Years Spent on Administration	
<=5	58(54.21)
6-10	19(17.76)
Breast Cancers Cases Encountered in Last Year	
0	17(13.93)
1-10	55(45.08)
11-50	34(27.87)

Table 2. *Questions Showing Significant Change from the pre to the post-test*

Positive Improvement			
Question	**% Correct**		
	Pre	**Post**	**p-value**
Alcohol intake as BC risk	31.37	54.90	0.0001
Exercise as BC protective factor	50.89	80.36	0.0001
Fruit&Veg consumption as BC protective factor	72.73	82.73	0.0164
Body weight as BC risk	74.14	93.97	0.0001
BC requires less treatment if diagnosed early stage	58.25	73.79	0.0025
BSE performed 10-15 days after end of menstruation	21.19	48.31	0.0001
LNE can be a sign of BC when absence of breast mass	51.25	65.00	0.0023
Hereditary genes may influence occurrence of BC	91.15	99.12	0.0027
If IBC diagnosis palpable mass will always be present	41.30	59.78	0.0004
Inverted nipples with IBC change is usually permanent	66.67	78.49	0.0218
Fever associated with IBC	10.53	27.63	0.0124
High white blood cell count associated with IBC	16.22	35.14	0.0106
Peau d'orange associated with IBC	88.31	98.70	0.0114
LNE as criteria to detect IBC when performing CBE	89.74	98.72	0.0196
Stop antibiotics after 1 week even if symptoms persist	48.98	85.71	0.0001
Refer to a cancer center after 1 week of antibiotics	64.94	92.21	0.0001
Breast lump and abnormal mammogram, perform biopsy	81.48	90.12	0.0348
Nipple discharge then proceed to mammogram	81.25	95.00	0.0023
LABC involves fungating tumor	85.07	95.52	0.0348
LABC involves erythema	64.52	83.87	0.0027
LABC cancer involves supraclavicular lymph nodes	57.14	77.78	0.0029
LABC involves cervical lymph node	36.84	57.89	0.0027
Neo-adjuvant chemotherapy to treat patient with LABC	95.06	100	0.0455
Participants Performed Worse in Post-test			
Biopsy should be advised after treating presumed mastitis with antibiotics and symptoms are not relieved	84.38	67.19	.0116

SCN = supraclavicular node LNE = lymph node enlargement BSE = breast self exam BC = breast cancer
AT = antibiotic treatment LABC = locally advanced breast cancer

Table 3. *Multivariate models of improvement in physicians' knowledge after controlling for year since graduation, postgraduate education and number of breast cancer cases seen in prior year of medical practice*

-General Breast Cancer Section-

Question(s)	**Time since graduation OR (95% CI) p-value**	**Postgraduate Education OR (95% CI) p-value**	**BC cases OR (95% CI) p-value**
Alcohol intake as BC risk	2.6(1.6,4.2) p=.0002	1.2(.60,2.5) p=.5791	1.0(.71,1.3) p=.8159
Exercise as BC protective factor	4.2(2.6,6.9) p=.0001	1.8(.84,3.7) p=.1308	1.0(.69-1.4) p=.9687
Fruit&Veg consumption as BC protective factor	1.9(1.1,3.2) p=.0135	.65(.29,1.5) p=.3051	1.1(.77,1.6) p=.5399
Body weight as BC risk	5.4(2.3,12.4) p=.0001	.90(.37,2.2) p=.8049	1.0(.66,1.4) p=.8947
BC requires less treatment if diagnosed early stage	2.1(1.3-3.4) p=.0017	.75(.36-1.6) p=.4450	1.2(.90-1.7) p=.2008
Exam of SCN in suspected BC patient	14.3(2,103) p=.0084	1.5(.36,6.4) p=.5758	1.5(.78,2.8) p=.2308
Bone scanning in suspected BC patient	3.3(1.7,6.5) p=.0006	.93(.39,2.2) p=.8755	1.2(.84,1.7) p=.3325
Whole body irradiation as possible BC treatment	3.1(1.5,6.5) p=.0031	1.4(.48,3.9) p=.5619	.64(.37,1.1) p=.1212
BSE performed 10-15 days after end of menstruation	3.3(2.0,5.6) p=.0001	1.2(.59,2.4) p=.6370	1.2(.85,1.6) p=.3503
LNE can be a sign of BC when absence of breast mass	1.7(1.2,2.4) p=.0030	.5(.2-1.2) p=.1185	1.0(.74,1.5) p=.8219
Hereditary genes may influence occurrence of BC	12(1.4-110) p=.0251	.27(.06,1.3) p=.0951	2.4(1.2-4.5) p=.0104
P53 related to hereditary breast cancer in women	3.5(1.9,6.3) p=.0001	1.9(.5,7.7) p=.3400	.8(.6,1.2) p=.3480
BRCA1 related to hereditary breast cancer in women	4.8(1.9,12.3) p=.0012	.3(.07,1.0) p=.0521	1.3(.7,2.2) p=.4200
KRAS related to hereditary breast cancer in women	4.5(2,10.1) p=.0003	3.6(1,13.3) p=.0536	1(.65,1.7) p=.8360
MLH1 related to hereditary breast cancer in women	3.4(1.4,7.9) p=.0054	1.1(.27,4.4) p=.8930	1.5(1,2.2.0) p=.0629
BRCA2 related to hereditary breast cancer in women	4.4(1.1,17.2) p=.0352	1.6(.42,6.0) p=.5023	1.2(.67,2.0) p=.6007
BRCA3 related to hereditary breast cancer in women	11(4.6,25.1) p=.0001	.4(.11,1.2) p=.0973	.9(.57,1.4) p=.5674
BRCA4 related to hereditary breast cancer in women	9.2(4.2,20) p=.0001	.4(.14,1.3) p=.1336	1.3(.82,2.0) p=.2860

-Inflammatory Breast Cancer Section-

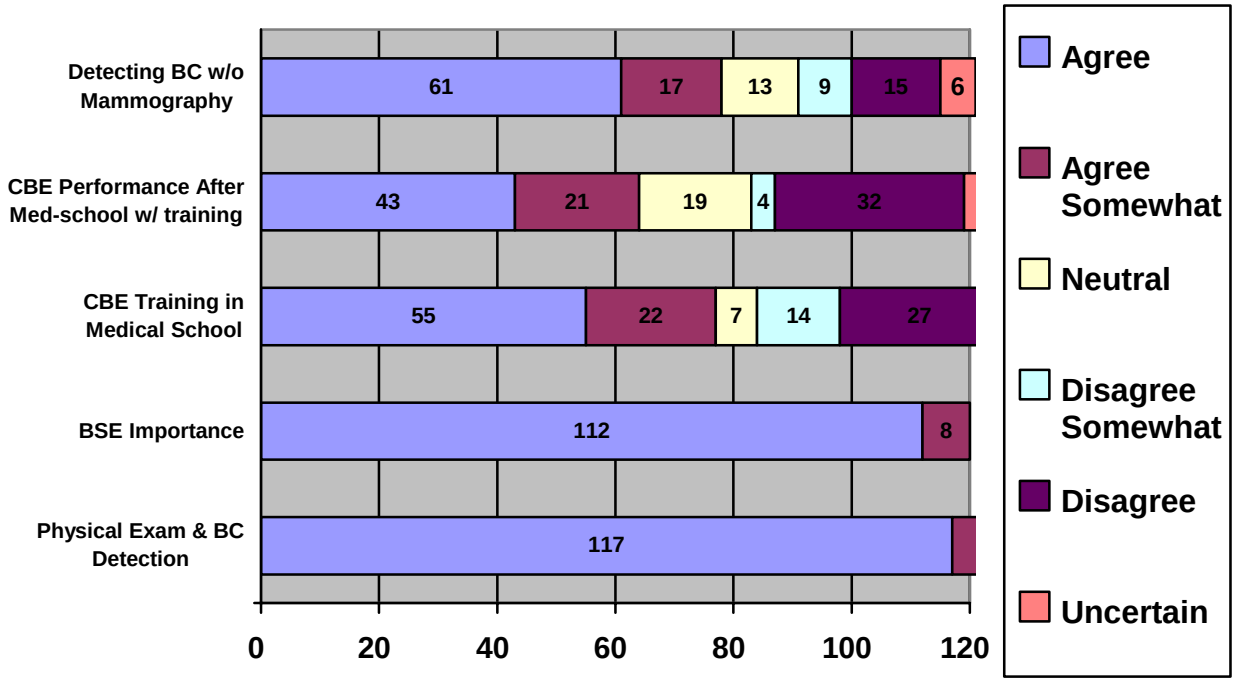
Question(s)	**Time since graduation OR (95% CI) p-value**	**Postgraduate Education OR (95% CI) p-value**	**BC cases OR (95% CI) p-value**
If IBC diagnosis palpable mass will always be present	2.6(1.6,4.0) p=.0001	.75(.34,1.6) p=.4695	1.5(1.1,2.1) p=.0112
Inverted nipples with IBC change is usually permanent	2.1(1.3,3.6) p=.0050	1.3(.56,2.9) p=.5592	1.2(.86,1.8) p=.2444
Fever associated with IBC	4(1.4,11.5) p=.0086	1.0(.40,2.4) p=.9493	1.4(.93,2.1) p=.1072
High white blood cell count associated with IBC	3.2(1.3,7.8) p=.0100	1.3(.58,2.9) p=.5220	1.5(1.0,2.1) p=.0414
Peau d'orange associated with IBC	7.8(1.0,61) p=.0499	1.1(.25,4.7) p=.9219	.69(.35,1.37) p=.2860
LNE as criteria to detect IBC when performing CBE	7.2(.83,63.6) p=.0737	1.8(.32,9.8) p=.5115	.5(.23,.95) p=.0356
Symptoms remaining after 1 week of AT advise for more antibiotics	7.3(2.9,18) p=.0001	1.2(.41,3.4) p=.7719	1.0(.65,1.7) p=.8610
Symptoms remaining after 1 week of AT advise referral to cancer center	5.8(2.4,14.2) p=.0001	1.3(.51,3.5) p=.5461	.6(.37,.95) p=.0313

-Locally Advanced Breast Cancer Section-

Question(s)	**Time since graduation** **OR (95% CI)** **p-value**	**Postgraduate Education** **OR (95% CI)** **p-value**	**BC cases** **OR (95% CI)** **p-value**
Breast lump and abnormal mammogram proceed with biopsy	2.1(1.0,4.3) p=.0496	3.2(.89, 12) p=.0746	1.2(.7,2.1) p=.4987
Nipple discharge then proceed to mammogram	4.7(1.6,14) p=.0053	4(.9,18) p=.0682	1.5(.78,3.0) p=.2148
LABC involves fungating tumor LABC involves erythema LABC cancer involves supraclavicular lymph nodes LABC involves cervical lymph node	3.2(.88,11.8) p=.0778 2.7(1.3,5.6) p=.0063 2.4(1.2,4.9) p=.0129 2.2(.21,1.3) p=.0066	4(.5,32.4) p=.1850 2.9(.74,11.4) p=.1272 2.2(.67,7.1) p=.1988 1.7(.56,5.1) p=.3526	.8(.44,1.4) p=.4077 1.0(.63,1.5) p=.8639 .74(.51,1.1) p=.1009 .75(.55,1.0) p=.0664
Neo-adjuvant chemotherapy to treat a patient with locally advanced breast cancer	na	na	na

Figure *1*. *Change in physicians' attitude from pre-testing to post-testing evaluation*

Pre-testing



Post-testing