Knowledge Gained After a Brief CME Module on Breast Cancer Diagnosis

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Abstract—*Background.* In developing countries, continuing medical education (CME) is lacking and physicians' knowledge of cancer control may also be lacking. *Method.* We evaluated knowledge of 144 primary care physicians in Egypt and 50 in Tunisia regarding breast cancer (BC) and inflammatory BC (IBC) in particular. We invited the physicians to pretesting, presentation of an educational module, and posttesting. *Results.* We found significant improvement in knowledge about risk factors for IBC and BC, importance of early detection and clinical examination, and referral of IBC cases. The variables that were independently associated with improved BC knowledge, were rural practice location, being a female physician, and greater numbers of BC patients seen in the last year. *Conclusion.* We developed and evaluated a CME module to improve BC diagnostic knowledge of primary care physicians in developing countries. The evaluation showed that physicians most lacking in this knowledge had the greatest gains. With the anticipated adoption of this module in Egypt and Tunisia, we expect to see more appropriate referrals to cancer centers. These results could guide future oncology CME for physicians in developing countries. ***J Cancer Educ.*** 2006; 21:169-174.

Primary care physicians (PCPs) can play a key role in prevention and early detection of cancer. In the United States, PCPs help in identifying cancer cases at early stages and referring them to specialized cancer centers if needed. Continuing medical education (CME) of PCPs plays a major role in raising their awareness to recent advances in early detection and cancer control.[1] In many developing countries, CME is lacking, and exposure of PCPs to recent knowledge of cancer control and early detection may be considered a low priority by medical educators.[2] With cancer surfacing as a global problem and more than 50% of cancer cases occurring in developing countries, early detection and cancer control becomes more than ever an important issue in developing countries.[3]

The main objective of this study was to evaluate knowledge of PCPs in Egypt and Tunisia about the epidemiology and management of breast cancer (BC) and in particular, inflammatory BC (IBC), an aggressive type of cancer more prevalent in the 2 countries.[4,5] We reevaluated physicians' knowledge immediately after providing the educational program. The ultimate purpose of the module was to improve referral of all BC cases and in particular, IBC.

MATERIALS AND METHOD

Through government-based health systems, we recruited 144 PCPs in Egypt and 50 in Tunisia. We invited them in groups of 8 to 20 to a pretesting, presentation, and discussion of CME educational module and posttesting. In Egypt, the presentations and evaluation questionnaires were presented in English; and in Tunisia, the presentations and questionnaires were translated into French by local faculty. Our Powerpoint-based educational module included BC diagnosis, early detection, breast clinical examination, and management of BC, with illustrations on breast models. PCPs in this study orally consented to participation.

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Study Participants

We held 6 sessions in Egypt; 3 in Assiut city, the capital of Assiut province in South Egypt; and 3 in Tanta city, capital of Gharbeia province in the center of the Nile Delta region. We chose Assiut and Tanta because they are the major cities in South and North Egypt, respectively, and have the oldest medical schools with a strong connection to community outreach and rural/urban areas. In Egypt, medical students who graduate with high scores are hired as PCPs in urban areas, whereas those with lower graduation scores work in rural areas. About 50% of physicians stay in primary care practice with little or no chance for CME, whereas the other 50% may seek clinical specialization in regional or central hospitals.

In Tunisia, we held 3 conferences in Tunis with a total of 50 PCPs recruited through the Centre de Santé Base. Occasional training sessions are provided for PCPs in Tunisia, but there is no accreditation requirement for participation. The characteristics of physicians recruited for this study are described in Table 1.

Evaluation Sessions

Each conference consisted of 3 parts in the following order: pretesting; a live presentation of our educational module consisting of a 30-minute Powerpoint-based presentation, with question/answer session by a local oncologist; and finally, posttesting. The paper-and-pencil pretesting lasted between 45 to 60 minutes. The posttesting took between 35 to 45 minutes. Our study questionnaire used in pretesting and posttesting consisted of 52 questions covering topics included in the educational module focusing on epidemiology, management, and referral of BC and IBC. In addition to the 37 true or false or uncertain questions on knowledge, we included 5 questions to evaluate physicians' attitudes about breast self-examination and clinical examination. In both Egypt and Tunisia, attitudes did not change significantly between pretesting and posttesting evaluations ($P > .05$). In both the pretesting and the posttesting, over 70% of the participants were uncertain whether breast self-examinations and clinical examinations were important in detecting BC.

Statistical Methods

We used univariate analysis based on McNemar's test to compare the proportion of correct responses for each question on the preintervention and postintervention evaluations. Based on the results of the univariate analyses, we grouped the questions as follows: (*a*) questions on which par-

TABLE 1. Characteristics of the Study Population in Egypt and Tunisia

	Egypt (n = 144)				Tunisia (n = 50)			
Characteristic	N		%		N		%	
Gender								
Female	95		66		45		90	
Male	49		34		5		10	
Medical school of graduation								
Egypt								
Assiut	74		51.4					
Tanta	70		48.6					
Tunisia								
Tunis					35		70	
Others					10		20	
Characteristic	Mean	± SD	Median	Range	Mean	± SD	Median	Range
Daily hours practicing medicine	6.66	3.1	6	1-24	8.63	6.63	6	1-30
Years practicing medicine	3.34	4.38	2	0-25	4.07	6.95	15	1-25
Hours on clinical administration/day	5.33	4.54	5	0-24	2.46	4.58	0	0-22
Years on clinical administration	3.36	4.78	2	0-30	9.25	7.08	7.5	0-23
Breast cancer cases seen in past year	3.19	8.31	0	0-80	1.22	1.82	0	0-10
Pretest score for knowledge	60.92	8.2	61.5	40.7-91.7	63.8	9.52	65.5	42.9-82
Posttest score for knowledge	73.48	6.94	73.8	54.2-92.8	74.93	7.1	76.1	55.3-86.8
Characteristic	N		%		N		%	
Primary place of practice								
Urban/university clinic	63		44		28		56	
Rural clinic	69		48		18		36	
Previous training/graduate education								
Yes	32		22.2		20			
No	112		77.8		30		60	

ticipants improved (ie, proportion of correct responses increased) after the educational program, (*b*) questions on which participants did not show any significant change after the educational program, and (*c*) questions on which participants did worse after the educational program. For questions on which there was a significant change after the educational program (ie, *a* and *c*), we performed multivariate analyses based on conditional logistic regression to determine the effect of demographics, medical education, and prior training of physicians on modulating the change in the proportion of correct responses from preintervention to postintervention. Finally, we compared the participants' mean preintervention and postintervention scores (based on the 52 items) using a paired *t* test.

RESULTS

Egyptian physicians showed significant improvement in their knowledge related to epidemiology and management of BC and IBC. Improvement included epidemiology and risk factors for BC, symptoms associated with IBC, importance and methods of early detection of BC and IBC with clinical breast examination, and ideal protocol for treating IBC patients (Table 2). Egyptian physicians' scores were worse after the educational program regarding the appropriate advice that they would give to mastitis patients without a response to antibiotics after a week of antibiotic treatment. A correct response to this question was a biopsy to differentiate between IBC and mastitis. Approximately 53% of participants answered this question correctly in the pretesting; however, only 24% answered correctly in the posttest ($P = .006$).

Tunisian physicians also showed significant improvement in knowledge about risk factors for BC, detection of both BC and IBC with a clinical breast examination, ideal protocol for treating IBC patients, and the symptoms associated with IBC. Similar to Egyptian participants, Tunisian participants all showed improvement on questions related to genetics. Egyptian physicians showed no significant change between

TABLE 2. Questions Showing Significant Change From the Pretest to the Posttest*

	Egypt			Tunisia		
	% Correct			% Correct		
Question	Pre	Post	*P* Value	Pre	Post	*P* Value
Positive improvement						
Exercise as BC risk	40.00	52.17	.0106	41.03	58.97	.0348
Body weight as BC risk	60.32	74.60	.0067	61.9	78.6	.07
Diagnosis at early stage beneficial	69.70	79.55	.0280	74.42	76.74	.7055
Axilla palpation on same side as lesion as recommended	93.28	96.27	.0455	86.49	79.19	.5637
BSE timed 3-5 days postmenstruation	41.30	54.35	.0201	32.65	38.78	.366
Node enlargement a sign of BC without a mass	26.47	54.90	< .0001	33.33	70.37	.0039
Hereditary factors influence BC	92.65	99.26	.0067	90.48	100.00	NA
Breast enlargement a sign of BC	54.95	91.89	< .0001	51.85	81.48	.0047
Discharge from nipple a sign of IBC	74.56	93.86	< .0001	80.00	94.29	.0956
IBC is a subset of stage I BC	51.28	70.09	.0009	37.50	59.38	.0348
Symptoms develop early in IBC cases	48.76	65.29	.0026	37.50	68.78	.075
In IBC, nipple inversion is permanent	57.50	80.00	.0001	42.42	75.76	.0023
Chemotherapy is first mode of therapy for IBC	38.33	85.83	< .0001	47.06	85.29	.0016
IBC is treated with same drugs used for BC	29.46	69.64	< .0001	25.93	70.37	.0027
Recognized photo of mastitis	40.20	81.37	< .0001	38.46	69.23	.0114
Recognized photo of IBC	40.20	81.37	< .0001	40.74	70.37	.0114
With lymphedema, use mammography to diagnose IBC	65.05	92.23	< .0001	82.61	100.00	.0455
Peau d'orange is a symptom associated with IBC	54.70	93.16	< .0001	82.76	100.00	NA
Nipple discharge may be a sign of IBC	84.96	92.04	.0736	73.08	96.15	.0339
Lactation mastitis is a cellulites of lactating breast	86.33	95.68	.0029	74.47	74.47	1.0000
Mastitis, abscess, or cancer possible during lactation	84.17	94.24	.0043	82.61	93.48	.0956
Previous mastitis is a risk factor for mastitis	53.57	75.00	< .0001	75.56	75.56	1.0000
IBC is less than 1/1000 of mastitis cases	27.82	44.36	.0028	30.77	30.77	1.0000
More antibiotics should be advised if symptoms are not relieved after treatment of mastitis with antibiotics	45.45	94.81	< .0001	75.00	62.50	.5637
Incision and aspiration of lesion should be advised if after treating presumed mastitis with antibiotics symptoms are not relieved	46.84	93.67	< .0001	36.36	90.91	.014
Participants performed worse in posttest						
Biopsy should be advised after treating presumed mastitis with antibiotics and symptoms are not relieved	52.70	24.32	.0003	38.5	38.5	1.0000

*BC indicates breast cancer; BSE, breast self-examination; NA, not applicable; IBC, inflammatory breast cancer.

the pretesting and the posttesting about the criteria for IBC diagnosis including nipple discharge.

Tunisian participants demonstrated no significant change on 13 questions. In most of these questions, most physicians knew the answer before and after our educational program. However there were 2 questions for which Tunisian physicians had low scores before and after the educational program. These questions focused on the epidemiology and the importance of a biopsy if symptoms are not relieved after treating presumed mastitis with antibiotics.

Egyptian physicians showed no statistically significant change on 30 other questions. For 22 of these questions, the participants had high knowledge scores that ranged between 60% and 100% about the questions before and after the educational program. Physicians had knowledge on the standard symptoms of IBC and treatment of mastitis. There were 9 questions for which participants scored low before and after the intervention, with scores that ranged between 20% and 60%, including questions that asked about how to detect IBC with mammography and the clinical presentation of IBC.

For Tunisian participants, there were 55 questions that showed no statistically significant differences between pretesting and posttesting. There were 40 questions for which participants had high knowledge that ranged between 60% and 100% and 15 questions for which participants had low knowledge that ranged between 20% and 60%, before and after the educational program. Tunisian participants knew about the risk factors for BC, that diagnosis at an early stage is necessary for higher survival, how to approach a patient with a breast abnormality during a clinical examination, that IBC is misdiagnosed as mastitis, and about referral procedures. Tunisian physicians did not know about the epidemiology of BC, breast self-examination, that a palpable mass is not always present in IBC, that inverted nipples in a woman could be normal, that fever is not associated with IBC, and that mammograms are not accurate in differentiating between IBC and mastitis.

After adjusting for demographic, educational, and training background of participants, we revealed if our educational program was associated with improvement. For Egyptian participants, improvement on questions about early detection was significantly associated with postgraduate education (odds ratio [OR] = 3.45; confidence interval [CI], 1.42-8.4, P = .006). Techniques of clinical examination were significantly associated with number of BC cases seen (OR = 1.08; CI, 1.03-1.13, P = .002). Improvement for the questions on IBC and mastitis were significantly associated with training at a university hospital (OR = 2.44; CI, 1.25-4.76, P = .01) and female gender of physicians (OR = 2.0; CI, 1.04-3.87, P = .04) (Table 3). For Tunisian participants, improvement for questions on IBC and mastitis was associated with increasing years of practicing medicine (OR = 1.13; CI, 1.05-1.23, P = .002) and the number of BC cases seen during the past year (OR = 1.5; CI, 1.12-2.02, P = .007) (Table 3). Improvement for those questions on exercise and maintaining body weight as epidemiologic risk factors was solely dependant on our educational program.

For Egyptian participants, improvement on questions about genetic risk factors was associated with working at rural clinics (OR = 3.1; CI, 1.16-8.4, P = .025) and number of BC cases seen during the past year (OR = 1.17; CI, 1.06-1.29, P = .001). Improvement for questions on frequency or incidence of IBC was associated with female gender of physicians (OR = 1.87; CI, 1.02-3.45, P = .04). Improvement for questions on methods for clinical examinations was associated with female gender (OR = 4.55; CI, 1.02-20.22, P = .047), working at university hospitals (OR = 3.7; CI, 1.05-12.5, P = .04), and number of BC cases seen during the past year (OR = 1.07; CI, 1.02-1.12, P = .009). In addition, improvement for questions on IBC symptoms was associated with female gender (OR = 3.7; CI, 1.51-9.07, P = .004) and number of BC cases seen during the past year (OR = 1.05; CI, 1.02-1.08, P = .003) (Table 3). For Tunisian participants, improvement for questions on genes involved in BC etiology was associated with number of BC cases seen during the past year (OR = 1.29; CI, 1.06-1.57, P = .01) (Table 3).

We evaluated physicians' practices during pretesting, but we did not intend to evaluate the practices at posttesting after the short CME program. Egyptian participants reported performing clinical breast examinations on only 16% of their patients, whereas Tunisian PCPs reported clinical examinations of 38% of their patients. When participants reported examining the nipples during a clinical examination, almost all Egyptian and Tunisian physicians reported checking the nipple for asymmetry and for retraction. When asked how often physicians recorded medical history in a patient's chart for assessing BC risk, only 22% of Egyptian physicians and 10% of Tunisian physicians answered that they recorded a patient's medical history over 50% of the time.

Summary of Results

Overall, Egyptian and Tunisian participants in this study showed significant improvements in their knowledge scores. The average posttesting score for all questions was approximately 11.5% higher than pretesting score ($P < .0001$). Both the Egyptian and Tunisian physicians in this study showed highest pretesting scores for questions related to clinical breast examination for which participants answered over 70% of the questions correctly. However, participants had the lowest initial knowledge in pretesting on questions about epidemiology, risk factors, and genetics of BC for which approximately 50% of physicians answered these questions correctly. The most improvement for Egyptian and Tunisian physicians occurred on questions about epidemiology, risk factors, and genetics of BC. Improvement for many questions was associated with postgraduate education, number of BC cases seen during the past year, primary place of practice, female gender, and increasing years of practicing medicine.

TABLE 3. Multivariate Models of Improvement in Physicians' Knowledge in Relation to their Demographic, Educational, and Practice Characteristics*

	Egypt				Tunisia			
	Effect of Educational Program		Independent Variables†		Effect of Educational Program		Independent Variables†	
Question	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Exercise as BC risk	1.78	1.21-2.61	NS		3.20	1.58-6.51	NS	
Body weight as BC risk	1.93	1.21-3.09	NS		3.13	1.28-7.62	NS	
Diagnosis at early stage beneficial	1.75	1.09-2.81	3.45	1.42-8.4‡	1.32	0.67-2.6	0.7	0.5-0.99§
Axilla palpation on same side as lesion recommend	1.83	1.07-3.13	1.08	1.03-1.13§	0.88	0.33-2.35	NS	
BSE timed 3-5 postmenstruation	1.68	1.08-2.62	0.97	0.95-0.998§	1.57	0.82-3	NS	
Node enlargement a sign of BC without a mass	3.34	2.04-5.5	0.25	0.10-0.63‖	4.66	1.86-11.64	NS	
Breast enlargement a sign of BC	9.43	5.35-16.62	0.36	0.16-0.83¶	6.1	2.12-17.5	NS	
Discharge from nipple a sign of BC	3.90	2.23-6.82	0.79	0.66-0.94§	12.93	1.18-142.3	NS	
IBC is subset of stage I BC	2.22	1.43-3.47	NS		2.29	0.99-5.28	NS	
Symptoms develop early in IBC cases	1.98	1.28-3.05	0.41	0.21-0.8‖	3.24	1.37-7.66	NS	
In IBC, nipple inversion is permanent	2.85	1.69-4.8	2	1.04-3.87≠	5.11	1.96-13.3	1.13	1.05-1.23**
Chemotherapy is first mode of therapy for IBC	8.95	5.08-15.76	NS		11.82	3.43-40.7	1.5	1.12-2.02§
IBC is treated with same drugs used for BC	5.68	3.33-9.7	NS		5.6	1.76-17.82	NS	
Recognized photo of mastitis	7.68	4.53-13.00	NS		4.88	1.7-14.1	NS	
Recognized photo of IBC	7.68	4.53-13.00	NS		4.7	1.64-13.55	NS	
With lymphedema, use mammography to diagnose IBC	5.48	2.80-10.72	NS		18.42	0.76-446.25	0.87	0.78-0.97**
Lactation mastitis is a cellulites of lactating breast	3.81	1.55-9.34	NS		0.92	0.41-2.07	NS	
Mastitis, abscess, or cancer possible during lactation	2.77	1.3-5.92	NS		2.25	0.58-8.78	NS	
Previous mastitis is a risk factor for mastitis	2.63	1.69-4.1	NS		1.31	0.63-2.72	NS	
IBC is less than 1/1000 of mastitis cases	2.10	1.32-3.35	NS		1.45	0.71-2.95	1.4	1.02-1.93§
Untreated mastitis leads to abscess formation	1.98	0.995-3.94	NS		1.54	0.68-3.5	NS	
More antibiotics should be advised if symptoms are not relieved after treatment of mastitis with antibiotics	24.45	9.49-62.99	NS		1.19	0.23-6.1	NS	
Incision and aspiration should be advised if after treating mastitis with antibiotics symptoms are not relieved	8.08	3.69-17.71	0.91	0.85-0.98§	25.5	4.04-161.23	NS	

*OR indicates odds ratio; CI, confidence interval; BC, breast cancer; BSE, breast self-examination; IBC, inflammatory breast cancer.
†Only those variables which were significantly associated with the change in response are listed. If the change in response from pretest to posttest was not associated with any demographic variables, NS indicates not significant.
‡Postgraduate education.
§Number of BC cases seen during past year.
‖Urban clinic.
¶Rural clinic.
≠Female gender.
**Years practicing medicine.

DISCUSSION AND CONCLUSION

This is the first study to assess educational needs for BC diagnosis among PCPs in North Africa where BC and IBC are diagnosed at advanced disease stages.[4,5] In the study, we showed that PCPs in Egypt and Tunisia lacked sufficient knowledge in areas related to epidemiology and genetics of BC and differential diagnosis between IBC and mastitis. Our educational program improved physicians' knowledge regarding all areas of deficient knowledge, but it confused them regarding the appropriate advice that they should give mastitis patients having had no response after a week of antibiotic treatment. We think that the tradition of excessive use of antibiotics by physicians in developing countries will need a more focused educational program to change physicians' knowledge about misuse of antibiotics.[6]

For both Egyptian and Tunisian participants, improvement in physicians' knowledge was statistically related to working in a university hospital, increased number of patients seen during the year preceding the study, having postgraduate education, and female gender of physicians. Those variables point out to the importance of CME, training, and postgraduate studies in improving physicians' knowledge.

Our review of the curriculum of medical schools in Egypt[7] and Tunisia showed limited information about cancer epidemiology and importance of early detection and management of BC at the primary care level. Also, on-the-job training and CME were deficient in both countries.

Several studies in the United States have shown effectiveness of educating PCPs in early detection of BC through educational interventions. For example, Vetto et al.[1] showed that education using silicone breast models aided in improving PCPs sensitivity skills in clinical breast examinations in Oregon. Lane et al.[8] in Long Island, NY, showed that self-taught courses helped in improving family physicians knowledge about BC screening. Educational programs, similar to ours, involved small-group discussions with faculty in oncology improved knowledge of PCPs about genetic testing for BC.[9] Although this study has helped in improving physicians' knowledge, changing physicians' attitudes takes long periods of time.[10]

Our study has the following 2 strengths: (*a*) targeting countries with a relatively high frequency of a more aggressive type of BC and late-stage presentation for all BC and (*b*) an easily implemented educational module and evaluation questionnaires in the study countries. However, we identified a specific deficiency in the module (mastitis and antibiotic response) that will be corrected in future educational modules. The cross-sectional nature of the study limited investigating the impact of the educational module on retention of knowledge and change in physicians' attitudes.

In conclusion, this study introduced the basics of general BC detection and IBC to many participants. This knowledge will hopefully contribute to the appropriate referral of suspected BC patients to cancer centers at an earlier stage, ultimately increasing survival. Results from this study could be used to guide the implementation of future oncology CME programs for PCPs in developing countries.

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TIPS FOR CANCER EDUCATORS

HEAL (Health Education Assets Library) found at **http://www.healcentral.org** is a wonderful peer-reviewed collection of digital resources. HEAL began as an NSF Digital Library grant, is university based and supported, and contains approximately 20,000 items. The majority of the 20,000 items in the collection are images, but videos and animations are also included. HEAL's goal is to make materials freely available worldwide. It contains some complete programs, such as Bioterrorism, but consists mainly of smaller elements that can be repurposed and integrated into your programs or teaching materials as long as attribution is given. The user does not have to spend time writing for permissions. Worry-free teaching materials are thus available, and more are wanted if you are thinking of donating.