Breast Cancer Screening in Primary Health Care: Barriers and Predictors of Physicians' Adherence to Screening Guidelines

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Abstract

Background and Aim: Breast cancer is a significant public health problem in many developed and developing countries. Early detection by screening can lead to better prognosis. Primary healthcare (PHC) physicians have the opportunity to promote breast cancer screening practices. The aim of this study was to compare junior and senior PHC physicians' perception of breast cancer screening guidelines, and to identify the factors that predict their adherence to screening guidelines.

Subjects and Methods: A comparative cross-sectional design was applied in PHC centers in Riyadh area affiliated to all health sectors during the year 2008. The sample included 43 senior and 132 junior doctors. A self-administered anonymous questionnaire consisting of open and closed questions was used to collect data regarding physicians' perception and practice about breast cancer screening guidelines.

Results: Senior PHC physicians had higher awareness of the guidelines ($p<0.001$), with almost double rate. They also had higher scores of knowledge ($p=0.001$), and attitude ($p=0.023$). However, there was no difference of statistical significance between senior and junior physicians’ practice in ordering mammograms, which was low in both. The main barrier reported was lack of knowledge about the guidelines, which was higher among junior doctors ($p<0.001$), while seniors reported more time limitations ($p=0.033$) and different sex barrier ($p=0.044$). Multivariate analysis revealed the predictors of practice of breast cancer screening by ordering mammogram according to guidelines were younger physician's age, non-Saudi nationality, higher attitude score towards breast cancer screening, and awareness of the guidelines.

Conclusion and Recommendations: PHC physicians in Riyadh region have low awareness, knowledge, and practice of breast cancer screening guidelines, especially junior ones. The predictors of practice are physician’s younger age, non-Saudi nationality, and awareness and attitude towards guidelines. The study limitation is the possible over-reporting of practice, especially among junior doctors. It is recommended to intensify continuing medical education programs related to screening, with more emphasis on Saudi physicians and the juniors. For seniors, time management is needed to free time for such important preventive services.

Key Words: Breast cancer – Mammography – Primary healthcare – Barriers.

Introduction

BREAST cancer is the most common cancer of women and is a significant public health problem in many developed and developing countries. It has a major impact on women’s quality of life and on society at large in terms of economic burden [1]. In 2000, breast cancer accounted for 22% of all new cancers in women worldwide, with about one million new cases each year [2]. In the United States, breast carcinoma is the most common cancer in women of all racial groups [3]. This malignancy currently accounts for 32% of all new cancer cases and 15% of cancer deaths among American women [4].

In the Kingdom of Saudi Arabia (KSA), hospital and population based statistics have shown that breast cancer has the highest crude frequency rate among Saudi women [5-6]. It ranked first and accounted for 20.6% of all newly diagnosed female cancers. Between January 1999 and December 2000, there were 1,157 cases of female breast cancer and age-standardized-rate (ASR) was 13.6/100,000 for female population compared to 126.1/100,000 in the USA [7]. Moreover, the majority of breast cancer cases are detected at advanced stages (III/IV) [8]. Although breast cancer incidence rates have been increasing since the 1980s, death rates have declined by about 2.3%
Early detection of breast cancer by screening can find lesions for which treatment is more effective and generally more favorable for quality of life [11-12]. There are two types of breast screening programs, namely population and opportunistic screening. Many guidelines are available for breast cancer screening. The United States Preventive Services Task Force (USPSTF) guidelines is evidence-based and recommends screening with mammography, with or without clinical breast examination every 1-2 years for women aged 40 and older [13].

More and more evidence from high-quality randomized controlled trials and service population screening have shown the benefits of mammography, based on reports of significant reductions in mortality [14]. Mortality reductions of up to 30% have been identified in eight randomized intervention studies in women aged 50 to 65 years who were screened at 1-3-year intervals [15]. To be successful, a screening program should not only be accepted by the population but should also effectively detect cancers at an early stage, which can confer a better prognosis due to feasibility of treatments with less morbidity [14].

Primary care physicians or general practitioners (GPs) have the opportunity and ability to promote breast cancer screening practices among their patients [16]. However, primary care clinicians could not reach the goals set in Healthy People 2000 for cancer screening [17]. This might be attributed to lack of knowledge about early cancer detection and screening [18]. Women's uptake of breast cancer screening may be increased by raising GPs’ perceptions of the threat of breast cancer, addressing their concerns about breast screening, and enhancing their views of the importance of the role of primary care in a national screening program [19]. Therefore, primary care physicians need to be aware of the barriers preventing women from uptake of screening, and also must be able to provide women with genuine information and advice in a sensitive way so that women can make pertinent informed decisions [20].

Several studies examined the association of provider characteristics with mammography recommendations. However, there is a paucity of studies that investigated the difference between junior and senior physicians within the PHC setting regarding their perception of breast cancer screening and their adherence to related guidelines. In this regard, Santora, et al. (2003) [21] showed that board-certified family medicine physicians had better knowledge than general practitioners. Also, Abdel-Malek, et al. (2008) [22] found significant adherence to screening guidelines among PHC physicians working in academic and research centers.

**Aim of the study:**

The aim of this comparative study was to compare junior and senior Primary Health Care (PHC) physicians' perception of breast cancer screening guidelines, and to identify the factors that predict their adherence to screening guidelines. It was hypothesized that senior PHC physicians have more adherence to breast cancer screening guidelines recommendations compared to juniors.

**Subjects and Methods**

**Study design:** A comparative cross-sectional design was used in carrying out this study.

**Study setting:** The study was carried out in the PHC centers in Riyadh area during the year 2008. The study settings consisted of 8 PHC centers affiliated to the Ministry of Health, Riyadh Armed Forces, King Fahad National Guard, Security Forces, King Khalid University, and King Faisal Specialist Hospitals.

**Population and sample:** The sampling population consisted of all PHC care physicians in Riyadh area. A two-stage stratified random sampling technique was utilized to recruit physicians in the sample. The first stage consisted of selection of PHC centers by stratified random sampling according to the six sectors. The second stage was for recruitment of doctors within the selected centers, also by stratified random sampling, where doctors were categorized into junior (residents and registrars) and senior (senior registrars and consultants). The sample size was calculated to estimate assumed rates of adherence to breast cancer screening guidelines of 50% among senior and 25% among junior doctors, with a sample ratio 1:3 at a 95% level of confidence and 80% power, using Epi-Info 6.04 statistical software package. After correction for a dropout rate of 10%, the required sample size turned to be 46 senior and 140 junior doctors.

**Data collection tool:** A self-administered anonymous questionnaire consisting of open and closed questions was used to collect data. It was designed based on the information gathered from the U.S. Preventive Services Task Force guidelines [13] and
after reviewing other published studies’ questionnaire, pertinent literature. It was composed of two parts; the first part was for personal and socio-demographic data. The second part consisted of questions to assess physicians’ perception and practice about breast cancer screening guidelines. The questionnaire was validated through experts’ opinions, and pilot-tested for clarity and feasibility. It was distributed along with a covering letter explaining the aim of the study, and was recollected in the same day or on the next day. Data collection lasted from September to December, 2008.

Administrative aspects and ethical considerations: An ethical approval for the study was obtained from Saudi Board Training Program. An informed consent was obtained from doctors who participated in the study. They were reassured about the confidentiality of any obtained information.

Statistical analysis: Data entry and analysis were done using SPSS 14 statistical software package. Physicians’ knowledge was assessed by five questions with a maximum score of five. A correct answer was scored one and the incorrect zero. Physicians’ attitude towards breast cancer screening guidelines was assessed by four statements with a 3-point Likert scale response: Important, uncertain, and not important. The answers were respectively scored 2, 1, and zero with a maximum total score of eight. For quantitative data, Student t-test was used for comparisons of two means. For categorical data, Pearson Chi-square test was used, with Fisher exact test as indicated. To identify the independent predictors of practice, logistic regression analysis was used. The level of statistical significance was set at \( p < 0.05 \).

Results

Junior and senior PHC physicians in the study sample had similar distribution of nationality and working areas. However, they were statistically significantly different as regards age, sex, post graduate qualifications, and experience years (Table 1). It is evident that seniors were older, more females, with more post-graduate training and higher mean years of experience years. Nonetheless, 8.3% of the juniors had post-graduate qualifications.

Senior PHC physicians had significantly higher percentage of awareness of the guidelines compared to juniors \( (p < 0.001) \), with the rate reaching almost the double (Table 2). However, when physicians were asked about specific guidelines, much lower percentages gave correct answers, but still with statistically significant difference between seniors and juniors persisted \( (p = 0.047) \). Concerning their knowledge about guidelines content, senior physicians had higher rates of correct answers, which reached statistical significance regarding age at stopping screening \( (p = 0.007) \), and the effect of screening on reduced mortality \( (p = 0.003) \). In total, senior doctors had statistically significantly higher scores of knowledge than junior ones \( (p = 0.001) \). Concerning attitude, although none of the individual items showed a statistically significant difference between senior and juniors, the total score of attitude was statistically significantly higher among seniors \( (p = 0.023) \).

The study findings could not reveal a difference of statistical significance between senior and junior doctors in their adherence to guidelines in ordering mammograms, which was low in both (Table 3). However, the barriers to recommend screening were significantly different between the two groups. While the lack of knowledge about the guidelines and recommendation of breast cancer screening was higher among junior doctors \( (p < 0.001) \), the time limitations and the sex barrier due to unavailable female physicians were more reported by senior doctors \( (p = 0.033 \text{ and } p = 0.044, \text{ respectively}) \).

Table (1): Characteristics of junior and senior primary health care physicians.

<table>
<thead>
<tr>
<th></th>
<th>Junior ( (n=132) )</th>
<th>Senior ( (n=43) )</th>
<th>( p )-value (( X^2 ) test)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>78</td>
<td>18</td>
<td>41.9</td>
</tr>
<tr>
<td>Female</td>
<td>54</td>
<td>25</td>
<td>40.9</td>
</tr>
<tr>
<td>Age ( \text{mean} \pm SD )</td>
<td>33.2±8.3</td>
<td>42.2±7.6</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Nationality:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saudi</td>
<td>85</td>
<td>26</td>
<td>60.5</td>
</tr>
<tr>
<td>Non Saudi</td>
<td>47</td>
<td>17</td>
<td>35.6</td>
</tr>
<tr>
<td>Qualification:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bachelor</td>
<td>121</td>
<td>0</td>
<td>91.7</td>
</tr>
<tr>
<td>Post graduate</td>
<td>11</td>
<td>43</td>
<td>8.3</td>
</tr>
<tr>
<td>qualification</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Working area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>accreditation:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accredited PHC</td>
<td>114</td>
<td>39</td>
<td>86.4</td>
</tr>
<tr>
<td>centers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-accredited</td>
<td>18</td>
<td>4</td>
<td>13.6</td>
</tr>
<tr>
<td>PHC centers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Years of experience ( \text{mean} \pm SD )</td>
<td>8.2±8.0</td>
<td>16.8±7.5</td>
<td>&lt;0.001*</td>
</tr>
</tbody>
</table>

(*) Student \( t \)-test.
Table (2): Comparison of junior and senior primary health care physicians' perception on breast cancer screening guidelines.

<table>
<thead>
<tr>
<th></th>
<th>Junior (n=132)</th>
<th>Senior (n=43)</th>
<th>p-value (X² test)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. %</td>
<td>No. %</td>
<td></td>
</tr>
</tbody>
</table>

Awareness:
- Awareness of guidelines: 55/41.7 vs. 35/81.4, p < 0.001
- Mentioned specific guidelines: 32/24.2 vs. 16/37.2, p = 0.047

Have correct knowledge about:
- Age at start the screening: 77/58.3 vs. 26/60.5, p = 0.805
- Age at stop screening: 52/39.4 vs. 27/62.8, p = 0.007
- Proper screening method: 62/47.0 vs. 24/55.8, p = 0.314
- Screening interval: 73/55.3 vs. 30/69.8, p = 0.094
- Effect of screening on mortality: 28/21.2 vs. 19/44.2, p = 0.003

Knowledge score (mean ±SD): 6.8 ± 1.2 vs. 7.3 ± 1.2, p < 0.001

Attitude:
- Agree upon:
  - Importance of screening: 128/97.0 vs. 42/97.7, p = 0.642
  - Benefits of mammography screening: 107/87.1 vs. 39/90.7, p = 0.373
  - Cost-effectiveness of mammogram screening: 95/72.0 vs. 36/83.7, p = 0.104
  - Better survival for screened women: 115/87.1 vs. 39/90.7, p = 0.087

Attitude score (mean ±SD): 55 ± 32 vs. 32 ± 77, p = 0.047

Age at start the screening:
- χ² test: 11.4, p = 0.002
- Fisher’s exact test: 0.003

Age at stop screening:
- χ² test: 14.3, p = 0.001
- Fisher’s exact test: 0.002

Proper screening method:
- χ² test: 31.2, p < 0.001
- Fisher’s exact test: 0.033

Setting:
- Mammogram not available: 28/21.2 vs. 8/18.6, p = 0.449
- No policy available in setting: 16/12.1 vs. 9/20.9, p = 0.120
- Time factors: 2/1.5 vs. 4/9.3, p = 0.033

Physicians:
- Lack of knowledge: 59/44.7 vs. 8/18.6, p = 0.002

Patients:
- Patient refusal: 19/14.4 vs. 8/18.6, p = 0.329
- Sex barrier: 6/4.5 vs. 6/14, p = 0.044

* Fisher’s exact test.

Table (3): Comparison between junior and senior Primary Health Care physicians in ordering mammogram and in the barriers for adherence to cancer screening guidelines.

<table>
<thead>
<tr>
<th></th>
<th>Junior (n=132)</th>
<th>Senior (n=43)</th>
<th>p-value (X² test)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. %</td>
<td>No. %</td>
<td></td>
</tr>
</tbody>
</table>

Practice:
- Order mammogram: 61/46.2 vs. 22/51.2, p = 0.348

Barriers:
- Physicians:
  - Lack of knowledge: 59/44.7 vs. 8/18.6, p = 0.002
- Setting:
  - Mammogram not available: 28/21.2 vs. 8/18.6, p = 0.449
  - No policy available in setting: 16/12.1 vs. 9/20.9, p = 0.120
  - Time factors: 2/1.5 vs. 4/9.3, p = 0.033
- Patients:
  - Patient refusal: 19/14.4 vs. 8/18.6, p = 0.329
  - Sex barrier: 6/4.5 vs. 6/14, p = 0.044

Table (4): Best fitting multiple logistic regression model for prediction of the practice of mammography.

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>S.E.</th>
<th>p</th>
<th>OR</th>
<th>95% CI for OR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>−.05</td>
<td>.02</td>
<td>.95</td>
<td>.91</td>
<td>.99</td>
</tr>
<tr>
<td>Non-Saudi nationality</td>
<td>1.43</td>
<td>.44</td>
<td>.001</td>
<td>4.17</td>
<td>1.75 9.94</td>
</tr>
<tr>
<td>Attitude score</td>
<td>.48</td>
<td>.22</td>
<td>.026</td>
<td>1.62</td>
<td>1.06 2.48</td>
</tr>
<tr>
<td>Awareness of guidelines</td>
<td>.68</td>
<td>.35</td>
<td>.055</td>
<td>1.96</td>
<td>.99 3.92</td>
</tr>
<tr>
<td>Constant</td>
<td>−2.27</td>
<td>1.02</td>
<td>.027</td>
<td>.027</td>
<td>.10</td>
</tr>
</tbody>
</table>

Omnibus tests of model coefficients: chi. Variables not in the model sex, years of experience, knowledge score, job, working area, barriers of lack of knowledge, available mammogram, lack of policy and patient refusal.

Table (5): Classification table.

<table>
<thead>
<tr>
<th></th>
<th>Predicted practice</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Observed practice</td>
<td>Yes</td>
<td>63</td>
</tr>
<tr>
<td></td>
<td>38</td>
<td>45</td>
</tr>
<tr>
<td>Overall percentage</td>
<td>61.7</td>
<td>61.7</td>
</tr>
</tbody>
</table>
Discussion

This comparative cross-sectional study revealed that the PHC physicians’ perception about breast cancer screening guidelines is generally low, particularly among junior doctors. Although senior doctors had better awareness, knowledge, and attitudes regarding breast cancer screening guideline, no difference in adherence to practice of breast cancer screening according to guidelines was detected between senior and junior doctors. The predictors of adherence to practice guidelines are younger physicians’ age, non-Saudi nationality, higher attitude score, and more awareness of guidelines.

According to our study, the percentage of senior doctors who were aware of the guidelines was nearly double that of juniors. This level of the awareness of senior physicians is considered slightly low and that of juniors much lower than that reported in two international studies done in Hawaii and San Francisco which showed that 90% of physicians were aware by the guidelines, compared to about 80% among seniors in our study [23].

However, when doctors in the present study were asked to name specific guidelines, the percentages were much lower, where only about one-fourth and one-third of junior and senior doctors, respectively, had correct answers. This implies that these doctors only know about the presence of guidelines, but have no in-depth knowledge about these guidelines. This was evident from their responses to knowledge questions about the content of the guidelines, where the percentages of correct answers were low, especially among juniors.

Concerning practice of recommending screening, our study showed that about half of the PHC physicians requested mammogram for every patient who fulfilled the guidelines recommendations, with no difference between seniors and juniors. These rates are less than those reported in previous studies which reported that about 75% of PHC physicians were following breast cancer screening guidelines [16-23]. Also Keller, et al. [15] reported a rate of 63% among PHC physicians. The low rates revealed in our study could certainly be attributed to their low levels of actual awareness and knowledge of the guidelines and their content. In congruence with this, it has been claimed that physicians’ ordering of screening depended on their knowledge of breast screening guidelines [24].

Although senior doctors in our study had significantly better scores of knowledge and attitude regarding breast cancer screening, and were more aware about the guidelines, they were no better than juniors in the practice of breast cancer screening by ordering mammogram. The lack of significant difference between the two groups regarding practice could be due to over reporting by the juniors about ordering mammogram according to guidelines. This is evident from the differences between their awareness and their practice as the percentage of those who reported awareness about the guidelines was lower than those who reported adherence to these guidelines. On the other hand, more than three-fourth of seniors reported awareness while only about half of them reported adherence to practice. This gap between awareness and practice is known, 16 and its absence among juniors supports the assumption of over-reporting among them.

The gap between awareness and practice, especially among senior doctors of the present study, implies the presence of other factors hindering physicians’ adherence to guidelines. There could be barriers that limit the practice of screening. Our study demonstrated a number of barriers related to physicians themselves, clients, and setting. Most of these barriers were previously cited [24,25]. However, our study demonstrated differences in the barriers reported by senior and junior doctors. For junior doctors, the main barrier was lack of knowledge about the guidelines, which is quite expected and supported by their lower knowledge scores. The finding is in agreement with the results of systematic reviews of mammography screening barriers [26,27]. Therefore, more postgraduate education opportunities have been recommended for PHC physicians, aimed at increasing their knowledge of prevention and improving their attitudes toward primary cancer prevention and screening [18].

For senior doctors, the main barrier was the lack of time due to workload, which is the universal barrier always reported as a reason underlying deficient practice. This could be solved by proper time management. Meanwhile, although the cost of screening is one of important barriers previously reported [28,29] this was not the case in our study. This is certainly attributed to the nature of the study settings, where breast cancer screening is offered to clients at no charge.

Concerning the predictors of physicians’ practice, younger physician’s age turned is a positive predictor to practice and ordering mammogram according to guidelines. This finding goes with Herman, et al. [30] who reported that PHC physicians who were younger recommended mammography
more frequently than older ones. The authors attributed this to that younger physicians are trained in and environment of evidence-based practice. On the same line, Dominick, et al. [31] reported that older physicians were more conservative about screening for breast cancer.

Attitude and awareness about the guidelines were shown to be independent positive predictors of practice in our study. On the other hand, knowledge had no direct effect. The finding is quite plausible, since attitude is known to influence practice better than knowledge. The findings are in congruence with Keller, et al. [15]. Also, the Saudi Nationality was a negative predictor of the practice of screening. This could be related to attitude as well as stricter look to costs compared to non-Saudis. This is in congruence with Komen [8] who clarified that cultural beliefs can create significant obstacles to standard breast evaluation and diagnosis, especially in the setting where treating physicians are males.

Although physicians’ female sex was previously reported as a positive predictor in their practice of recommending regular screening [15-32] our multivariate analysis did not find physician’s sex as a predictor of practice in ordering mammogram. This might be explained by the generally low level of awareness about proper specific guidelines. Moreover, the relation between physicians’ sex and their practice was challenged by Gotzsche and Olsen [33] who clarified that the increased rates of mammography use among patients of female physicians may be a result of differences in patient characteristics (educational level, assertiveness, and prevention orientation) rather than differences in provider characteristics.

**Conclusion and Recommendations:**

Based on the study findings, it is concluded that PHC physicians in Riyadh region have low awareness, knowledge, and practice of breast cancer screening guidelines, especially junior ones. The predictors of practice are physician’s younger age, non-Saudi nationality, and awareness and attitude towards guidelines. However, the findings could not lead to acceptance of the study hypothesis that of a difference between senior and junior physicians in their adherence to breast cancer screening guidelines. This could be due to the study limitation of possible over-reporting of practice, especially among junior doctors. This could be taken into account in further studies through actual auditing of cases referred to screening.

It is recommended to intensify continuing medical education programs related to screening, especially for breast cancer, with more emphasis on Saudi physicians and the juniors who reported lack of knowledge as their main barrier. For seniors, time management is needed to free time for such important preventive services.

**References**


udiSituationAnalysis_Oct%5E620, 2009.


