RESEARCH ARTICLE

Organization and Evaluation of Performance Indicators of a Breast Cancer Screening Program in Meknes-Tafilalt Region, Morocco

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Abstract

Objective: The benefits of screening and early detection of breast cancer, including reduced morbidity and mortality, have been well-reported in the literature. In 2011, a breast cancer screening program was launched in Meknes-Tafilalt region of Morocco. The aim of this study was to evaluate the early performance indicators of this program. **Materials and Methods:** This retrospective evaluative study was conducted between April 2012 and December 2014, in Meknes-Tafilalt region of Morocco. Several performance indicators of the breast cancer screening program were calculated: the compliance rate, the positivity rate, the referral rate, the cancer detection rate and the organizational indicators. **Results:** During 2012-2014, a total of 184,951 women participated in the breast cancer screening program. The compliance rate was 26%, the positive rate was 3.3%, the referral rate was 36.7%, and the cancer detection rate was 1.2 per 1,000 women. The median time between the date of clinical breast examination and the date of biopsy (or cyto-puncture) was 36 days. The median time between the date of positive mammography and the date of biopsy (or cyto-puncture) was 6 days. The median time between the date of clinical breast examination and the date of the first received treatment was 61 days. **Conclusions:** The program needs better monitoring, as well as implementation of quality assurance tools to improve performance in our country.

Keywords: Breast cancer- screening program- early detection- performance indicators- Morocco

Introduction

Breast cancer is the most common cancer in women in the world (Cuzick, 2010). According to the GLOBOCAN 2012, this cancer represents the most frequent cause of cancer death in women in less developed regions (324.000 deaths, 14.3% of total), and the second cause of cancer death in more developed regions (198,000 deaths, 15.4%) after lung cancer. The range in mortality rates between world regions is less than that for incidence because of the more favorable survival of breast cancer in (high-incidence) developed regions, with rates ranging from 6 per 100,000 in Eastern Asia to 20 per 100,000 in Western Africa (Ferlay et al., 2015).

In Morocco, breast cancer represents 34.3% of all female cancers (Cancer Registry of Greater Casablanca, 2012). Its incidence has been increasing during the recent years; between 2004 and 2007, the age-standardized (to the world population) incidence increased by 10.3%, from 35.0 to 38.6 per 100,000 women (Bouchbika et al.,

2013). Furthermore, the majority of cases are diagnosed in advanced stages, 44.6% at stage II, 24.4% at stage III and only 13.5% at stage I (Cancer Registry of Rabat, 2012). The estimated number of deaths caused by this cancer was 2,878 in 2012, leading to an age-adjusted mortality rate of 18 per 100,000 women (Ferlay et al., 2015).

The benefits of screening and early detection of breast cancer including reduced morbidity and mortality have been well-reported in the literature (Kawar 2013; Mittra 2011; Pape et al., 2016). It has been suggested that screening may increase breast cancer incidence by up to 30% where organized programs take place (Bleyer and Welch, 2012). It has also been estimated that a participation rate of 85% or higher of the target population reduces the mortality by 40% (Pape et al., 2016).

Mammography, clinical breast examination (CBE), and breast self-examination are recommended methods to detect early breast cancer in women (Khatcheressian et al., 2006; Robert A. Smith et al., 2009; Secginli and Nahcivan, 2011).

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Morocco like many Low-Middle income Countries (LMCs) adopted clinical breast examination by trained health professionals at primary care unite (PCU) and mammography at secondary health center (SHC).

Otherwise, in order to optimize the use of resources and to ensure the quality of the tests performed and interpreted, monitoring early indicators of effectiveness is needed (Madlensky et al., 2003).

In Morocco, only one study has examined the performance indicators of breast cancer screening program, it was conducted in Temara city between 2009 and 2011 (El Fakir et al., 2015). The aim of the present study was to evaluate the early performance indicators of breast cancer screening program in the Meknes-Tafilalt region of Morocco, three years after its establishment.

Materials and Methods

This retrospective evaluative study was conducted between April 2012 and December 2014, in Meknes-Tafilalt region of Morocco.

Figure 1 shows the organization of the breast cancer screening program in Morocco. The screening program was a three-tier pyramidal structure. The target population for breast cancer screening in Morocco is women aged 45 to 69 years, or women with a family history of breast cancer (grandmother, mother, aunt, sister). The first level is represented by all primary care unite (PCU) of the public sector. Women in the eligible screening age range (45-69 years) who attended their nearest PCU for any reason were invited for screening by a clinical breast examination (CBE). This first test screening was performed by a trained health professional. Women with a positive CBE result were referred to a secondary level represented by secondary health center (or reference center) for confirmatory diagnosis by mammography. Women with normal mammography results were reassured and advised to undergo rescreening after 2 years. For women with positive mammography, an excisional biopsy (or, failing that, a cyto-puncture) was performed by a gynecologist at the reference center. Women with histologically confirmed malignant breast cancer (or with cyto-puncture results suspicious), were referred to a tertiary level University Hospital for treatment (or diagnosis confirmation) and psychological support.

Breast cancer screening program was launched in Meknes-Tafilalt region of Morocco in 2011. This region composed of six provinces. The primary level was represented by 131 of the 190 primary care units located in this region. The secondary level was represented by all reference centers in this region (3 reference centers). The tertiary level was represented by the University Hospital Hassan II of Fez.

All women (45-69 years) who underwent a first test screening between 2012 and 2014 in the breast cancer screening program, were included in this study. The target population of this region comprised 713,447 women.

Data collection

This study was based on process and performance indicators, the data on each level were collected from the

various health structures. The data of target population and numbers of women participating in the program were obtained from the information system database at the Regional Directorate of Meknes. In primary care unite (first level) and secondary health centers (second level), data were extracted from the registry program. In these two levels, information on CBE, mammography and biopsy (or cyto-puncture) was collected. In the tertiary level, data were extracted from medical system database (HOSIX®) and routine medical records at university Hospital Hassan II in Fez. Information on the number of women who attend tertiary level and the date of the first received treatment was collected.

Statistical analysis

A descriptive analysis of variables collected was conducted. Qualitative variables were described by frequencies and proportions and quantitative variables were described by median and range. Several performance indicators of breast cancer screening program were calculated: the compliance rate (the screened population divided by the target population), the positivity rate (the CBE test positive population divided by the screened population), the referral rate (the population that underwent mammography divided by the CBE positive population), the cancer detection rate (the number of women with confirmed cancer among 1,000 CBE positive women) and the organizational indicators (time between the date of CBE and the date of biopsy (or cyto-puncture), time between the date of positive mammography and the date of biopsy (or cyto-puncture), time between the date of CBE and the date of the first received treatment). The collected data were analyzed using Epi-info 7 software.

Results

Table 1 shows the performance indicators of breast cancer screening program in Meknes-Tafilalt region.
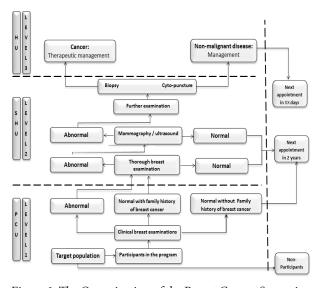

Figure 1. The Organization of the Breast Cancer Screening Program in Morocco. Data source: (Foundation Lalla Salma Prevention and Treatment of Cancers, 2011). PCU, Primary Care Unite; SHC, Secondary Health Center; UH, University Hospital

Table 1. Performance Indicators of Breast Cancer Screening Program in Meknes-Tafilalt Region - Morocco, 2012-2014.

Indicators		2012	2013	2014	2012-2014
		N or %	N or %	N or %	N or %
Target population		233,785	237,511	242,151	713,447
Clinical Breast Examination		40,445	72,998	71,508	184,951
	Compliance rate (%)	17.3	30.7	29.5	26
	Positive result	821	2,203	3,260	6,284
	Abnormal result	39,624	70,795	68,248	178,667
	Positivity rate (%)	2.1	3.1	4.5	3.3
Mammography		439	981	891	2,311
	Referral rate (%)	53.4	44.5	27.3	36.7
	Positive mammography	114	101	140	355
	Negative mammography	325	880	751	1,956
Biopsy (or cyto-puncture)		63	152	164	379
	Abnormal result	5	75	75	155
	Confirmed breast cancer [a]	58	77	89	224
	Cancer detection rate [b] (%)	1.4	1.1	1.2	1.2

[a], histologically confirmed ; [b], Per 1,000 women

Table 2. Organizational Indicators of Breast Cancer Screening Program in Meknes-Tafilalt Region - Morocco, 2012-2014

Organizational indicators	Median (range), day
Time between the date of CBE and the date of biopsy (or cyto-puncture)	36 (1-208)
Time between the date of positive mammography and the date of biopsy (or cyto-puncture)	6 (2-140)
Time between the date of CBE and the date of the first received treatment	61 (18-73)

During the period 2012-2014, a total of 184,951 participated in the breast cancer screening program. The compliance rate was lower in 2012 (17.3%) than in both 2013 (30.7%) and 2014 (29.5%). A total of 6 284 women had a positive CBE result, the positivity rate was 3.3%. 2311 women with a positive CBE result underwent mammography. The referral rate was 36.7%. The results of the mammography were positive for 355 (15.4%) women. A total of 379 biopsy (or cyto-puncture) were performed at the reference centers. 224 women had histologically confirmed breast cancer. The cancer detection rate was 1.2 per 1000 women.

Table 2 shows the organizational indicators of breast cancer screening program in Meknes-Tafilalt region of Morocco, during the period 2012-2014. The median of time between the date of screening by CBE and the date of biopsy (or cyto-puncture) was 36 days (range 1-208 days). The median of time between the date of positive mammography and the date of biopsy (or cyto-puncture) was 6 days (range 2-140 days). The median of time between the date of screening by CBE and the date of the first received treatment was 61 days (range 18-73 days).

Discussion

The purpose of this study was to evaluate the early performance indicators of breast cancer screening program in the region of Meknes –Tafilalt, Morocco.

The findings of this study showed that during the period 2012-2014, the participation rate was 26% in the breast cancer screening program in Meknes-Tafilalt region, it was lower than the rates reported in previous studies in Morocco (35.7%) (El Fakir et al., 2015), and other countries: Turkey (76.8%) (Dundar et al., 2012), Hawaii (69.6%) (Reginald et al., 2010), Norway (75.0%) (Moshina et al., 2016), Italy (72.0%) (Berardi et al., 2013), Germany (55.0%) (Simbrich et al., 2016), Sweden (89.0%) (Nyström et al., 1993). However, it was higher than in other studies in Tunisia (17.3%) (Frikha et al., 2013) and in Iran (21.5%) (Samah and Ahmadian, 2012). Generally, the results of this study are very encouraging, considering that the participation rate increased from 17.3% in 2012 to 29.5% in 2014. Previous studies have reported some factors associated with participation of women in the breast cancer screening, such as breast cancer background knowledge, access to health care system, level of education, social coverage, having family history of breast cancer, socio-economic status, as well as various geographical, environmental and cultural factors (Lagerlund et al., 2000; Pape et al., 2016; Potvin et al., 1995; Secginli and Nahcivan 2011; Taylor et al., 1995). The poor involvement of healthcare professionals and the lack of media campaigns about breast cancer screening may be implicated in this low compliance in our region (El Fakir et al., 2015). Further investigations are needed to explore the reasons for low participation in our region.

In this study, 3.3% of the CBEs were coded abnormal; this is comparable with another study conducted in Philippines which showed the rate of 2.5% (Pisani et al., 2006). But, this rate was lower than that found in other studies, like by (Bobo et al., 2000). (6.9%) and by (Baines et al., 1989). (11.8%). However, we did not

have information about age at time of CBE which is an important factor in many analyses. Age was negatively associated with the likelihood of having an abnormal CBE but was positively associated with the likelihood of having a cancer detected (Bobo et al., 2000).

The cancer detection rate in this study was 1.2 per 1,000 women; similar results were seen in other studies also (Morimoto et al., 1997). However, this detection rate was lower than that reported by other screening programs relying on both CBE and mammography: 8.1 per 1,000 women in Germany (Malek and Kaab-Sanyal, 2016) and 4.5 per 1,000 screened in Singapore (Yeoh et al., 2006)..

The referral rate observed in this study (3.4%) was low to the rate recommended by breast cancer screening program in Morocco, which is 10% to 13% (Foundation Lalla Salma Prevention and Treatment of Cancers., 2011). This low rate may be explained by the fact that a large number of women who prefer to follow-up at private sector after a positive CBE. The effective communication between several levels of the program can increase the referral rate in our region.

In our study, The median of time between the date of clinical breast examination and the date of biopsy (or cyto-puncture) was 36 days, it significantly better than reported in previous studies in Africa : 60 day in Niger (Harounay 2001), 90 day in Tunisia (Maalej et al., 1999), 225 day in Libya (Ermiah et al., 2012) and 390 day in Burkina Faso (Sano et al., 1998). The time observed in our study between the date of CBE and the date of the first received treatment (median = 61 days), is similar to that reported in some Middle Eastern countries such as Egypt (Schlichting et al., 2015), and Iran (Rastad et al., 2012). However, it remains higher than that reported in some developed countries studies such as in France 13 days (Revaux et al., 2014) and in USA 42 days (Vandergrift et al., 2013).

The main limitation of this study was the lack of information about women who had chosen to follow-up at private sector or at other health structures out of the area of this study.

In conclusion, collaborative efforts are necessary to increase the breast cancer screening rates to the recommended levels. In addition, there is a need of better monitoring, as well as implementation of quality assurance tools to improve program performance in our country.

Acknowledgements

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Evaluation of Performance Indicators of Breast Cancer Screening Program in Morocco

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