Cost-effectiveness of mammography breast cancer screening in Iranian women

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Extended Abstract

Introduction: Breast cancer is the most common cancer in Iranian women and about 51% of diagnosed cases are less than 50 years old. In spite of huge burden of the breast cancer on Iranian women, their family and the health system, there have not been developed any early diagnosis or screening program/strategy in this country, so far. It is expected that a screening policy for breast cancer, can downstage the disease distribution and decrease the mortality rates and disabilities associated with breast cancer. we developed an analytical model to assess the incremental cost effectiveness of an organized screening program in Iran.

Materials and methods: This study is an economic evaluation of mammography screening strategy among Iranian woman aged 40-70 years compared to no-screening. The study was conducted from the viewpoint of Iran’s health system. Model outcomes were Quality Adjusted Life Years (QALY) and lifetime costs calculated over 50-year time horizon. Comparative performance of two strategies was measured by using the incremental cost-effectiveness ratio (ICER). Annual transition probabilities between health states were derived from previous studies, national reports and expert panels if needed. Information about age distribution and prevalence of breast cancer among Iranian women (Cancer Office CDC, 2012 #1106) adopted from national resources. We used a decision tree to detect patients with breast cancer. Then a Markov model was used to calculate additional life years saved due to early detection of breast cancer through screening program. According to the experts, the abnormal findings would be detected in 60% of attendances in which almost 7% (3% - 10%) require more assessment. The probability of using invasive or non-invasive assessments procedures were assumed to be 20% and 80% respectively. According to expert opinions, overall sensitivity and specificity of mammography were considered 75% and 55% respectively. According to the previous studies conducted in Iran, the breast cancer detection rate was estimated to be 1/1000 in screened women. The background and disease specific mortality rate for patients with breast cancer were estimated using Iran life table 2009, Iran death registry data, and two longitudinal studies conducted by Movahedi and Haghiqat. we used combination of public and private sector national tariffs in 2012(MOH, 2012 #1127), to estimate the mean cost of medical care. One-way Sensitivity analyses were performed by varying the different model parameters. Regarding World Health Organization guideline and per capita GDP in Iran, the 39300$ considered as cost effectiveness threshold.

Results: This study examined the effect and cost of screening program in 9,102,292 Iranian women aged 40 — 69 years, of which 7,300,000 women (80%) participated in the program. About 10,000 patients with breast cancer are diagnosed annually in this targeted population. Advanced cancers were frequent in 44% of patients while about 14% of them were in stage I of disease. Considering model assumptions, it was noticed that screening could find 5110 cases more than non-screening strategy. Results showed that screening could provide 13,400 QALY more than non-screening strategy which is 1.34 QALY per each participant. It was estimated that cost of mammography screening and evaluation of the abnormal findings in 7,300,000 recruited women was int$ 3,186,403,941. It means that the cost of finding each cases due to screening policy would be int$ 623,562. Study findings showed that the mean costs of treatment in a breast cancer were int$ 16,434 and int$ 17,504 in screening and non-screening strategies respectively. Results showed that the cost of every QALY saved through mammography screening program would be int$37,350. So, the total cost of screening program will be about int$272,655,000,000 .

The sensitivity of the outcome variable changing certain model parameters was demonstrated by tornado diagram (figure 1). It showed that the Cost effectiveness of screening was very sensitive to recall rate of abnormal findings. Variation of recall rate between 3% and 10% changes the ICER from Int.$ 26280 to Int.$ 85847 respectively. Probabilistic sensitivity analysis showed that screening program would be cost effective in 53% of the cases regarding the threshold of 39300$.

Discussion: This is the first study conducted about the cost effectiveness of mammography screening program in Iran. Results indicate that the cost of mammography screening in Iranian women is Int.$ 37,350 per-quality-adjusted life-year (QALY) , with a probability of 53% being cost-effective at a threshold of Int.$ 39,300 . ICER varies according to the changes in age groups, interval of screening and basic probability assumptions of involved parameters in screening. Because of insufficiency of the resources required for screening program, the triennially interval of screening were adopted. Variation of interval cancer showed only 13% change of ICER in sensitivity analysis, which is very low range. So it seems that triennially screening costs and effects are not affected very much by interval cancer rates. Future studies about these estimations in annually and biannually screening may lead to more accurate conclusion. In Iran, nearly 12% of women are in 40-49 age group and about 16% of them are 50 years and more. So, we considered start age of screening from 40. Implementing mammography screening for breast cancer in young population has been criticized by some studies. It insists on need for precise economic evaluation to establish screening program in this young population. Incidence rate of breast cancer in Iran is about 30 per 100,000 women population.(Cancer Office CDC, 2010 #1097; Cancer Office CDC, 2012 #1106) Based on our assumption, to detect a breast cancer case, 1000 women should be screened. Sensitivity analysis showed that a 10% change in the incidence of breast cancer, the ICER would change by 15.8%. We consider the developed models as holistic ones for demonstrating the breast cancer states in annually intervals in Iran. Establishing some local screening programs and applying their results to this model, may facilitate evaluating different strategies for disease control. Definitely implying both direct and indirect expenditures will provide
more accurate estimation of breast cancer burden for health system. Evaluation of other screening strategies would be useful to identify more cost-effective program for health policy makers in cancer control.

Nooshin Peymana, Mohammad Amanib, among rural women in Roshtkhar, Iran 2015 planned behavior on Breast Cancer Screening Programs The relationship between health literacy and the theory of cancer control.

A study show that those with low health literacy are inadequate health literacy. This study was conducted to determine the relationship between health literacy and age, and low participation in cancer screening programs, clinical tests, and treatment procedures.

Introduction: Breast cancer is considered as a cause of death in women. Patients with breast cancer in our country are about 10 years younger than similar patients in western countries. Katz et al’s study indicates that there is a significant relationship between low health literacy and low screening. Furthermore, low cancer screening is related to low health literacy, low information about cancer, negative attitude towards cancer screening, and low self-efficacy. The results of Pagán et al’s study show that those with low health literacy are more likely to do less mammography. Sentell et al’s study also confirms that there is a significant relationship between low health literacy and low levels of cancer screening among American-Chinese women in California. The results of another study in Iran also demonstrates that form the population under study, 28.1% have adequate health literacy, 15.3% have marginal health literacy, and 56.6% have inadequate health literacy. This study was conducted to determine the relationship between Theory of Planned Behavior and Health Literacy by Breast Cancer Screening programs in Rural women in Roshtkhar.

Methods: This cross-sectional study was conducted on 250 women above age 35 years who were selected by stratified sampling method from population covered by rural health centers of Roshtkhar. Each of 1 to 7 health centers of Roshtkhar was considered as a class. Second, 14 health homes under the supervision of these seven centers were randomly selected. Then, samples were randomly chosen in proportion to the population covered by each health home. The sample size in this study was 210 (15 to 30 per variables). The number of samples was increased to 250 to be more precise. Data were collected by self-report questionnaire (functional health literacy and breast cancer) and analyzed using SPSS software version 13 and statistical, Kruskal Wallis Test, Spearman correlation coefficient, and General linear Model. P value less than 0.05 was considered significance.

Results: The mean age of participants was 39.6±4.84 years. Of all the participants in the present study, 82.8% have inadequate health literacy, 6% have marginal health literacy, and 11.2% have adequate health literacy. Spearman correlation test indicates that there is a statistically significant relationship between health literacy and age (p<0.001, r=-0.23), knowledge and health literacy (p<0.001, r=0.45). The Kruskal Wallis Test showed a significant relationship between Breast Screening programs and Health Literacy (x²=16.13, p<0.001) and education and health literacy (p<0.001, x²=100.29). Women with adequate health literacy levels were more likely to report to ever have a Breast Screening programs, compared to women with inadequate or marginally functional health literacy levels. Inadequate/ marginal functional health literacy is strongly associated with lower Breast Screening programs. General linear Model had predicted 40.2% of variance in the performance of breast cancer screening programs by Theory of Planned Behavior in the adjusted model.

Discussion: The aim of this study is determine the relationship between the theory of Planned Behavior and women’s health literacy on breast cancer screening tests in Roshtkhar in 2015. The results of the study indicate that 82.8%, 6%, 11.2% of the participants have respectively inadequate, marginal, and adequate health literacy which is consistent with the results of other studies such as Tehrani et al. Along the same line, the results of the present study show that there is a significant relationship among education level, age, and health literacy. Inadequate health literacy is more common at older ages and lower education level which is consistent with the results of other studies such as Tehrani. Moreover, there is a significant relationship between health literacy and breast cancer screening tests and it is more likely that women’s with inadequate health literacy do less screening tests which is consistent with the results of Armin’s study and Katz et al’s study. Also, the results of this study demonstrate that women having inadequate health literacy are less aware of breast cancer and its screening tests which is consistent with the results of Morri’s study. The results of this study support the application of theory of planned Behavior to do breast cancer screening tests as though the variables of intention, attitude, perceived behavioral control, and subjective norms justify 40.2% of the observed behavioral dispersion which is consistent with the results of Rutter’s and Drossaert’s studies. Tolma’s qualitative study on Cypriot women points to the women’s positive attitude towards mammography which is consistent with the present study results. The results of Davis et al’s study showed that inadequate health literacy is one of the most important factors in advanced-stage cancer diagnosis, and low participation in cancer screening programs, clinical tests, and treatment procedures.

Finally, it should be noted that one of the important issues about breast cancer screening behaviors and health concepts is cultural and intercultural differences. It seems that there is health behaviors disobedience in every society because right and wrong health behaviors constitute part of that society’s culture. Therefore, applying health behaviors and appropriate educational programs are needed to prepare people for the correct ways of life in order to maintain their health and prevent diseases.