Revista Brasileira de Enfermagem
REBEn

Breast cancer screening program for risk groups: facts and perspectives

Programa de rastreamento de neoplasias da mama para grupos de risco: fatos e perspectivas

Tamizaje Masivo de neoplasias de la mama para grupos de riesgo: hechos y perspectivas

Carla Andréia Vilanova Marques[I]
ORCID: 0000-0003-1151-9126

Elisabeth Níglio de Figueiredo[I]
ORCID: 0000-0001-5939-8306

Maria Gaby Rivero de Gutiérrez[I]
ORCID: 0000-0003-4189-1594

[I]*Universidade Federal de São Paulo. São Paulo, São Paulo, Brazil.*

How to cite this article:
Marques CAV, Figueiredo EN, Gutiérrez MGR. Breast cancer screening program for risk groups: facts and perspectives. Rev Bras Enferm. 2022;75(3):e20210050. https://doi.org/10.1590/0034-7167-2021-0050

Corresponding author:
Carla Andréia Vilanova Marques
deiavilanova@hotmail.com

Submission: 03-07-2021 **Approval:** 06-22-2021

ABSTRACT

Objectives: to measure the frequency and compliance of breast cancer screening, according to the risk for this disease. **Methods:** a cross-sectional study with 950 female users of 38 public Primary Health Care services in São Paulo, between October and December 2013. According to UHS criteria, participants were grouped into high risk and standard risk, and frequency, association (p≤0.05), and screening compliance were measured. **Results:** 6.7% had high risk and 93.3% standard risk, respectively; in these groups, the frequency and compliance of clinical breast examination were 40.3% and 37.1%, and 43.5% and 43.0% (frequency p=0.631, compliance p=0.290). Mammograms were 67.7% and 35.5% for participants at high risk, and 57.4% and 25.4% for those at standard risk (frequency p=0.090, compliance p=0.000). **Conclusions:** in the groups, attendance and conformity of the clinical breast exam were similar; for mammography, it was higher in those at high risk, with assertiveness lower than the 70% set in UHS.
Descriptors: Breast Neoplasms; Risk Assessment; Primary Prevention; Mass Screening; Process and Outcome Evaluation in Health Care.

RESUMO

Objetivos: mensurar a frequência e conformidade de rastreio do câncer mamário segundo risco para esta doença. **Métodos:** estudo transversal em São Paulo, com 950 usuárias de 38 da atenção primária no SUS entre outubro a dezembro de 2013. Segundo critérios do SUS, as participantes foram agrupadas como risco elevado ou padrão e mensurou-se frequência, associação (p≤0,05) e conformidade do rastreio. **Resultados:** 6,7% tinha risco elevado e 93,3% risco padrão, respectivamente, nestes grupos a frequência e conformidade do exame clínico mamário foram de 40,3% e 37,1% e de 43,5% e 43,0% (frequência p=0,631, conformidade p=0,290). Realização de mamografia alcançou percentuais de 67,7 e 35,5 para as com risco elevado, e de 57,4 e 25,4 nas com risco padrão (frequência p=0,090, conformidade p=0,000). **Conclusões:** nos grupos, a frequência e conformidade do exame clínico mamário foram semelhantes, para mamografia foi maior nas com risco elevado, tendo assertividade inferior aos 70% pactuados no SUS.
Descritores: Neoplasias da Mama; Grupos de Risco; Atenção Primária à Saúde; Programas de Rastreamento; Avaliação de Processos e Resultados em Cuidados de Saúde.

RESUMEN

Objetivos: mensurar frecuencia y conformidad de rastreo del cáncer mamario, segundo riesgo para esa enfermedad. Métodos: estudio transversal con 950 usuarias de 38 servicios de Atención Primaria púbicos en São Paulo, entre octubre y diciembre de 2013. Segundo criterios del SUS, agruparon las participantes en riesgo elevado y riesgo-estándar, y mensurado frecuencia, relación (p≤0,05) y conformidad del rastreo. **Resultados:** 6,7% tenían riesgo elevado y 93,3% riesgo-estándar, respectivamente; en eses grupos, la frecuencia y conformidad del examen clínico mamario fueron de 40,3% y 37,1% y de 43,5% y 43,0% (frecuencia, p=0,631; conformidad, p=0,290). Realización de mamografía alcanzó porcentuales de 67,7% y 35,5% para participantes con riesgo elevado, y de 57,4% y 25,4% en con riesgo-estándar (frecuencia, p=0,090; conformidad, p=0,000). **Conclusiones:** En los grupos, la frecuencia y conformidad del examen clínico mamario fueron semejantes, para mamografía fue mayor en las con riesgo elevado, habiendo asertividad inferior a 70% pactados en el SUS.
Descriptores: Neoplasias de la Mama; Grupos de Risco; Atención Primaria de Salud; Tamizaje Masivo, Evaluación de Procesos y Resultados en Atención de Salud.

INTRODUCTION

Breast cancer has become a global challenge to the health care system as it affects women and families, with a prevalence rate of 24.2% and a mortality rate of 15%[1]. In Brazil, except for skin cancer, breast cancer is also more frequent in women and has an increasing mortality rate[1-2].

It is considered a non-communicable disease (NCD), and the etiology of the tumor is multifactorial in most cases[3-5]. However, it is estimated that 5% to 10% of these cancers are related to genetic mutation, commonly in the BRCA ½ genes, with 1 case among 300 to 500 individuals[4-5]. In order to control this scenario, efforts should be directed to health promotion, early detection through mammography (MMG) combined or not with clinical breast examination (CBE), and the offer of timely treatment[6-7].

For Brazilian women who use the Unified Health System (UHS), in 2004 there was a consensus for early detection of this disease according to risk and age group[8]. At that time, the high-risk criteria for breast cancer included: the presence of a personal history of breast cancer or proliferative breast lesion with atypia or lobular neoplasm in situ; a history among first-degree relatives of male breast cancer or bilateral cases of this tumor in women at any age or a unilateral occurrence of this disease at an age under 50 years or of ovarian cancer[8]. This document recommended for high-risk users that CBE and MMG be performed annually, starting at 35 years of age, while for the others, annual CBE starting at 40 years of age and biennial MMG starting at 50 years of age, performed by Primary Health Care (PHC) professionals[8].

The current guideline released in 2015 targeted the standard-risk population and recommended screening with biennial MMG for those between 50 and 69 years, early diagnosis with encouragement of awareness strategies, identification of suspicious signs and symptoms, and diagnostic confirmation in a single service[9]. On the other hand, it contraindicated screening with breast self-examination, with other exams, and with MMG at another periodicity or age; and, for screening with CBM, there was no recommendation in view of the balance between possible harms and uncertain benefits[9].

In the search for efficiency and risk reduction for health service users, ways to institute care centered on their needs and supported by evidence are currently being discussed, including for breast cancer detection programs[10-16]. Thus, modeling, protocols, tools and feasibility assessments emerged for the implementation of personalized breast cancer prevention and early detection by risk stratification, involving users and other health system actors[5,10-16]. However, in Brazil and other Latin American countries, the identification and screening of women according to genetic susceptibility still lacks a better understanding, with little evaluation of family history of cancer in the last decade[17-30]. Furthermore, prior to the pandemic of COVID-19, 3.2 million new cases of breast cancer per year were estimated for 2050[1]. In the current scenario, projections indicate that the drain on resources to deal with the pandemic moment of COVID-19 has reduced the uptake of breast cancer control programs. This leads to worsening of the epidemiological picture, failures and delays in both diagnosis and treatment of this disease, deterioration of the quality of life of those affected, and increased spending on health services, which has mobilized attention to the personalization of access to screening based on the risk of the target audience[10-16,31].

OBJECTIVES

To measure the frequency and compliance of breast cancer screening according to risk for this disease.

METHODS

Ethical aspects, study design and period

Cross-sectional study conducted according to the STROBE tool, between October and December 2013; conducted after authorization from the Ethics Committees and from each participant.

Place, study sample, and inclusion and exclusion criteria

In the southeast region of the city of São Paulo (SP), there were 90 PHC services and approximately 55,812 women aged 35 to 69 years. We carried out a two-stage conglomerate probability sampling, considering 50% frequency of the outcome in the target group, 95% confidence interval, and design effect of 2.9, resulting in a sample of 1,117 users and 38 PHC services.

The PHC services were constituted in primary sampling units selected with simple randomization technique and proportional sharing to the number of users, respecting the age groups of interest. The users comprised the secondary sampling units, selected by systematic technique, scaled by demand and distributed in 93 periods of data collection.

Included in the sample were non-communicable disease that had been functioning for three years or more and women between 35 and 69 years old who had been using the PHC services for at least three years. Informants with comprehension deficits and those who did not consent to participate in the research were excluded.

Study protocol

Pilot testing and previous calibration of the interviewers were applied, aiming to adapt the approach and language to be intelligible to the target audience. Then, the data collection was conducted in loco by a trained and supervised team, which applied 83 questions from a validated questionnaire, addressing the actions for early detection of breast cancer carried out between 2009 and 2012[32]. Even so, there was a loss of 15% (167) of the participants due to failure in the selection of women outside the target age. In view of this situation, we assessed a sample error of 3.15% and a test power of 71.59% of the final sample, with 950 users from 38 PHC services.

The determination "high risk for breast cancer" followed the UHS criteria already described, and the other women who did not meet these criteria were classified as "standard risk"[8]. Initially, in each group, the frequency of the following variables was evaluated:

- Sociodemographic – age group (35-39, 40-49, 50-69 years old), marital status (lives with partner - yes, no), race (white,

non-white), years of education (0-3, 4-7, 8-10, ≥ 11), and economic class according to the 2014 National Business Association Brazil Economic Classification Criterion (A+B, C, D+E).

- Cancer Detection Actions – CBE (performed by UHS, not performed), MMG (performed by UHS, not performed, purchased), age orientation by UHS in the last four years to start preventive exams (no, yes - before 40 years old; yes - after 40 years old; yes - after 50 years old; yes, no age restriction), reason for CBE and MMG done by UHS (screening and other reason, breast alteration, case of cancer in family member), periodicity of MMG done by UHS (≤ 1 year, biennial, > biennial), conformity of CBE, MMG and CBE+MMG done by UHS (yes, no).

Storage, analysis of results and statistics

One of the researchers and another assistant, independently, entered the information into the Statistical Package for the Social Sciences 2010 database. Later, a double-entry test was performed to check consistency and to make tabulation adjustments, which generated the final version of this database. This same program was used for descriptive analysis and the chi-square test ($p \leq 0.05$) comparing the groups. The conformity of actions was measured descriptively, based on UHS parameters (Chart 1).

Chart 1 – Parameters for detection of breast cancer recommended from 2004 to 2014 in the Unified Health System

Target audience	Recomended action
35 years or older with high risk	Annual clinical breast exam and annual mammography
40 to 49 years old with standard risk	Annual clinical breast exam
50 to 69 years old with standard risk	Annual clinical breast examination and biennial mammography

Source: Ministry of Health, Brazil[8].

RESULTS

Of the 950 interviewees, 47.7% (453) had a family history of breast or ovarian cancer investigated in the UBS, and 20.7% (197) knew of cases of this disease in their relatives. There was 2.6% (25) loss of information. Among the remaining participants (925), 93.3% (863) had standard risk for breast cancer, and 6.7% (62) had high risk, predominantly cases of breast cancer in the family (33), unilateral (25), under 50 years of age (25) (Table 2).

Regarding the sociodemographic characteristics presented in Table 1, there was no association between the groups with standard risk and high risk for breast cancer. However, in the participants at high risk, white women and those aged 40-49 prevailed, while for those at standard risk, non-white women and those aged 50-69 prevailed.

Chart 2 – Distribution of family history of cancer in 62 women at high risk for breast cancer, São Paulo, São Paulo, Brazil, 2013

Age group	Type of cancer	Laterality	Age	Kinship	
35-39 years (n = 09)	» Breast	» Unilateral	» < 50 years	» Mother	(n = 02)
	» Breast	» Bilateral	» > 50 years	» Mother	(n = 01)
	» Ovary			» Mother	(n = 04)
				» Sister	(n = 01)
				» Daughter	(n = 01)
40-49 years (n = 29)	» Breast	» Unilateral	» < 50 years	» Mother	(n = 03)
				» Sister	(n = 10)
	» Breast	» Non specific	» Non specific	» Homem	(n = 01)
	» Breast	» Bilateral	» < 50 years	» Mother	(n = 01)
				» Sister	(n = 01)
	» Ovary			» Mother	(n = 08)
				» Sister	(n = 05)
50-69 years (n = 24)	» Breast	» Unilateral	» < 50 years	» Mother	(n = 03)
				» Sister	(n = 05)
				» Daughter	(n = 02)
	» Breast	» Bilateral	» < 50 years	» Mother	(n = 01)
				» Sister	(n = 02)
	» Breast	» Bilateral	» < 50 years	» Mother	(n = 01)
	» Ovary			» Mother	(n = 05)
				» Sister	(n = 04)
				» Daughter	(n = 01)

Table 1 – Distribution of sociodemographic characteristics of interviewees according to high and standard risk for breast cancer, São Paulo, São Paulo, Brazil, 2013

Sociodemographic profile	Risk				*p* value
	High		Standard		
	n (62)	%	n (863)	%	
Age group (in years)					
35 to 39	9	14,5	175	20,3	0,181†
40 to 49	29	46,8	306	35,5	
50 to 69	24	38,7	382	44,2	
Total	62	100,0	863	100,0	
Lives with a partner					
Yes	36	58,1	510	59,1	0,873†
No	26	41,9	353	40,9	
Total	62	100,0	863	100,0	
Race					
White	32	51,6	375	43,5	0,211†
Non-white	30	48,4	488	56,5	
Total	62	100,0	863	100,0	
Years of study					
0 to 3	11	17,7	202	23,4	0,722†
4 to 7	18	29,0	235	27,2	
8 to 10	11	17,7	124	14,4	
11 or more	22	35,5	301	34,9	
Total	62	100,0	862*	100,0	
Economic class‡					
A+B	11	17,7	202	23,4	0,244†
C	45	72,6	535	62,0	
D+E	6	9,7	126	14,6	
Total	62	100,0	863	100,0	

**Loss; †Pearson's chi-square statistical test; ‡National Business Association's Brazil Economic Classification Criterion, 2014.*

Table 2 – Distribution of interviewed women who underwent clinical breast examination and mammography according to high and standard risk for breast cancer, São Paulo, São Paulo, Brazil, 2013

Actions for early detection of breast cancer performed	Risk				*p* value
	High		Standard		
Clinical breast examination	n (62)	%	n (863)	%	
Done in public service	25	40,3	375	43,5	0,631†
Not done in public service	37	59,7	488	56,5	
Total	62	100,0	863	100,0	
Reason for breast examination in public service	n (25)	%	n (375)	%	
Screening and other reason	13	52,0	305	82,0	0,000†
Breast alteration	5	20,0	50	13,4	
Case of cancer in a relative	7	28,0	17	4,6	
Total	25	100,0	372*	100,0	
Mammography	n (62)	%	n (863)	%	
Done in public service	42	67,7	495	57,4	0,090†
Not done in public service	9	14,5	235	27,2	
Done through the complementary system	11	17,7	133	15,6	
Total	62	100,0	863	100,0	
Reason for mammography in public service	n (42)	%	n (495)	%	
Screening and other reason	19	45,2	424	86,7	0,000†
Breast alteration	17	40,5	16	3,3	
Case of cancer in a relative	6	14,3	49	10,0	
Total	42	100,0	489*	100,0	
Mammography periodicity in public service	n (42)	%	n (495)	%	
≤ 1 year	29	70,7	307	64,6	0,715†
Biennial	7	17,1	104	21,9	
> biennium	5	12,2	64	13,5	
Total	42	100,0	495	100,0	

**Loss; †Pearson's chi-square statistical test.*

Age recommendation to women at high risk and at standard risk to perform CBE was made to 37.1% (23) and 34.3% (296) of them, respectively (p = 0.662). For MMG, 30.6% (19) and 37.1% (320) were instructed about the age at which they should start this exam (p = 0.273). Most BHU professionals instructed to start CBE and MMG after 40 years, regardless of the risk.

Breast examination was performed in 64% (16) of participants with high risk and 76.2% (291) of those with standard risk. Similarly and in the same order, MMG was performed in 76.2% (32) and 71.3% (353) of the interviewees.

Of the participants with high risk and those with standard risk, 83.3% (20) and 86.6% (324), respectively, had their breasts examined by the physician 16.7% (4) and by the nurse 12.8% (48) (p = 0.815). Requests for MMG for those at high and standard risk were made more frequently by the physician, reaching 92.9% (39) and 98.2% (480) of them, compared to those demanded by nurses, with 7.1% (3) and 1.8% (9), respectively (p = 0.026).

Table 2 shows that regardless of cancer risk, annual MMG frequency, screening as the driver of investigation, and more frequent MMG for participants at high risk predominated.

In the period investigated, the achieved compliance of the performance of the exams according to the UHS recommendation for users with high risk and those with standard risk was 33.9% (21) and 40.7% (350) of assertiveness for the CBE (p = 0.290); 56% (28) and 26.9% (191) of achievement in relation to the MMG (p = 0.000); and 18% (9) and 6.8% (48) in the evaluation of the practice of CBE and MMG together (p = 0.004).

DISCUSSION

The genetic mutation related to breast cancer increases the risk of the disease. Positively, scientific advances enable its proper identification and approach, impacting the quality of life of the carrier[4-5,10-16]. In this perspective, it was estimated that one in eight women in the UK would develop breast cancer and 20% of them would have a positive family history, requiring PHC professionals to have the skills to manage the situations of those at high risk[33]. However, few breast cancer early detection programs include genetic susceptibility assessment as a guiding criterion for clinical management, despite evidence that the benefits outweigh the risks and that implementation is feasible[5,10,12-16]. On reflection, the pandemic condition established by COVID19 and the fear of its spread have, on the one hand, generated an overburdened health care system, economic recession and scarce investment in the control of breast cancer; on the other hand, one notes the prospect of the use of technological evidence in favor of breast cancer screening[5,10-16,31].

From this angle, to support users at high risk for breast cancer, as well as PHC professionals in screening and referrals, some clinical protocols, computerized tools and training on the subject are being developed and tested[5,10-16]. The use of a self-applicable electronic program while the woman waits for clinical care has been pointed out as satisfactory for rapid risk mapping and provision of evidence-based guidance[5,10,14,33]. The use of this type of tool favors the user's empowerment regarding daily lifestyle, enables reflection on the theme "cancer" and motivates her to seek clarification with the health professional, strengthening the bond with the health service and the self-perception of health.

In the study conducted in the PHC in São Paulo, many reports of family members affected by ovarian cancer were observed, and it is thought that this fact is a result of memory bias or difficulty in distinguishing ovarian cancer from others that affect the gynecological system. To clarify these doubts, it would be necessary to investigate supporting documents such as death certificates, reports or diagnostic reports of the affected family member. However, the search for confirmation would take time, making it unfeasible to conduct the research, so it was decided to analyze the information according to what was self-reported, a topic subject to memory bias.

Considering the challenges in obtaining family history of cancer, it is timely to note that in Brazil there is widespread use of mobile digital devices, and this favors proposing the use of a self-applied electronic form that maps genetic susceptibility locally or remotely, especially in the pandemic period of COVID-19[33-34]. In addition, research indicates ways to increase non-formal education in population health via digital media, such as online social networks Facebook, Instagram and Twitter, alternatives that facilitate addressing the topic "breast cancer and susceptibility linked to the occurrence of cases in the family"[35].

In Latin America, even with the recognition of genetic susceptibility as a causal determinant of breast cancer, a review of 47 articles showed that less than half of the studies addressed

family history of cancer[17]. In Brazil, seven publications published after 2010, two of them in the Southeast, one in the Midwest and four in the Northeast, approached 247 to 3,608 women (mean = 842), between 18 and 88 years of age, predominantly in local researches in PHC services, identifying a 13.2% to 22.1% history of breast cancer affecting mother (2.3%) or daughter (0.2%) or sister (1.3% to 3.9%)[19,21-24].

In this study, the percentage of family history of cancer was 20.7%, affecting 1.9% of sister relatives and 0.2% of daughters, close to what was identified[18-19,21,23]. According to the literature, accurately obtaining a family history of cancer is an arduous task in nations with high awareness and availability of resources to professionals and the population[10,12,14,33]. These conditions are far from the welfare characteristics and the level of education of Brazilian women, which may have had repercussions on the differences observed.

Worldwide, there is evidence that a case of breast cancer in a closely related family member is associated with a greater chance of the successor lineage being affected[3-5]. In the Brazilian program for the control of breast cancer, the mention of genetic predisposition with a definition of conduct dates back to 2004[8]. Nevertheless, between 2013 and 2014, a multicenter study conducted in the cities of São Paulo, Diadema, Ribeirão Preto and São Luiz do Maranhão, with PHC nurses, indicated that most of them assess risk factors including family history of cancer, claim to perform CBE in female users, guide CBE without age restriction and without following any periodicity, prevailing annual indication of MMG for women aged 40 years or more[27-30]. Three research fields demonstrated that more than 50% of the nurses requested MMG, while in Ribeirão Preto, almost all of the interviewees were not allowed to request this exam[27-30]. In Maranhão, the main driver for mammographic investigation was age[30].

However, in the assistance observed in the PHC in the city of São Paulo, less than half of the 950 users were asked about family history of cancer and had an annual MMG request; and 30.9% of those at high risk had this test done at intervals other than the recommended interval. Moreover, a fact that draws attention and corroborates the findings of the multicenter study[27-30] is the predominance of age guidance to start CBE and MMG after age 40, regardless of the user's high or standard risk. This situation indicates that, after more than a decade, the consensus of annual screening for high-risk women starting at age 35 has not yet been implemented.

In fact, the situation described reinforces the relevance of continuous training of PHC professionals, whether in person or at a distance, as well as highlights the importance of creating spaces for listening to these professionals, in order to align practices to goals, with discussion of the obstacles[10,12,14,36]. These arrangements contribute to the systematization and coordination of care, fundamental assumptions for the implementation of integrated health care networks[6-7,9].

With regard to the presence of breast cancer risk for PHC users in São Paulo, as for other Brazilian women, no association was confirmed with the performance of MMG, nor of CBE[18,23]. On the other hand, the most frequent reason for requesting mammography exams was having a family history of this disease, indicating that this factor led to the active listening of PHC professionals and can be further enhanced with their training[36]. At the same time, women who are made aware of the risk factors will tend to expose this susceptibility, stimulating adherence to the screening program and a healthier lifestyle[14,35-36].

Comparing the actions performed with what was recommended by the UHS at the time, compliance for users with high risk was higher than for those with standard risk, both for MMG (56% versus 26.9%) and in the combination of mammography with CBE (18% versus 6.8%), most likely due to the culture disseminated by the medical profession, opposed to the UHS recommendation and in favor of annual MMG[9]. On the other hand, the CBE was the one with the highest compliance among participants with standard risk (40.7% versus 33.9%). Consequently, the achieved compliance of the exams in the respective groups was below the government target of 70%[8].

Limitations of the Study

It is noteworthy that the population prevalence of high risk for breast cancer is low. Thus, the variations observed may be due to chance, conditioned by the size and type of sample used. Data collection was based on recall, and is therefore subject to recall bias. Still, the findings presented must be taken with caution, since they report actions performed for users of the PHC of the UHS and enrolled in a metropolitan geographical area in a given time interval, according to reference in force at the time.

Contributions to the Field

Internationally, emphasis is placed on the continuous monitoring and evaluation of the actions proposed for cancer control, with extensive nursing participation[6-7,9-10,14]. In this direction, the exposed results advanced in the temporal analysis of the actions of early detection of the national program of breast cancer control among women at high risk for this neoplasm, pointing out the frequency and conformity of the practices performed in 38 PHC services in the southeast region of São Paulo.

The finding that there was no differentiation in the care offered in the PHC assigned to genetically susceptible users in the largest metropolitan region of Brazil leads to the inference that the health professionals in these services were not fully aware of the possibility of stimulating health promotion and monitoring of the group with greater genetic vulnerability; added to this finding, the scarce Brazilian scientific production in this field points to opportunities for collaboration of academia in testing interventions that expand the actions of health promotion and early detection of breast cancer in the target population. And finally, the measures already applied to address the barriers in screening and referral of women at high risk for breast cancer emerge as possibilities to be tested in the Brazilian context.

CONCLUSIONS

The frequency of actions for early detection of breast cancer among women at high and standard risk was similar, indicating inattention to the group at higher risk of developing this tumor. There was an association with the reason for performing mammography and clinical breast examination between the groups analyzed.

The compliance of mammography alone or combined with clinical breast examination was higher for participants at high risk, and there was a statistically significant difference in these findings between the groups; however, the assertiveness of the exams analyzed in the groups did not reach the 70% agreed upon by UHS.

FUNDING

The financial subsidy for this research was made by National Council of Science and Technology (CNPq) and by the Coordination for the Improvement of Higher Education Personnel (CAPES) doctoral grant.

REFERENCES

1. Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 2018;68(6):394-424. https://doi.org/10.3322/caac.21492
2. Couto MSA, Guerra MR, Firme VAC, Bustamante-Teixeira MT. Breast cancer mortality in Brazilian municipalities and associated factors. Rev Panam Salud Publica. 2017;41:e168. https://doi.org/10.26633/RPSP.2017.168
3. Krewski D, Rice JM, Bird M, Milton B, Collins B, Lajoie P, et al. Concordance between sites of tumor development in humans and in experimental animals for 111 agents that are carcinogenic to humans. J Toxicol Environ Health B Crit Rev. 2019;22(7-8):203-36. https://doi.org/10.1080/10937404.2019.1642586
4. Apostolou P, Fostira F. Hereditary breast cancer: the era of new susceptibility genes. Biomed Res Int. 2013;2013:747318. https://doi.org/10.1155/2013/747318
5. Nelson HD, Pappas M, Cantor A, Haney E, Holmes R. Risk assessment, genetic counseling, and genetic testing for BRCA-Related Cancer in women: updated evidence report and systematic review for the US Preventive Services Task Force. JAMA. 2019;322(7):666-85. https://doi.org/10.1001/jama.2019.8430
6. Lauby-Secretan B, Scoccianti C, Loomis D, Benbrahim-Tallaa L, Bouvard V, International Agency for Research on Cancer Handbook Working Group, et al. Breast-cancer screening: viewpoint of the IARC Working Group. N Engl J Med. 2015;372(24):2353-8. https://doi.org/10.1056/NEJMsr1504363
7. International Agency for Research on Cancer. Breast cancer screening [Internet]. Lion: 2016[cited 21 Jan 21]. Volume 15. Available from: https://publications.iarc.fr/Book-And-Report-Series/Iarc-Handbooks-Of-Cancer-Prevention/Breast-Cancer-Screening-2016
8. Marques CAV, Figueiredo EN, Gutiérrez MGR. Public health policies for breast cancer control in Brazil. Rev Enferm UERJ. 2015;23(2):272-8. https://doi.org/10.12957/reuerj.2015.13632
9. Migowski A, Stein AT, Ferreira CBT, Ferreira DMTP, Nadanovsky P. Guidelines for early detection of breast cancer in Brazil: development methods. Cad Saúde Pública 2018;34:e00116317. https://doi.org/10.1590/0102-311x00116317
10. Gagnon J, Lévesque E, Clinical Advisory Committee on Breast Cancer Screening and Prevention, et al. Recommendations on breast cancer screening and prevention in the context of implementing risk stratification: impending changes to current policies. Curr Oncol. 2016;23(6):e615-25. https://doi.org/10.3747/co.23.2961
11. Pashayan N, Morris S, Gilbert FJ, Pharoah PDP. Cost-effectiveness and Benefit-to-Harm Ratio of Risk-Stratified Screening for Breast Cancer: a life-table model. JAMA Oncol. 2018;4(11):1504-10. https://doi.org/10.1001/jamaoncol.2018.1901
12. Hoskins KF, Tejeda S, Vijayasiri G, Chukwudozie IB, Remo MH, Shah HA, et al. A feasibility study of breast cancer genetic risk assessment in a federally qualified health center. Cancer. 2018;124(18):3733-41. https://doi.org/10.1002/cncr.31635
13. Román M, Sala M, Domingo L, Posso M, Louro J, Castells X. Personalized breast cancer screening strategies: a systematic review and quality assessment. PLoS One. 2019;14(12):e0226352. https://doi.org/10.1371/journal.pone.0226352
14. Esquivel-Sada D, Lévesque E, Hagan J, Knoppers BM, Simard J. Envisioning implementation of a personalized approach in breast cancer screening programs: stakeholder perspectives. Healthc Policy. 2019;15(2):39-54. https://doi.org/10.12927/hcpol.2019.26072
15. Daly MB, Pal T, Berry MP, Buys SS, Dickson P, Domchek SM, et al. Genetic/familial high-risk assessment: breast, ovarian, and pancreatic, Version 2.2021, NCCN Clinical Practice Guidelines in Oncology. J Natl Compr Canc Netw. 2021;19(1):77-102. https://doi.org/10.6004/jnccn.2021.0001
16. National Collaborating Centre for Cancer (UK). Familial breast cancer: classification and care of people at risk of familial breast cancer and management of breast cancer and related risks in people with a family history of breast cancer. Cardiff (UK): National Collaborating Centre for Cancer (UK); 2013.
17. Inumaru LE, Quintanilha MIGD, Silveira EA, Naves MMV. Risk and protective factors for breast cancer in Midwest of Brazil. J Environ Public Health. 2012:1-9. https://doi.org/10.1155/2012/356851
18. Batiston AP. Early detection of breast cancer: knowledge and practice of women and professionals of the Family Health Strategy in Dourados/ MS. Rev Bras Ginecol Obstet. 2010;32(2):99. https://doi.org/10.1590/S0100-72032010000200010
19. Matos JC, Pelloso SM, Carvalho MDB. Prevalence of risk factors for breast neoplasm in the city of Maringá, Paraná state, Brazil. Rev Latino-Am Enfermagem. 2010(3):352-9. https://doi.org/10.1590/S0104-11692010000300009

20. Silva APS, Pinto FJM, Sousa FS, Mourão CML, Lopes MVO, Fernandes AFC. Risk factors for breast cancer in women who use a basic health unit: descriptive study. Online Braz J Nurs. 2011;10(1). https://doi.org/10.5935/1676-4285.20113215

21. Barreto ASB, Mendes MFM, Thuler LCS. Evaluation of a strategy adopted to expand adherence to breast cancer screening in Brazilian Northeast. Rev Bras Ginecol Obstet. 2012;34(2):86-91. https://doi.org/10.1590/S0100-72032012000200008

22. Lages RB, Oliveira GP, Simeão Filho VM, Nogueira FM, Teles JB, Vieira SC. Inequalities associated with lack of mammography in Teresina - Piauí - Brazil, 2010-2011. Rev Bras Epidemiol. 2012;15(4):737-47.https://doi.org//10.1590/S1415-790X2012000400006

23. Romeiro-Lopes TC, Dell'Agnolo CM, Rocha-Brischiliari SC, Gravena AA, Carvalho MD, Pelloso SM. Population inquiry regarding mammography in postmenopausal women in southern Brazil. Asian Pac J Cancer Prev. 2013;14(11):6839-44. https://doi.org/10.7314/apjcp.2013.14.11.6839

24. Bushatsky M, Lima KD, Moraes LX, Gusmão LTB, Barros MBSC, Figueira Filho ASS. Breast cancer: prevention of shares in primary health care. Rev Enferm UFPE. 2014;8(10):3429-36. https://doi.org/10.5205/reuol.6039-55477-1-ED.0810201421

25. Jerônimo AFA, Freitas AGQ, Weller M. Risk factors of breast cancer and knowledge about the disease: an integrative revision of Latin American studies. Cienc Saude. 2017;22(1):135-49. https://doi.org/10.1590/1413-81232017221.09272015

26. Marques CAV, Silva VR, Gutiérrez MGR. Nurses' role in early detection of breast cancer. Rev Enferm UERJ. 2017;25:e22639. https://doi.org/10.12957/reuerj.2017.22639

27. Moraes DC, Almeida AM, Figueiredo EN, Loyola EAC, Panobianco MS. Opportunistic screening actions for breast cancer performed by nurses working in primary health care. Rev Esc Enferm USP. 2016;50(1):14–21. https://doi.org/10.1590/S0080-623420160000100002

28. Melo FBB, Marques CAV, Rosa ADS, Figueiredo EN, Gutiérrez MGR. Actions of nurses in early detection of breast cancer. Rev Bras Enferm. 2017;70(6):1119-28. https://doi.org/0.1590/0034-7167-2016-0155

29. Teixeira MS, Goldman RE, Gonçalves VC, Gutiérrez MGR, Figueiredo EN. Primary care nurses´ role in the control of breast cancer. Acta Paul Enferm. 2017;30(1)1-7. https://doi.org/10.1590/1982-0194201700002

30. Barbosa YC, Rabêlo PPC, Aguiar MIF, Azevedo PR, Cortês LSL. Early detection of breast cancer: how do the nurses in Primary Health Care perform? Rev APS. 2018;21(3):375-86. https://doi.org/10.34019/1809-8363.2018.v21.16505

31. Vanni G, Pellicciaro M, Materazzo M, Bruno V, Oldani C, Pistolese CA, et al. Lockdown of Breast Cancer Screening for COVID-19: Possible Scenario. In Vivo. 2020;34(5):3047-53. https://doi.org/10.21873/invivo.12139

32. Marques CAV, Figueiredo EN, Gutiérrez MGR. Validation of an instrument to identify actions for screening and detection of breast cancer. Acta Paul Enferm. 2015;28(2):183-9. https://doi.org/10.1590/1982-0194201500031

33. Qureshi N, O`Fllynn N, Evans G. Dealing with family history of breast cancer: something new, something old. Br J Gen Pract. 2014;64(618):6-7. https://doi.org/10.3399/bjgp14X676267

34. Salvador PTCO, Alves KYA, Rodrigues CCFM, Oliveira LV. Online data collection strategies used in qualitative research of the Health Field: a scoping review. Rev Gaúcha Enferm, 2020:41:e20190297. https://doi.org/10.1590/1983-1447.2020.20190297

35. Yamaguchi MU, Barros JK, Souza RCB, Bernuci MP, Oliveira LPO. The role of digital media na digital literacy in non-formal health education. Rev Eletrôn Educ. 2020;14(11):e3761017. https://doi.org/10.14244/198271993761

36. Rubin G, Berendsen A, Crawford SM, Dommett R, Earle C, Emery J, et al. The expanding role of primary care in cancer control. Lancet Oncol. 2015;16(12):1231-72. https://doi.org/10.1016/S1470-2045(15)00205-3