Time to diagnosis and treatment for breast cancer in public and private health services

Tempo para diagnóstico e tratamento do câncer de mama na assistência pública e privada

Tiempo de diagnóstico y tratamiento del cáncer de mama en asistencia pública y privada

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ABSTRACT

Objective: To analyze the time to diagnosis and treatment for breast cancer and the associated factors, according to the type of care (public vs. private).

Methodology: Retrospective cohort study with 477 women diagnosed with breast cancer between 2014 and 2016. Data were collected in an oncology service in a municipality in Minas Gerais, in the 2018-2019 period. Analyzes were performed using the Kaplan-Meier method and Cox's proportional regression model.

Results: The median time to diagnosis was 70 days, being shorter for women who discovered the disease through screening tests and who were diagnosed in early stages of the disease. The median time for treatment was 32 days, which was shorter for women assisted by private health service, with a high level of education and who were diagnosed in early stages.

Conclusions: Private care and facilitators of access to breast cancer care were associated with shorter waiting times.

Keywords: Breast neoplasms. Delayed diagnosis. Time-to-treatment. Public assistance. Health care quality, access, and evaluation.

RESUMO

Objetivo: Analisar o tempo para o diagnóstico e tratamento do câncer de mama e os fatores associados, segundo o tipo de assistência (pública vs. privada).

Métodos: Coorte retrospectiva com 477 mulheres diagnosticadas com câncer de mama entre 2014-2016. Os dados foram coletados em um serviço de oncologia de um município de Minas Gerais, entre 2018-2019. As análises foram realizadas pelo método de Kaplan-Meier e pelo modelo de regressão de Cox.

Resultados: O tempo mediano para diagnóstico foi de 70 dias, sendo menor para aquelas que descobriram a doença por exames de rastreamento e diagnosticadas em estádios iniciais. O tempo mediano para o tratamento foi de 32 dias, sendo menor para as mulheres assistidas pela rede privada, com alta escolaridade e diagnosticadas em estádios iniciais.

Conclusões: Assistência na rede privada e facilitadores do acesso ao cuidado do câncer de mama associaram-se a menores tempos de espera.

Palavras-chave: Neoplasias da mama. Diagnóstico tardio. Tempo para o tratamento. Assistência pública. Qualidade, acesso e avaliação da assistência à saúde.

RESUMEN

Objetivo: Analizar el tiempo de diagnóstico y tratamiento del cáncer de mama y los factores asociados, según el tipo de assistência (pública vs. privada).

Metodología: Cohorte retrospectiva con 477 mujeres diagnosticadas de cáncer de mama entre 2014-2016. Los datos fueron recolectados en un servicio de oncología de Minas Gerais, en el período 2018-2019. Los análisis se realizaron mediante el método de Kaplan-Meier y el modelo de regresión de Cox.

Resultados: Mediana de tiempo para el diagnóstico fue de 70 días – menor para las que descubrieron la enfermedad mediante pruebas de detección y que fueron diagnosticadas en etapas tempranas. Mediana de tiempo para tratamiento fue de 32 días – menor para las atendidas por la red privada, con alto nivel educativo y diagnosticadas en etapas tempranas.

Conclusiones: Asistencia en la red privada y facilitadores de acceso a la atención del cáncer de mama asociados a tiempos de espera más cortos.

Palabras clave: Neoplasias de la mama. Diagnóstico tardío. Tiempo de tratamiento. Asistencia pública. Calidad, acceso y evaluación de la atención de salud.

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■ INTRODUCTION

Despite having a public and universal Health System created in 1990 and a National Oncology Care Policy that came into force in 2005, compared to high-income countries, Brazil still has a higher percentage of breast tumors diagnosed at advanced stages, and a higher mortality rate by breast cancer, despite the lower incidence rate [1–2]. Such data reflect disparities in access to screening programs, early diagnosis and prompt treatment.

Studies show that a long waiting time to access diagnosis and start treatment generates a great negative impact on the prognosis and survival of breast cancer [3]. In this context, low- and middle-income countries have longer waiting times for cancer care compared to high-income countries [4].

Although no consensus has yet been reached on the time intervals considered adequate for health care, and, therefore, there are different specifications for the starting and end points of the diagnosis time [3,4], Brazilian legislation defined two parameters of adequacy to time in the context of cancer care [5].

The first parameter, enacted by Law No.12,732/2012, established a period of 60 (sixty) days to start the treatment of patients with malignant neoplasm, counted from the confirmation of the diagnosis by pathological report or in a shorter period, as needed [5]. This Law was complemented in 2019 (second parameter), with the establishment of a period of 30 (thirty) days to perform the necessary tests to clarify the diagnosis, in cases where the main diagnostic hypothesis is that of malignant neoplasm [5].

The type of healthcare service (public or private) has a great impact on the prolonged waiting time for diagnosis and beginning or treatment [6]. Brazilian studies that investigated this association in the context of breast cancer focused mainly on the waiting time for treatment and found that patients in private health services wait less time than patients assisted in the public healthcare network [7,8,9]. This reinforces the need to identify the associated factors in order to overcome inequalities in health care.

This study aimed to analyze the time taken to diagnose and treat breast cancer and the associated factors, according to the type of care (public vs. private). The hypothesis is that there is a difference in the waiting times for treatment and diagnosis of breast cancer between women assisted by the public and private networks.

■ METHODS

Retrospective cohort study with women diagnosed with breast cancer assisted in a reference service for oncology care in the public and private healthcare networks in the city of Juiz de Fora, in Minas Gerais.

Women diagnosed with breast cancer between 2014 and 2016 and lived in the State of Minas Gerais, identified as analytical cases from the Hospital Cancer Registry, were included.

Precise information regarding the dates of diagnosis and treatment of 45 women among the 522 women eligible for the study could not be obtained. Thus, 477 women who provided information about dates for analysis of at least one of the two waiting times evaluated were investigated: 360 had information about the date of diagnosis and 457 had information about the date of treatment.

Data were collected from March 2018 to May 2019 by a team composed of health professionals and scientific initiation scholarship holders trained and supervised by specialists in oncology and pathological anatomy. The team was trained in general aspects related to the object of the study and guidance on the use of the data collection manual, with supervised practice of filling out the electronic form.

Data were collected from medical records using an electronic survey form in the KoBoToolbox software (version 1.5.0; Harvard Humanitarian Initiative, Cambridge) and stored in the Excel software (version 2013; Microsoft). Quality control of the information obtained was carried out by the research team through the verification of the completeness and consistency of the database originating from the electronic forms. An attempt was made to complete the missing information and correct any inconsistencies by reviewing the medical records.

Sociodemographic characteristics and aspects related to the diagnosis of the disease, tumor profile, staging and treatment were considered. Information was also recorded, when available, on the reasons for the prolonged time elapsed to diagnosis and treatment.

To ensure the security and confidentiality of the data, measures were adopted such as storing the information collected on a mobile device protected by a password and signing the confidentiality agreement by all researchers involved. Furthermore, after data extraction, the identified fields were excluded and the entire analysis was performed without the personal identification of the participants.

Two dependent variables were considered in this study, according to the waiting times evaluated, namely:

The waiting time for diagnosis – defined as the time interval (in days) between the date of the first symptoms or abnormalities in imaging exams suggestive of breast cancer and the date of diagnosis of the disease by anatomopathological report.

The waiting time for treatment – defined as the time interval (in days) between the date of release of the anatomopathological report of the diagnosis of the disease and the date of the first record of treatment, whether surgery, chemotherapy, radiotherapy or hormone therapy.

For patients who underwent surgical biopsy followed by involved margin surgery, the date of the biopsy was considered as the date of diagnosis and the date of the surgery for removal of involved margin as the date of treatment.

The following independent variables were analyzed: type of health care (public; private), age group (≤ 49 years; 50-69 and ≥70 years), level of education (≤ 8 years of education completed; > 8 years of education completed), skin color recorded in the medical record (brown or black; white), marital status (lives without a partner; lives with a partner), region of residence (city where the service is located; other cities), family history of breast cancer (no; yes), presence of comorbidities – record in the medical record of at least one other concomitant disease (yes; no), mode of disease detection (presence of symptoms; screening), staging (initial:0, I and II; advanced: III and IV), waiting time for immunohistochemistry (>30 days; ≤30 days) and waiting time for diagnosis (>60 days; ≤60 days), the latter only when the waiting time for treatment is investigated.

For the characterization of the participants, the variables were described through measures of central tendency and absolute and relative frequencies of the categories of each variable.

Kaplan-Meier method was used to analyze the estimated waiting times. For the waiting time for diagnosis, start date (time zero) was the date of the first symptoms or abnormalities in the imaging exams and, as an error, the date of issuance of the anatomopathological report, while for the waiting time for treatment, the date of diagnosis was considered as time zero and the date of the first treatment as an error.

To assess the factors associated with waiting times, the Cox proportional hazards regression model was used, computing the hazard ratios (HR) and the corresponding 95% confidence intervals (95% CI). Variables were selected based on their relevance in the literature and significance obtained in the univariate Cox model, considering those with a p-value <0.20. The variables were included step-by-step in the multiple analysis (stepwise forward), and only those with p ≤ 0.05 were maintained in the final model.

Schoenfeld's standardized residuals were used to assess the assumption of proportionality of risk over time. Goodness of fit assessment was based on the likelihood ratio, pretest probability and the global goodness-of- fit measure.

Data analysis was performed using the STATA® software (version 14.0; StataCorp. LP, United States of America) assuming a 5% significance level for statistical inference.

The study was approved by the Research Ethics Committee of Universidade Federal de Juiz de Fora, according to Protocol No 2038.39, CAAE No 04575712.4.0000.5147.

■ RESULTS

Most women were diagnosed in the 50- 69 years age range (51.4%), had completed high education (58.2%), had white skin color (73.7%), had a companion (50.6%), lived outside the city where the hospital facility was located (52.7%), had no family history of breast cancer (65.8%), had comorbidities (67.3%), were diagnosed with the disease following the onset of symptoms (56.1%), was diagnosed in early stages of the disease (76.5%) and was assisted by the public health system (60.6%).

Low education, non-white skin color, place of residence outside the city where the health service is located, detection of the disease from the onset of symptoms and advanced staging showed significantly higher percentages (p<0.05) in public health care services (Table 1).

The percentage of women who were diagnosed within 30 days was 19.7%, with a median waiting time for the diagnosis of 70 days. It was lower for women assisted by the private health network (p=0.006) (Figure 1), whose disease was detected in screening tests (p=0.001) and who were diagnosed at early stages of the disease (p=0.001) (Table 2).

When the type of health care service was considered, the median waiting time for diagnosis was significantly shorter for women assisted in the private network, with low educational level, white skin, who lived in the municipality where the health service was located, found out they were sick after the onset of symptoms and who were diagnosed in the early stages of the disease (Table 2).

The percentage of women who started treatment within 60 days was 80.5%. The median waiting time for treatment was 32 days, being significantly shorter (p<0.05) for women assisted by the private network (Figure 1), with high education, white skin color, diagnosed in the early stages of the disease and that had a waiting time of up to 30 days for the laboratory immunohistochemical report (Table 3).

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Table 1 – Sociodemographic and clinical characteristics of the study participants, in general and according to the type of care service, 2014-2016. Juiz de Fora, MG, Brazil

| Variables | Total[a] n (%) | Type of care | | P[b] |
		Public n (%)	Private n (%)	
TOTAL	477 (100)	289 (60.6)	188 (39.4)	
Age range				
≤ 49 years	146 (30.6)	94 (32.5)	52 (27.7)	
50 – 69 years	245 (51.4)	149 (51.6)	96 (51.0)	0.259
≥ 70 years	86 (18.0)	46 (15.9)	40 (21.3)	
Education[c]				
≤ 8 years	194 (41.8)	162 (57.9)	32 (17.4)	
> 8 years	270 (58.2)	118 (42.1)	152 (82.6)	<0.001
Skin color				
Not white	123 (26.3)	100 (35.6)	23 (12.3)	
White	345 (73.7)	181 (64.4)	164 (87.7)	<0.001
Marital status				
No companion	234 (49.4)	152 (53.0)	82 (43.9)	
With a companion	240 (50.6)	135 (47.0)	105 (56.1)	0.052
Place of residence				
Municipality where the health service is located	225 (47.3)	106 (36.7)	119 (63.6)	
Other	251 (52.7)	183 (63.3)	68 (36.4)	<0.001
Family history of breast cancer				
Yes	139 (34.2)	81 (32.1)	58 (37.4)	
No	268 (65.8)	171 (67.9)	97 (62.6)	0.276
Comorbidities[d]				
Yes	274 (67.3)	176 (67.2)	98 (67.6)	
No	133 (32.7)	86 (32.8)	47 (32.4)	0.933
Disease detection				
Presence of symptoms	206 (56.1)	144 (60.8)	62 (47.7)	
Screening	161 (43.9)	93 (39.2)	68 (52.3)	0.016
Staging				
Early (0, I and II)	364 (76.5)	196 (68.1)	168 (89.4)	
Advanced (III and IV)	112 (23.5)	92 (31.9)	20 (10.6)	<0.001

Source: Research data, 2019.
[a] Differences in totals are justified by the lack of information;
[b] Chi-square test p-value for each variable;
[c] The educational level was considered high for participants who reported more than 8 years of schooling;
[d] Comorbidities considered (yes) when at least one other concomitant disease was recorded in the medical chart.

Table 2 – Median waiting time (in days) between early symptoms and diagnostic confirmation, according to type of health care, sociodemographic and clinical characteristics (n=360), 2014-2016. Juiz de Fora, MG, Brazil

Variables	Type of care Median time (CI)[a]		Total Median time (CI)[a]	P[b]
	Public	Private		
TOTAL	82 (69 – 95)	56 (43 – 63)	70 (62 – 82)	0.005
Age range				
≤ 49 years	92 (69 – 121)	65 (39 – 93)	83 (68 – 108)	
50 – 69 years	78 (52 – 91)	58 (39 – 68)	64 (52 – 79)	
≥ 70 years	98 (60 – 151)	39 (23 – 60)	60 (44 – 83)	0.385
Education[c]				
≤ 8 years	**87 (72 – 107)**	**33 (23 – 52)**	81 (60 – 92)	
> 8 years	79 (57 – 117)	60 (45 – 75)	67 (56 – 79)	0.801
Skin color				
Not white	85 (69 – 118)	45 (22 – 115)	82 (63 – 115)	
White	**82 (66 – 92)**	**57 (42 – 65)**	67 (57 – 79)	0.372
Marital status				
No companion	87 (68 – 126)	52 (35 – 77)	77 (60 – 91)	
With a companion	82 (62 – 94)	57 (41 – 73)	68 (57 – 82)	0.258
Place of residence				
Municipality where the health service is located	**82 (66 – 108)**	**58 (41 – 65)**	68 (58 – 82)	
Other	82 (68 – 107)	52 (37 – 75)	75 (60 – 87)	0.652
Family history of breast cancer				
No	91 (68 – 115)	51 (35 – 75)	79 (61 – 91)	
Yes	72 (51 – 87)	60 (42 – 74)	68 (52 – 82)	0.484
Comorbidities[d]				
Yes	91 (68 – 115)	51 (35 – 75)	69 (57 – 83)	
No	75 (51 – 87)	60 (42 – 74)	69 (58 – 82)	0.680
Disease detection				
Presence of symptoms	**95 (82 – 135)**	**58 (39 – 79)**	83 (72 – 101)	
Screening	66 (48 – 82)	61 (43 – 77)	63 (49 – 74)	0.001
Staging				
Advanced (III and IV)	107 (69 – 139)	51 (26 – 198)	92 (62 – 137)	
Early (0, I and II)	**81 (67 – 91)**	**57 (42 – 64)**	68 (58 – 79)	0.001

Source: Research data, 2019.
[a] Median time in days and 95% confidence interval (CI)
[b] p-value of the log-rank test for each variable;
[c] Educational level was considered high for participants who reported more than 8 years of schooling;
[d] Comorbidities considered (yes) when the medical record included at least one other concomitant disease.
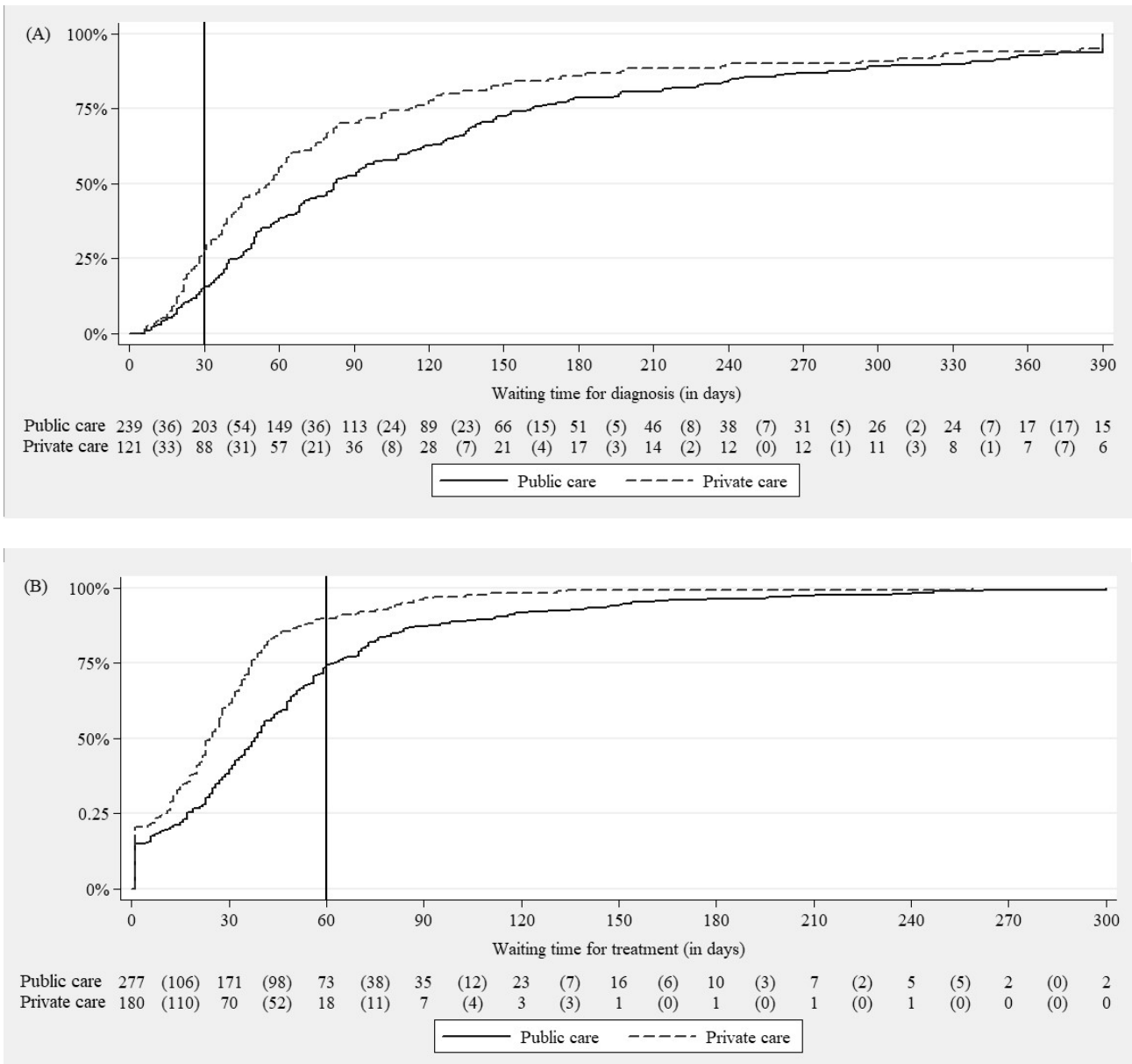
Figure 1 – (A) Kaplan Meier curves for waiting time for diagnosis, according to type of health care service (public vs. private) and (B) Kaplan Meier curves for waiting time for treatment, according to the type of health care service (public vs. private).
Source: Research data, 2019.

When the type of health care service was considered, the median waiting time for treatment was shorter for women assisted in the private health care network, aged 50-69 years, with white skin color, who had a partner, lived outside the city where the health service was located, did not have a family history of breast cancer, had comorbidities, detected the disease from the onset of symptoms, and were diagnosed in the early stages of the disease (Table 3).

Multivariate analysis showed that disease detection based on screening and diagnosis at early stages were independently associated with shorter waiting times for diagnosis (Table 4).

Also, regarding a shorter waiting time for treatment, women assisted by the private health network, who had a high level of education and were diagnosed in early stages were independently associated, according to multivariate analysis (Table 4).

Table 3 – Median waiting time (in days) between diagnostic confirmation and the beginning of treatment of the participants of the study, according to type of care, sociodemographic and clinical characteristics (n=457), 2014-2016. Juiz de Fora, MG, Brazil.

Variables	Type of care Median time (CI)[a]		Total Median time (CI)[a]	P[b]
	Public	Private		
TOTAL	38 (34 – 41)	24 (22 – 28)	32 (28 – 35)	<0.001
Age range				
≤ 49 years	30 (22 – 37)	23 (14 – 28)	26 (23 – 31)	
50 – 69 years	**40 (36 – 48)**	**23 (18 – 28)**	33 (28 – 37)	
≥ 70 years	48 (32 – 52)	28 (17 – 37)	35 (30 – 45)	0.690
Education[c]				
≤ 8 years	40 (37 – 48)	30 (21 – 37)	39 (35 – 43)	
> 8 years	30 (24 – 39)	23 (20 – 27)	25 (23 – 29)	<0.001
Skin color				
Not white	40 (31 – 53)	25 (15 – 33)	35 (28 – 43)	
White	**37 (32 – 41)**	**23 (21 – 27)**	30 (26 – 34)	0.001
Marital status				
No companion	39 (31 – 45)	24 (18 – 32)	32 (26 – 38)	
With a companion	**37 (32 – 44)**	**23 (20 – 28)**	31 (27 – 34)	0.742
Place of residence				
Municipality where the health service is located	35 (26 – 44)	25 (21 – 30)	29 (24 – 34)	
Other	**39 (35 – 45)**	**23 (12 – 28)**	33 (29 – 38)	0.387
Family history of breast cancer				
No	**37 (32 – 44)**	**25 (20 – 28)**	32 (28 – 35)	
Yes	41 (31 – 51)	23 (18 – 32)	35 (26 – 40)	0.862
Comorbidities[d]				
Yes	**40 (35 – 44)**	**26 (22 – 32)**	34 (30 – 38)	
No	36 (24 – 48)	23 (12 – 29)	29 (23 – 35)	0.732

Table 3 – Cont.

Variables	Type of care Median time (CI)[a]		Total Median time (CI)[a]	P[b]
	Public	**Private**		
Disease detection				
Presence of symptoms	**38 (33 – 41)**	**23 (14 – 26)**	32 (28 – 37)	
Screening	40 (31 – 51)	29 (21 – 34)	33 (28 – 37)	0.831
Staging				
Advanced (III and IV)	40 (33 – 51)	24 (12 – 39)	39 (32 – 45)	
Early (0, I and II)	**36 (31 – 44)**	**23 (21 – 28)**	29 (26 – 33)	0.001
Waiting time for diagnosis[e]				
> 60 days	37 (32 – 44)	28 (20 – 34)	35 (31 – 39)	
<= 60 days	**41 (34 – 48)**	**24 (18 – 29)**	32 (27 – 38)	0.129
Waiting time for IMHQ[f]				
> 30 days	44 (35 – 49)	25 (15 – 36)	40 (33 – 44)	
<= 30 days	30 (23 – 37)	23 (20 – 28)	25 (23 – 30)	<0.001

Source: Research data, 2019.
[a] Median time in days and 95% confidence interval (CI);
[b] p-value of the log-rank test for each variable;
[c] The educational level was considered high for participants who reported more than 8 years of schooling;
[d] Comorbidities considered (yes) when the medical record included at least one other concomitant disease
[e] Waiting time between the onset of symptoms/changes in screening tests and diagnosis;
[f] Waiting time between the date of the anatomopathological report and the date of the immunohistochemical report.

■ DISCUSSION

The median waiting time for the diagnosis of breast cancer was greater than that recommended by Brazilian legislation, while the median waiting time for treatment met the recommended parameter [5].

The percentage of women who were diagnosed within 30 days was only 19.7%, which highlights the difficulty in accessing the diagnostic test in a timely manner among the participants in this study. The median waiting time between the onset of symptoms and diagnosis (70 days) was similar to that found in a study conducted in São Paulo, which identified a median waiting time of 72 days between suspicious mammography and the date of the biopsy [10].

Median waiting times for diagnosis longer than those found in the present study (70 days) are described in the literature. A study carried out in a public hospital in Rio de Janeiro with 104 women with breast cancer identified a median waiting time between the first sign or symptom and the diagnosis confirmation of 240 days [11]. Also in Rio de Janeiro, a study with 526 women who underwent treatment for breast cancer in a public health service identified a median waiting time between the first contact with the health service and the diagnosis of 156 days [12].

In Piauí, a study with 155 women with breast cancer found a median waiting time between the onset of symptoms and the diagnosis of 122.3 days [13]. Also in the Northeast region, a study carried out in Paraíba, with 128 women, identified a median waiting time of 86 days between the mammogram and the diagnosis [14]. A study carried out in Paraná, with 71 women with breast cancer, identified an average waiting time for diagnosis of 102 days [15].

Table 4 – Crude and adjusted hazard ratios of the final multivariate model variables for (A) the waiting time between onset of symptoms and diagnostic confirmation and for (B) the waiting time between diagnostic confirmation and initiation of treatment, 2014-2016. Juiz de Fora, MG, Brazil

Variables	(A) Median waiting time (in days) between the first symptoms and diagnostic confirmation					
	Crude HR	(CI 95%)	p	Adjusted HR[a b]	(CI 95%)	p
Disease detection						
Symptomatic	1			1		
Screening	1.45	1.16 – 1.81	0.001	1.27	1.01 – 1.62	0.043
Staging						
Advanced (III and IV)	1			1		
Early (0, I and II)	1.53	1.20 – 1.95	0.001	1.46	1.13 – 1.90	0.004

Variables	(B) Median waiting time (in days) between diagnostic confirmation and the beginning of treatment					
	Crude HR	(CI 95%)	p	Adjusted HR[c,d]	(CI 95%)	p
Type of care						
Public	1			1		
Private	1.73	1.43 – 2.10	<0.001	1.43	1.15 – 1.78	0.001
Education[e]						
≤ 8 years	1			1		
> 8years	1.72	1.41 – 2.09	<0.001	1.45	1.17 – 1.80	0.001
Staging						
Advanced (III and IV)	1			1		
Early (0, I and II)	1.52	1.22 – 1.91	<0.001	1.35	1.07 – 1.71	0.011

Source: Research data, 2019.

[a] The model met the assumption of proportionality of risks over time, with a global p value of the Schoenfeld test of 0.6331;

[b] Model adjusted by type of care (private; public) and age group (40 to 49; 50 to 69 and ≥70 years old);

[c] The model met the assumption of proportionality of risks over time, with a global p value of the Schoenfeld test of 0.8382;

[d] Model adjusted for age group (40 to 49; 50 to 69; ≥70 years old);

[e] Educational level was high for participants who reported more than 8 years of schooling;

Crude HR = non adjusted hazard ratio;

Adjusted HR= adjusted hazard ratio;

CI95% = 95% confidence interval

On the other hand, a study carried out in Recife with 173 women diagnosed with breast cancer identified a median waiting time of 41 days between the first appointment and the biopsy [16], which was lower than that observed in this study.

Similarly to other investigations, early stage disease at the time of diagnosis [10] and its detection through screening [11] were associated with shorter waiting times for diagnostic confirmation.

It should be noted that women who detected the disease through screening were already included in the breast cancer care line, and were monitored by a health professional from the health care network. Thus, the flow of patient referral and guidance to other levels of care tends to be smooth, and this may have led to a faster diagnostic investigation process [17] and, consequently, the disease was diagnosed in its earliest stages.

In this context, the importance of carrying out an active search for patients with altered mammography exams is emphasized, in order to schedule an appointment with a specialist for further investigation [17], which can enable the diagnosis of the disease in a timely manner.

It should be noted that early diagnosis of symptomatic disease deserved greater attention in the latest update of the Brazilian guidelines on breast cancer, which until then prioritized mammographic screening [2].

For patients with a waiting time for diagnosis of more than 200 days (16.7%), the possible causes of the longer delay were also investigated in the medical records. Such delay was found to be related to subjective issues of patients, which were described in the literature, such as personal barriers, beliefs, values, family problems, ignorance or fears [4].

The percentage of women who started treatment within 60 days of diagnosis (80.5%) was similar to that found in a Brazilian multicenter study that analyzed data from 151,931 women and identified a waiting time of less than 60 days in 81.6% [9]. On the other hand, other investigations found a lower percentage of women who underwent treatment within 60 days [7,13–14,16,18–19].

The median time between diagnosis and beginning of treatment for the participants was 32 days, a slightly longer waiting time for this interval was identified in all Brazilian regions in the 2013-2015 period, ranging from 53 days in the Northeast region to 65 days in the Southeast region, according to data from the National Cancer Institute report [17].

Most studies describe a median waiting time for breast cancer treatment that is higher than that observed in this study in the South [15], Southeast [18] and Northeast [8,13–14,16] regions of Brazil. Lower waiting times have been identified in high-income countries [12].

In line with other studies, the median waiting time for the beginning of treatment was shorter for women assisted by the private health network [7–9,14].

In Ceará, a study that also evaluated the waiting time for treatment depending on the type of care, found a median waiting time for treatment of 71.5 in the public network and 39 days in the private network [8]. Lower values were obtained in the present investigation (38 days in the public network and 24 days in the private network).

Women assisted by the public health system generally had higher percentages of low education, non-white skin color, lived outside the municipality where the reference health service is located, waited longer time for diagnosis and treatment, disease was detected symptomatically and diagnosis occurred in advanced stages. Such findings suggest the need to consider the influence of social inequalities in breast cancer care. Corroborating this finding, a study conducted in Minas Gerais showed association of social vulnerability profiles and waiting time for breast cancer treatment, so that the most vulnerable women were more prone to delayed diagnosis [18].

In the public health system, access to secondary and tertiary care is subject to assessment and referral by primary health care services [8–9,17], and to the limit set for referral to the medical specialty. On the other hand, in the private health system, patients choose their health professionals and have easier access to specialist doctors, such as breast cancer specialists and surgeons, which may favor treatment in a timelier manner.

Factors such as low availability of specialist professionals, limited number of vacancies, barriers to accessing tests that are essential for starting therapy and underfunding of the health system are challenges faced by public breast cancer screening and diagnostic services [8–9].

In other countries, especially those without a universal public health system, greater delays in diagnosis were identified in women who had health insurance. This can be explained by the need for financial co-participation by patients and the time taken in the authorization of procedures by health insurance companies [6].

Studies conducted in Brazil showed that patients go through public and private services in search of access to health services. However, diagnostic investigation and cancer treatment are usually long and costly, which makes it difficult to access them exclusively in private services. In the present study, at least 60% of the women were dependent on the public health network and, despite the longer waiting time for diagnosis and treatment, it is worth emphasizing the relevance of public care in the context of oncology in the country.

The shorter waiting time for starting treatment observed among women with a higher educational level was also reported in other study [6–7,15,19]. The level of education is an indirect indicator of the socioeconomic status and, consequently, of access to health services. Moreover, highly educated women can better understand the guidance provided by health professionals, are more likely to hear to other opinions and take more tests. They have also better understanding of the disease, which can lead to earlier treatment [7,15].

In the present study, women diagnosed with breast cancer at early stages had a shorter waiting time for treatment. Literature results for the association between delayed cancer care and staging are still controversial [6]. While some studies show that tumors diagnosed at advanced stages tend to have a shorter waiting time for treatment due to their greater severity [7,13,17,19], shorter waiting times for patients in early stages of the disease have also been reported in other investigations [6,17].

In advanced staging, the signs of the disease are easily perceived, facilitating its diagnosis and, therefore, the beginning of treatment [7]. On the other hand, the longer the waiting time to start treatment, the greater the replication of the tumor, the probability of dissemination and diagnosis in advanced stages [3].

The percentage of women who started treatment within the established deadline (80.5%) was much higher than the percentage of women diagnosed within the recommended period (19.7%) by current Brazilian regulations. Therefore, it should considered that the legal regulation that established the deadline for starting treatment dates back to 2012 and the one that established the time for diagnosis was published more recently, in 2019, and is still in the process of consolidation, and the who participated in this study were diagnosed before the establishment of this deadline.

The limitations of Brazilian regulations regarding waiting times in oncology, given the difficulty in characterizing clinical suspicion and the fact that the method for diagnostic elucidation, as well as the time to start treatment, may vary according to with the type of cancer.

The Brazilian regulations that establish the recommended period for oncological care can be used as a legal instrument to guarantee access to diagnostic confirmation and timely treatment. In the long term, they will improve the breast cancer care network, with emphasis on early diagnosis and early treatment, which will help reduce mortality and improve the quality of life of patients.

In order to systematize and facilitate the monitoring of the waiting time for treatment, in 2019, the National Cancer Institute made available to municipal managers the Oncology Panel tool, which includes data on the beginning of treatment following the diagnosis of cancer [20], not including data on the waiting time between the onset of symptoms and diagnosis.

Therefore, the waiting times for diagnosis and treatment, are influenced by the public policies implemented, the flows established for patient care in the health care network, the characteristics of health services and the sociocultural context of the patients [6]. In addition, there is a wide variation in the starting and ending points of these waiting times and so far there is no standardization of the intervals considered [3,4]. Such facts may explain the great variability of waiting times found in the literature.

Of the waiting times evaluated in this study, the waiting time for diagnosis is described as a delay more related to the patient, while the waiting time for treatment has been described as a delay more related to the health system [4]. This understanding may justify, at least in part, the fact that the type of health care service is not independently associated with the waiting time for diagnosis in this study. On the other hand, it should be taken into account that the type of care service was associated with explanatory variables related to the waiting time for diagnosis, such as sociodemographic characteristics, staging and mode of diagnosis of the disease, as described in table 1.

The possible biases arising from lack of information about the diagnosis or treatment seem to have been minimized, since no significant differences were observed between women with accurate information about the waiting time for diagnosis and/or treatment and the eligible population, in relation to most of the sociodemographic and clinical characteristics considered.

Despite the limitations inherent in the use of secondary data, all the independent variables used showed completeness of information above 90%. In addition, data collection was performed by a field team consisting of trained health professionals and research assistants, supervised by specialists, with the adoption of control procedures in order to guarantee the quality of the information obtained.

This study contributes to improve knowledge about the factors associated with waiting times for the diagnosis and treatment of breast cancer, since it considered the effect of sociodemographic and clinical characteristics, according to the type of health care service provided, with the application of specific statistical techniques to analyze the time intervals considered.

Unlike other studies that investigated the waiting times for diagnosis and treatment of breast cancer in Brazil, this study analyzes the outcomes continuously, instead of using

waiting times with previously Moreover, it contributes to a better characterization of inequalities in the investigated delays and associated factors in the Brazilian context by comparing waiting times according to the type of health care (public vs. private

Finally, the study inserts the discussion of the findings in the light of Law No. 13.896/2019, which established a period of 30 days for the clarification of the diagnosis, in cases where the main hypothesis is cancer, stimulating reflection on the conditions that they can interfere with the legally recommended deadline, which may be related to the social context, the health service, the individual and even the investigated health problem.

■ CONCLUSIONS

Although the median waiting time for the treatment of breast cancer met the recommended national parameter, the median waiting time for the diagnosis was greater than that recommended by current regulations in Brazil, which indicates the need for alignment of care flows, to guarantee access, in particular, to diagnostic elucidation exams. In this context, it is worth emphasizing the role of Nursing in the process of patient guidance in the health system, which can provide access to oncological care in a timely manner.

The impact of education, the way in which the disease is diagnosed and staging in the waiting times for diagnosis and beginning of treatment highlights the disparities in cancer care, which can be minimized by increase in the coverage of the Family Health Strategy; intensification of activities aimed at raising the population' awareness of the disease that impact early detection; improvement of referral and counter-referral of patients at different levels of care and strengthening of diagnostic investigation and treatment services.

Strategies such as intensification of early diagnosis of symptomatic women, aiming to ensure that treatment begins quickly, as well as the implementation of organized screening can also contribute to improve access to health services in a timely and effective manner.

Finally, allocating financial resources to achieve goals related to waiting time for cancer care in the public system can be an effective strategy to guarantee access to timely diagnosis and treatment, minimizing the influence of social inequalities in breast cancer care.

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