ORIGINAL ARTICLE

The Magnitude of Delay in Non-metastatic Breast Cancer Treatment in a Tertiary Hospital: an Analysis from 2012 to 2018

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ABSTRACT

Background and Objective. The burden of treatment delay in breast cancer is high, especially among developing countries. Despite adversely affecting morbidity and mortality, treatment delay remains unexplored in the Philippines. This study aimed to determine treatment delays among breast cancer patients in a tertiary hospital during surgery, neoadjuvant chemotherapy, and adjuvant chemotherapy, and to identify predictors of delay.

Methods. A cross-sectional study was conducted among breast cancer patients seen between January 1, 2012 to December 31, 2018. The following outcomes were investigated: ≥90 days from initial diagnosis to surgery, ≥8 weeks from diagnosis to initiation of neoadjuvant chemotherapy, and >120 days from diagnosis to initiation of adjuvant chemotherapy. Summary statistics were reported as percent for categorical data and as mean for continuous data. The individual correlations were performed using Chi-square for qualitative data and t-test for quantitative data while predictors were determined through logistic regression.

Results. A total of 324 patients were included in this study. The majority of the patients were less than 65 years old living in urban areas. More than half of the patients were overweight or obese, hypertensive, and diabetic. The following delays were observed: 61.1% (n = 198) with any type of delay, 23.8% (n = 53) with delay in surgery, 53.8% (n = 120) with delay in adjuvant chemotherapy, and 74.3% (n = 75) with delay in neoadjuvant chemotherapy. The patients noted to have any type of delay were more likely to be hypertensive (p = 0.046) and residing in urban areas (p = 0.041). There were no differences in the distribution of age, body mass index, and presence of co-morbid conditions such as hypertension, diabetes mellitus, coronary artery disease, and heart failure among those with any form of delay compared with no delay.

Conclusions. The present study shows the presence of treatment delay among breast cancer patients and may be used to enact policy changes to optimize breast cancer care delivery. Further studies may be done to identify other factors affecting these delays and policy changes are recommended to address these gaps in surgery and chemotherapy administration among breast cancer patients.

Keywords: breast cancer, quality of care, treatment delays

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INTRODUCTION

Breast cancer still remains as one of most common causes of morbidity and mortality among cancer patients. According to GLOBOCAN, there were 24,798 new cases and 8,057 deaths from breast cancer diagnosed in 2018.[1] A study showed that breast cancer diagnosis in underdeveloped nations is diagnosed at a more advanced stage as compared to developed countries. Some of the reasons include low participation in breast cancer primary prevention and poor health-seeking behavior.[2] Lower-middle-income countries (LMIC) have higher mortality-to-incidence rates compared to their high-income counterparts with more women dying from cancer LMICs.[3] In a mixed methods study performed in Indonesia, several causes of patient delays in cancer treatment were noted including lack of knowledge, financial constraints, reluctance to seek care, preference for alternative treatment, logistical reasons including distance to the hospital, and insurance issues. Several factors such as older age, lower educational attainment, previous use of alternative treatment were associated with treatment delays.[4] Provider delays included both physician- and systems-related factors such as prolonged imaging and biopsy waiting time. Facilitators in breast cancer care noted were having a positive attitude, faith, and family support.[5]

In a modelling study, improving access to early detection and adjuvant treatment improves outcomes especially in LMICs.[6] Other strategies include early detection through public health education and incorporating multidisciplinary approach in management.[7]

A seminal review of literature showed several studies investigating treatment delays among patients with breast cancer, albeit with conflicting results on survival outcomes. Delays can emanate from different timepoints in treatment: 1) from diagnosis of breast cancer to treatment initiation (chemotherapy or surgery), 2) from definitive surgery to adjuvant chemotherapy, and 3) from conclusion of neoadjuvant chemotherapy to definitive surgery. A study by Yoo and colleagues showed that patients with comorbidities and those referred from other institutions were associated with longer treatment initiation.[8] However, no difference in survival was noted among different cut-offs of 15, 30, 45, and 60 days. In contrast, decreased survival among patients with delay in treatment initiation was observed among those treated with a one-month delay and twelve-week delay.[9,10] Delay from diagnosis to surgery was associated with lower overall and disease-specific survival[11] while better overall survival and breast cancer-specific survival among patients was shown who underwent surgery within 90 days after neoadjuvant chemotherapy.[12] A meta-analysis showed that initiating adjuvant chemotherapy after 30 days resulting in worse survival among triple negative breast cancer patients.[13]

To date, no local study has been conducted evaluating treatment delays among breast cancer patients. This study was conducted to determine treatment delays among breast cancer patients in a tertiary hospital from 2012-2018 across three timepoints: time from diagnosis to surgery, time from diagnosis to neoadjuvant chemotherapy, and time from surgery to initiation of adjuvant chemotherapy;a and to identify possible factors associated with delay. Through this study, policy changes may be enacted to address these gaps in treatment.

METHODS

Setting

This was a cross-sectional study conducted at the Philippine General Hospital, a tertiary referral center and teaching hospital of the University of the Philippines. The following inclusion criteria were used: 1) females aged 18 to 79 years old, 2) new or old patients with histopathologic diagnosis of breast cancer, 3) patients enrolled under the Breast Care Medical Assistance Program from January 1, 2012 to December 31, 2018, and 4) completed surgery, chemotherapy (both neoadjuvant and adjuvant chemotherapy), and radiation therapy. Patients with metastatic disease, lost to follow-up, and incomplete treatment chart data were excluded. The following cut-offs were defined as delays: 1) delay in surgery (≥90 days from initial diagnosis to surgery)[14], 2) delay in neoadjvant chemotherapy (≥56 days from diagnosis to initiation of neoadjuvant chemotherapy)[15], and 3) delay in adjuvant chemotherapy (>120 days from diagnosis to initiation of adjuvant chemotherapy)[16]. *Any type of delay* was defined as the presence of any of the abovementioned delays in a patient. Timeframes were recorded as days or weeks.

Statistical Analysis

Data extracted by the investigator from the patients' records were manually entered into an electronic spreadsheet file. Data processing and analysis was then carried out using Stata 13. Descriptive statistics using frequency and percentage were used to describe the variables and outcomes of the study population. The median (and range) of interval (time) data were also compared across notable clinicodemographic variables. The prevalence of select outcomes and determinants were also computed, as well as their interval estimate. We included all eligible patients (total enumeration) in our study.

A series of chi-square tests of association and Fisher's exact test were performed to compare the demographic and clinical variables across the presence of any form of treatment delay. Logistic regression models were used to determine the association of different facets of treatment delays across clinically important prognostic factors such as age, presence of comorbidities, tumor size, nodal status, hormone status, and clinical stage. The level of significance for all sets of analysis was set at a p-value less than 0.05 using two-tailed comparisons.

Ethical Considerations

This study was conducted in accordance with the tenets of Declaration of Helsinki regarding biomedical research, the Philippine National Ethical Guidelines for Health Research 2011, and the International Ethical Guidelines of Epidemiological Studies in 2008. The study was duly approved by the University of the Philippines Manila Research Ethics Board (UPMREB) Panel (2019-463-01).

RESULTS

Of the 1, 837 patient records reviewed from January 1, 2012 to December 31, 2018, 324 patients were included in the final analysis. The median age of the participants was 49 (range: 18 to 71) years. The majority were 65 years and below (96.6%, n = 313) and from urban areas (56.2%, n = 182). The median time to surgery was 76 days, median time to adjuvant chemotherapy was 125 days, and median time to neoadjuvant chemotherapy was 91 days. The majority were obese (42.0%, n = 136) and had hypertension (61.7%, n = 200) or diabetes (59.3%, n = 192). Any type of delay was noted in 61.1% (n = 198), delay in surgery in 23.8% (n = 53), delay in adjuvant chemotherapy in 53.8% (n = 120), and delay in neoadjuvant chemotherapy in 74.3% (n=75). The patients noted to have any type of delay were more likely to be hypertensive (p = 0.046) and residing in urban areas (p = 0.041). There were no differences in the distribution of age, body mass index, and presence of co-morbid conditions such as hypertension, diabetes mellitus, coronary artery disease, and heart failure among those with any form of delay compared with no delay (Table 1). The patients without coronary artery disease were more likely to experience delay in surgery (p = 0.011).

The majority of the patients had grade 2 tumors with T2 (28.4%, n=92), N0(21.3%, n=69), and stage III disease (54.9%, n=178). The majority of the tumors were hormone receptor-positive (71.3%, n=231) and HER2-negative (50.9%, n=165). Most received doxorubicin and cyclophosphamide with subsequent taxane (n=234, 72.2%) (Table 2). There were no noted differences in the distribution of tumor size, nodal status, and disease stage. T2 to T3, N0 to N1 and grade 2 tumors, and the use of doxorubicin and cyclophosphamide (with or without taxane) were more likely to have any type of delay (p = 0.006, 0.002, 0.036, and 0.010, respectively), while N0 tumors were more likely to have delay in surgery (p = 0.026, 0.002, 0.036, respectively). Likewise, the use of the multiagent chemotherapy doxorubicin cyclophosphamide, and taxane was more likely to have delay in adjuvant chemotherapy (p = 0.002) (Table 2). On logistic regression, there was no noted clinicodemographic factor which was associated with any type of delay (Table 3).

Table 1. Demographic Profiles by Study Outcomes

Characteristics	Any delay, n (%) (n=324)		*p*-value	Delay in surgery (n=223)		*p*-value	Delay in adjuvant chemotherapy (N=223)		*p*-value	Delay in neoadjuvant chemotherapy (N=101)		*p*-value
	Present (n=198)	Absent (n=126)		Present (n=53)	Absent (n=170)		Present (n=120)	Absent (n=103)		Present (n=75)	Absent (n=26)	
Age (years)												
≤65	192 (97.0%)	121 (96.0%)	0.649	51 (96.2%)	163 (95.9%)	0.912	116 (96.7%)	98 (95.1%)	0.565	73 (97.3%)	26 (100%)	0.400
>65	6 (3.0%)	5 (4.0%)		2 (3.8%)	7 (4.1%)		4 (3.3%)	5 (4.9%)		2 (2.7%)	0	
Residence												
Rural	70 (35.3%)	50 (39.7%)	0.041*	15 (28.3%)	63 (37.1%)	0.210	38 (31.7%)	40 (38.8%)	0.084	31 (41.3%)	11 (42.3%)	0.260
Urban	109 (55.1%)	73 (58.0%)		32 (60.4%)	98 (57.6%)		70 (58.3%)	60 (58.3%)		37 (49.3%)	15 (57.7%)	
Unknown	19 (9.6%)	3 (2.4%)		6 (11.3%)	9 (5.3%)		12 (10.0%)	3 (2.9%)		7 (9.3%)	0	
Body mass index (kg/m^2)												
Underweight (<18.5)	12 (6.1%)	3 (2.4%)	0.114	4 (7.5%)	5 (2.9%)	0.091	8 (6.7%)	1 (1.0%)	0.155	4 (5.3%)	2 (7.7%)	0.362
Normal (18.5 to 22.9)	52 (26.3%)	32 (25.4%)		8 (15.1%)	46 (27.1%)		28 (23.3%)	26 (25.2%)		24 (32.0%)	6 (23.1%)	
Overweight (23 to 24.9)	30 (15.2%)	25 (19.8%)		16 (30.2%)	31 (18.2%)		23 (19.2%)	24 (23.3%)		5 (6.7%)	3 (11.5%)	
Obese (>25)	78 (39.4%	58 (46.0%)		19 (35.8%)	73 (43.0%)		47 (39.2%)	45 (43.7%)		30 (40.0%)	14 (53.8%)	
Unknown	26 (13.1%	8 (6.3%)		6 (11.3%)	15 (8.8%)		14 (11.7%)	7 (6.8%)		12 (16.0%)	1 (3.8%)	
Co-morbid Conditions												
Hypertension												
Without	22 (11.1%)	102 (81.0%)	0.046*	44 (83.1%)	141 (82.9%)	0.990	105 (87.5%)	80 (77.7%)	0.052	69 (92.0%)	24 (92.3%)	0.960
With	176 (88.9%)	24 (19.0%)		9 (17.0%)	29 (17.1%)		15 (12.5%)	23 (22.3%)		6 (8.0%)	2 (7.7%)	
Diabetes Mellitus												
Without	9 (4.5%)	123 (97.6%)	0.315	51 (96.3%)	164 (96.5%)	0.933	114 (95.0%)	101 (98.1%)	0.221	72 (96.0%)	25 (96.2%)	0.972
With	189 (95.4%)	3 (2.4%)		2 (3.8%)	6 (3.5%)		6 (5.0%)	2 (1.9%)		3 (4.0%)	1 (3.8%)	
Coronary Artery Disease												
Without	196 (99.0%)	125 (99.2%)	0.843	51 (96.2%)	170 (100%)	0.011*	118 (98.3%)	103 (100%)	0.188	75 (100%)	25 (96.2%)	0.088
With	2 (1.0%)	1 (0.8%)		2 (3.8%)	0		2 (1.7%)	0		0	1 (3.8%)	

DISCUSSION

In this seven-year analysis of breast cancer patients, we observed treatment delays across three key timepoints: from diagnosis of breast cancer to treatment initiation (chemotherapy or surgery); from definitive surgery to adjuvant chemotherapy; and from the conclusion of neoadjuvant chemotherapy to definitive surgery. A high prevalence of delays were observed: 61.1% (n=198) with any type of delay, 23.8% (n =53) with delay in surgery, 53.8% (n=120) with delay in adjuvant chemotherapy, and 74.3% (n=75) with delay in neoadjuvant chemotherapy. The patients noted to have any type of delay were more likely to be hypertensive and residing in urban areas while those with CAD were more likely to experience delays in surgery. T2 to T3, N0 to N1 and grade 2 tumors, and the use of doxorubicin and cyclophosphamide (with or without taxane) were more likely to have any type of delay. Likewise, the use of the multiagent

Table 2. Tumor Profile of the Study Population

Characteristics	Overall delay		*p*-value	Delay in surgery		*p*-value	Delay in adjuvant chemotherapy (N=120)		*p*-value	Delay in neoadjuvant chemotherapy (N=101)		*p*-value
	Present (n=198)	Absent (n=126)		Present (n=53)	Absent (n=170)		Present (n=120)	Absent (n=103)		Present (n=75)	Absent (n=26)	
Tumor size (cm)												
<2	26 (13.1%)	18 (14.3%)	0.006*	8 (15.1%)	11 (6.5%)	0.054	10 (8.3%)	9 (8.7%)	0.165	16 (21.3%)	9 (34.6%)	0.299
2-5	64 (32.3%)	28 (22.2%)		16 (30.2%)	47 (27.6%)		37 (30.1%)	26 (25.2%)		24 (32.0%)	5 (19.2%)	
>5	29 (14.6%)	8 (6.3%)		7 (13.2%)	12 (7.1%)		14 (11.7%)	5 (4.9%)		15 (20.0%)	3 (11.5%)	
Unknown	79 (39.9%)	72 (57.1%)		22 (41.5%)	100 (58.8%)		59 (49.2%)	63 (61.2%)		20 (26.7%)	9 (34.6%)	
Nodal status (#nodes)												
None	44 (22.2%)	25 (19.8%)	0.002*	12 (22.6%)	29 (17.1%)	0.026*	24 (20.0%)	17 (16.5%)	0.187	20 (26.7%)	8 (30.8%)	0.338
1-3	43 (21.7%)	18 (14.3%)		10 (18.9%)	30 (17.6%)		25 (20.8%)	15 (14.6%)		17 (22.7%)	4 (15.4%)	
4-9	31 (15.7%)	11 (8.7%)		11 (20.8%)	14 (8.2%)		0	0		13 (17.3%)	4 (15.4%)	
≥10	7 (3.5%)	0		0	0		16 (13.3%)	9 (8.7%)		7 (9.3%)	0	
Unknown	73 (36.9%)	72 (57.1%)		20 (37.7%)	97 (57.1%)		55 (45.8%)	62 (60.2%)		18 (24.0%)	10 (38.5%)	
Hormone receptor status												
HR negative	50 (25.3%)	43 (34.1%)	0.085	16 (30.2%)	53 (31.2%)	0.892	33 (27.5%)	36 (35.0%)	0.230	17 (22.7%)	7 (26.9%)	0.660
HR positive	148 (74.7%)	83 (65.9%)		37 (69.8%)	117 (68.8%)		87 (72.5%)	67 (65.0%)		58 (77.3%)	19 (73.1%)	
HER2 receptor status												
HER negative	106 (53.5%)	59 (46.8%)	0.326	30 (56.6%)	74 (43.5%)	0.239	59 (49.2%)	45 (43.7%)	0.205	17 (22.7%)	16 (61.5%)	0.660
HER positive	70 (35.4%)	55 (43.7%)		17 (32.1%)	74 (43.5%)		43 (35.8%)	48 (46.6%)		58 (77.3%)	8 (30.8%)	
Equivocal	22 (11.1%)	12 (9.5%)		6 (11.3%)	22 (12.9%)		18 (15.0%)	10 (9.7%)			2 (7.7%)	
Lymphovascular invasion												
Negative	32 (16.2%)	16 (12.7%)	0.275	7 (13.2%)	19 (11.2%)	0.348	16 (13.3%)	10 (9.7%)	0.701	15 (20.0%)	7 (26.9%)	0.437
Positive	40 (20.2%)	19 (15.1%)		10 (18.9%)	20 (11.8%)		16 (13.3%)	14 (13.6%)		24 (32.0%)	5 (19.2%)	
Unknown	126 (63.6%)	91 (72.2%)		36 (67.9%)	131 (77.1%)		88 (73.3%)	79 (76.7%)		36 (48.0%)	14 (53.9%)	
Tumor grade												
1	13 (6.6%)	4 (3.2%)	0.036*	3 (5.7%)	6 (3.5%)	0.816	6 (5.0%)	3 (2.9%)	0.435	7 (9.3%)	1 (3.8%)	0.170
2	53 (26.8%)	21 (16.7%)		12 (22.6%)	37 (21.8%)		29 (24.2%)	20 (19.4%)		22 (29.3%)	3 (11.5%)	
3	35 (17.7%)	20 (15.9%)		10 (18.9%)	27 (15.9%)		22 (18.3%)	15 (14.6%)		13 (17.3%)	5 (19.2%)	
Unknown	97 (49.0%)	81 (64.3%)		28 (52.8%)	100 (58.8%)		63 (52.5%)	65 (63.1%)		33 (44.0%)	17 (65.4%)	
Chemotherapy regimen												
ACT	147 (74.2%)	87 (69.0%)	0.010*	32 (60.4%)	103 (60.6%)	0.991	63 (52.5%)	72 (70.0%)	0.002*	73 (97.3%)	26 (100%)	0.702
AC	30 (15.2%)	9 (7.1%)		10 (18.9%)	29 (17.1%)		30 (25.0%)	9 (8.7%)		0	0	
TC	5 (2.5%)	12 (9.5%)		3 (5.7%)	14 (8.2%)		5 (4.2%)	12 (11.7%)		0	0	
CMF	2 (1.0%)	2 (1.6%)		1 (1.9%)	3 (1.8%)		2 (1.7%)	2 (1.9%)		0	0	
FAC	12 (6.1%)	12 (9.5%)		6 (11.3%)	17 (10.0%)		11 (9.2%)	12 (11.7%)		1 (1.3%)	0	
Two or more lines	2 (1.0%)	4 (3.2%)		1 (1.9%)	4 (2.4%)		0	5 (4.9%)		1 (1.3%)	0	
Stage												
I	2 (1.0%)	5 (4.0%)	0.253	1 (1.9%)	5 (2.9%)	0.543	1 (0.8%)	5 (4.9%)	0.314	1 (1.3%)	0	0.761
II	75 (37.9%)	54 (42.9%)		24 (45.3%)	96 (56.5%)		68 (56.7%)	52 (50.5%)		7 (9.3%)	2 (7.7%)	
III	116 (58.6%)	62 (49.2%)		25 (47.2%)	64 (37.6%)		48 (40.0%)	41 (39.8%)		65 (86.7%)	24 (92.3%)	
IV	4 (2.0%)	4 (3.2%)		2 (3.8%)	4 (2.4%)		2 (1.7%)	4 (3.9%)		2 (2.7%)	0	
Unknown	1 (0.5%)	1 (0.8%)		1 (1.9%)	1 (0.6%)		1 (0.8%)	1 (1.0%)		0	0	

A: doxorubicin, C: cyclophosphamide, T: Taxane (docetaxel), F: 5-fluorouracil, M: Methotrexate

Table 3. Logistic Regression Model Predicting any Type of Delay among Breast Cancer Patients

Determinants	OR (95%) CI)	*p*-value
Age (years)		
≤65 (reference)		
>65	0.76 (0.23, 2.53)	0.650
Residence		
Urban		
Rural	1.07 (0.67, 1.70)	0.788
Unknown	4.52 (1.27, 16.12)	0.020
Co-morbidities		
Absent (reference)		
Present	0.69 (0.38, 1.23)	0.205
Body mass index (kg/m²)		
Underweight (<18.5)	2.46 (0.64, 9.40)	0.188
Normal (18.5 to 22.9) (reference)		
Overweight (23 to 24.9)	0.74 (0.37, 1.47)	0.389
Obese (>25)	0.83 (0.47, 1.44)	0.505
Unknown	2.00 (0.81, 4.95)	0.134
Tumor size (cm)		
<2 (reference)		
2-5	1.58 (0.75, 3.34)	0.229
>5	2.51 (0.94, 6.73)	0.068
Unknown	0.76 (0.38, 1.50)	0.428
Nodal status		
None (Reference)		
1-3	1.36 (0.65, 2.84)	0.417
4-9	1.60 (0.69, 3.73)	0.275
≥10	-	-
Unknown	0.58 (0.32, 1.04)	0.066
Hormone status		
Positive (reference)		
Negative	0.65 (0.40, 1.06)	0.086
HER2 receptor status		
Positive	0.71 (0.44, 1.14)	0.155
Negative (reference)		
Equivocal	1.02 (0.47, 2.21)	0.959
Clinical stage		
Stage I/II (reference)		
Stage III/IV	1.39 (0.89, 2.19)	0.151
Unknown	0.77 (0.05, 12.51)	0.852
Lymphovascular invasion		
None (reference)		
Present	1.05 (0.47, 2.37)	0.901
Unknown	0.69 (0.36, 1.34)	0.273
Tumor grade		
I/II (reference)		
III	0.66 (0.32, 1.36)	0.261
Unknown	0.45 (0.26, 0.78)	0.005

chemotherapy doxorubicin cyclophosphamide, and taxane was more likely to have delay in adjuvant chemotherapy.

Delays in treatment and their effects on survival have been substantiated by previous authors. The time from breast cancer diagnosis to time to primary breast surgery of more than 8 weeks was associated with worse overall survival in a cohort study.[17] Similarly, a meta-analysis has shown that delaying surgery more than 12 weeks was associated with worse overall survival among breast cancer patients.[18] Based on meta-analysis of eight studies, a four-week increase in the time to adjuvant chemotherapy was associated with increased risk of death.[18] Yu et al. showed a decrease in overall survival by 15% for every four-week delay in chemotherapy administration resulting in a 30% increase in the risk of death.[19] Moreover, the detrimental effect of delayed chemotherapy was more pronounced among those with triple-negative breast cancer, a highly aggressive subtype.[12] In contrast, time to neoadjuvant chemotherapy was not associated with worse survival among triple-negative and HER-2 positive breast cancer patient.[20]

Our findings show a higher prevalence of delays compared to the global delay of 17%.[21] Other LMICs such as Iran have also reported a relatively lower prevalence of delay (42.5%) compared to that found in our study (61.1%).[21] The median time to surgery in our study (76 days) was longer compared to high income countries such as Korea (14 days)[22] and other LMIC like China (4 days).[23] In China, the time to adjuvant chemotherapy was noted to be twenty days which was shorter compared to our data (125 days).[24] In a study in Pakistan, the median treatment delay (defined as diagnosis of cancer to the start of treatment) among breast cancer patients was 26 days while in India it was noted to be 130 days.[25,26] In a meta-analysis among delays and barriers to cancer care in low- and middle-income countries, the median delay in diagnosis was sixteen weeks and the median delay in treatment among breast cancer patients was four weeks. The median delay in treatment based on this analysis was lower compared to the median times derived from our study which were all more than four weeks.[27]

Barriers to cancer care in low- and middle-income countries include health literacy, cancer stigma, limited access, financial constraints, and socio-cultural constrains.[27] Treatment delay among breast cancer patients in India was due to disease misclassification, discontent with public health care facilities, poor accessibility, limited resources, treatment-related fear, and associated side effects.[26] A study conducted in Nigeria showed that the fear of mastectomy, financial constraints, and sociocultural beliefs were major barriers to treatment access.[28] A local study showed the presence of treatment delays in trastuzumab administration among HER2-positive patients which may be due availability issues. The high influx of patients may overload the whole system resulting in a shortage of medications.[29]

In our study, the patients with hypertension were more likely to have any delays in treatment. Comorbidity

potentially may affect cancer at different timepoints from diagnosis, treatment, and outcomes[30] and is also associated with a longer interval from diagnosis to treatment initiation.[8] In a study among breast cancer patients undergoing surgery, delays were more prevalent among urban patients (2.5%) than rural patients (1.9%).[31] In our study, more advanced breast cancer (T2-3 tumors) presented with any type of delay as these usually require pretreatment diagnostic work-up. Delays in diagnostic tests may stem from lack of finances and limited machines available in the hospital.

In this study, the magnitude of the delay across all three timeframes provides a lens through which we can see areas of improvement on the government-initiated program. Identifying and addressing causative factors is crucial in delivering quality breast cancer care.

Limitations and Recommendations

We present our study's inherent limitations. A high number of records were excluded due to missing chart data and poor patient follow-up. Due to the observational nature of the study, confounding factors may have affected the associations noted. The retrospective nature of our study may have introduced reporting bias, attrition bias, and information bias from missing data and chart records during data abstraction. It is recommended that cut-offs be established on the treatment course of patients which may serve as quality indicators of breast cancer care. Future studies may be conducted to examine the percentage of patients who proceeded to surgery, progressed or became inoperable/metastatic. Other outcomes such as time to surgery after neoadjuvant therapy, disease-free survival, and overall survival may also be explored. Future research may also look into breast cancer databases when possible to abstract information not available in physical records to increase the number of patients included and the power to detect significant risk factors. Variables may also be presented as composites in subsequent studies to increase statical power. Risk factors may also be curated to only include those which have robust data in previous studies. In addition, other risk factors which maybe determinants of delay such as educational status, insurance status, and age may also be investigated.

By describing the magnitude of treatment delay and plausible factors associated, the healthcare team can be guided on their treatment plans, mindful of the consequences of treatment delay on survival. Breast cancer treatment pathways may also be established with cancer quality metrics defined during treatment. We also recommend further studies exploring the various factors which contribute to delays in treatment initiation, surgery and chemotherapy and its effect on survival. It is our hope that this study will set the platform for policy changes which can translate to better delivery of healthcare in the hope of improving long-term patient outcomes among breast cancer patients in the Philippines.

CONCLUSION

In conclusion, the present study shows the presence of treatment delay among breast cancer patients across several timepoints. Further studies may be done to identify factors affecting these delays and policy changes are recommended to address these gaps in treatment.

Statement of Authorship

All authors certified fulfillment of ICMJE authorship criteria.

Author Disclosure

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