BREAST CANCER

Breast Cancer Care Timeliness Framework: A Quality Framework for Cancer Control

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PURPOSE The aim of this study is to determine the pathway that women follow for Breast Cancer Care (BCC) and the time intervals from symptom discovery to treatment initiation and to develop a quality matrix framework.

METHODS A retrospective cohort study was conducted at six tertiary centers in Malaysia. All women with newly diagnosed breast cancer were interviewed, and a medical records review was conducted using a structured questionnaire. The BCC timeliness framework showed that the total time between a woman discovering their first breast changes and the date of initial treatment was divided into three distinct intervals: presentation interval, diagnostic interval, and treatment interval. Four diagnosis subintervals, referral, biopsy, report, and diagnosis resolution intervals, were also looked into.

RESULTS The BCC timeliness framework was used to capture important time points. The median total time, presentation interval, diagnostic interval, and treatment interval were 4.9 months (range, 1 month to 10 years), 2.4 months (range, 7 days to 10 years), 26 days (range, 4 days to 9.3 months), and 21 days (range, 1 day to 7.2 months), respectively. Meanwhile, the median time for the diagnosis subinterval of referral, biopsy, report, and diagnosis resolution was 8 days (range, 0 day to 8 months), 0 day (range, 0 day to 20 days), 7 days (range, 3 days to 3.5 months), and 4 days (range, 1 day to 1.8 months), respectively.

CONCLUSION The BCC timeliness framework is based on the current sequenced trajectory of the BCC journey. Clarity in the measurement of timeliness provides a standardized language for monitoring and outcome research. It can serve as a quality indicator for community and hospital-based breast cancer programs.

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INTRODUCTION

Breast cancer is the most common cancer worldwide. In 2020, Asia accounted for 45.4% of the global incident cases and 50.5% of the mortality rate, and the incidence is predicted to climb significantly.[1] Similarly, breast cancer is the most frequent cancer in Malaysia,[2] and the incidence is expected to escalate because of increasing life expectancy, better socioeconomic status, and changes in lifestyle.[3] A high proportion of advanced stage with limited access to timely diagnosis and treatments puts Asian women, especially those living in low-middle–income countries, at a high cancer mortality risk.[4] The Malaysian study on cancer survival (MyScan) has reported a lower 5-year relative survival rate of 66.8% compared with Japan (88.9%), United States (88.8%), and Singapore (80.3%).[5] Women with breast cancer in Malaysia often delay in seeking medical care and present with more advanced stages of disease.[6] Besides the sociodemographic[7] and sociocultural[8] factors, delays are also associated with health care systems,[9] symptom interpretation,[10] and type of treatment.[11]

Timely access to health care services has become a priority in public health policies.[12,13] The time interval not only is an indicator of the accessibility of health care but also aids in identifying inequalities of care in patient management.[14-16] Therefore, appropriate assessment from the primary health care level, timely access to breast cancer diagnosis, and treatment initiation are required, but there is a scarcity of data that measure the timeliness of access to diagnosis and treatments. Only two timeframe studies were conducted in Malaysia. First, the study was conducted on private and tertiary hospitals in a well-resourced urban setting concentrated with cancer specialists, manpower, and physical infrastructure.[17] Another study was on the feasibility of patient navigation on breast cancer care (BCC) but limited to a historical comparison without full follow-up data.[18]

The Clinical Practice Guidelines (CPG) for breast cancer management in Malaysia recommended a 2-month interval from presentation at diagnostic centers to initial treatment,[19] and the latest CPG clinical audit

ASSOCIATED CONTENT

Appendix

Author affiliations and support information (if applicable) appear at the end of this article.

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CONTEXT

Key Objective

This study establishes a framework for the care of breast cancer that can be quickly adopted by nonexperts. The quality matrices for breast cancer quality care are based on the framework data on timeliness.

Knowledge Generated

The Breast Cancer Care (BCC) timeliness framework is based on three (3) sequential episodes of presentation, diagnosis, and treatment. Four (4) diagnosis subintervals of referral, biopsy, report, and diagnosis resolution were examined. The optimal time or the acceptable duration of women's pathway to BCC can be recommended to patients for self-regulation and a guide for seeking BCC.

Relevance

The BCC timeliness framework is useful to study the patients' journey and identify the barriers to early presentation, diagnosis, and treatment, which can be adapted into cancer control programs.

indicator targets 80% of women to be referred to the breast clinic within 2 weeks of presenting to primary care services.[20] Nevertheless, there has not been a national audit exercise to document timeliness in access to presentation, diagnosis, and treatments in Malaysia. The lack of contextual knowledge among policy makers necessitates that the quality cancer care includes process matrices that nontechnical experts may easily adopt. The framework could identify health system or patient barriers to early presentation, diagnosis, and treatment for timely interventions.

Although there are guidelines on time frames provided by western countries that can be used as a reference, the time points being used in scientific papers[21,22] and policy documents[20] vary causing difficulties in selecting the most appropriate intervals that may be suitable for adoption in national cancer control programs. Hence, this study aims to identify the time point intervals of patients' presentation, diagnosis, and treatment in public tertiary centers in Malaysia to precisely define a framework for future audits and studies.

METHODS

Study Design and Study Population

The researchers developed a structured study questionnaire from literature review, expert panel discussion, and pilot testing. The questionnaires were in both Malay and English languages and pretested for content validity among breast surgeons and face validity among breast cancer survivors to meet the study objectives. This retrospective cohort study was conducted at six tertiary public centers in Malaysia between June 2015 and June 2017. These hospitals are the main public tertiary centers located in different regions and act as referral centers for breast cancer cases in Malaysia. Each hospital has an open-access diagnostic center where women may be consulted. The study population consisted of 870 universally sampled patients with newly diagnosed breast cancer that was confirmed through histopathology examination. Cases were identified through breast cancer records at surgery outpatient department and breast clinics in each hospital. After medical records review, exclusions, and missing data, 340 patients were included in the study (Appendix 1). The median follow-up was 14 months (range, 12-18 months) from diagnosis.

Data Collection

All patients with breast cancer consented through phone call before data collection. The sociodemographic data and all important dates of their BCC journey were captured from both medical record reviews and interviews using the structured questionnaire. Phone interviews with the aid of a calendar view helped women remember important dates and events. Relevant clinical information was retrieved from the medical records. All data were then cross-validated between patient medical records and interviews by researchers to ensure accuracy.

The sociodemographic profile included age, ethnicity, marital status, educational level, employment status, household income, and lifestyle. Medical details included the method of cancer detection (eg, self-detected and screen-detected), type of symptom, symptom interpretation, practice of breast self-examination, type of primary care facility (eg, clinic and hospital), type of biopsy, number of biopsies, histologic diagnosis, stage at diagnosis (American Joint Committee on Cancer seventh edition), treatment details, and the all important time points.

Important Time Points for the Breast Cancer Care Pathway

The important time points for the BCC pathway includes the symptom duration, date of symptom discovery, date of first primary care visit, date of first diagnostic center visit, date of the first biopsy, date of histology report that confirmed malignancy, date of diagnostic resolution or completion and communication, and date of initial treatment. Initial treatment is defined as the recommended primary treatment. The total time between a woman discovering

symptoms and the date of initial treatment was then divided into three intervals: presentation interval (PI), diagnostic interval (DI), and treatment interval (TI). PI was defined as the time from women discovering the first symptom to presentation at a primary care facility. DI was defined as the time from the first presentation at a primary care facility to a diagnosis resolution. Meanwhile, TI was defined as the time from a diagnosis resolution to initial treatment. In addition, we also explored four other subintervals, which are referral (time taken from referral to a diagnostic center), biopsy (time taken to perform a biopsy), report (time taken to obtain a histologic report of confirmed malignancy), and diagnosis resolution (time taken to diagnosis resolution) intervals. Delay was determined if the PI was more than 3 months,[23,24] the DI was more than 1 month,[22-24] and the TI was more than 1 month.[25,26]

Data Analysis

All analyses were performed using SPSS version 20.0 (SPSS Inc, Chicago, IL). Descriptive statistical analysis was used to determine the patterns of presentation and details of diagnosis and treatment, along the median time of women's pathways to BCC. Delay was divided into dichotomous outcomes: nondelay and delay. Important variables and variables with $P < .25$ in the univariable analysis were selected for multivariable analysis to identify factors associated with delays in presentation, diagnosis, and treatment. Results were presented as adjusted odds ratio, 95% CI with a significant P value $< .05$.

Ethical approvals were obtained from the University Malaya Medical Centre Ethics Committee (PPUM/MDU/300/04/03) and National Medical Research Registry, Medical Research and Ethics Committee ((2)dlm.KKM/NIHSEC/08/0804/P12-824).

RESULTS

The median age for all patients was 53 years (23-74 years). Most of the patients (45.3%) were Malays, 76.2% were married, and 75.9% have at least a secondary education level. For economic status, 67.9% of the patients were unemployed with a median household income of RM 2,900 (~US dollars 694) per month. Only a small portion of patients have a family history of breast cancer (18.3%), consumed alcohol (12.1%), ever-smoked (15.9%), and used contraception (26.2%). All the sociodemographic characteristics of women with breast cancer can be found in Table 1.

TABLE 1. Sociodemographic Characteristics of Women With Breast Cancer (N = 340)

Characteristic	No. (%)
Age, years	
< 50	132 (38.8)
≥ 50	208 (61.2)
Median (range)	53 (23-74)
Ethnicity	
Malay	154 (45.3)
Chinese	104 (30.6)
Indian	54 (15.9)
Others	28 (8.2)
Marital status	
Married	259 (76.2)
Single	57 (16.8)
Widowed/divorced	24 (7.1)
Education	
Tertiary	49 (14.4)
Secondary	258 (75.9)
Primary	33 (9.7)
Working status	
Employed	109 (32.1)
Unemployed	231 (67.9)
Household income per month, MYR	
< 3,000	244 (71.8)
≥ 3,000	96 (28.2)
Median (range)	2,900 (900-5,560)
Family history with breast cancer	
Yes	62 (18.2)
No	278 (81.8)
Alcohol	
Yes	41 (12.1)
No	299 (87.9)
Ever-smoked	
Yes	54 (15.9)
No	286 (84.1)
Contraception	
Yes	89 (26.2)
No	251 (73.8)

Abbreviation: MYR, Malaysian Ringgit.

Presentation, Diagnosis, and Treatment Details

The appearance of a breast lump (88.2%) was the most common main symptom, followed by breast pain (3.8%), changes in breast shape (2.9%), nipple discharge (2.6%), and weight loss (2.3%), none were screen-detected. More than half appraised their symptom as cancerous (63.2%). Approximately, 65.3% performed regular breast self-examination before the diagnosis. All patients presented to a primary health care clinic (86.2%) or directly to a hospital (13.8%) through outpatient departments and accident and emergency.

Results showed that most (68.6%) patients underwent one biopsy to confirm malignancy and 16.8% had a surgical biopsy. The majority were confirmed through needle biopsy, via free-hand core needle (50%), fine needle aspiration

TABLE 2. Presentation, Diagnosis, and Treatment Details of Women With Breast Cancer (N = 340)

Characteristic	No. (%)
Symptom detection method	
Self-detected	340 (100)
Screen-detected	0 (0)
Symptom type	
Breast lump	300 (88.2)
Breast pain	13 (3.8)
Changes in breast shape	10 (2.9)
Nipple discharge	9 (2.6)
Weight loss	8 (2.3)
Symptom interpretation	
Cancerous	215 (63.2)
Noncancerous	125 (36.8)
BSE practice	
Yes	222 (65.3)
No	118 (34.7)
Primary care center	
Clinic	293 (86.2)
Hospital	47 (13.8)
No. of biopsies, median (range)	1 (1-4)
1	234 (68.8)
2	71 (20.9)
≥ 3	35 (10.3)
Type of biopsy that confirmed malignancy	
Needle biopsy	283 (83.2)
Surgical biopsy	57 (16.8)
Needle biopsy (n = 283)	
Core needle	170 (50.0)
FNAC	56 (16.5)
US image–guided	57 (16.7)
Surgical biopsy (n = 57)	
Excisional biopsy	52 (15.3)
Incisional biopsy	5 (1.5)
Diagnosis place	
Treating hospitals	284 (83.5)
Other hospitals	56 (16.5)
Stage	
I	59 (17.4)
II	128 (37.6)
III	114 (33.5)
IV	39 (11.5)
Initial treatment	
Surgery	264 (77.6)
Chemotherapy	44 (12.9)
Radiotherapy	2 (0.6)
Hormonal therapy	8 (2.4)
Defaulted	22 (6.5)

NOTE. No. of biopsies includes needle and surgical biopsies.

Abbreviations: BSE, breast self-examination; FNAC, fine needle aspiration cytology; US, ultrasound.

cytology (16.5%), or image-guided core (16.7%) biopsies. The majority were diagnosed at the treating hospitals (83.5%), with 45% diagnosed at late-stage cancer (stage III and IV). Surgery (77.6%) was performed in the majority of women as the initial treatment with a high adherence rate of 86%. All the details on the presentation, diagnosis, and treatment of breast cancer can be found in Table 2.

BCC Timeliness Framework

The median total time for BCC pathway from first symptom discovery to initial treatment was 4.9 months (range, 1 month to 10 years), which was then divided into three sequential episodes of PI, DI, and TI.

The median time for PI, DI, and TI was 2.4 months (range, 7 days to 10 years), 26 days (range, 4 days to 9.3 months), and 21 days (range, 1 day to 7.2 months), respectively. Referral interval was the longest duration of diagnostic subinterval with a median time of 8 days (range, 0 days to 8 months). A minimum of 0 days indicated that patients were referred within the same day of the first primary care visit, whereas a maximum of the 8 months was due to patient delay. The interval for a referral from community clinics was shorter than within hospitals, with the median of 7 days (range, 0 day to 5.7 months) and 9 days (range, 0 days to 8 months), respectively. Within the hospital referral included from primary care, gynecology, and emergency department to the surgical outpatient department.

The median time for biopsy interval or getting the first biopsy was 0 days (range, 0 days to 20 days), indicating that the majority of patients (89.0%) undergo biopsy at the first visit or the same day to the diagnostic center. Meanwhile, the pathology report interval took a median time of 7 days (range, 3 days to 3.5 months), and the median time for diagnostic resolution or result disclosure in the clinic was 4 days (range, 1 day to 1.8 months). Figure 1 illustrates the median (range) time intervals of women's pathways to BCC in Malaysia. Table 3 lists the all important data collection requirements for the BCC timeliness Framework.

The proportions for presentation, diagnosis, and treatment delays in our study were 35%, 41.8%, and 36.2%, respectively. The multivariable analysis did not find any sociodemographic characteristic linked with these delays. However, the study location showed a significant

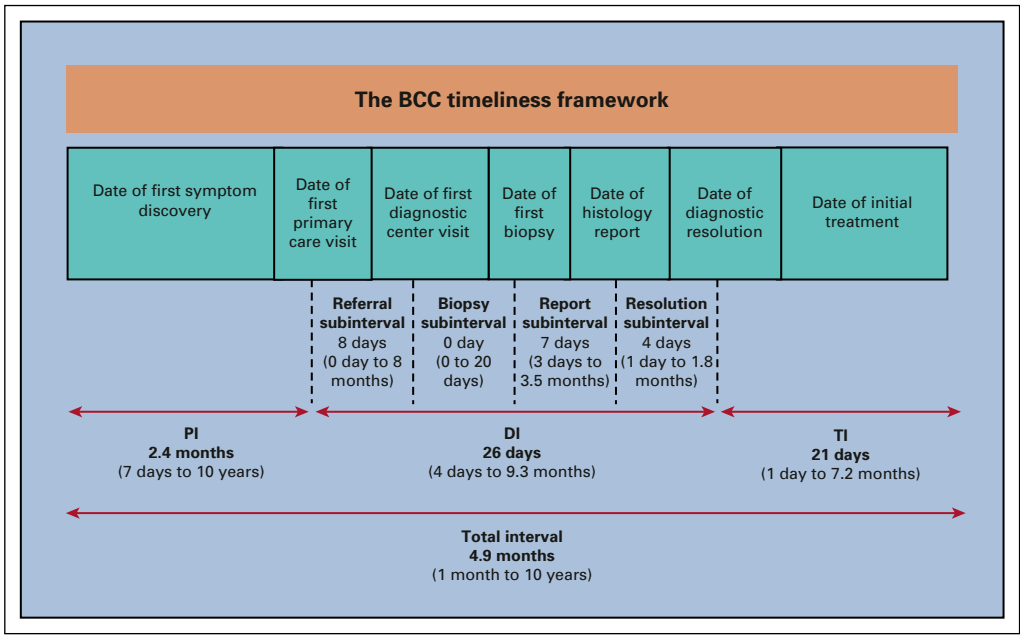

FIG 1. Important time points and intervals in the timeliness framework and the median (range) time intervals in Malaysia. BCC, Breast Cancer Care; DI, diagnostic interval; PI, presentation interval; TI, treatment interval.

association with presentation delay. Diagnosis delay was associated with symptoms without lumps, having two or more biopsies, and undergoing surgical excision biopsy. Treatment delay was associated with the study site. The analyses are not shown here; refer to Appendix Tables A1, A2, and A3 in the Appendix.

DISCUSSION

A timeliness framework for the BCC pathways was developed. A PI of 2.4 months was the most extended interval in this study compared with the DI and TI. The range of 7 days to 10 years illustrates the delayed help-seeking process and possibly the natural history of low-grade cancer. Other local studies similarly report a median of 2-4 months after symptoms discovery,[6,17,18] indicating that time taken to present for seeking medical care among patients with breast cancer is delayed and differs between institutions and Malaysia locations. We found that the Kelantan site was most likely to delay the presentation. Kelantan located on the East Coast is more rural and less developed than the

TABLE 3. Data Collection Requirements for the Breast Cancer Care Timeliness Framework

Timeliness Interval	Timeliness Subintervals	Important Dates
Total interval		Date of first symptom discovery Date of initial treatment
PI		Date of first symptom discovery Date of first primary care visit
DI		Date of first primary care visit Date of diagnostic resolution clinic visit
	Referral subinterval	Date of first primary care visit Date of first diagnostic center visit[a]
	Biopsy subinterval	Date of first diagnostic center visit Date of first biopsy
	Report subinterval	Date of first biopsy Date of histology report
	Diagnosis resolution subinterval	Date of histology report Date of diagnostic resolution clinic visit[b]
TI		Date of diagnostic resolution clinic visit Date of initial treatment

Abbreviations: DI, diagnostic interval; PI, presentation interval; TI, treatment interval.
[a]Clinic that provides investigations and biopsy.
[b]Diagnosis disclosed to the patient.

West Coast.[10] Rural and suburban Asian women are private and less receptive to revealing their private parts even to health care providers.[10,27,28] Previous studies conducted in Kelantan reported that poor knowledge, fear of consequences of cancer, beliefs in complementary alternative medicine, needing support from others, competing priorities, denial, wait and see attitude, and perceptions of a weak health care system were reasons for delay.[29,30] In addition, there were lack of self-management skills, lack of family support, especially husbands, and a firm reliance on family to make medical decisions.[31-33] The Malaysian and specifically Kelantan community would require a strategic and culturally sensitive health education.

Notably, we uncovered delays in this study where all the patients were symptomatic. Malaysia does not have a population-based mammogram screening program. Screening is performed opportunistically with a low uptake of 6.8% to 25.5%.[34,35] However, there are opportunities to improve breast cancer outcomes by downstaging clinically apparent breast cancer.[8] Given that 47.9% of cases were diagnosed with advanced disease[2] with low survival rates in Malaysia,[5] the priority for cancer control is not only to intensify health promotion but also to strengthen timely diagnostic services in the public sector, which remain the safety net of many underprivileged citizens as Malaysia has universal health coverage before implementing screening programs.

The median DI of 26 days in this study was similar to other studies in Asia[36,37] and high-income countries[38,39] where the reported intervals were 7-45 days. Moreover, these intervals are within the recent Breast Health Global Initiative recommendations that health systems should strive to complete a diagnostic examination within 60 days.[12] This finding illustrates that the time interval to a diagnosis of breast cancer in Malaysia is acceptable, but the 9.3 months upper range begs for improvement. Between the diagnosis subintervals, the referral interval showed the longest duration. No time frame was recommended for a referral from a primary care facility to a diagnostic center in Malaysia at the time of the study, but 2 weeks is suggested for referral time in the United Kingdom and Ireland,[15,40] and recently, this has been incorporated into the updated Malaysian Management of Breast Cancer CPG.[20] Meanwhile, the short median time for the biopsy in this study indicated that many patients underwent biopsy during their first visit to the diagnostic center. However, the upper range of the biopsy interval was 20 days, indicating that there could be a health system or help-seeking barrier that the study could not capture.

This study showed that symptoms without a breast lump were significantly associated with diagnosis delay, similarly seen in other studies.[26,41,42] This finding illustrates incorporation of breast cancer lump and nonlump symptoms education. A systematic review has reported that false attribution of breast lumps as benign, lack of proficient clinical breast examination, and nonreferral for further investigation among primary health care workers also cause diagnostic delays,[8,33,43] necessitating comprehensive education to health care providers.[8,41,44,45]

In our study, 31.2% of the patients had two or more biopsies to resolve the diagnosis, indicating the issues with the quality of biopsy technique, and poor clinical decision making or lack of image-guided biopsies in public hospital settings, indicating the urgent need to support training and diagnostic equipment for the workforce. Some 18% of diagnosis was resolved beyond a month, indicating that timely scheduling or pathology reporting is still a major barrier. The practice of multidisciplinary team (MDT) meetings in all the studied hospitals was beyond the scope of the study, and only the academic center had routine weekly multidisciplinary team meetings.[46] The availability of diagnostic MDTs can reduce the rate of institutional procedure sampling errors and errors in pathology laboratory interpretation.[47]

The median TI in this study was consistent with other studies.[48-51] We found that treatment delay was primarily influenced by the type of hospital. Although all study sites were tertiary referral centers, the public hospitals in this study did not have the whole range of in-house cancer services, compared with the university hospital comparator, which had the full range of disciplines. Furthermore, longer TI was associated with scheduling issues, high caseloads, and the need for cross-referrals to other centers in general hospitals compared with university hospitals.[52] Besides health system delays, patient delays may also influence delays in treatments because of the holdups in making treatment decisions as illustrated in the total breast cancer delay model.[53] Moreover, treatment decisions are left to family members on the basis of the family-oriented culture in Asia.[56-56]

Our study like other studies[57,58] indicated that those who were diagnosed at other hospitals than treating hospitals had a higher risk of treatment delay. Unfortunately, limitations of navigating patients between hospitals are unavoidable because of issues of availability, accessibility, affordability, timely care, and need for second opinion necessitating attending multiple hospitals.[14,42,59-61] Therefore, navigating patients to reduce logistical barriers is vital in timely treatment. Our study similar to others showed that TI did not differ according to the cancer stage.[62,63] Another study has found that the advanced stages of cancer were associated with a shorter time to treatment.[48] Hence, prioritizing according to advanced disease may help in providing safer timely access to those who need urgent treatments.

This study provides a framework that details the BCC pathway that is divided into three sequential episodes of care that can be adopted easily by nontechnical experts. This pathway is based on the current sequential breast cancer presentation, diagnosis, and treatment care

pathways that are required in all resource settings, similar to that proposed in the recent Breast Health Global Initiative summit.[12] Our timeliness framework includes the critical dates that need to be recorded, thus making this concept easy to implement (Table 3). The data on timeliness intervals provide the quality matrices for breast cancer quality care. Furthermore, the publication language for these time points and intervals is not standardized, making comparisons in research and monitoring challenging. To ensure data quality, cost efficiency, and time-saving, electronic medical record–enabled hospitals can be designed to digitalize the timepoints.[64] Our study illustrates that these timepoints data have been tested and are available in all hospitals. The prospective collection of these dates is also feasible. Hence, the BCC timeliness framework may be a useful outcome measurement tool for community-based interventions in shortening PIs and in hospital-based quality indicators for ensuring timely diagnosis and treatment initiation. Although not mentioned in this study, other treatment dates can be recorded to measure other treatment subintervals.[56]

Although our results may be affected by the small sample size and attrition of the sample, every precaution and resource were used. Furthermore, all data obtained through medical record review and interviews were cross-validated to ensure accuracy. Hence, a retrieval rate of 54% in busy public tertiary hospitals with limitations in manual record keeping would provide a good representation. In addition, this study is a multicenter retrospective cohort study conducted at six public tertiary hospitals that act as referral centers for patients with breast cancer representing all regions in Malaysia, making this study relevant for policy makers in cancer control planning.

In conclusion, the BCC timeliness framework is based on the current sequential trajectory of breast cancer presentation, diagnosis, and treatment. This framework provides clarity in the measurement of timeliness even for nonexperts. It provides a standardized language for monitoring and outcome research. It can serve as a quality indicator for community and hospital-based breast cancer programs.

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REFERENCES

1. Globocan: The Global Cancer Observatory; Breast Cancer. Lyon, France, International Agency for Research on Cancer, 2020
2. National Cancer Registry: Malaysia National Cancer Registry Report 2012-2016 (ed 5). Azizah A, Hashimah B, Nirmal K, et al (eds): Putrajaya, Malaysia, Ministry of Health Malaysia, 2019, pp 2-116
3. Yip CH, Pathy NB, Teo SH: A review of breast cancer research in Malaysia. Med J Malaysia 69:8-22, 2014 (suppl A)

4. Rivera-franco MM, Leon-rodriguez E: Delays in breast cancer detection and treatment in developing countries. Breast Cancer (Auckl) 10.1177/1178223417752677 [epub ahead of print on January 8, 2018]
5. National Cancer Registry: Malaysian Study on Cancer Survival (MySCan), Volume 4. National Cancer Institute, Ministry of Health Malaysia, Putrajaya, Malaysia, 2018, pp 1-72
6. Yip CH, Mohd Taib NA, Mohamed I: Epidemiology of breast cancer in Malaysia. Asian Pac J Cancer Prev 7:369-374, 2006
7. Ibrahim NA, Oludara MA: Socio-demographic factors and reasons associated with delay in breast cancer presentation: A study in Nigerian women. Breast 21:416-418, 2012
8. Taib NA, Yip CH, Low WY: Recognising symptoms of breast cancer as a reason for delayed presentation in Asian women-the psycho-socio-cultural model for breast symptom appraisal: Opportunities for intervention. Asian Pac J Cancer Prev 12:1601-1608, 2011
9. Sharma K, Costas A, Shulman LN, et al: A systematic review of barriers to breast cancer care in developing countries resulting in delayed patient presentation. J Oncol 2012:121873, 2012
10. Norsa'adah B, Rahmah MA, Rampal KG, et al: Understanding barriers to Malaysian women with breast cancer seeking help. Asian Pac J Cancer Prev 13:3723-3730, 2012
11. Arpino G, Pensabene M, Condello C, et al: Tumor characteristics and prognosis in familial breast cancer. BMC Cancer 16:924, 2016
12. Duggan C, Dvaladze A, Rositch AF, et al: The Breast Health Global Initiative 2018 global summit on improving breast healthcare through resource-stratified phased implementation: Methods and overview. Cancer 126:2339-2352, 2020
13. Moodley J, Cairncross L, Naiker T, et al: Understanding pathways to breast cancer diagnosis among women in the Western Cape Province, South Africa: A qualitative study. BMJ Open 6:1-7, 2016
14. McCutchan GM, Wood F, Edwards A, et al: Influences of cancer symptom knowledge, beliefs and barriers on cancer symptom presentation in relation to socioeconomic deprivation: A systematic review. BMC Cancer 15:1000, 2015
15. Hiom SC: Diagnosing cancer earlier: Reviewing the evidence for improving cancer survival. Br J Cancer 112:S1-S5, 2015
16. Martins T, Hamilton W, Ukoumunne OC: Ethnic inequalities in time to diagnosis of cancer: A systematic review. BMC Fam Pract 14:197, 2013
17. Lim GCC, Aina EN, Cheah SK, et al: Closing the global cancer divide—Performance of breast cancer care services in a middle income developing country. BMC Cancer 14:212, 2014
18. Yeoh Z-Y, Jaganathan M, Rajaram N, et al: Feasibility of patient navigation to improve breast cancer care in Malaysia. J Glob Oncol 4:1-13, 2018
19. Ministry of Health Malaysia: Clinical Practice Guidelines, Management of Breast Cancer (ed 2). Putrajaya, Malaysia, Ministry of Health, 2010
20. Ministry of Health Malaysia: Clinical Practice Guidelines, Management of Breast Cancer (ed 3). Putrajaya, Malaysia, Malaysian Health Technology Assessment Section (MaHTAS), 2020
21. Ho PJ, Cook AR, Binte Mohamed Ri NK, et al: Impact of delayed treatment in women diagnosed with breast cancer: A population-based study. Cancer Med 9:2435-2444, 2020
22. Moodley J, Cairncross L, Naiker T, et al: From symptom discovery to treatment—Women's pathways to breast cancer care: A cross-sectional study. BMC Cancer 18:312, 2018
23. Lim JNW, Potrata B, Simonella L, et al: Barriers to early presentation of self-discovered breast cancer in Singapore and Malaysia: A qualitative multicentre study. BMJ Open 5:e009863, 2015
24. Ghazali SM, Othman Z, Cheong KC, et al: Non-Practice of breast self examination and marital status are associated with delayed presentation with breast cancer. Asian Pac J Cancer Prev 14:1141-1145, 2013
25. Huo Q, Cai C, Zhang Y, et al: Delay in diagnosis and treatment of symptomatic breast cancer in China. Ann Surg Oncol 22:883-888, 2014
26. Plotogea A, Chiarelli AM, Mirea L, et al: Clinical and prognostic factors associated with diagnostic wait times by breast cancer detection method. Springerplus 3:125, 2014
27. Pruitt L, Mumuni T, Raikhel E, et al: Social barriers to diagnosis and treatment of breast cancer in patients presenting at a teaching hospital in Ibadan, Nigeria. Glob Public Health 10:331-344, 2014
28. Rastad H, Khanjani N, Khandani BK: Causes of delay in seeking treatment in patients with breast cancer in Iran: A qualitative content analysis study. Asian Pac J Cancer Prev 13:4511-4515, 2012
29. Taib NA, Yip CH, Ibrahim M, et al: Breast cancer in Malaysia: Are our women getting the right message? 10 Year-experience in a single institution in Malaysia. Asian Pac J Cancer Prev 8:141-145, 2007
30. Norsa'adah B, Rahmah MA, Rampal KG: Understanding barriers to Malaysian women with breast cancer seeking help. Asian Pac J Cancer Prev 13:3723-3730, 2012
31. Taib NA, Akmal MN, Mohamed I, et al: Improvement in survival of breast cancer patients—Trends in survival over two time periods in a single institution in an Asia Pacific country, Malaysia. Asian Pac J Cancer Prev 12:345-349, 2011
32. Mohd Taib NA, Su TT, Al Sadat N, et al: Malaysian breast cancer survivorship cohort (MYBCC) study. J Univ Malaya Med Cent 16:58, 2013
33. Yu FQ, Murugiah MK, Khan AH, et al: Meta-synthesis exploring barriers to health seeking behaviour among Malaysian breast cancer patients. Asian Pac J Cancer Prev 16:145-152, 2015
34. Mahmud A, Aljunid SM: The uptake of mammogram screening in Malaysia and its associated factors: A systematic review. Med J Malaysia 73:202-211, 2018
35. Institute for Public Health: National Health and Morbidity Survey (NHMS) 2019: Non-communicable Diseases, Healthcare Demand, and Health Literacy—Key Findings. Putrajaya, Malaysia, Ministry of Health, Malaysia, 2019
36. Poum A, Promthet S, Duffy SW, et al: Factors associated with delayed diagnosis of breast cancer in Northeast Thailand. J Epidemiol 24:102-108, 2014
37. Norsa'adah B, Rampal KG, Rahmah MA, et al: Diagnosis delay of breast cancer and its associated factors in Malaysian women. BMC Cancer 11:141, 2011
38. Chang G, Chan CW, Hartman M: A commentary on delayed presentation of breast cancer in Singapore. Asian Pac J Cancer Prev 12:1635-1639, 2011
39. Harirchi I, Ghaemmaghami F, Karbakhsh M, et al: Patient delay in women presenting with advanced breast cancer: An Iranian study. Public Health 119:885-891, 2005
40. Mccain S, Newell J, Badger S, et al: Referral patterns , clinical examination and the two-week-rule for breast cancer : A cohort study. Ulster Med J 80:68-71, 2011
41. Forbes LJL, Warburton F, Richards MA, et al: Risk factors for delay in symptomatic presentation: A survey of cancer patients. Br J Cancer 111:1-8, 2014
42. El Jones C, Maben J, Jack RH, et al: A systematic review of barriers to early presentation and diagnosis with breast cancer among black women. BMJ Open 4:e004076, 2014
43. Lim JN, Potrata B, Simonella L, et al: Barriers to early presentation of self-discovered breast cancer in Singapore and Malaysia: A qualitative multicentre study. BMJ Open 5:e009863, 2015

44. Bish A, Ramirez A, Burgess C, et al: Understanding why women delay in seeking help for breast cancer symptoms. J Psychosom Res 58:321-326, 2005
45. Burgess CC, Ramirez AJ, Richards MA, et al: Who and what influences delayed presentation in breast cancer? Br J Cancer 77:1343-1348, 1998
46. Tham TM, Iyengar KR, Taib NA, et al: Fine needle aspiration biopsy, core needle biopsy or excision biopsy to diagnose breast cancer—Which is the ideal method? Asian Pac J Cancer Prev 10:155-158, 2009
47. Bairati I, Jobin E, Fillion L, et al: Determinants of delay for breast cancer diagnosis. Cancer Detect Prev 31:323-331, 2007
48. Plotogea A, Chiarelli AM, Mirea L, et al: Factors associated with wait times across the breast cancer treatment pathway in Ontario. Springerplus 2:388, 2013
49 Shieh S-H, Hsieh VC-R, Liu S-H, et al: Delayed time from first medical visit to diagnosis for breast cancer patients in Taiwan. J Formos Med Assoc 113:696-703, 2014
50. Caplan LS, May DS, Richardson LC: Time to diagnosis and treatment of breast cancer: Results from the national breast and cervical cancer early detection program, 1991-1995. Am J Public Health 90:130-134, 2000
51. Ruddy KJ, Gelber S, Tamimi RM, et al: Breast cancer presentation and diagnostic delays in young women. Cancer 120:20-25, 2014
52. Brazda A, Estroff J, Euhus D, et al: Delays in time to treatment and survival impact in breast cancer. Ann Surg Oncol 17:291-296, 2010 (suppl 3)
53. Taib NA, Yip CH, Low WY: A grounded explanation of why women present with advanced breast cancer. World J Surg 38:1676-1684, 2014
54. Muhamad M, Merriam S, Suhami N: Why breast cancer patients seek traditional healers. Int J Breast Cancer 2012:689168, 2012
55. Teh Y, Elina N, Shaari N, et al: Determinants of choice of surgery in Asian patients with early breast cancer in a middle income country. Asian Pac J Cancer Prev 15:3163-3167, 2014
56. Mujar NM, Dahlui M, Emran NA, et al: Complementary and alternative medicine (CAM) use and delays in presentation and diagnosis of breast cancer patients in public hospitals in Malaysia. PLoS One 12:e0176394, 2017
57. Yoo T, Kim J, Lee JW, et al: Delay of treatment initiation does not adversely affect survival outcome in breast cancer. Cancer Res Treat 48:962-969, 2016
58. Chen SJ, Kung P-T, Huang KH, et al: Characteristics of the delayed or refusal therapy in breast cancer patients: A longitudinal population-based study in Taiwan. PLoS One 10:e0131305, 2015
59. Facione NC, Facione PA: The cognitive structuring of patient delay in breast cancer. Soc Sci Med 63:3137-3149, 2006
60. Unger-Saldaña K: Challenges to the early diagnosis and treatment of breast cancer in developing countries. World J Clin Oncol 5:465-477, 2014
61. Landercasper J, Linebarger JH, Ellis RL, et al: A quality review of the timeliness of breast cancer diagnosis and treatment in an integrated breast center. J Am Coll Surg 210:449-455, 2010
62. Wagner JL, Warneke CL, Mittendorf EA, et al: Delays in primary surgical treatment are not associated with significant tumor size progression in breast cancer patients. Ann Surg 254:119-124, 2011
63. Mujar M, Dahlui M, Yip CH, et al: Delays in time to primary treatment after a diagnosis of breast cancer: Does it impact survival? Prev Med (Baltim) 56:222-224, 2013
64. Mohd Nor NA, Taib NA, Saad M, et al: Development of electronic medical records for clinical and research purposes: The breast cancer module using an implementation framework in a middle income country—Malaysia. BMC Bioinformatics 19:402, 2019 (suppl 13)

APPENDIX 1

Number of Samples

A total of 870 patients with breast cancer were provided by the six hospitals from their hospital registries. A review of the medical records excluded those with recurrent cancer and secondary cancer, thus excluding 86 patients. The remaining 784 patients who were newly diagnosed during that period were contacted through a telephone call, whereby only 426 (54%) agreed to participate. Those with incomplete data (n = 86) were excluded, leaving a total of 340 patients.

Factors Associated With Delays in Presentation, Diagnosis, and Treatment of Patients With Breast Cancer

Details of the factors associated with delays in presentation, diagnosis, and treatment of patients with breast cancer are shown in Appendix Tables A1-A3.

TABLE A1. Factors Associated With Delays in Presentation Among Patients With Breast Cancer Attending Public Hospitals in Malaysia (N = 340)

Variable	Presentation		Crude, Odds Ratio (95% CI)	*P*[a]	Adjusted, Odds Ratio (95% CI)	*P*[b]
	Nondelay (n = 221)	Delay (n = 119)				
Age group, years						
≤ 50	81 (61.4)	51 (38.6)	1.00	.263	—	—
> 50	140 (67.3)	68 (32.7)	0.77 (0.49 to 1.21)			
Study sites						
Kuala Lumpur (1)	66 (66.0)	34 (34.0)	1.00	—	1.00	—
Kuala Lumpur (2)	51 (63.8)	29 (36.3)	1.10 (0.59 to 2.04)	.753	1.24 (0.62 to 2.48)	.537
Perak	39 (81.3)	9 (18.8)	0.44 (0.19 to 1.03)	.059	0.42 (0.17 to 1.02)	.057
Johor	31 (62.0)	19 (38.0)	1.19 (0.58 to 2.40)	.629	1.18 (0.53 to 2.62)	.684
Kelantan	6 (30.0)	14 (70.0)	4.53 (1.59 to 12.8)	**.004**	4.78 (1.45 to 15.70)	**.010**
Sarawak	28 (66.7)	14 (33.3)	0.97 (0.45 to 2.08)	.939	1.15 (0.46 to 2.85)	.756
Ethnicity						
Chinese	70 (67.3)	34 (32.7)	1.00	—	1.00	—
Malay	93 (60.4)	61 (39.6)	1.35 (0.80 to 2.27)	.259	1.06 (0.58 to 1.95)	.833
Indian	39 (72.2)	15 (27.8)	0.79 (0.38 to 1.63)	.527	0.68 (0.30 to 1.51)	.345
Others	19 (67.9)	9 (32.1)	0.97 (0.39 to 2.38)	.956	0.81 (0.30 to 2.21)	.693
Educational level						
Tertiary	36 (73.5)	13 (26.5)	1.00	—	1.00	—
Secondary and primary	185 (63.6)	106 (36.4)	1.58 (1.80 to 6.14)	**.038**	1.34 (0.74 to 3.63)	.219
Marital status						
Married	171 (66.0)	88 (34.0)	1.00	—	—	—
Single/divorced	50 (61.7)	31 (38.2)	1.20 (0.71 to 2.02)	.480		
Household income, MYR						
≤ 3,000	163 (66.8)	81 (33.2)	1.00	—	1.00	—
> 3,000	58 (60.4)	38 (39.6)	1.31 (0.80 to 2.14)	.267	1.23 (0.10 to 3.39)	.122
Employment status						
Employed	77 (70.6)	32 (29.4)	1.00	—	1.00	—
Unemployed	144 (62.3)	87 (37.7)	1.45 (0.89 to 2.37)	.135	1.31 (0.91 to 2.87)	.102
Family with breast cancer						
Yes	45 (72.6)	17 (27.4)	1.00	—	1.00	—
No	176 (63.3)	102 (36.7)	1.53 (1.83 to 4.82)	**.048**	1.28 (0.91 to 3.47)	.090
Breast symptom						
With lump	195 (65.0)	105 (35.0)	1.00	—	—	—
Without lump	26 (65.0)	14 (35.0)	1.00 (0.50 to 1.99)	1.000		
Interpreted symptom as cancer						
Yes	136 (63.3)	79 (36.7)	1.00	—	—	—
No	85 (68.0)	40 (32.0)	0.81 (0.50 to 1.29)	.377		
Performed BSE						
Yes	149 (67.1)	73 (32.9)	1.00	—	1.00	—
No	72 (61.0)	46 (39.0)	1.30 (0.82 to 2.07)	.262	1.41 (0.82 to 2.40)	.207

NOTE. Significant value $P < .05$ are provided in bold.

Abbreviations: BSE, breast self-examination; MYR, Malaysian Ringgit.

[a]Univariable logistic regression.

[b]Multivariable logistic regression.

TABLE A2. Factors Associated With Delays in Diagnosis Among Patients With Breast Cancer Attending Public Hospitals in Malaysia (N = 340)

Variable	Diagnosis		Crude, Odds Ratio (95% CI)	P^a	Adjusted, Odds Ratio (95% CI)	P^b
	Nondelay (n = 198)	Delay (n = 142)				
Age group, years						
≤ 50	78 (59.1)	54 (40.9)	1.00	—	—	—
> 50	120 (57.7)	88 (42.3)	1.05 (0.68 to 1.64)	.799		
Study sites						
Kuala Lumpur (1)	76 (76.0)	24 (24.0)	1.00	—	1.00	—
Kuala Lumpur (2)	39 (48.8)	41 (51.3)	3.32 (1.76 to 6.28)	**< .001**	3.81 (0.85 to 7.85)	.071
Perak	24 (50.0)	24 (50.0)	1.16 (0.52 to 6.56)	.072	1.53 (0.60 to 5.80)	.101
Johor	26 (52.0)	24 (48.0)	2.92 (1.42 to 6.00)	**.004**	3.13 (0.35 to 7.23)	.098
Kelantan	9 (45.0)	11 (55.0)	0.87 (0.43 to 4.45)	.208	1.40 (0.34 to 4.49)	.085
Sarawak	24 (57.1)	18 (42.9)	1.37 (0.10 to 2.10)	.127	1.42 (0.95 to 6.14)	.063
Ethnicity						
Chinese	63 (60.6)	41 (39.4)	1.00	—	1.00	—
Malay	85 (55.2)	69 (44.8)	1.24 (0.75 to 2.06)	.391	0.74 (0.41 to 1.35)	.338
Indian	31 (57.4)	23 (42.6)	1.14 (0.58 to 2.22)	.700	1.17 (0.54 to 2.54)	.689
Others	19 (67.9)	9 (32.1)	0.72 (0.30 to 1.76)	.482	0.60 (0.20 to 1.75)	.354
Educational level						
Tertiary	28 (57.1)	21 (42.9)	1.00	—	—	—
Secondary and primary	170 (58.4)	121 (41.6)	0.88 (0.47 to 1.64)	.701		
Marital status						
Married	154 (59.5)	105 (40.5)	1.00	—	—	—
Single/divorced	44 (54.3)	37 (45.7)	1.23 (0.74 to 2.03)	.413		
Household income, MYR						
≤ 3,000	136 (55.7)	108 (44.3)	1.00	—	1.00	—
> 3,000	62 (64.6)	34 (35.4)	0.69 (0.42 to 1.12)	.138	1.37 (0.76 to 2.44)	.287
Employment status						
Employed	59 (54.1)	50 (45.9)	1.00	—	—	—
Unemployed	139 (60.2)	92 (39.8)	0.78 (0.49 to 1.23)	.292		
Family with breast cancer						
Yes	31 (50.0)	31 (50.0)	1.00	—	—	—
No	167 (60.1)	111 (39.9)	0.66 (0.38 to 1.15)	.147		
Symptom type						
With lump	180 (60.0)	120 (40.0)	1.00	—	1.00	—
Without lump	18 (45.0)	22 (55.0)	1.83 (1.54 to 3.56)	**.044**	1.98 (1.45 to 4.12)	**.028**
Primary care center						
Clinic	170 (58.0)	123 (42.0)	1.00	—	1.00	—
Hospital	28 (59.6)	19 (40.4)	0.93 (0.50 to 1.75)	.841	0.70 (0.34 to 1.44)	.336
Diagnosis place						
Treating hospitals	158 (55.6)	126 (44.4)	1.00	—	1.00	—
Other hospitals	40 (71.4)	16 (28.6)	2.50 (1.26 to 6.93)	**.031**	0.78 (0.53 to 1.65)	.311
No. of biopsies						
1	161 (68.8)	73 (31.2)	1.00	—	1.00	—
≥ 2	37 (34.9)	69 (65.1)	4.11 (2.53 to 6.68)	**< .001**	3.02 (2.42 to 6.45)	**.032**

(Continued on following page)

TABLE A2. Factors Associated With Delays in Diagnosis Among Patients With Breast Cancer Attending Public Hospitals in Malaysia (N = 340) (Continued)

Variable	Diagnosis		Crude, Odds Ratio (95% CI)	*P*[a]	Adjusted, Odds Ratio (95% CI)	*P*[b]
	Nondelay (n = 198)	Delay (n = 142)				
Type of biopsy						
Needle	172 (60.8)	111 (39.2)	1.00	—	1.00	—
Surgical	26 (45.6)	31 (54.4)	1.84 (1.04 to 3.27)	**.036**	2.56 (1.30 to 5.04)	**.006**

NOTE. Significant value $P < .05$ are provided in bold.
Abbreviation: MYR, Malaysian Ringgit
[a]Univariable logistic regression.
[b]Multivariable logistic regression.

TABLE A3. Factors Associated With Delays in Treatment Among Patients With Breast Cancer Attending Public Hospitals in Malaysia (N = 340)

Variable	Treatment		Crude, Odds Ratio (95% CI)	*P*[a]	Adjusted, Odds Ratio (95% CI)	*P*[b]
	Nondelay (n = 217)	Delay (n = 123)				
Age group, years						
≤ 50	85 (64.4)	47 (35.6)	1.00	—	—	—
> 50	132 (63.5)	76 (36.5)	1.04 (0.66 to 1.64)	.862		
Study sites						
Kuala Lumpur (1)	79 (79.0)	21 (21.0)	1.00	—	1.00	—
Kuala Lumpur (2)	47 (58.8)	33 (41.3)	2.64 (1.37 to 5.08)	**.004**	3.10 (1.48 to 6.49)	**.003**
Perak	34 (70.8)	14 (29.2)	1.54 (0.70 to 3.40)	.276	1.23 (0.75 to 3.99)	.198
Johor	25 (50.0)	25 (50.0)	3.76 (1.80 to 7.83)	**< .001**	4.95 (2.13 to 11.5)	**< .001**
Kelantan	8 (40.0)	12 (60.0)	5.64 (2.04 to 9.58)	**.001**	6.68 (2.02 to 22.06)	**.002**
Sarawak	24 (57.1)	18 (42.9)	2.82 (1.29 to 6.14)	**.009**	3.88 (1.52 to 9.88)	**.002**
Ethnicity						
Chinese	74 (71.2)	30 (28.8)	1.00	—	1.00	—
Malay	90 (58.4)	64 (41.6)	1.75 (1.03 to 2.98)	**.038**	1.22 (0.66 to 2.25)	.516
Indian	34 (63.0)	20 (37.0)	1.45 (0.72 to 2.91)	.295	1.15 (0.88 to 4.29)	.095
Others	19 (67.9)	9 (32.1)	1.16 (0.47 to 2.87)	.734	0.94 (0.34 to 2.61)	.920
Educational level						
Tertiary	32 (65.3)	17 (34.7)	1.00	—	—	—
Secondary and primary	185 (51.2)	106 (48.8)	1.00 (0.53 to 1.91)	.980		
Marital status						
Married	162 (62.5)	97 (37.5)	1.00	—	—	—
Single/divorced	55 (67.9)	26 (32.1)	0.79 (0.46 to 1.34)	.382		
Household income, MYR						
≤ 3,000	154 (63.1)	90 (36.9)	1.00	—	—	—
> 3,000	63 (65.6)	33 (34.4)	0.89 (0.54 to 1.47)	.665		
Employment status						
Employed	68 (62.4)	41 (37.6)	1.00	—	—	—
Unemployed	149 (64.5)	82 (35.5)	0.91 (0.56 to 1.46)	.705		
Family history with breast cancer						
Yes	33 (53.2)	29 (46.8)	1.00	—	1.00	—
No	184 (66.2)	94 (33.8)	0.58 (0.33 to 1.01)	.056	0.55 (0.29 to 1.02)	.058
Diagnosis place						
Treating hospitals	188 (66.2)	96 (33.8)	1.00	—	1.00	—
Other hospitals	29 (51.8)	27 (48.2)	1.82 (1.02 to 3.25)	**.042**	2.18 (1.14 to 4.15)	**.017**
Surgical services						
Breast surgeon	134 (67.0)	66 (33.0)	1.00	—	1.00	—
General surgeon	83 (59.3)	57 (40.7)	1.39 (0.89 to 2.18)	.146	1.39 (0.87 to 2.23)	.161
Oncology services						
Available	175 (64.3)	97 (35.7)	1.00	—	1.00	—
Not available	42 (61.8)	26 (38.2)	1.11 (0.64 to 1.93)	.693	0.98 (0.55 to 1.75)	.967
Stage at diagnosis						
Early stage	123 (65.8)	64 (34.2)	1.00	—	1.00	—
Late stage	94 (61.4)	59 (38.6)	1.20 (0.77 to 1.88)	.408	1.34 (0.81 to 1.88)	.476

NOTE. Significant value $P < .05$ are provided in bold.

Abbreviation: MYR, Malaysian Ringgit

[a]Univariable logistic regression.

[b]Multivariable logistic regression.