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Timeliness of Breast Cancer Treatment in Delaware

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Abstract

Studies have shown timely screening, diagnosis, and treatment of breast cancer reduces mortality rates. The objective of this study is to evaluate the overall timeliness of breast cancer diagnosis and treatment for Delawarean women using the Centers for Disease Control and Prevention's (CDC) National Breast and Cervical Cancer Early Detection Program's (NBCCEDP) recommendations of 60 days maximum for screening to diagnosis and 60 days maximum for diagnosis to treatment. This study analyzed Delaware Cancer Registry (DCR) data for female Delawarean breast cancer patients diagnosed in 2010 who had valid screening, diagnosis, and treatment dates.

Calculations of three time intervals were performed: screening to diagnosis (Time A), diagnosis to treatment (Time B), and screening to treatment (Time C). The mean and median for Time Intervals A (21.2 days, 17.0 days), B (27.8 days, 25.0 days), and C (49.0 days, 42.0 days) met CDC recommendations. Our results show most Delawarean women who had valid screening, diagnosis, and treatment dates received a diagnosis within 60 days of screening and first course of treatment occurred within 60 days of diagnosis and therefore met the NBCCEDP recommendations.

Introduction

Breast cancer screening followed by timely follow- up and appropriate treatment reduces mortality rates.[1] Studies have shown women who wait longer than 6 to 12 months for diagnostic workup have a poorer prognosis.[2,3] Limited data is available on how optimal diagnostic and treatment intervals might increase survival time from breast cancer detected by mammography.[4] Some investigators have found follow-up intervals of up to 3 months may not impact overall survival,[5] whereas others have shown women who waited more than 30 days for evaluation after breast cancer detection were more likely to experience breast cancer recurrence or death.[6] The Centers for Disease Control and Prevention (CDC) has established quality standards of having a diagnosis within 60 days of an abnormal screening test result and initiation of treatment within 60 days of diagnosis. These standards ensure timely diagnosis and treatment initiation for women screened through its National Breast and Cervical Cancer Early Detection Program (NBCCEDP).[7]

In Delaware, The Advisory Board Company, a research, technology, and consulting firm, is used to provide standards regarding breast cancer process and outcome standards. These standards include both process benchmarks, in which timeliness of care is outlined, and outcome benchmarks. These benchmarks vary from the NBCCEDP in two ways: time intervals and ideal

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benchmarks or observed average benchmarks. The Advisory Board Company reports to the National Consortium of Breast Centers, Inc. for timeliness benchmarks. These include an ideal benchmark of fewer than seven calendar days for time from diagnostic mammogram to needle biopsy, an average of 13.9 days for time from diagnostic mammogram to surgical biopsy, and an average of 14.0 days from needle biopsy to initial cancer surgery.[8] We chose to use the CDC's NBCCEDP standards for this project. While The Advisory Board Company provides timeliness of treatment standards used in the Delaware medical community, one key timeliness benchmark was missing: time from initial screening to diagnosis. Additionally, The Advisory Board Company reports averages and benchmarks for several pathways. Because the reporting and coding within the Delaware Cancer Registry (DCR) is to NAACCR standards, not all of these time periods are defined or captured.

Breast cancer screening rates have risen across the country in recent years.[9] Reports of an incomplete or delayed clinical follow-up after an abnormal cancer screening may be a significant public health concern.[10] The Delaware Cancer Consortium (DCC) and the Delaware Division of Public Health (DPH) conducted an evaluation to determine if female breast cancer patients were meeting the CDC recommendations regarding time elapsed between screening to diagnosis and diagnosis to treatment initiation. The purpose of this study is to evaluate the overall timeliness of breast cancer care for Delawarean women. Results from this evaluation will enable the DCC to expand future time-to-treatment analyses to include additional diagnosis years and cancer types and serve as a baseline for studying cancer-related time-to-treatment trends statewide.

The DCR is managed by DPH and serves as the state's central cancer registry. Thirty-three facilities submit data to the DCR; these facilities include 7 hospitals, 11 diagnostic laboratories, 15 free-standing ambulatory surgery centers. Dozens of physician offices also submit data to the DCR. The DCR has met the highest rating (Gold certification) given by the North American Association of Central Cancer Registries (NAACCR) for all data years included in this study. Additionally, the DCR is audited by the CDC's National Program of Cancer Registries (NPCR). The most recent audit year was 2008 in which Delaware ranked highest among the eight states audited. The overall data quality was 95.7%, with breast cancer element accuracy rate of 95.5%. In May 2015, The DCR was awarded the 2014 Registry of Excellence by the CDC's NPCR.

Methods

Design and Participants

This study was approved by the Delaware Department of Health and Human Services' Institutional Review Board. This is a cohort study of diagnosed breast cancer patients with a primary residence in Delaware. Patients with breast cancer had to meet the following eligibility criteria to be retained in the analyses: (1) diagnosed with breast cancer during calendar year 2010; (2) female; (3) classified as Class of Case 0, 1, or 2; (4) did not have any signs of breast cancer (i.e. breast lump); and (5) tumor was a primary cancer. The study population used for analyses included 455 cases.

Measures

For this study, the DCR provided complete records for all breast cancer patients diagnosed in the state between January 1, 2010 and December 31, 2010. Breast cancer patients were identified using the Surveillance Epidemiology and End Records (SEER) case definition: ICD-O-3 site

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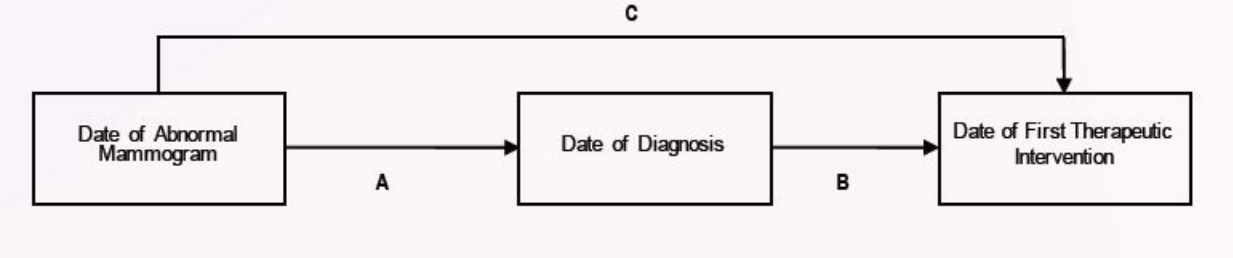
C500-509, excluding histologies 9050-9055, 9590-9989, and 9140. For most cancer surveillance activities, a data request is submitted to the DCR to obtain a file of cancer patients and selected variables that would be used for analysis. The DCR fulfills requests by providing an encrypted file but is unable to export text fields using this data exchange method. To facilitate exportation of text fields, the DCR provided a complete NAACCR format file including 534 variables for all breast cancer cases diagnosed in 2010. All variables collected in association with each patient were determined and coded according to NAACCR guidelines.[11]

Conceptual Model

The conceptual model for this study (Figure 1) was based on the NBCCEDP model and consisted of three time intervals of particular interest (see "A," "B," and "C"). Time interval "A" represents the time period between the date a woman receives a mammogram yielding abnormal results and the date of breast cancer diagnosis. Time interval "B" represents the time period between the date a woman receives a diagnosis confirming cancer and the date she begins her cancer treatment. Time interval "C" represents the overall time period between date of abnormal mammogram and date of treatment initiation.

Figure 1. Conceptual Model



Date Identification for Key Time Interval Variables

Preliminary analyses identified the text fields most often containing key dates of interest. A subset of these text variables was created and each field was manually probed, extracting dates of abnormal screening mammogram, diagnosis, and initiation of treatment. Abnormal screening mammograms had a BI-RADS category of 3 or higher or were described as suspicious or abnormal in the text field of the NAACCR variable "DxProc-XRay/scan." If there were multiple abnormal screening mammograms, the National Comprehensive Cancer Network (NCCN) guidelines for Breast Cancer Screening and Diagnosis were followed.[12] All dates were extracted for later analyses and stored in a separate file. This new file was merged with the NAACCR format file, using patient ID as the merging variable. Date of diagnosis was listed as the NAACCR variable "Date of Diagnosis." Two dates of treatment were described in the NAACCR file: "Date of Initial RX–SEER" and "Date of 1st Crs RX–CoC." We chose to use "Date of 1st CRS Rx–COC" as the treatment variable in this study because it contained useful information not available in the "Date of Initial RX–SEER" variable. Per the Commission on Cancer (CoC) definition, the date of non-treatment (if applicable) was recorded in this field. In contrast, the SEER-defined variable "Date of Initial RX–SEER" is left blank if no treatment was administered.

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Missing Date Data Ascertainment

For cases with a missing screening mammogram date, date of diagnosis, or treatment date described in the text fields or coded within the NAACCR variable, attempts were made to gather these data from the DCR, hospital registries, or the Delaware Health Information Network (DHIN), Delaware's health information exchange. Three hundred sixteen (316) cases did not have date data available for screening mammogram. All dates were recorded for date of diagnosis and treatment date.

Validation Study

For those cases that did not meet the CDC recommendation of 60 days for time interval "A" or time interval "B," a validation to determine the reason why the case exceeded recommendations was conducted. This validation was conducted by a three-doctor team and a representative from the Division of Public Health. The physician team consisted of a medical oncologist and two surgical oncologists, one of whom is the medical director of a Delaware cancer center and research institute. The doctors were selected based on expertise and their affiliation with different hospitals, so as to provide a well-balanced and unbiased team for reviewing the various hospital records. The doctors determined if a reason for exceeding CDC recommendations was documented in the patient's chart and, where a reason was documented, whether or not the reason was acceptable. Cases were classified as either having an acceptable reason, determined by the clinical expertise of the doctors, or not having an acceptable reason for exceeding CDC recommendations.

Analysis

Analyses were performed for the above-mentioned time intervals. Selected demographic characteristics were summarized using mean and standard deviation for the entire sample, study population, and those ineligible for the study. An independent t-test and chi-square tests were performed to determine if there were statistically significant differences between the study population and those ineligible for the study.

These same tests were performed to determine if there were statistically significant differences between those who met recommendations and those who did not meet recommendations. Likewise, analysis using these inferential statistics was used to determine if there were statistically significant differences between those whose chart contained an acceptable reason and those whose chart did not contain an acceptable reason.

All analyses were performed using SAS 9.2™ (SAS Institute, Cary, NC).

Results

Baseline characteristics

A total of 937 cases of breast cancer were identified between January 1, 2010 and December 31, 2010. Out of the original sample, 6 were male cases (0.6%) and were excluded from analyses. Further, 13 cases (1.4%) were dropped from the analyses because they were non- analytic cases (i.e. the cases dropped were not Class of Case 0, 1, or 2). One hundred forty-seven cases (15.7%) were not eligible because they were not first primary cases (i.e. the cases dropped had a tumor record number greater than 1). In addition, 316 cases (33.7%) did not have a valid date for at

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least one abnormal mammogram (Figure 2). All cases had a diagnosis and first course of treatment date. The study population was comprised of 455 breast cancer cases.

Figure 2. Inclusion Criteria Flow Diagram

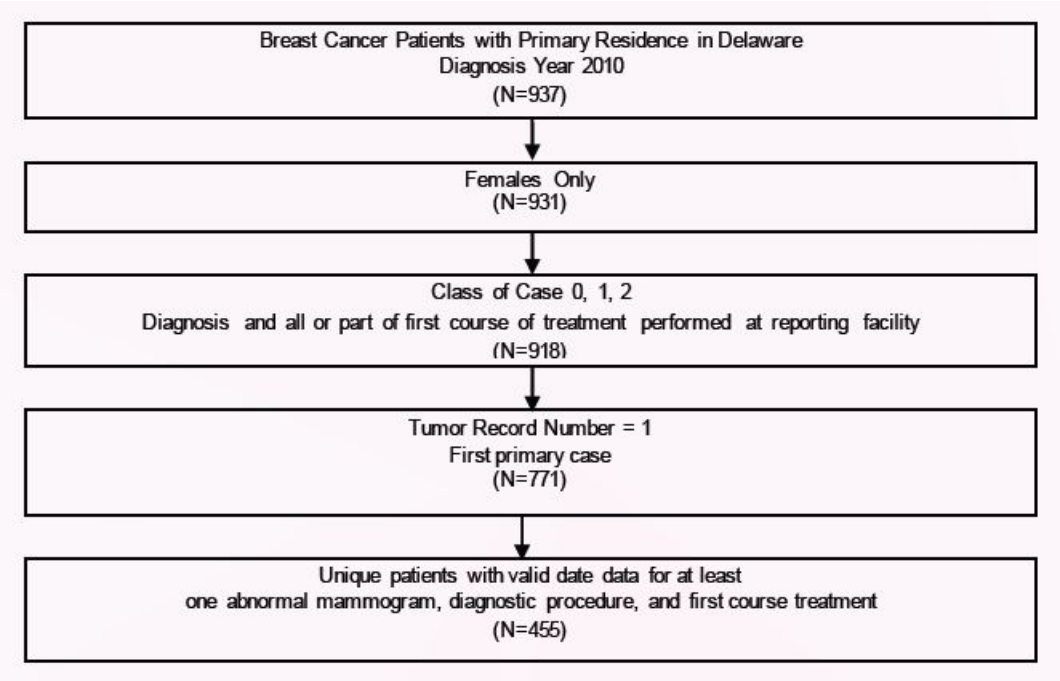

Figure 3 describes the mean and standard deviation for continuous variables and number and frequency for categorical variables for the entire sample (n=937), study population (n=455), and ineligible cases (n = 482). For the entire sample, the average patient was 62 years old, primarily white (80.5%), from New Castle County (54.9%), had local stage breast cancer (52.2%), and was either using a private insurance (45.4%) or was on Medicare (44.7%). In the study population, in situ (29.2%) stage cancers were over- represented while regional, distant, and unknown were under-represented. Additionally, all cancers had a stage assigned for those included in the study population.

Figure 3. Comparison of the cases included in the study population to those who were excluded

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Variable	Entire Sample n = 937 Mean (SD)	Study Population n = 455 Mean (SD)	Ineligible from Study Population n = 482 Mean (SD)	Independent t - test (p-value)
Age	62.3 (13.6)	61.3 (12.7)	63.2 (14.3)	-2.06 (.0400)*
				χ^2 (p-value)
Race				0.9746 (.6143)
White	754 (80.5)	364 (80.0)	390 (80.9)	
Black	163 (17.4)	83 (18.2)	80 (16.6)	
Other	20 (2.1)	8 (1.8)	12 (2.5)	
County				6.8961 (.0318)*
Kent	190 (20.3)	84 (18.5)	106 (22.0)	
New Castle	514 (54.9)	241 (53.0)	273 (56.6)	
Sussex	233 (24.9)	130 (28.6)	103 (21.4)	
Stage				48.1976 (<.0001)*
In situ	210 (22.4)	133 (29.2)	77 (16.0)	
Local	489 (52.2)	245 (53.9)	244 (50.6)	
Regional	194 (20.7)	69 (15.2)	125 (25.9)	
Distant	34 (3.6)	5 (1.3)	28 (5.8)	
Unknown	10 (1.1)	2 (0.4)	8 (1.7)	
Primary Payer				10.1716 (.0376)*
Not Insured	9 (1.0)	3 (0.6)	6 (1.2)	
Private	425 (45.4)	223 (49.0)	202 (41.9)	
Medicaid	62 (6.6)	30 (6.6)	32 (6.6)	
Medicare	419 (44.7)	194 (42.6)	225 (46.7)	
Unknown	22 (2.4)	5 (1. 1)	17 (3.5)	

*p -value <0.05

In Figure 4, those who met the CDC recommendations and those who did not meet CDC recommendations were compared by demographic characteristics. Those who met CDC recommendations were more likely to be white and have private insurance compared to those who were black and had Medicaid as their insurer. No other differences in county of residence or stage of cancer were observed.

Figure 4. Comparison of the included cases in the study population that met CDC recommendations to those who did not meet CDC recommendations

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Variable	Study Population n = 455 Mean (SD)	Met CDC recommendations n = 411 Mean (SD)	Did not meet CDC recommendations n = 44 Mean (SD)	Independent t - test (p -value) / χ^2 (p-value)
Age	61.3 (12.7)	61.4 (12.8)	60.9 (12.7)	0.23 (.8221)
Race				13.8 (.0010)*
White	364 (80.0)	338 (82.2)	26 (59.1)	
Black	83 (18.2)	66 (16.1)	17 (38.6)	
Other	8 (1.8)	7 (1.7)	1 (2.3)	
County				3.5653 (.1682)
Kent	84 (18.5)	72 (17.5)	12 (27.3)	
New Castle	241 (53.0)	223 (54.3)	18 (40.9)	
Sussex	130 (28.6)	116 (28.2)	14 (31.8)	
Stage				7.7402 (.1016)
In situ	133 (29.2)	115 (28.0)	18 (40.9)	
Local	245 (53.9)	225 (54.7)	20 (45.5)	
Regional	69 (15.2)	64 (15.6)	5 (11.4)	
Distant	5 (1.3)	6 (1.5)	0 (0.0)	
Unknown	2 (0.4)	1 (0.2)	1 (2.3)	
Primary Payer				11.5 (.0218)*
Not Insured	3 (0.6)	3 (0.7)	0 (0.0)	
Private	223 (49.0)	205 (49.9)	18 (40.9)	
Medicaid	30 (6.6)	22 (5.4)	8 (18.2)	
Medicare	194 (42.6)	176 (42.8)	18 (40.9)	
Unknown	5 (1.1)	5 (1.2)	0 (0.0)	

*p -value <0.05

Of those who did not meet CDC recommendations, Figure 5 compares those who had explanations determined to be acceptable during the validation to those who did not have an acceptable explanation documented in their chart. There were no differences noted for any of the demographic variables.

Figure 5. Comparison of those who did not meet CDC recommendations by chart containing or not containing an acceptable reason for exceeding recommendation

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Variable	Did not meet CDC Recommendations n = 44 Mean (SD)	Chart contained acceptable reason n = 16 Mean (SD)	Chart did not contain an acceptable reason n = 28 Mean (SD)	Independent t - test (p-value)
Age	60.9 (12.7)	62.2 (14.0)	60.2 (12.0)	0.49 (.6245)
				χ^2 (p-value)
Race				0.7759 (.6784)
White	26 (59.1)	8 (56.3)	17 (60.7)	
Black	17 (38.6)	7 (43.8)	10 (35.7)	
Other	1 (2.3)	0 (0.0)	1 (3.8)	
County				0.9743 (.6144)
Kent	12 (27.3)	3 (18.8)	9 (32.1)	
New Castle	18 (40.9)	7 (43.8)	11 (39.3)	
Sussex	14 (31.8)	6 (37.5)	8 (28.6)	
Stage				2.4663 (.4814)
In situ	18 (40.9)	5 (31.3)	13 (46.4)	
Local	20 (45.5)	8 (50.0)	12 (42.9)	
Regional	5 (11.4)	3 (18.8)	2 (7.1)	
Distant	0 (0.0)	0 (0.0)	0 (0.0)	
Unknown	1 (2.3)	0 (0.0)	1 (3.6)	
Primary Payer				0.1255 (.9392)
Not Insured	0 (0.0)	0 (0.0)	0 (0.0)	
Private	18 (40.9)	6 (37.5)	12 (42.9)	
Medicaid	8 (18.2)	3 (18.8)	5 (17.9)	
Medicare	18 (40.9)	7 (73.8)	11 (39.3)	
Unknown	0 (0.0)	0 (0.0)	0 (0.0)	

*p -value <0.05

Statistical Analyses

Univariate analyses were used for descriptive summarization of time intervals, "A," "B," and "C." Baseline characteristics of cases for the conceptual model are shown in Figure 3. The mean age at diagnosis was 62 years (range, 27-94 years). Among the 455 cases, the majority of the women were white (80.5%) and lived in New Castle County (54.9%). Most of the women were insured: Private payer (45.4%), Medicare (44.7%), or Medicaid (6.6%). Additionally, the majority of breast cancer cases were in situ (22.4%) or local (52.2%) stage.

Statistical analyses of time intervals

Figure 6 summarizes the time intervals for the study population. This figure also illustrates the study population whose diagnostic and treatment course met CDC's recommendations (≤60 days) or exceeded recommendations. It is important to note that time interval "C" is the combination of time interval "A" and time interval "B," both of which independently have a recommendation of ≤60 days.

Figure 6. Comparison of time interval A, B, and C for the study population, met CDC recommendations, and did not meet CDC recommendations

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Time Interval	Mean (SD)	Median (Q1, Q3)	IQR	Range (Min, Max)
Time A				
Study Population	21.2 (24.5)	17.0 (6.0, 28.0)	22.0	322.0 (0.0 , 322.0)
Met Recommendations	18.1 (14.9)	16.0 (6.0, 27.0)	21.0	59.0 (0, 59.0)
Did not meet Recommendations	50.1 (57.5)	32.5 (13.5, 71.5)	58.0	322.0 (0.0, 322.0)
Acceptable	56.3 (79.4)	24.5 (8.5, 76.0)	67.5	322.0 (0.0, 322.0)
Unacceptable	46.5 (41.6)	36.0 (19.0, 68.5)	49.5	192.0 (0.0, 192.0)
Time B				
Study Population	27.8 (24.1)	25.0 (15.0, 35.0)	20.0	211.0 (0.0, 211.0)
Met Recommendations	23.8 (14.5)	23.0 (15.0, 32.0)	17.0	60.0 (0.0, 60.0)
Did not meet Recommendations	65.4 (50.5)	62.5 (25.5, 82.0)	56.5	211.0 (0.0, 211.0)
Acceptable	60.1 (55.7)	65.5 (0.0, 89.0)	89.0	49.0 (0.0, 168.0)
Unacceptable	68.4 (48.0)	62.0 (37.5, 80.5)	43.0	211.0 (0.0, 211.0)
Time C				
Study Population	49.0 (32.6)	42.0 (29.0, 62.0)	33.0	321.0 (1.0, 32 2.0)
Met Recommendations	41.9 (19.3)	40.0 (28.0, 54.0)	26.0	106.0 (1.0, 107.0)
Did not meet Recommendations	115.4 (51.6)	99.5 (85.0, 124.0)	39.0	260.0 (62.0, 322.0)
Acceptable	116.4 (66.3)	90.5 (73.5, 128.5)	55.0	259.0 (62.0, 322.0)
Unacceptable	114.9 (42.5)	102.5 (86.0, 122.5)	36.5	171.0 (62.0, 233.0)

Time interval "A"

For the study population, analysis shows a mean of 21.2 days (median of 17 days) from screening mammogram to first diagnostic procedure. Range varies from 0 to 322 days. Only 19 cases exceeded the recommended time. Of those within the study population who met the CDC recommendations, it took an average of 18.1 days (median of 16.0 days) from screening mammogram to first diagnostic procedure, compared to those who did not meet the CDC recommendations who took an average of 50.1 days (median 32.5 days). Additional analysis examined those who had explanations determined to be acceptable during the validation compared to those who did not have an acceptable explanation documented in their chart. Of those who were determined to have acceptable explanations documented, the average time to navigate Time A was 56.3 days (median 24.5 days) compared to those who did not have acceptable explanations of 46.5 days (median 36.0 days).

Time interval "B"

Analysis reveals a mean of 27.8 days (median of 25 days) from diagnosis to treatment for the entire sample a range from 0 to 211 days. Only 26 cases exceeded the CDC recommendations during this time interval.

Of those within the study population who met CDC recommendations, it took an average of 23.8 days (median 14.5 days) from first diagnostic procedure to first course of treatment compared to those who did not meet CDC recommendations who took an average of 65.4 days (median 62.5 days). Analysis of data collected during the validation revealed that those who had an acceptable documented reason for the delay had an average of 60.1 days (median 65.5 days) compared to those who did not have an acceptable documented reason with an average of 68.4 days (median 62.0 days) to navigate Time B.

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Time interval "C"

As noted in Figure 4, the mean number of days from screening mammogram to treatment was 49.0 days with a median of 42.0 days; the range was 0 to 322 days. Fifteen cases exceeded recommendations. Those who met the CDC recommendations had an average of 41.9 days (median 40.0 days) from screening mammogram to first course of treatment compared to those who did not meet CDC recommendations with an average of 115.4 days (median 99.5 days).

Those with acceptable reasons documented within their charts averaged 116.4 days (median 90.5 days) compared to an average of 114.9 days (median 102.5 days) for those without acceptable reasons documented within their charts.

Discussion

We chose to use the CDC's NBCCEDP standards for this project because one key timeliness benchmark was missing from The Advisory Board Company: time from initial screening to diagnosis. In addition, The Advisory Board Company reports averages for several pathways. However, not all of these time periods are captured because data within the DCR are reported and coded to NAACCR standards. The CDC's NBCCEDP standard recommends a woman receive a diagnosis within 60 days of being screened (Time Interval A). Our study results show a mean of 21.2 days and a median of 17.0 days for women who have had a screening mammography to complete an initial diagnostic procedure. Of the study population, only 19 cases (4.2%) exceeded the recommended 60 days. The CDC also recommends commencement of first course of treatment within 60 days of diagnosis (Time Interval B). Our study shows a mean of 27.8 days with a median of 25.0 days for this time interval. Only 26 (5.7%) women exceeded this recommendation.

Additionally, for the entire time interval investigated (screening to first course of treatment, aka Time Interval C), only 15 women (3.3%) exceeded 120 days.

Of those who exceeded the CDC recommendations, a validation study was conducted to determine if the patient's chart included an acceptable reason for a delay in care for that particular time interval. Of the 44 total patients exceeding CDC recommendations, 28 (63.6%) charts did not contain an acceptable reason.

Reasons were evaluated based on the expertise of the three-doctor validation team. A variety of reasons were found to be acceptable, including taking time to receive a second opinion, illness of a spouse, patient scheduling issues, and patient did not follow up despite provider effort to contact the patient. Many charts did not contain an explanation for the delay in care and therefore, were automatically deemed unacceptable.

Of those charts with an unacceptable explanation, the most common reason included provider coordination and scheduling of multiple procedures. Limitations and Strengths

Our study was specifically designed as an evaluation project to determine the average length of time between screening, diagnosis, and treatment initiation among Delaware women diagnosed with breast cancer. Because of the length of time that has elapsed since the 2010 diagnoses, our results may not reflect current practices.

Our study population also included only those who had a valid screening procedure date, diagnosis date, and treatment initiation date. Therefore, the study population included only 59.0% of the eligible sample. When the study population was compared to the excluded cases,

differences in age, stage of cancer, and primary payer were noted. These differences could have created bias in our study population. A number of variables of interest are not collected by DCR as they are not required by NAACCR. A key variable, screening date, was manually abstracted from text fields. When multiple mammography dates were found, the NCCN Guidelines Breast Cancer Screening and Diagnosis were used to determine the clinically significant mammogram. However, dates related to screening are not required variables within the NAACCR dataset. Therefore, while many observations had dates provided within text variables, some observations were missing screening dates completely. DCR only requires dates of diagnosis and first course of treatment, not dates of specific procedures.

Therefore, analyzing timeliness between specific procedures is not feasible without manually extracting dates from charts. Some hospitals choose to follow the Advisory Board Company guidelines providing stricter, shorter time frames for periods between procedures.

This practice may enhance the timeliness of breast cancer care within the organization. However, at this time, due to the incompatibility of DCR variable capture and Advisory Board Company guideline variables, we are unable to evaluate these timeliness benchmarks. Recommendations may be made that the DCR consider adopting additional variables which align with other guidelines and help facilitate further analyses.

The only variable available to indicate socioeconomic status (SES) was primary payer. Due to the average age of our study population, Medicare, which is not indicative of SES, was the insurance payer for over 40% of our study population. Therefore, in future studies, methodology to calculate SES should be included so this social indicator can be used in analyses and controlled for in any multivariate analyses.

Only a small portion (6.2%) of the study population failed to meet the CDC recommendations and deemed unacceptable. However, the goal is to have no cases outside of the CDC recommendations and deemed unacceptable. The CDC guidelines are meant to be a maximum length of time between dates and therefore, should not be exceeded without an acceptable reason. The majority of cases where a reason was documented – but deemed unacceptable - appeared to involve poor organization. Future cases such as these could be avoided by more fully utilizing the services provided under the cancer screening nurse navigator housed within each hospital. The nurse navigator is responsible for assisting a woman through the screening process until a diagnosis is reached.

This service is available to any Delaware resident being screened for cancer. However, because most cases were deemed unacceptable due to the lack of documentation within the chart, providers need to take greater care in documenting reasons for delays.

In follow up studies, we would like to investigate these timeliness of treatment benchmarks with a larger sample size. Because Delaware has a small population, it may be necessary to look at these benchmarks across several years to create a larger sample. We would also like to explore the possibility of benchmarking timeliness of treatment to the Advisory Board Company guidelines.

Conclusions

The DCR is an important source of data for investigating cancer and cancer treatment trends in Delaware. Our results show most Delawarean women who had valid date data received a

diagnosis within 60 days of screening, and first course of treatment occurred within 60 days of diagnosis. However, further investigation needs to be conducted with a larger population. Additional benchmarks, such as those provided by the Advisory Board Company with shorter times between procedures, should be investigated. Bias may have been created due to the sampling methods which eliminated a large proportion (41.0%) of the eligible sample due to missing dates.

In summary, this study has shown most Delawarean women who had valid date data received a diagnosis within 60 days of screening, and first course of treatment occurred within 60 days of diagnosis. Identifying disparities in race, ethnicity, or socioeconomic status may be important to identify at-risk populations, which can then be identified for targeted public health interventions. Additionally, future research needs to focus on identifying the barriers to follow-up so effective interventions may be implemented.

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