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Patterns of Multidisciplinary Care in the Management of Non-metastatic Invasive Breast Cancer in the United States Medicare Patient

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Abstract

PURPOSE—Multidisciplinary care (MDC) in managing breast cancer is resource-intensive and growing in prevalence anecdotally, although care patterns are poorly characterized. We sought to determine MDC patterns and effects on care in the United States Medicare patient.

METHODS—Patients diagnosed with non-metastatic invasive breast cancer from 1992–2009 were reviewed using the Survival, Epidemiology, and End Results (SEER)-Medicare linked dataset. MDC was defined as a post-diagnosis, preoperative visit with a surgical, medical, and radiation oncologist. Same day-MDC (MDC_{SD}) was the MDC subset having all three visits on one date.

RESULTS—Among 88,865 patients, MDC was utilized in 2.9%, with 12% of these having MDC_{SD}. MDC use did not vary by stage, but MDC patients were more likely to be younger, black, receive lumpectomy, have fewer nodes examined, and receive radiotherapy. MDC_{SD} patients were more likely than non-MDC patients to be black, receive mastectomy, and receive radiotherapy. MDC and MDC_{SD} use increased over time and varied by geographic region, with rural patients less likely to receive MDC(OR0.54[95% CI 0.45–0.65]) and MDC_{SD}(OR0.32[95% CI 0.19–

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0.54]). Radiotherapy after breast conserving surgery, used in 86.2% of non-MDC patients, was administered to 89.0% of MDC($p<0.001$) and 92.6% of MDC_{SD}($p=0.096$) patients. Post-mastectomy radiotherapy was administered in 52.0% of non-MDC patients, 63.8% of MDC($p=0.050$), and 89.1% of MDC_{SD}($p=0.011$) after propensity score adjustment.

CONCLUSION—While increasing, few Medicare patients undergo MDC and MDC_{SD} is rare. MDC may improve quality and MDC_{SD} should be considered for patient convenience. While not yet widespread, efforts should integrate MDC and MDC_{SD} across the U.S.

Keywords

Multidisciplinary care; medical oncology; surgical oncology; radiation oncology; breast cancer

INTRODUCTION

Care of the patient with breast cancer has increased in complexity over the past several decades because of data demonstrating survival benefits from multimodal therapy.[1, 2] Consequently, care of the oncology patient has evolved to coordinate these new treatment paradigms for efficiency and patient convenience, and the term multidisciplinary care (MDC) frequently refers to coordination among specialties. Despite its perceived benefits, the patterns of multidisciplinary care in the United States have not been previously investigated to our knowledge. There is no standard definition for MDC, and no reference for what can be considered standard practice in the multidisciplinary treatment of the breast cancer patient.

Treatment of breast cancer represents an ideal target for MDC, because of the interdisciplinary paradigms used, as well as the interdependency of the therapeutic modalities used in treatment. Despite favorable perceptions by patients and providers, there is also surprisingly little data demonstrating improvements in outcomes resulting from MDC use, and no data investigating the benefits to breast cancer patients on a national level.[3–11]

The National Accreditation Program for Breast Centers (NAPBC) of the American College of Surgeons has identified formal interdisciplinary team management involving consultations with multiple specialists as a standard component for breast cancer centers, although this does not specify the timing of the care that should be provided.[12] As the concept of MDC has now become considered as a quality indicator, we sought to examine the incidence of MDC involving formal consultations provided preoperatively to determine if this is standard practice, to evaluate factors predictive of its use in managing localized breast cancer for the United States Medicare population, and to see if quality metrics quantifiably improve with its use.

METHODS

After IRB and NCI approval, we reviewed cases from 1992–2009 from the National Cancer Institute (NCI) Surveillance, Epidemiology, and End Results (SEER)-Medicare linked database. Women ≥65 years of age have the highest breast cancer incidence, and unlike SEER or the National Cancer Database, the SEER-Medicare linked dataset is one of the few

large national datasets with sufficient granularity from its claims data[13] to determine the national patterns of care pertinent to this study.

We included patients with invasive, non-metastatic, non-inflammatory breast cancer. Inclusion and exclusion criteria are outlined in Figure 1. The date of diagnosis was defined as the first biopsy date occurring in the same month or month after the SEER clinical diagnosis date. We included patients who underwent surgery for breast cancer within 6 months after the date of diagnosis. We excluded patients who received neoadjuvant chemotherapy for treatment homogeneity and to more accurately assess who was seeing all 3 specialties even when they did not necessarily require it for therapy preoperatively.

Patterns of Care

MDC was defined as a visit with a surgeon, a medical oncologist, and a radiation oncologist all preoperatively on the same or different dates. We queried new patient/consultations or follow-up visits occurring within 2 months of the date of diagnosis for general surgery or surgical oncology, medical oncology or hematology/oncology, and radiation oncology. Health Care Financing Administration (HCFA) provider-specific codes were used to identify provider type. Supplemental Tables 1 and 2 list the Current Procedural Terminology (CPT) and line HCFA codes used to abstract the relevant provider visits. We limited to consultations within a 2 month time frame to query for a pattern of coordinated upfront provider visits. Two separate analyses were performed: one evaluating all MDC patients (MDC), and the second characterizing the subset of patients who saw all three specialties on the same day (MDC same date, MDC_{SD}).

Treatment Quality

To measure the impact of MDC on quality metrics, we assessed patterns of care similar to American College of Surgeons' Commission on Cancer[14] and NAPBC[15] quality measures.[14] The following measures were evaluated: rate of breast conserving surgery versus mastectomy for stage 0, I and II breast cancer, adjuvant radiation therapy following breast conserving surgery, adjuvant post-mastectomy radiation therapy for patients with either T3/T4 primaries or ≥ 4 positive lymph nodes, adjuvant chemotherapy use among node positive patients, and the use of sentinel node biopsy. Supplemental Table 3 lists the CPT codes used to define the quality metrics.

Statistical Analyses

We used T-tests and chi-squared tests to compare unadjusted differences. We used a multiple logistic regression to investigate the predictors of breast conservation therapy. To investigate adjusted differences in quality metrics between MDC groups, we used multiple logistic regressions with propensity score based-weighting (i.e. inverse probability of treatment weighting [IPTW]).[16, 17] We used multiple logistic regression models to estimate the propensity score. In the propensity score models for the quality metrics, we included metropolitan status (e.g. rural for large metropolitan area), SEER geographic region, year of diagnosis, nodes examined, nodes positive, histology, Elixhauser score,[18, 19] Charlson score,[20] percentage of residents in case's census tract with less than a high school education, median income in case's census tract, age at diagnosis, tumor size, sequence of

breast cancer (i.e. of all cancer diagnoses that a person had, the order in which the first breast cancer occurred), marital status, race, AJCC tumor stage, and grade of tumor.

To examine adjusted survival differences among groups, we used propensity-score based weighted Cox proportional hazards regressions for overall survival, and Fine and Gray proportional hazards regressions for cause specific survival.[21] In addition to the covariates used for the quality metric analyses, we also included indicator variables denoting surgery (BCT versus mastectomy), radiotherapy, and chemotherapy use. In the propensity score models, we incorporated continuous variables through the use of restricted cubic splines with two knots.[22] We examined the propensity score-based weighted differences between MDC groups to ensure that the propensity scores appropriately balanced the data between arms, on average, and used interaction terms in the propensity score model, as necessary, to ensure that all covariates were balanced. We used bootstrap standard errors that accounted for estimation of the propensity score in the weighted models, and set the criteria for statistical significance as $p \leq 0.05$.

We performed sensitivity analyses excluding patients over age 80 for the quality metrics analysis, and excluding patients diagnosed before the year 2000 for the sentinel lymph node analysis. We used STATA version 13 (StataCorp, College Station, Texas) for analyses.

RESULTS

There were 88,865 Medicare patients after all exclusions (Figure 1) with 2,538 (2.8%) patients having MDC with 357 (14.1%) of these having their surgical, radiation oncology, and medical oncology appointment on the same date (MDC_{SD}). 1,098 patients who received neoadjuvant chemotherapy were excluded, of which 12.1% received MDC, and 0.6% received MDC_{SD}. Baseline patient and general treatment characteristics for MDC and MDC_{SD} are listed in Table 1. The practice of MDC increased over time for both MDC and MDC_{SD} as illustrated in Figure 2 ($p<0.001$ for both trends).

Patterns of Care

Table 2 outlines the clinical and demographic variables associated with the practice of MDC and MDC_{SD}. Younger patients were more likely to receive MDC. The practice of MDC did not vary significantly by AJCC stage, patient comorbidity, tumor grade, or histology. The incidence of MDC varied according to region, however, with a 22.5 fold decrease in the rate of MDC_{SD} in the south compared to the midwest. Patients living in more sparsely populated areas were significantly less likely to receive MDC and MDC_{SD}. Black patients more frequently underwent MDC and MDC_{SD}, while patients living in counties with lower education rates were less likely to undergo MDC and MDC_{SD}.

Treatment Quality

Table 3 demonstrates unadjusted and propensity score-based weighted estimates of quality measures associated with the practice of MDC. Overall, the rates of sentinel node biopsy were similar among the non-MDC, MDC and MDC_{SD} groups. Administration of adjuvant radiation following breast conserving surgery was significantly greater in the setting of MDC and MDC_{SD}. Among patients having indications for post-mastectomy radiotherapy

(T3 or T4 tumors, or ≥ 4 positive lymph nodes), absolute rates of adjuvant radiation therapy were 11.8% (MDC) and 37.3% (MDC_{SD}) higher than non-MDC patients with borderline statistical significance. Use of adjuvant chemotherapy among node-positive patients was significantly more frequent among the MDC_{SD} cohort with an absolute increase of 4.4% compared to non-MDC. Finally, patients having MDC and MDC_{SD} experienced significantly longer mean times between diagnosis to surgery in propensity matched comparisons with an increase of 12.6 days and 7.8 days, respectively.

A sensitivity analysis excluding patients diagnosed before the year 2000 did not significantly change results for the sentinel lymph node analysis. A second sensitivity analysis excluding patients over the age of 80 also did not significantly change results for the remaining quality metrics analyses.

Outcomes

After propensity score adjustment, including surgery type, adjuvant chemotherapy use, and administration of adjuvant radiation therapy, overall survival (OS) estimates for MDC were HR [95% CI]= 0.86 [0.73–1.02], p = 0.092, while breast cancer-specific survival estimates had a sHR [95% CI] = 0.80 [0.63–1.02], p = 0.073. Among the MDC_{SD} cohort, OS estimates were HR [95% CI] = 0.57 [0.29–1.12], p = 0.101, while breast cancer-specific survival estimates were sHR [95% CI] = 1.06 [0.28–4.07], p = 0.934. Supplemental Figure 1 shows the adjusted overall and cause-specific survival curves for both cohorts.

DISCUSSION

Despite this growing perception that formal preoperative consultation with multiple oncologic specialists to formulate a plan of care improves care and patient outcomes, there have been no data, to our knowledge, to determine how frequently this occurs in the United States breast cancer patient. It consequently has remained unclear whether MDC, defined in this manner, is currently standard practice or whether facilities not engaging in such coordinated care are the norm. We were surprised to find that the use of MDC, defined here as a preoperative visit after breast cancer diagnosis with a surgeon, medical oncologist and radiation oncologist, was rare and occurred in only 2.8% of the United States Medicare beneficiary population overall. We were gratified to see, however, that the rates of MDC increased by over ten-fold during the period of study in question.

Although MDC is highly regarded as an optimal component of care[23], it remains difficult from our findings to suggest that it is currently standard practice in the U.S. with fewer than 3% of breast cancer Medicare patients receiving care coordinated in this fashion. Same-day consultations for all three specialties, while convenient for the patient, are even rarer with fewer than 1% of patients having that opportunity after diagnosis. This latter type of scheduling coordination requires substantial effort, and so while it was expected that a minority of patients received MDC and MDC_{SD}, the remarkably small proportion was surprising.

Increasingly sophisticated treatment paradigms require systems that better coordinate care among subspecialists. Changes in management decisions,[6] surgical choice,[3] patient

satisfaction,[24] radiographic/pathologic interpretation,[8] and expedited treatment times,[9] have all been associated with the use of MDC in single-institution studies of breast cancer management. As such, the European Partnership for Action Against Cancer (EPAAC) issued a policy statement in 2014 identifying multidisciplinary teams as a core component of cancer care organizations, and defined the elements necessary for a multidisciplinary approach to cancer care in Europe.[23] In the United States, The National Accreditation for Breast Centers (NAPBC) was officially launched in 2008 to define standards for breast centers and also recognizes interdisciplinary team management as a standard component for breast centers.[12, 25]

The use of MDC in this study was not uniformly distributed, and its use varied most widely according to geographic region, with a lower likelihood of receiving MDC and MDC_{SD} as population density decreased. These findings may be, in part, due to disparities in resource allocation, especially among rural locations; however the SEER-Medicare dataset cannot distinguish the institution type caring for the patient, such as a cancer center, academic, or private institution, to determine the settings in which these MDC patterns occurred. We hypothesize that institutions having greater resources and numbers of employed physicians, such as large private and academic centers, are more likely to utilize MDC, explaining these geographic differences. Interestingly, disparities in race also appear to exist in MDC utilization, with blacks receiving MDC more frequently, possibly as a result of an inner city distribution of and proximity to larger centers that may provide it.

Patients undergoing MDC experienced longer mean times from diagnosis to surgery in our series consistent with a previous analysis documenting an associated delay of 7.9 days from diagnosis to surgery for an additional consultation beyond surgical evaluation.[13] The delays observed are likely related to increased time required to coordinate provider visits. MDC_{SD} may be one mechanism by which delays are minimized and patient convenience is maximized, although the small increases in time to surgery, even when patients are seen on different days, should not itself affect outcomes.[26] Beyond convenience, the most important influence that MDC may have on treatment is an improvement in the adherence to standard therapy, which may influences outcomes.

We noted significant variation in practice patterns associated with the use of MDC, and greater compliance with most of the quality measures in the MDC and MDC_{SD} patients. While some did not reach statistical significance (such as post-mastectomy radiotherapy in MDC_{SD}) these may have been underpowered. For the radiotherapy and chemotherapy standards, greater adherence to standard practice may be due to a correlation between provider knowledge and the institutions implementing MDC, but this also may result from improved communication about patient specifics resulting from this multidisciplinary team approach[27] in which formal consultations are utilized.

When evaluating breast cancer outcomes directly, MDC was associated with modest improvements in overall and breast cancer-specific survival which did not reach statistical significance. Similarly, MDC_{SD} was associated with a trend towards improved overall survival without a difference in breast cancer-specific mortality. The benefits of modern adjuvant therapy among breast cancer patients are well described in the literature.[1, 2]

Since our propensity score models included both baseline tumor information and treatment variables (i.e. surgery type, adjuvant chemotherapy and radiation therapy use), it seems likely that the major benefits of MDC lie, in part, within the appropriate use of adjuvant therapy, as expected.

Some limitations should inform the interpretation of our data. Our data applies to patients evaluated preoperatively in a multidisciplinary setting. Our definition of MDC may underestimate the true degree to which MDC occurs across the United States. Expanding the definition of MDC to care given by multiple specialties preoperatively and postoperatively would increase the proportion of patients felt to receive it; however, our definition represents a paradigm that is felt to provide patients with information up front and potentially improve coordination of treatment. We also defined MDC according to claims data for consultations with providers, and consultations do not necessarily equate to coordination of care, especially if performed in different health systems, which cannot be discerned via our dataset. Tumor board meetings and conferences are another way to provide preoperative MDC which is not captured in Medicare claims data, and such conferences may still provide input which can elevate care towards that which occurs in a preoperative formal consultation setting. We were also not able to assess whether MDC affects diagnostic accuracy, such as the ability to detect inflammatory or metastatic cases. The quality metrics used in our analysis may not be applicable to some patients who are of advanced age or have significant comorbidities, although we performed a sensitivity analysis excluding those over 80 and found no differences in our results. The strengths of our study exist in the large, nationally representative sample, and the granularity provided by Medicare claims, with this being the first study to our knowledge to assess MDC in the United States. Further study could be directed at the patient population receiving neoadjuvant chemotherapy, who were excluded in our analysis for homogeneity.

In summary, although the rates of MDC have increased linearly over time, very few Medicare patients with localized breast cancer received it. Implementation of MDC varied most widely according to geographic location and population density. The practice of MDC was associated with improved adherence to quality measures, including appropriate administration of adjuvant chemotherapy and radiation therapy following breast conserving surgery and mastectomy, and the modest improvements in outcomes were likely related to the appropriate administration of adjuvant therapy. Further efforts to emphasize MDC should be pursued and there should be an effort to improve multidisciplinary care across the United States in a breast cancer setting.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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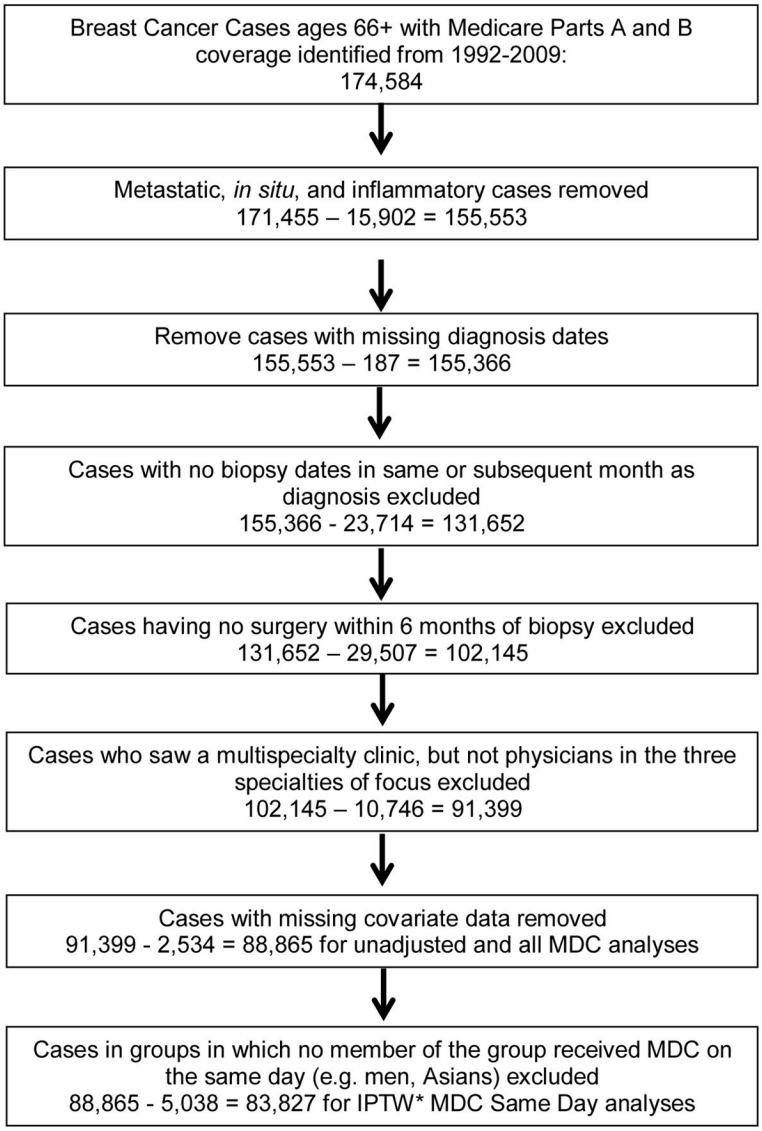

Figure 1.
Exclusion criteria. *IPTW=inverse probability of treatment weights.

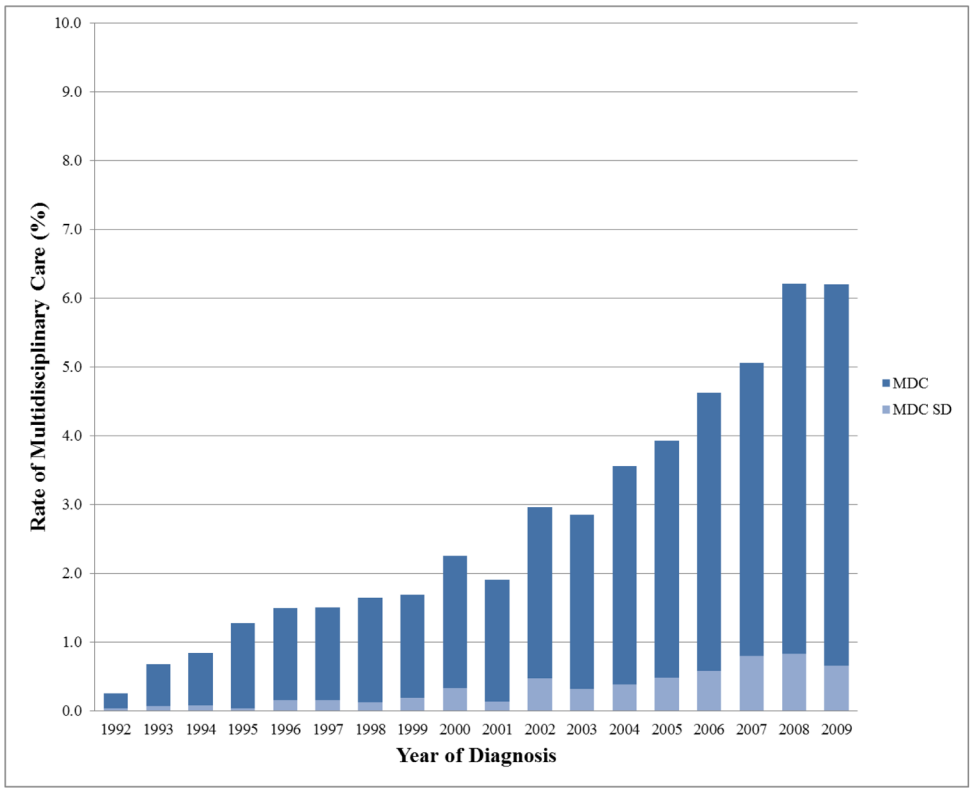

Figure 2.

Rates of multidisciplinary care over time among Medicare patients having invasive non-metastatic, non-inflammatory breast cancer in the United States. MDC = all patients receiving multidisciplinary care. MDC_{SD} = subset of patients receiving MDC on the same date.

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Table 1

Unadjusted patient and treatment characteristics for patients not receiving multidisciplinary care (non-MDC), receiving multidisciplinary care (MDC), and the same day multidisciplinary care (MDC_{SD}) subset.

	Non-MDC		MDC			MDC_{SD}		
	n	%	n	%	*p**	n**	%	*p**
All patients	86,327	96.7	2,538	2.8		357	0.4	
Gender								0.079
Male	746	0.9	13	0.5		0	0.0	
Female	85,581	99.1	2,525	99.5		357	100.0	
Race					<0.001			<0.001
White	77,200	89.4	2,241	88.3		>287		
Black	5,209	6.0	214	8.4		59		
Other/Unknown	1,394	1.6	42	1.7		<11		
Asian	1,668	1.9	22	0.9		0		
Hispanic	856	1.0	19	0.7		<11		
Marital Status					<0.001			0.975
Not married	47,101	54.6	1,364	53.7		195	54.6	
Married	39,226	45.4	1,174	46.3		162	45.4	
Region					<0.001			<0.001
Northeast	16,750	19.4	311	12.3		49	13.7	
Midwest	12,543	14.5	592	23.3		144	40.3	
West	37,137	43.0	1,261	49.7		152	42.6	
South	19,897	23.0	374	14.7		12	3.4	

	Non-MDC		MDC			MDC_{SD}		
	n	%	n	%	*p**	n**	%	*p**
Population Density					<0.001			<0.001
Big Metro	44,139	51.1	1,530	60.3		248	69.5	
Metro	26,830	31.1	704	27.7		74	20.7	
Urban	5,637	6.5	138	5.4		17	4.8	
Less Urban/Rural	9,721	11.3	166	6.5		18	5.0	
AJCC Stage					0.016			0.330
Stage I	49,603	57.5	1,531	60.3		219	61.3	
Stage II	31,225	36.2	857	33.8		116	32.5	
Stage III	5,499	6.4	150	5.9		22	6.2	
Histology					0.427			0.437
Ductal	74,772	86.6	2,191	86.3		>301		
Lobular	9,320	10.8	289	11.4		45		
Other/Unknown	2,235	2.6	58	2.3		<11		
Tumor Grade					<0.001			0.003
Well	18,982	22.0	627	24.7		95		
Moderate	36,347	42.1	1,153	45.4		>150		
Poor	21,966	25.4	606	23.9		88		
Undifferentiated	1,107	1.3	27	1.1		<11		
Missing	7,925	8.2	125	4.9		13		
Lumpectomy					<0.001			0.059

	Non-MDC		MDC			MDC_{SD}		
	n	**%**	**n**	**%**	***p****	**n****	**%**	***p****
No	24,072	27.9	588	23.2		115	32.2	
Yes	62,255	72.1	1,950	76.8		242	67.8	
Chemotherapy					0.003			0.045
No	66,767	77.3	1,899	74.8		260	72.8	
Yes	19,560	22.7	639	25.2		97	27.2	
Radiotherapy					<0.001			<0.001
No	42,506	42.9	852	33.6		107	30.0	
Yes	43,821	50.8	1,686	66.4		250	70.0	
	Mean	SD	Mean	SD	*p*	Mean	SD	*p*
Age of Diagnosis	75.3	6.2	74.7	6.0	<0.001	74.9	6.1	0.315
Charlson Index	0.5	0.9	0.5	0.9	0.399	0.5	0.9	0.481
Elixhauser Score	1.1	3.2	1.1	3.4	0.846	0.8	3.0	0.178
Cens income	49920.9	24137.9	54952.0	25504.7	<0.001	52781.9	23349.8	0.033
Cens poverty	10.5	8.9	9.3	8.1	<0.001	10.2	10.3	0.649
Tumor Size(mm)	19.2	19.3	18.1	14.1	0.004	17.8	13.1	0.150
Nodes Examined	8.8	7.4	6.7	6.8	<0.001	6.6	7.2	<0.001
Nodes Positive	1.0	2.9	0.8	2.7	0.002	0.7	1.8	0.069

** p* vs non-MDC

**** Specific values for cells <11 have been censored along with other cells that may make such cells calculable

MDC = multidisciplinary care, all patients receiving multidisciplinary care (includes patients receiving MDC on same date, and different dates). MDC_{SD} = same-day multidisciplinary care. SD = standard deviation. Cens = census-derived

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Table 2

Multivariable analysis of factors associated with the use of MDC and MDC_{SD}.

	MDC (n=2,538 (2.8%))				MDC_{SD} (n=357 (0.40%))			
	Odds Ratio	**[95% CI]**		***p***	**Odds Ratio**	**[95% CI]**		***p***
Age of Diagnosis	0.99	0.98	0.99	<0.001	1.00	0.98	1.01	0.678
Year of Diagnosis	1.13	1.11	1.14	<0.001	1.13	1.10	1.17	<0.001
Gender								
Male	1.00	Referent		--	1.00	Referent		--
Female	1.57	0.90	2.73	0.114		*		
Charlson Comorbidity Index	1.01	0.96	1.06	0.765	0.93	0.80	1.07	0.303
Elixhauser Comorbidity Score	1.00	0.99	1.02	0.705	0.99	0.95	1.03	0.493
Race								
White	1.00	Referent		--	1.00	Referent		--
Black	1.65	1.41	1.94	<0.001	3.22	2.31	4.48	<0.001
Asian	0.40	0.26	0.62	<0.001	1.00	*		
Hispanic	0.96	0.60	1.53	0.860	0.40	0.06	2.92	0.369
Other/Unknown	0.88	0.64	1.20	0.420	0.70	0.26	1.90	0.483
Marital Status								
Not married	1.00	Referent		--	1.00	Referent		--
Married	0.94	0.86	1.02	0.117	0.99	0.80	1.24	0.947
Region								
Northeast	1.00	Referent		--	1.00	Referent		--
Midwest	3.67	3.17	4.25	<0.001	5.17	3.68	7.25	<0.001
West	2.18	1.92	2.48	<0.001	1.64	1.18	2.28	0.003
South	1.27	1.09	1.49	0.003	0.23	0.12	0.44	<0.001
Population Density								
Big Metro	1.00	Referent		--	1.00	Referent		--
Metro	0.82	0.74	0.90	<0.001	0.56	0.43	0.74	<0.001
Urban	0.78	0.65	0.94	0.008	0.57	0.34	0.96	0.034

	MDC (n=2,538 (2.8%))			MDC$_{SD}$ (n=357 (0.40%))		
	Odds Ratio	**[95% CI]**	***p***	**Odds Ratio**	**[95% CI]**	***p***
Less Urban/Rural	0.54	0.45 0.65	<0.001	0.32	0.19 0.54	<0.001
Median Education	0.99	0.98 0.99	<0.001	0.99	0.97 1.00	0.030
Median Income	1.00	1.00 1.00	0.505	1.00	1.00 1.00	0.089
Tumor Size (mm)	1.00	1.00 1.00	0.552	0.99	0.98 1.00	0.167
AJCC Stage						
Stage I	1.00	Referent	--	1.00	Referent	--
Stage II	1.06	0.95 1.18	0.286	1.01	0.75 1.36	0.963
Stage III	0.98	0.76 1.26	0.880	1.13	0.56 2.28	0.733
Histology						
Ductal	1.00	Referent --	1.00	Referent	--	
Lobular	1.11	0.97 1.26	0.128	1.29	0.93 1.79	0.131
Other/Unknown	1.09	0.83 1.43	0.524	1.00	0.47 2.15	0.994
Elixscore	1.00	0.99 1.02	0.705	0.99	0.95 1.03	0.493
Tumor Grade						
Well	1.00	Referent	--	1.00	Referent	--
Moderate	1.07	0.97 1.18	0.192	0.97	0.75 1.26	0.847
Poor	1.02	0.90 1.15	0.793	0.92	0.67 1.26	0.614
Undifferentiated	1.23	0.83 1.83	0.309	1.07	0.33 3.42	0.910
Missing	0.82	0.67 1.00	0.049	0.55	0.30 1.00	0.050
First Breast Cancer	1.50	1.34 1.67	<0.001	1.18	0.87 1.60	0.300
Lumpectomy						
No	1.00	Referent --	1.00	Referent	--	
Yes	1.17	1.05 1.30	0.003	0.56	0.43 0.73	<0.001
Nodes Examined	0.98	0.98 0.99	<0.001	0.99	0.97 1.01	0.177
Nodes Positive	1.00	0.98 1.02	0.955	0.95	0.88 1.02	0.161
Chemotherapy						
No	1.00	Referent --	1.00	Referent	-- 1.01	0.177
Yes	1.05	0.94 1.16	0.389	1.18	0.90 1.54	0.240

	MDC (n=2,538 (2.8%))				MDC_{SD} (n=357 (0.40%))			
	Odds Ratio	**[95% CI]**		***p***	**Odds Ratio**	**[95% CI]**		***p***
Radiotherapy								
No	1.00	Referent	--	1.00	Referent	--		
Yes	1.44	1.31	1.58	<0.001	2.07	1.60	2.69	<0.001

MDC = multidisciplinary care, all patients receiving multidisciplinary care (includes patients receiving MDC on samedate, and different dates). MDC_{SD} = same-day multidisciplinary care. SD = standard deviation. Cens = census-derived

Table 3

Treatment quality metrics for patients not receiving MDC, those having MDC, and the MDC_{SD} subset.

	Unadjusted						Propensity Score-Based Weighted					
	No MDC*	MDC		No MDC_{SD}*	MDC_{SD}		No MDC			No MDC	MDC_{SD}	
	n=86,327	n=2,538	*p*	n=86,067	n=357	*p*	(%)	MDC	*p*	(%)	(%)	*p*
Sentinel node biopsy												
Performed	46,772 (54.2%)	1,841 (72.5%)	<0.001	47,227 (54.9%)	277 (77.6%)	<0.001	54.7	56.1	0.222	55.2	52.7	0.264
Breast Conservation Surgery												
+RT	37,027 (86.2%)	1,479 (89.0%)	0.001	37,632 (86.3%)	223 (92.5%)	0.005	86.2	90.2	0.001	86.5	92.6	0.019
Mastectomy with T3/T4, or ≥ 4 + nodes												
+PMRT	3,780 (51.9%)	105 (70.5%)	<0.001	3,704 (51.9%)	14 (70.0%)	0.105	52.0	63.8	0.050	51.8	89.1	0.298
Node positive												
Chemotherapy	10,480 (47.2%)	289 (47.1%)	0.949	10,357 (46.9%)	47 (52.2%)	0.317	47.3	46.6	0.784	46.8	52.2	0.044
Diagnosis to surgery												
Mean time (days)	20.6	35.6	<0.001	20.9	35.2	<0.001	20.7	33.3	<0.001	21.1	27.9	<0.001

MDC = patients receiving multidisciplinary care (includes patients receiving MDC on the same date or, different dates).

MDC_{SD} = same-day multidisciplinary care subset.

SD = standard deviation.

RT = radiation therapy.

PMRT = Post mastectomy radiation therapy.

* Total cohort numbers when evaluating MDC and MDC_{SD} differ due to the need to exclude males and Asians to achieve the propensity score adjustment for the MDC_{SD} group.