

Supplemental online content for:

## Low Rates of Chemotherapy Use for Primary, High-Grade Soft Tissue Sarcoma: A National Cancer Database Analysis

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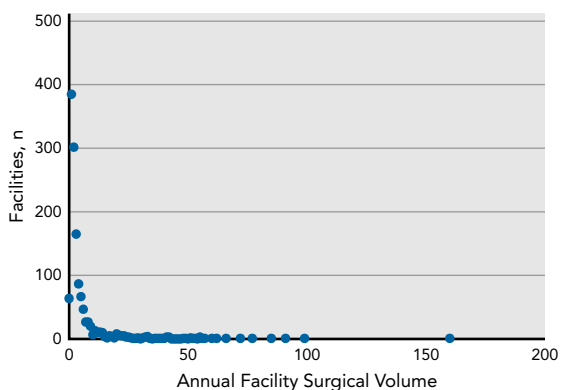
**eFigure 1:** Analysis of Annual Sarcoma Surgical Case Volume

**eFigure 2:** Distance From Patient Residence to Treatment Facility

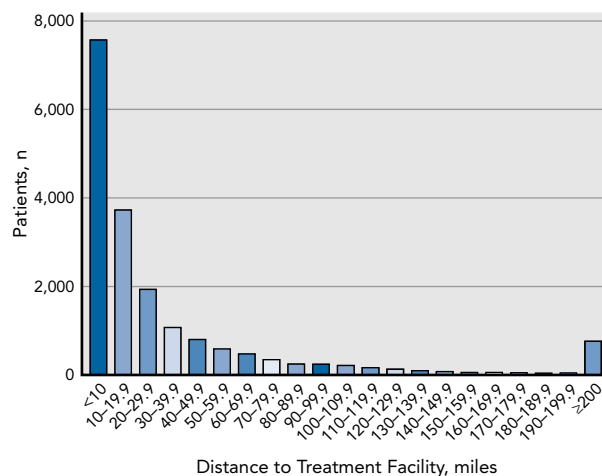
**eFigure 3:** Trends in Chemotherapy Use, Multiagent Chemotherapy Use, and Neoadjuvant Chemotherapy Use

**eTable 1:** Study Cohort Characteristics

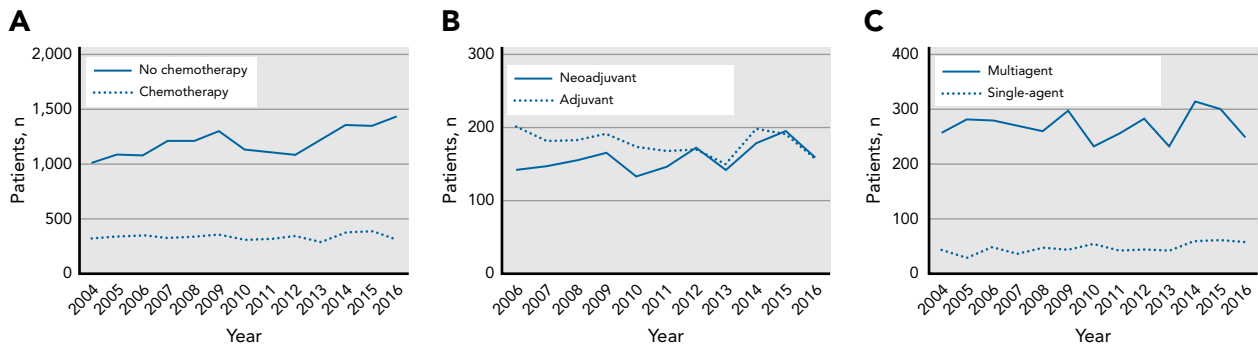
**eTable 2:** Analysis of Temporal Trend of Chemotherapy Use



**eFigure 1.** Analysis of annual sarcoma surgical case volume (by facility) in the National Cancer Database (soft tissue sarcoma database, n=106,822) from 2004 to 2016. Facilities in the 99th percentile performed >55 sarcoma surgeries per year. One facility performed 160 sarcoma surgeries per year, and the next-highest-volume facility performed 99 sarcoma surgeries per year. In the final study population, 19 centers (4.9%) were categorized as high volume and 367 (95.1%) were categorized as low volume. A total of 15,194 (76.1%) patients were seen at low-volume centers, whereas 4,775 patients (23.9%) were seen at high-volume centers.



**eFigure 2.** Distance from patient residence to treatment facility for adult patients with primary high-grade soft tissue sarcoma in the National Cancer Database from 2004 to 2016.



**eFigure 3.** Trends in (A) chemotherapy use, (B) multiagent chemotherapy use, and (C) neoadjuvant chemotherapy use in adult patients with primary high-grade soft tissue sarcoma in the National Cancer Database from 2004 to 2016.

**eTable 1. Study Cohort Characteristics**

Characteristic	Yes vs No Chemotherapy		Single-Agent vs Multiagent Chemotherapy		Neoadjuvant vs Adjuvant Chemotherapy	
	n (%)	P Value	n (%)	P Value	n (%)	P Value
Total, n	19,969		4,109		3,699	
Sex		.626		.861		<.001
Male	10,620 (53.2)		2,204 (53.6)		1,970 (53.3)	
Female	9,349 (46.8)		1,905 (46.4)		1,729 (46.7)	
Age, y		<.001		<.001		.328
18–49	4,429 (22.2)		1,627 (39.6)		1,427 (38.6)	
50–69	8,281 (41.5)		2,012 (49.0)		1,819 (49.2)	
≥70	7,259 (36.3)		470 (11.4)		453 (12.2)	
Race/Ethnicity		<.001		.124		.284
White	16,061 (80.4)		3,206 (78.0)		2,855 (77.2)	
Black	1,835 (9.2)		416 (10.1)		382 (10.3)	
Hispanic	1,173 (5.9)		306 (7.5)		296 (8.0)	
Other/Unknown	900 (4.5)		181 (4.4)		166 (4.5)	
Insurance status		<.001		<.001		.739
Commercial	8,912 (44.6)		2,594 (63.1)		2,297 (62.1)	
Medicare	8,686 (43.5)		876 (21.3)		844 (22.8)	
Medicaid	1,104 (5.5)		332 (8.1)		300 (8.1)	
Uninsured	628 (3.2)		165 (4.0)		149 (4.0)	
Other government/unknown	639 (3.2)		142 (3.5)		109 (3.0)	
Annual income, USD		<.001		.083		.003
≥\$63,333	7,392 (37.0)		1,592 (38.7)		1,451 (39.2)	
\$50,354–\$63,332	4,691 (23.5)		983 (23.9)		888 (24.0)	
\$40,227–\$50,353	4,311 (21.6)		886 (21.6)		784 (21.2)	
<\$40,277	3,241 (16.2)		592 (14.4)		528 (14.3)	
Unknown	334 (1.7)		56 (1.4)		48 (1.3)	
County type		.032		.608		.077
Metropolitan	16,322 (81.7)		3,399 (82.7)		3,074 (83.1)	
Urban	2,793 (14.0)		539 (13.1)		472 (12.8)	
Rural	336 (1.7)		78 (1.9)		70 (1.9)	
Unknown	518 (2.6)		93 (2.3)		83 (2.2)	
Facility location		<.001		<.001		.061
South	6,151 (30.8)		1,008 (24.5)		958 (25.9)	
East	3,829 (19.2)		617 (15.0)		537 (14.5)	
Central	4,728 (23.7)		1,013 (24.7)		901 (24.3)	
West	3,120 (15.6)		624 (15.2)		557 (15.1)	
Unknown	2,141 (10.7)		847 (20.6)		746 (20.2)	
Facility type		<.001		<.001		<.001
Nonacademic	8,065 (40.4)		1,213 (29.5)		1,119 (30.2)	
Academic	9,763 (48.9)		2,049 (49.9)		1,834 (49.6)	
Unknown	2,141 (10.7)		847 (20.6)		746 (20.2)	

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<b>eTable 1. Study Cohort Characteristics (cont.)</b>						
<b>Characteristic</b>	<b>Yes vs No Chemotherapy</b>		<b>Single-Agent vs Multiagent Chemotherapy</b>		<b>Neoadjuvant vs Adjuvant Chemotherapy</b>	
	<b>n (%)</b>	<b>P Value</b>	<b>n (%)</b>	<b>P Value</b>	<b>n (%)</b>	<b>P Value</b>
Facility volume		<.001		<.001		<.001
Low	15,194 (76.1)		2,856 (69.5)		2,626 (71.0)	
High	4,775 (23.9)		1,253 (30.5)		1,073 (29.0)	
Distance to treatment, miles		<.001		.042		<.001
0–9	7,632 (38.2)		1,403 (34.2)		1,256 (34.0)	
10–29	5,785 (29.0)		1,242 (30.2)		1,141 (30.8)	
30–100	4,207 (21.1)		917 (22.3)		825 (22.3)	
>100	2,262 (11.3)		530 (12.9)		468 (12.7)	
Unknown	83 (0.4)		17 (0.4)		9 (0.2)	
Year		.001		.023		.040
2004–2008	7,287 (36.5)		1,548 (37.7)		1,010 (27.3)	
2009–2012	5,954 (29.8)		1,249 (30.4)		1,319 (35.7)	
2013–2016	6,728 (33.7)		1,312 (31.9)		1,370 (37.0)	
Charlson-Deyo comorbidity score		<.001		<.001		.045
0	15,865 (79.5)		3,492 (85.0)		3,113 (84.1)	
1	3,144 (15.7)		506 (12.3)		480 (13.0)	
≥2	960 (4.8)		111 (2.7)		106 (2.9)	
Histology		<.001		<.001		<.001
UPS	6,009 (30.1)		1,047 (25.5)		923 (25.0)	
High-grade myxoid liposarcoma	581 (2.9)		173 (4.2)		149 (4.0)	
Synovial sarcoma	1,026 (5.1)		487 (11.8)		442 (12.0)	
MPNST	753 (3.8)		197 (4.8)		160 (4.3)	
Leiomyosarcoma	3,040 (15.2)		575 (14.0)		515 (13.9)	
Liposarcoma	2,067 (10.4)		346 (8.4)		319 (8.6)	
Angiosarcoma	723 (3.6)		204 (5.0)		186 (5.0)	
Fibrosarcoma	313 (1.6)		46 (1.1)		41 (1.1)	
Fibromyxosarcoma	1,595 (8.0)		209 (5.1)		198 (5.4)	
Epithelioid sarcoma	260 (1.3)		57 (1.4)		48 (1.3)	
Other undifferentiated/unclassified sarcoma	3,602 (18.0)		768 (18.7)		718 (19.4)	
Primary site		<.001		<.001		<.001
Extremity	12,355 (61.9)		2,408 (58.6)		2,145 (58.0)	
Heart	153 (0.8)		76 (1.8)		73 (2.0)	
Trunk	1,142 (5.7)		175 (4.3)		160 (4.3)	
Thorax	1,999 (10.0)		451 (11.0)		414 (11.2)	
Abdomen/Pelvis	3,727 (18.6)		884 (21.5)		799 (21.6)	
Other	593 (3.0)		115 (2.8)		108 (2.9)	
Tumor size, cm		<.001		<.001		<.001
≤5	5,371 (26.9)		506 (12.3)		442 (12.0)	
5.1–10	6,208 (31.1)		1,411 (34.4)		1,260 (34.1)	
10.1–15	3,106 (15.6)		919 (22.4)		817 (22.1)	
>15	2,530 (15.5)		774 (18.8)		690 (18.6)	
Unknown	2,754 (13.8)		499 (12.1)		490 (13.2)	

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**eTable 1. Study Cohort Characteristics (cont.)**

Characteristic	Yes vs No Chemotherapy		Single-Agent vs Multiagent Chemotherapy		Neoadjuvant vs Adjuvant Chemotherapy	
	n (%)	P Value	n (%)	P Value	n (%)	P Value
Depth		<.001		.005		.134
Deep	9,027 (45.2)		2,274 (55.3)		2,132 (57.6)	
Superficial	4,908 (24.6)		565 (13.8)		529 (14.3)	
Unknown	6,034 (30.2)		1,270 (30.9)		1,038 (28.1)	
Surgical margins		<.001		<.001		<.001
Negative	15,169 (76.0)		3,076 (74.9)		2,748 (74.3)	
Positive	3,525 (17.6)		687 (16.7)		639 (17.3)	
Unknown	1,275 (6.4)		346 (8.4)		312 (8.4)	
Radiation therapy		<.001		.002		<.001
Yes	10,949 (54.8)		2,468 (60.1)		2,215 (59.9)	
No	9,020 (45.2)		1,641 (39.9)		1,484 (40.1)	

Abbreviations: MPNST, malignant peripheral nerve sheath tumor; UPS, undifferentiated pleomorphic sarcoma.

**eTable 2. Analysis of Temporal Trend of Chemotherapy Use**

Year	OR (95% CI)	P Value
Temporal trend of chemotherapy use 2004–2016		
2004	Ref	
2005	0.98 (0.83–1.17)	.858
2006	1.01 (0.85–1.20)	.902
2007	0.86 (0.72–1.02)	.087
2008	0.88 (0.74–1.04)	.142
2009	0.86 (0.73–1.03)	.098
2010	0.86 (0.72–1.02)	.086
2011	0.89 (0.75–1.06)	.198
2012	1.00 (0.84–1.20)	.960
2013	0.75 (0.63–0.90)	.002
2014	0.87 (0.74–1.04)	.120
2015	0.90 (0.76–1.07)	.245
2016	0.69 (0.58–0.83)	<.001
Temporal trend of multiagent chemotherapy use 2004–2016		
2004	Ref	
2005	1.68 (1.01–2.78)	.044
2006	0.97 (0.62–1.52)	.902
2007	1.25 (0.78–2.01)	.356
2008	0.93 (0.59–1.45)	.735
2009	1.16 (0.73–1.82)	.533
2010	0.72 (0.46–1.11)	.140
2011	0.99 (0.63–1.57)	.973
2012	1.10 (0.70–1.73)	.689
2013	0.90 (0.57–1.42)	.648
2014	0.90 (0.59–1.38)	.640
2015	0.82 (0.54–1.26)	.368
2016	0.73 (0.47–1.13)	.155
Temporal trend of neoadjuvant chemotherapy use 2006–2016		
2006	Ref	
2007	1.14 (0.84–1.55)	.390
2008	1.20 (0.89–1.62)	.241
2009	1.22 (0.91–1.65)	.188
2010	1.08 (0.79–1.48)	.620
2011	1.23 (0.90–1.68)	.189
2012	1.43 (1.06–1.94)	.020
2013	1.34 (0.98–1.83)	.068
2014	1.27 (0.95–1.71)	.110
2015	1.45 (1.08–1.94)	.014
2016	1.43 (1.05–1.95)	.022

Abbreviation: OR, odds ratio.