

Supplemental online content for:

Impact of Facility Surgical Volume on Survival in Patients With Cancer

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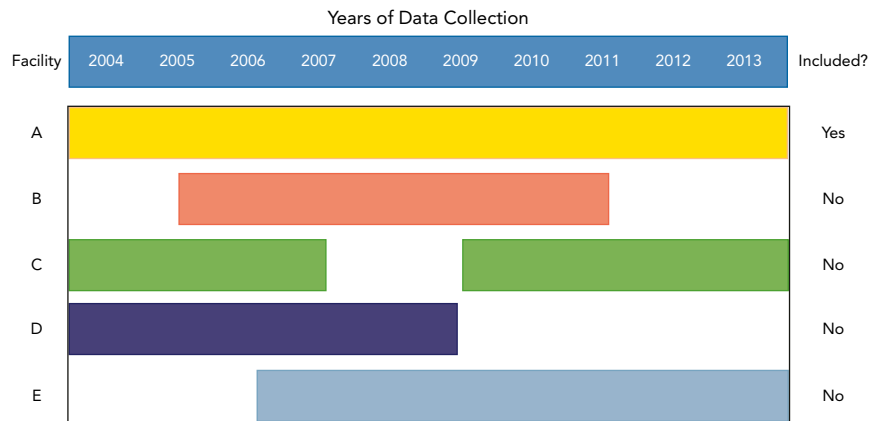
eFigure 1: Chart Defining Complete Volume Data

eTable 1: Comparison of Hazard Ratios From Original Versus Sensitivity Analysis

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eFigure 1. Chart defining complete volume data. Only facilities that were open and treating patients from 2004–2013, with complete volume data, were included in the analyses. For example, facility A shows data collection continuously occurring from 2004–2013 and therefore was included in the analyses, whereas facilities B through E have gaps in their data collection during this time period and therefore were excluded.

eTable 1. Comparison of HRs From Original Versus Sensitivity Analysis^a

Cancer Site	Facility Volume Classification	Original HR (95% CI) ^b	Sensitivity Analysis HR (95% CI)	Sensitivity P Value ^c
Breast	Low	Ref	Ref	
	Intermediate	0.93 (0.92–0.95)	0.87 (0.84–0.91)	<.0001
	High	0.89 (0.88–0.90)	0.85 (0.82–0.89)	<.0001
	Very high	0.84 (0.82–0.85)	0.80 (0.77–0.84)	<.0001
Prostate	Low	Ref	Ref	
	Intermediate	0.86 (0.83–0.89)	0.84 (0.83–0.90)	<.0001
	High	0.77 (0.74–0.80)	0.75 (0.74–0.80)	<.0001
	Very high	0.66 (0.63–0.69)	0.74 (0.67–0.83)	<.0001
Colon	Low	Ref	Ref	
	Intermediate	0.97 (0.95–0.98)	0.97 (0.95–0.99)	<.001
	High	0.94 (0.92–0.96)	0.92 (0.91–0.94)	<.0001
	Very high	0.88 (0.87–0.90)	0.89 (0.87–0.91)	<.0001
NSCL	Low	Ref	Ref	
	Intermediate	0.96 (0.95–0.98)	1.02 (0.93–0.97)	.35
	High	0.92 (0.90–0.94)	0.92 (0.89–0.93)	<.0001
	Very high	0.92 (0.90–0.94)	0.88 (0.84–0.93)	<.0001
Melanoma	Low	Ref	Ref	
	Intermediate	0.89 (0.86–0.91)	0.88 (0.82–0.96)	<.0001
	High	0.84 (0.81–0.87)	0.85 (0.78–0.94)	<.0001
	Very high	0.81 (0.78–0.84)	0.72 (0.66–0.81)	<.0001
Kidney	Low	Ref	Ref	
	Intermediate	0.95 (0.92–0.98)	0.98 (0.91–1.05)	.58
	High	0.94 (0.91–0.97)	0.94 (0.88–1.01)	.13
	Very high	0.87 (0.83–0.90)	0.86 (0.79–0.93)	<.0001
Uterus	Low	Ref	Ref	
	Intermediate	0.97 (0.94–0.99)	1.04 (0.96–1.14)	.31
	High	0.96 (0.93–0.99)	1.08 (0.98–1.18)	.11
	Very high	0.95 (0.92–0.98)	0.97 (0.89–1.07)	.55
Thyroid	Low	Ref	Ref	
	Intermediate	0.93 (0.87–0.99)	0.91 (0.77–1.07)	.25
	High	0.89 (0.82–0.96)	1.03 (0.86–1.24)	.74
	Very high	0.82 (0.75–0.89)	0.78 (0.63–0.97)	.02
Bladder	Low	Ref	Ref	
	Intermediate	0.94 (0.92–0.97)	0.97 (0.91–1.02)	.25
	High	0.91 (0.89–0.93)	0.89 (0.84–0.95)	<.0001
	Very high	0.86 (0.83–0.89)	0.85 (0.79–0.90)	<.0001
Rectum	Low	Ref	Ref	
	Intermediate	0.92 (0.89–0.95)	0.90 (0.82–1.00)	.91
	High	0.87 (0.84–0.90)	0.89 (0.80–0.99)	.03
	Very high	0.83 (0.80–0.86)	0.74 (0.66–0.82)	<.0001

Abbreviations: HR, hazard ratio; NSCL, non–small cell lung.

^aWith CLASS_OF_CASE values of only 12 or 14.

^bObtained using Cox proportional multivariate analysis, adjusting for: age, sex, race, insurance status, cancer stage, urban/rural region, income level, comorbidity score, facility type, radiation, chemotherapy, and distance traveled to facility.

^cStatistically significant at $P < .0012$.

eTable 2. Breakdown of Patients Treated at Various Institutions by "CLASS_OF_CASE" Value

	0	10	11	12	13	14	20	21	22	12+14	Sum of All	% (12+14)/All
Bladder	886	53,512	3,714	9,583	6,852	27,861	24,196	13,184	7,974	37,444	147,762	0.253408
Brain	1,798	21,232	272	355	6,228	10,571	13,173	5,878	5,097	10,926	64,604	0.169123
Breast	36,219	639,720	36,971	24,528	170,349	256,377	326,626	196,954	79,222	280,905	1,766,966	0.158976
Colon	6,829	188,218	5,338	10,657	20,427	76,587	71,815	26,282	26,172	87,244	432,325	0.201802
Esophagus	1,317	7,874	406	327	1,512	2,902	11,009	4,928	3,594	3,229	33,869	0.095338
Kidney	4,025	59,842	710	4,764	3,260	41,243	27,559	4,410	21,842	46,007	167,655	0.274415
NSCL	7,946	102,335	1,059	2,641	13,576	54,600	42,844	12,311	19,152	57,241	256,464	0.223193
Melanoma	1,199	72,044	11,645	14,238	3,571	34,336	113,416	61,964	35,831	48,574	348,244	0.139483
Pancreas	2,048	13,641	172	201	4,807	9,486	7,422	4,467	3,814	9,687	46,058	0.210322
Prostate	6,432	150,974	10,253	62,179	2,964	34,767	176,617	18,835	80,999	96,946	544,020	0.178203
Rectum	2,116	42,696	2,673	2,467	7,661	14,145	35,077	18,746	8,740	16,612	134,321	0.123674
Thyroid	2,571	52,132	2,691	4,646	8,472	30,071	28,504	14,508	13,543	34,717	157,138	0.220933
Uterine	6,450	64,345	3,980	11,551	6,784	28,165	75,966	22,071	42,745	39,716	262,057	0.151555
Total										769,248	4,361,483	0.176373

Abbreviation: NSCL, non-small cell lung.

Clinical Cancer Stage	2004	2005	2006	2007	2008^a	2009	2010	2011	2012	2013
0	21,818	22,853	24,107	27,293	38,946	43,788	46,018	47,767	49,983	52,415
I	49,671	54,494	59,138	71,661	114,760	132,938	160,985	169,700	169,589	173,558
II	46,376	51,407	59,405	72,401	97,004	103,228	91,770	92,432	89,010	92,256
III	12,838	14,264	15,608	17,754	23,307	24,706	26,267	25,795	25,836	26,086
IV	6,686	7,093	7,426	8,443	12,088	12,784	13,903	13,763	13,709	13,948
Unknown	197,309	199,263	204,067	191,987	115,395	88,610	67,666	71,044	69,802	69,400
Percent unknown	59.0%	57.0%	55.2%	49.3%	28.7%	21.8%	16.6%	16.9%	16.7%	16.2%

^aReporting rules changed, allowing clinical stage to be reported by managing physician or pulled from patient record.

eAppendix 1: Sensitivity Analysis for Patients Treated at Only One Facility

Regarding the delivery of all treatments “at the reporting facility,” there is a variable to assess where treatments were performed, “CLASS_OF_CASE,” with the values shown below. Approximately 17% of patients were treated solely at a single institution, whereas treatment for the remainder may have included at least one other institution. To capture only treatments performed at the same institution, we conducted a sensitivity analysis and included only cases with values of 12 and 14. Overall, the sensitivity analysis hazard ratios were similar to those of the original analysis.

Code	Definition
00	Initial diagnosis at the reporting facility and all treatment or a decision not to treat was done elsewhere
10	Initial diagnosis at the reporting facility, and part or all of first course treatment or a decision not to treat was done at the reporting facility, NOS
11	Initial diagnosis in a staff physician’s office and part of first course treatment was done at the reporting facility
12	Initial diagnosis in a staff physician’s office and all of first course treatment or a decision not to treat was done at the reporting facility
13	Initial diagnosis and part of first course treatment was done at the reporting facility; part of first course treatment was done elsewhere
14	Initial diagnosis and all of first course treatment or a decision not to treat was done at the reporting facility
20	Initial diagnosis elsewhere and all or part of first course treatment or a decision not to treat was done at the reporting facility, NOS
21	Initial diagnosis elsewhere and part of first course treatment was done at the reporting facility; part of first course treatment was done elsewhere
22	Initial diagnosis elsewhere and all of first course treatment or a decision not to treat was done at the reporting facility

Abbreviation: NOS, not otherwise specified.