Burden of Systemic Light-Chain (AL) Amyloidosis by Mayo Stage: Results From an Electronic Health Record (EHR) Linked To Claims Analysis

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INTRODUCTION

- Light-chain (AL) amyloidosis is a rare, systemic disease of protein deposition caused by plasma cell dyscrasia (PCD) producing amyloidogenic immunoglobulin light chains that misfold and aggregate to form amyloid fibrils, which deposit in organs, the most important being the heart.[1,2]
- Prior research into the economic burden of AL amyloidosis found that amongst newly diagnosed Medicare beneficiaries from 2011 to 2016, mean total annual all-cause healthcare costs in the 1-year follow-up period were significantly higher in newly diagnosed beneficiaries with AL amyloidosis than in disease-free controls ($71,040 vs. $13,722, P < 0.001).[3]
- Additionally, in a US commercial claims study of patients with AL amyloidosis from 2007 to 2015, mean total annual all-cause healthcare costs were $101,855, and the major cost elements were outpatient, inpatient, and emergency room (ER) visits.[4]
- Amyloid deposition is most commonly found in the heart (approximately 70%-80% of patients), and cardiac involvement is the leading cause of death in patients with AL amyloidosis.[5]
- The extent of cardiac involvement is the most relevant factor for prognostication in AL amyloidosis, and thus, most staging systems assess the extent of cardiac involvement and are largely based on biomarkers of cardiac disease (NT-proBNP/BNP and troponin), including the Mayo 2004 European Modification staging system.[5-7]
- Limited evidence exists on the real-world cost and healthcare resource utilization (HCRU) amongst AL patients when stratified by Mayo 2004 European Modification staging system.

OBJECTIVES

- To assess all-cause and condition-related healthcare resource utilization (HCRU) and costs amongst newly diagnosed AL amyloidosis patients when stratified by the Mayo 2004 European Modification staging system.

CONCLUSIONS

- A higher degree of clinical severity, whether it be based on the Mayo staging system, other indicators of cardiac involvement, or indicated by the presence of AL-related treatments, is associated with higher all-cause & condition-related costs, ER visits, and inpatient hospitalizations.
- This is the first study to directly quantify HCRU and costs using robust methods of linked RWE data verifying that AL is a severe condition with high burden amongst patients with higher levels of disease severity, supporting the continued need for therapeutic advances to treat these patient populations.

LIMITATIONS

- The primary limitation of this study is the generalizability of study results that may be biased due to the inherent data qualities when applying inclusion/exclusion criteria to different data sources that require linkage, including: (1) patients that have been treated within select delivery networks that serve as the basis of the EHR data; and (2) commercial claims datasets that do not include the uninsured, Medicare/Medicaid FFS, or other insurance types.
- Another limitation of the current analysis is that our study time period does not include, and thus does not account for, changes in HCRU and costs following the approval daratumumab for the treatment of AL.

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METHODS

STUDY DESIGN & DATA SOURCE

- Retrospective, non-interventional, observational study leveraging Optum's Clinical Electronic Health Record (EHR) database (>700 hospitals, >7000 clinics and >16 million patients) linked to Optum's Market Clarity claims data for patients newly diagnosed with AL amyloidosis 1/1/2017-3/31/2021.
- Patient observations were first identified in the EHR data (index diagnosis & manually-assigned Mayo stage based on lab values), and then were deterministically linked to payer-agnostic claims, where costs/HCRU were assessed during the maximum follow-up time post-index while patients had continuous medical and prescription enrollment.

INCLUSION/EXCLUSION CRITERIA

EHR-Based (applied first)

- ≥2 diagnosis codes (ICD-10-CM code E85.81) or positive mentions about the disease (including clinical features indicative of AL amyloidosis) found in the physician's notes (≥30 days apart) 1/1/2017-3/31/2021 (first recorded diagnosis = index date)
- ≥18 years of age at their index date (1st diagnosis, 1st note)
- At least 12 months of pre-clinical data from the index event
- Valid laboratory tests (Natriuretic peptide tests [BNP or NT-proBNP] & Cardiac Troponin) within 2 weeks of each other to enable assignment of Mayo 2004 stage most proximal to index diagnosis

Linked Claims (applied second)

- Mayo stage assigned, linkable patients from EHR-only cohort build
- ≥30 days continuous medical and prescription insurance enrollment post-index
- Patient observations where month-of-death is the same as month of index were excluded

MAYO STAGING

- NT-proBNP and troponin operationalized to assign European Modification 2004 Mayo stage most proximal to first-identified index AL diagnosis
- The thresholds for elevated cardiac biomarkers were as follows: cardiac troponin T ≥ 0.035 mcg/L; high sensitivity cardiac troponin T ≥ 50 ng/L; cardiac troponin I ≥ 0.1 mcg/L; brain natriuretic peptide (BNP) ≥ 81 ng/L; N-terminal pro-brain natriuretic peptide (NT-proBNP) ≥ 332 ng/L

Stages

- Stage I—no elevation of cardiac troponin or BNP/NT-proBNP
- Stage II—elevation of either cardiac troponin or BNP/NT-proBNP but not both
- Stage IIIa—elevation of both cardiac troponin and BNP/NT-proBNP but BNP < 700 ng/L and NT-proBNP < 8500 ng/L
- Stage IIIb—elevation of both cardiac troponin and BNP/NT-proBNP with BNP ≥ 700 ng/L or NT-proBNP ≥ 8500 ng/L

OUTCOMES

- All outcomes were assessed during the 12-month post-index period OR end of continuous enrollment OR death (if occurring within 12-months post-index)
- All-cause and condition-specific HCRU (inpatient, outpatient, office, ER) and costs (total, medical, drug) were assessed
- 'Drug' costs included both outpatient prescription costs as well as a carve-out of drug costs from medical claims (identified as any claim with an applicable HCPCS 'J' code or a valid NDC)
- 'Medical' costs represent non-drug medical claims
- HCRU & medical costs were considered "condition-specific" if they had an associated primary/secondary ICD-10 code indicating AL-related (ICD-10: E85.81, E85.4, E85.89, E85.9) OR cardiac-related (I42.*='cardiomyopathy'; I43.*='cardiomyopathy in diseases classified elsewhere'; I50.*='heart failure'

OUTCOMES CONTINUED

- Drug costs were considered "condition-specific" if they were a claim for one of the following anti-PCD regimen medications (assigned using NDC/HCPCS codes for identification): bendamustine, bortezomib, carfilzomib, cyclophosphamide, daratumumab, ixazomib, lenalidomide, melphalan, pomalidomide, venetoclax

COHORT STRATIFICATION

- Patients were classified as 'Treated' if they had a claim for one of the following during their 12-month post-index period: autologous stem cell transplant (ASCT), bendamustine, bortezomib, carfilzomib, cyclophosphamide, daratumumab, ixazomib, lenalidomide, melphalan, pomalidomide, venetoclax
- Patients were classified as 'Cardiac' if they had a medical claim with a primary/secondary diagnosis of the following during their 12-month post-index period: I42.* ='cardiomyopathy'; I43.* ='cardiomyopathy in diseases classified elsewhere'; I50.* = 'heart failure'

STATISTICAL ANALYSIS

- Descriptive statistics, including mean(SD) for continuous variables and N(%) for categorical variables
- Results reported by Mayo stage for the overall sample and when stratified into 'Treated', 'Cardiac', and 'Treated+Cardiac'
- Cost results reported as per-patient-per-month (PPPM), with all costs inflated to 2023 $'s using the Medical CPI from the Bureau of Labor and Statistics
- HCRU events were normalized & reported as 12-month mean
- For inpatient events, length-of-stay (LOS) was described in mean(SD) days

RESULTS AND INTERPRETATION

STUDY SAMPLE

- Out of the 1,956 patient observations identified in the EHR data, a total of 215 patients had linked EHR+claims data and an identifiable Mayo stage, including: 53-stage I, 79-stage II, 31-stage IIIa, & 52-stage IIIb **(Table 1)**
- A total of 136 patients received some type of AL treatment during their follow-up period, including: 31-stage II, 47-stage II, 23-stage IIIa, & 35-stage IIIb
- 130 patients were identified as having a cardiac-involved (heart failure, cardiomyopathy) HCRU event post-index, including: 15-stage I, 52-stage II, 25-stage IIIa, & 38-stage IIIb
- 85 patients had evidence of both treatment as well as ≥1 post-index cardiac-involved HCRU event, including: 9-stage I, 29-stage II, 20-stage IIIa, & 27-stage IIIb

DEMOGRAPHICS

- The majority of patients were age 60+ (>70%), male (~60%), and caucasian (>~70%)
- Medicare Advantage was the largest insurance type (>45%), followed by commercial (>35%)

COSTS

- Overall, costs were highest in patients receiving treatment [with/without cardiac-event utilization] **(Table 2)**
- Higher costs were typically seen in patients with more severe cardiac involvement (Mayo stage IIIa/IIIb), except in the case of Treated+Cardiac Mayo stage I patients, which had the highest total PPPM cost estimates (but also the smallest cohort sample size of N=9)
- Treated stage IIIa patients had PPPM all-cause/AL-related total, medical, and prescription mean costs of $26,338/$14,116; $15,601/$4,772; and $10,737/$9,345; respectively
- Treated+Cardiac stage IIIa patients had PPPM all-cause/AL-related total, medical, and prescription mean costs of $23,325/$15,050; $11,541/$4,795; and $11,784/$10,255; respectively
- Treated stage IIIa had PPPM all-cause/AL-related total, medical, and prescription mean costs of $19,354/$11,357; $11,255/$4,453 and $8,099/$7,286; respectively
- Treated+Cardiac stage IIIb patients had PPPM all-cause/AL-related total, medical, and prescription mean costs of $23,786/$13,950; $13,908/$4,985 and $9,878/$8,965; respectively

HEALTHCARE RESOURCE UTILIZATION

- 87.0% & 58.6% of all patients had ≥1 all-cause or condition-related physician office visit **(Table 3a)**
- Treated+Cardiac patients displayed the highest proportion of ≥1 condition-related physician office visit post-index, including: 66.7%-stage I, 79.3%-stage II, 70.0%-stage IIIa, & 74.1%-stage IIIb
- 92.6% & 80.5% of all patients had ≥1 all-cause or condition-related outpatient visit **(Table 3b)**
- 100.0% of Treated & Treated+Cardiac Mayo stage IIIa patients had ≥1 all-cause OR condition-related outpatient visits, while lower rates were seen amongst Mayo stage IIIb patients (likely due to censoring)
- 48.8% & 15.3% of all patients had ≥1 all-cause or condition-related ER visit **(Table 3c)**
- The highest rates of all-cause ER visits were seen amongst Mayo stage II, IIIa, & IIIb patients, ranging from ~50% to ~70.0%
- Condition-related ER visits were highest amongst patients assigned as Mayo stage IIIa/IIb, and ranged from ~20% to >30%
- Rates of inpatient hospitalizations were high, with 58.1% and 41.4% of all patients having ≥1 all-cause or condition-related inpatient hospitalization, respectively **(Table 3d)**
- The highest rates were seen amongst Treated Stage IIIa patients at 82.6% and 73.9%, and amongst Treated+Cardiac Stage IIIb patients at 85.2% and 74.1%, with ≥1 all-cause/AL-related inpatient hospitalization during follow-up, respectively
- Mayo stage IIIa/IIIb patients had an average of >2.0 condition-related inpatient hospitalizations in the 12-months post-index (amongst all with ≥1), with a mean length-of-stay (LOS) of around 2 weeks

Table 1.

n (%)	All Patients	Treated Patients	Cardiac Patients	Treated+ Cardiac Patients
Age				
30-49	11 (5.1)	7 (5.1)	4 (3.1)	3 (3.5)
50-59	43 (20.0)	30 (22.1)	22 (16.9)	18 (21.2)
60-69	70 (32.6)	46 (33.8)	44 (33.8)	28 (32.9)
70-79	64 (29.8)	40 (29.4)	42 (32.3)	25 (29.4)
80+	27 (12.6)	13 (9.6)	18 (13.8)	11 (12.9)
Gender				
Female	89 (41.4)	55 (40.4)	49 (37.7)	30 (35.3)
Male	126 (58.6)	81 (59.6)	81 (62.3)	55 (64.7)
Insurance Type				
Commercial	86 (40.0)	60 (44.1)	45 (34.6)	35 (41.2)
Medicaid	13 (6.0)	7 (5.1)	9 (6.9)	5 (5.9)
Medicare	105 (48.8)	62 (45.6)	69 (53.1)	42 (49.4)
Other	11 (5.1)	7 (5.1)	7 (5.4)	3 (3.5)
Race				
African American	45 (20.9)	28 (20.6)	34 (26.2)	20 (23.5)
Asian	4 (1.9)	1 (0.7)	2 (1.5)	1 (1.2)
Caucasian	154 (71.6)	100 (73.5)	89 (68.5)	62 (72.9)
Other/Unknown	12 (5.6)	7 (5.1)	5 (3.8)	2 (2.4)
Mayo Stage				
I	53 (24.7)	31 (22.8)	15 (11.5)	9 (10.6)
II	79 (36.7)	47 (34.6)	52 (40.0)	29 (34.1)
IIIa	31 (14.4)	23 (16.9)	25 (19.2)	20 (23.5)
IIIb	52 (24.2)	35 (25.7)	38 (29.2)	27 (31.8)
Follow-Up (mo)				
1	4 (1.9)	1 (0.7)	4 (3.1)	1 (1.2)
2	8 (3.7)	6 (4.4)	5 (3.8)	4 (4.7)
3	4 (1.9)	3 (2.2)	4 (3.1)	3 (3.5)
4	6 (2.8)	5 (3.7)	6 (4.6)	5 (5.9)
5	7 (3.3)	7 (5.1)	5 (3.8)	5 (5.9)
6	4 (1.9)	1 (0.7)	3 (2.3)	1 (1.2)
7	7 (3.3)	5 (3.7)	4 (3.1)	2 (2.4)
8	10 (4.7)	7 (5.1)	7 (5.4)	5 (5.9)
9	6 (2.8)	5 (3.7)	5 (3.8)	4 (4.7)
10	2 (0.9)	2 (1.5)	2 (1.5)	2 (2.4)
11	7 (3.3)	6 (4.4)	5 (3.8)	4 (4.7)
12	150 (69.8)	88 (64.7)	80 (61.5)	49 (57.6)

Table 2.

	Total Costs				Medical Costs				Drug Costs (OutPt Rx + Mx Drug Carve Out)			
	All-Cause		Condition-Related		All-Cause		Condition-Related		All-Cause		Condition-Related	
	N	PPPM mean (SD)	N	PPPM mean (SD)	N	PPPM mean (SD)	N	PPPM mean (SD)	N	PPPM mean (SD)	N	PPPM mean (SD)
All Patients	215	$15177 (17970)	203	$8171 (12159)	215	$9143 (12902)	194	$3037 (5616)	209	$6207 (10222)	136	$7864 (11109)
Treated Patients	136	$19699 (19848)	136	$11619 (13507)	136	$10715 (14082)	127	$4020 (6543)	136	$8984 (11668)	136	$7864 (11109)
Cardiac Patients	130	$18230 (19941)	130	$9542 (13870)	130	$11164 (13792)	130	$3710 (6497)	129	$7121 (11539)	85	$8919 (12518)
Treated+Cardiac Patients	85	$22996 (21860)	85	$13801 (15456)	85	$12793 (14915)	85	$4882 (7569)	85	$10203 (13108)	85	$8919 (12518)
	N	PPPM mean (SD)	N	PPPM mean (SD)	N	PPPM mean (SD)	N	PPPM mean (SD)	N	PPPM mean (SD)	N	PPPM mean (SD)
Mayo Stage I: All Patients	53	$12517 (17230)	47	$7054 (9070)	53	$6491 (10819)	43	$2255 (4820)	52	$6142 (9097)	31	$7566 (8576)
Mayo Stage I: Treated Patients	31	$18261 (20298)	31	$10379 (9601)	31	$8738 (13119)	27	$3229 (5867)	31	$9523 (10379)	31	$7566 (8576)
Mayo Stage I: Cardiac Patients	15	$22436 (26910)	15	$11151 (11239)	15	$12109 (18230)	15	$3991 (7649)	15	$10327 (11604)	9	$11934 (9430)
Mayo Stage I: Treated+Cardiac Patients	9	$34754 (28814)	9	$18074 (9252)	9	$18686 (21371)	9	$6141 (9421)	9	$16069 (11785)	9	$11934 (9430)
	N	PPPM mean (SD)	N	PPPM mean (SD)	N	PPPM mean (SD)	N	PPPM mean (SD)	N	PPPM mean (SD)	N	PPPM mean (SD)
Mayo Stage II: All Patients	79	$12922 (12886)	77	$7428 (9896)	79	$7414 (9839)	75	$2758 (4308)	77	$5651 (7986)	47	$7768 (8924)
Mayo Stage II: Treated Patients	47	$17654 (13815)	47	11409 (10296)	47	$9224 (11455)	45	$3803 (4899)	47	$8430 (8967)	47	$7768 (8924)
Mayo Stage II: Cardiac Patients	52	$13368 (13895)	52	$7068 (9639)	52	$8523 (11274)	52	$3153 (4581)	51	$4940 (7332)	29	$7020 (8474)
Mayo Stage II: Treated+Cardiac Patients	29	$18385 (15672)	29	11475 (10826)	29	$10790 (13676)	29	$4455 (5261)	29	$7594 (8506)	29	$7020 (8474)
	N	PPPM mean (SD)	N	PPPM mean (SD)	N	PPPM mean (SD)	N	PPPM mean (SD)	N	PPPM mean (SD)	N	PPPM mean (SD)
Mayo Stage IIIa: All Patients	31	$20299 (25365)	30	$10960 (16300)	31	$12164 (19674)	30	$3796 (7962)	31	$8135 (11594)	23	$9345 (12465)
Mayo Stage IIIa: Treated Patients	23	$26338 (26988)	23	$14116 (17417)	23	$15601 (21878)	23	$4772 (8895)	23	$10737 (12478)	23	$9345 (12465)
Mayo Stage IIIa: Cardiac Patients	25	$19356 (24216)	25	$12197 (17494)	25	$9815 (16134)	25	$3993 (8575)	25	$5301 (9900)	20	$10255 (13150)
Mayo Stage IIIa: Treated+Cardiac Patients	20	$23325 (25627)	20	$15050 (18536)	20	$11541 (17660)	20	$4795 (9451)	20	$11784 (13078)	20	$10255 (13150)
	N	PPPM mean (SD)	N	PPPM mean (SD)	N	PPPM mean (SD)	N	PPPM mean (SD)	N	PPPM mean (SD)	N	PPPM mean (SD)
Mayo Stage IIIb: All Patients	52	$18258 (19648)	49	$8704 (15167)	52	$12671 (13159)	46	$3729 (6373)	49	$5930 (13299)	35	$7286 (14661)
Mayo Stage IIIb: Treated Patients	35	$19354 (20820)	35	$11357 (17211)	35	$11255 (11191)	35	$4453 (7326)	35	$8099 (15246)	35	$7286 (14661)
Mayo Stage IIIb: Cardiac Patients	38	$22483 (20151)	38	$10545 (16760)	38	$15292 (12825)	38	$4175 (6903)	38	$7191 (14859)	27	$8965 (16330)
Mayo Stage IIIb: Treated+Cardiac Patients	27	$23786 (21717)	27	$13950 (18830)	27	$13908 (11397)	27	$4985 (7868)	27	$9878 (16968)	27	$8965 (16330)

Table 3

	Table 3a: Office Visits						Table 3b: Outpatient Visits						Table 3c: Emergency Room Visits						Table 3d: Inpatient Visits							
	Office Visits (12-Month Follow-Up Period)						Outpatient Visits (12-Month Follow-Up Period)						Emergency Room Visits (12-Month Follow-Up Period)						Inpatient Visits (12-Month Follow-Up Period)							
	All-Cause			Condition-Related			All-Cause			Condition-Related			All-Cause			Condition-Related			All-Cause				Condition-Related			
	N	%	12-month mean (SD)	N	%	12-month mean (SD)	N	%	12-month mean (SD)	N	%	12-month mean (SD)	N	%	12-month mean (SD)	N	%	12-month mean (SD)	N	%	12-month mean (SD)	mean LOS (SD)	N	%	12-month mean (SD)	mean LOS (SD)
All Patients	187	87.0	17.0 (15.5)	126	58.6	9.21 (11.26)	199	92.6	27.4 (39.0)	173	80.5	14.5 (15.3)	105	48.8	3.3 (3.3)	33	15.3	1.4 (0.9)	125	58.1	2.5 (1.9)	16.7 (15.0)	89	41.4	1.9 (1.0)	12.3 (14.0)
Treated Patients	118	86.8	19.3 (16.5)	92	67.6	11.55 (12.32)	127	93.4	32.8 (42.5)	119	87.5	18.2 (15.9)	66	48.5	3.4 (3.1)	22	16.2	1.5 (0.9)	88	64.7	2.7 (1.8)	17.8 (14.6)	68	50.0	2.0 (1.1)	13.0 (14.3)
Cardiac Patients	110	84.6	19.4 (16.8)	87	66.9	9.8 (11.74)	124	95.4	30.6 (44.3)	114	87.7	15.7 (16.7)	74	56.9	3.5 (3.6)	28	21.5	1.5 (1.0)	88	67.7	2.7 (2.1)	17.6 (16.2)	70	53.8	2.0 (1.1)	13.4 (14.9)
Treated+Cardiac Patients	72	84.7	22.0 (18.0)	63	74.1	12.49 (12.78)	82	96.5	35.8 (48.8)	79	92.9	19.2 (17.6)	47	55.3	3.7 (3.3)	19	22.4	1.5 (1.0)	61	71.8	2.9 (1.9)	19.4 (16.5)	51	60.0	2.2 (1.1)	15.0 (15.6)
	N	%	12-month mean (SD)	N	%	12-month mean (SD)	N	%	12-month mean (SD)	N	%	12-month mean (SD)	N	%	12-month mean (SD)	N	%	12-month mean (SD)	N	%	12-month mean (SD)	mean LOS (SD)	N	%	12-month mean (SD)	mean LOS (SD)
Mayo Stage I: All Patients	48	90.6	15.0 (13.7)	25	47.2	7.32 (6.99)	48	90.6	20.9 (17.0)	42	79.2	13.6 (13.4)	18	34.0	2.7 (2.4)	3	5.7	1.0 (0.0)	21	39.6	2.0 (1.2)	13.7 (12.1)	12	22.6	1.6 (0.8)	9.8 (9.9)
Mayo Stage I: Treated Patients	27	87.1	19.2 (14.8)	18	58.1	8.72 (7.65)	30	96.8	27.7 (18.0)	29	93.5	18.3 (13.8)	9	29.0	2.2 (2.3)	1	3.2	1.0 (0.0)	15	48.4	2.1 (1.4)	13.13 (8.5)	11	35.5	1.6 (0.8)	10.4 (10.2)
Mayo Stage I: Cardiac Patients	12	80.0	25.1 (15.4)	8	53.3	10.5 (9.3)	13	86.7	29.9 (23.1)	13	86.7	18.1 (17.3)	4	26.7	3.2 (3.2)	0	0.0	0.0 (0.0)	6	40.0	2.2 (1.2)	13.2 (13.0)	3	20.0	2.0 (1.0)	17.7 (15.0)
Mayo Stage I: Treated+Cardiac Patients	7	77.8	32.1 (16.3)	6	66.7	13 (9.53)	9	100.0	40.0 (20.6)	9	100.0	25.2 (16.2)	2	22.2	5.0 (4.2)	0	0.0	0.0 (0.0)	5	55.6	2.2 (1.3)	14.6 (14.0)	3	33.3	2.0 (1.0)	17.7 (15.0)
	N	%	12-month mean (SD)	N	%	12-month mean (SD)	N	%	12-month mean (SD)	N	%	12-month mean (SD)	N	%	12-month mean (SD)	N	%	12-month mean (SD)	N	%	12-month mean (SD)	mean LOS (SD)	N	%	12-month mean (SD)	mean LOS (SD)
Mayo Stage II: All Patients	68	86.1	20.3 (16.6)	51	64.6	10.8 (12.79)	77	97.5	31.7 (50.5)	69	87.3	15.0 (16.6)	42	53.2	3.7 (3.9)	12	15.2	1.1 (0.3)	44	55.7	2.7 (2.3)	15.2 (13.7)	29	36.7	1.7 (0.8)	10.3 (12.1)
Mayo Stage II: Treated Patients	42	89.4	22.8 (18.3)	36	76.6	14.31 (13.76)	45	95.7	42.2 (61.4)	43	91.5	19.8 (17.5)	24	51.1	3.7 (3.2)	7	14.9	1.0 (0.0)	27	57.4	2.7 (1.8)	17.3 (13.9)	20	42.6	1.8 (0.7)	12.6 (13.8)
Mayo Stage II: Cardiac Patients	44	84.6	21.1 (17.9)	35	67.3	10.86 (12.43)	51	98.1	36.0 (60.3)	46	88.5	15.9 (18.4)	32	61.5	3.9 (4.3)	11	21.2	1.1 (0.3)	31	59.6	2.7 (2.4)	15.8 (15.8)	23	44.2	1.8 (0.8)	11.0 (13.0)
Mayo Stage II: Treated+Cardiac Patients	26	89.7	24.9 (19.6)	23	79.3	15.39 (13.23)	28	96.6	49.9 (76.0)	27	93.1	21.0 (20.1)	17	58.6	3.7 (3.4)	6	20.7	1.0 (0.0)	17	58.6	2.7 (1.7)	18.8 (17.1)	14	48.3	1.9 (0.7)	14.9 (15.4)
	N	%	12-month mean (SD)	N	%	12-month mean (SD)	N	%	12-month mean (SD)	N	%	12-month mean (SD)	N	%	12-month mean (SD)	N	%	12-month mean (SD)	N	%	12-month mean (SD)	mean LOS (SD)	N	%	12-month mean (SD)	mean LOS (SD)
Mayo Stage IIIa: All Patients	26	83.9	20.9 (17.8)	19	61.3	9.63 (13.61)	30	96.8	31.4 (28.4)	28	90.3	20.8 (18.8)	15	48.4	3.1 (2.8)	6	19.4	1.3 (0.9)	22	71.0	2.7 (1.8)	19.32 (19.0)	19	61.3	2.3 (1.3)	13.0 (16.9)
Mayo Stage IIIa: Treated Patients	20	87.0	20.4 (16.2)	16	69.6	11.13 (14.39)	23	100.0	36.6 (29.0)	23	100.0	23.2 (18.9)	13	56.5	3.4 (3.0)	6	26.1	1.3 (0.9)	19	82.6	3.0 (1.8)	21.5 (19.5)	17	73.9	2.3 (1.4)	14.0 (17.6)
Mayo Stage IIIa: Cardiac Patients	21	84.0	21.4 (18.1)	17	68.0	9.35 (13.96)	25	100.0	33.8 (28.8)	24	96.0	23.0 (19.3)	12	48.0	2.9 (3.1)	5	20.0	1.4 (0.9)	19	76.0	2.9 (1.9)	17.8 (19.9)	16	64.0	2.3 (1.4)	14.6 (18.0)
Mayo Stage IIIa: Treated+Cardiac Patients	17	85.0	21.7 (16.8)	14	70.0	11 (14.95)	20	100.0	37.5 (29.6)	20	100.0	25.3 (19.3)	10	50.0	3.2 (3.4)	5	25.0	1.4 (0.9)	16	80.0	2.9 (1.9)	20.1 (20.9)	14	70.0	2.4 (1.5)	16.1 (18.8)
	N	%	12-month mean (SD)	N	%	12-month mean (SD)	N	%	12-month mean (SD)	N	%	12-month mean (SD)	N	%	12-month mean (SD)	N	%	12-month mean (SD)	N	%	12-month mean (SD)	mean LOS (SD)	N	%	12-month mean (SD)	mean LOS (SD)
Mayo Stage IIIb: All Patients	45	86.5	11.9 (12.6)	31	59.6	7.87 (9.83)	44	84.6	24.4 (39.4)	34	65.4	9.1 (8.3)	30	57.7	3.3 (2.9)	12	23.1	1.9 (1.2)	38	73.1	2.6 (2.0)	18.6 (15.3)	29	55.8	2.1 (1.1)	14.9 (15.2)
Mayo Stage IIIb: Treated Patients	29	82.9	13.5 (14.8)	22	62.9	9.68 (11.12)	29	82.9	20.5 (29.3)	24	68.6	10.5 (9.1)	20	57.1	3.7 (3.4)	8	22.9	2.0 (1.2)	27	77.1	2.8 (2.1)	18.1 (13.8)	20	57.1	2.2 (1.0)	14.0 (14.4)
Mayo Stage IIIb: Cardiac Patients	33	86.8	13.7 (14.0)	27	71.1	8.52 (10.35)	35	92.1	20.8 (28.6)	31	81.6	8.6 (6.7)	26	68.4	3.5 (3.1)	12	31.6	1.9 (1.2)	32	84.2	2.8 (2.0)	20.1 (14.9)	28	73.7	2.1 (1.0)	14.3 (15.1)
Mayo Stage IIIb: Treated+Cardiac Patients	22	81.5	15.6 (16.2)	20	74.1	10.05 (11.62)	25	92.6	17.1 (11.0)	23	85.2	9.3 (7.1)	18	66.7	3.8 (3.5)	8	29.6	2.0 (1.2)	23	85.2	3.1 (2.2)	20.5 (13.6)	20	74.1	2.2 (1.1)	14.0 (14.4)