

Direct Costs and Healthcare Resource Use Among Patients Newly Diagnosed with Advanced Urothelial Carcinoma

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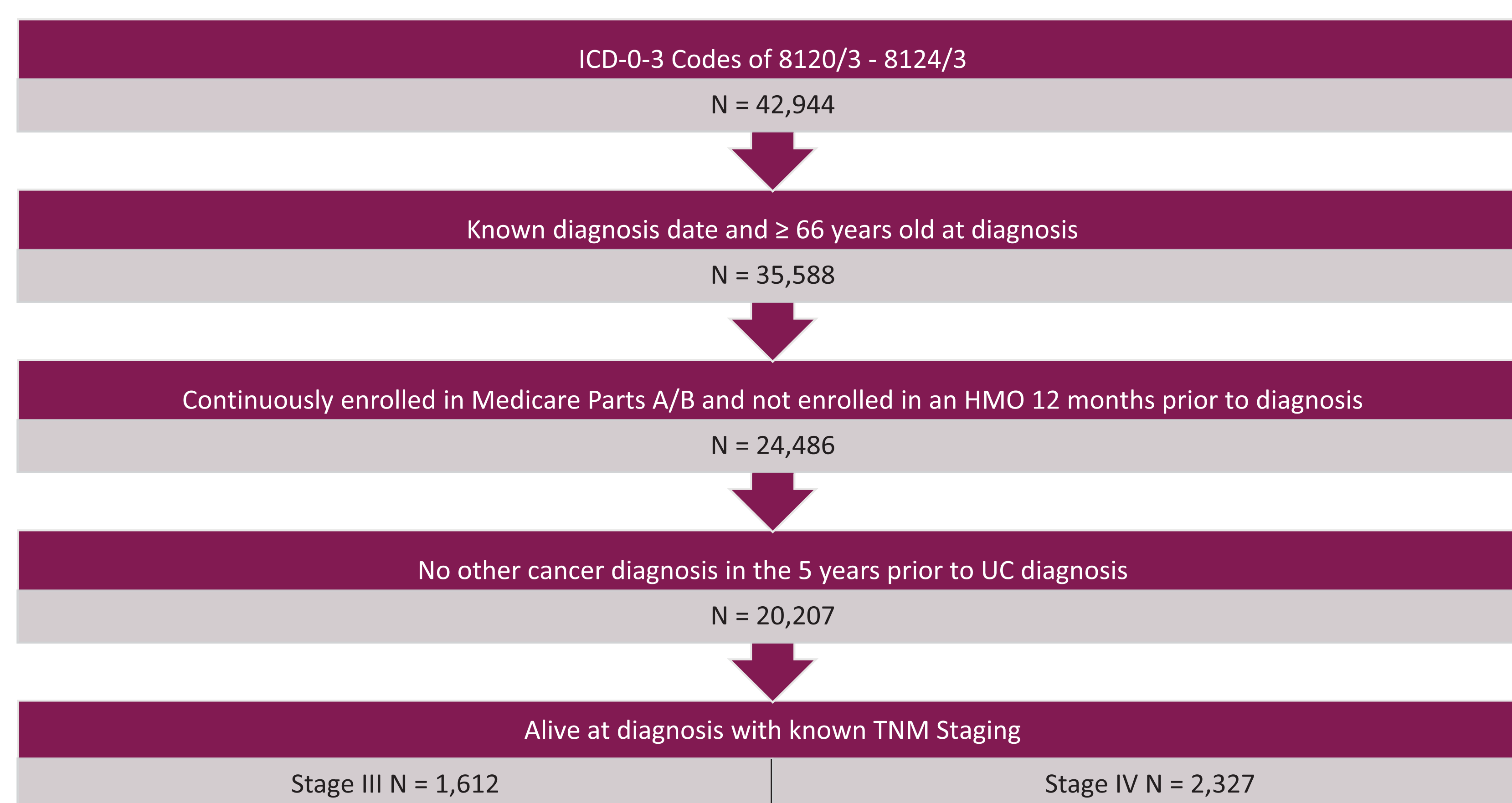
Background and Objective

- Bladder cancer is the sixth most common cancer in the United States, and urothelial carcinoma (UC) accounts for 90% of bladder tumors.^{1,2}
- UC is the most costly cancer in elderly patients.³
- About 25% of patients present with advanced disease at diagnosis.⁴
- The objective of this study was to describe healthcare resource use (HCRU) and costs incurred by patients newly diagnosed with stage III or IV UC.

Methods

- This was a retrospective cohort study design.
- Medicare patients newly diagnosed with UC between 2004 and 2013 with claims ending in 2014 were identified within the Surveillance, Epidemiology, and End Results (SEER)-Medicare linked database.
- Patients meeting the inclusion criteria in Figure 1 were followed from UC diagnosis to death or last follow-up.
- Healthcare resource use and costs were obtained from Medicare payment claims in the inpatient hospitalization (MEDPAR), outpatient (Medicare Part B), National Claims History (NCH), durable medical equipment (DME), home health (HHA), hospice, and prescription drug (Medicare Part D) files.
- Patients were stratified by whether they:
 - Did not receive systemic chemotherapy
 - Received (neo-)adjuvant chemotherapy without additional lines of chemotherapy (LOT)
 - Received ≥ 1 LOT

Figure 1. Patient Attrition



HMO, Health Maintenance Organization; ICD-O-3, International Classification of Diseases for Oncology, Third Edition; UC, urothelial carcinoma

Results

Patient Characteristics and Treatment

- 1,612 stage III and 2,327 stage IV patients met the inclusion criteria (Figure 1).
- Median age at diagnosis was 77 years, 66% of patients were male, and 29% had a Charlson Comorbidity Index ≥ 2 (Table 1).
- Median follow-up was 17 months for stage III patients and 8 months for stage IV patients.
- Over half of patients (63% of Stage III and 55% of Stage IV) did not receive systemic chemotherapy; and these patients were older, sicker, and had the shortest follow-up time.
- (Neo-)adjuvant chemotherapy without additional LOTs was received by 12% of stage III and stage IV patients.
- LOT1+ was received by 25% of stage III and 33% of stage IV patients.

Table 1. Patient Demographic and Clinical Characteristics by Stage at UC-Diagnosis

Characteristic	All Patients (N = 3,939)	Stage III (N = 1,612)	Stage IV (N = 2,327)	P value
Age at Diagnosis, Years, Median (IQR)	77 (72 to 82)	77 (72 to 82)	77 (71 to 82)	0.062
Male, N (%)	2,598 (66.0)	1,115 (69.2)	1,483 (63.7)	<0.001
Race/Ethnicity, N (%)				
Non-Hispanic White	3,340 (84.8)	1,390 (86.2)	1,950 (83.8)	0.038
Non-Hispanic Black	268 (6.8)	94 (5.8)	174 (7.5)	
Hispanic	176 (4.5)	60 (3.7)	116 (5.0)	
Other	155 (3.9)	68 (4.2)	87 (3.7)	
Census Location, N (%)				
West	1,665 (42.3)	661 (41.0)	1,004 (43.1)	0.186
South	928 (23.6)	408 (25.3)	520 (22.3)	
Northeast	871 (22.1)	353 (21.9)	518 (22.3)	
Midwest	475 (12.1)	190 (11.8)	285 (12.2)	
Charlson Comorbidity Index, N (%)				
0	1,846 (46.9)	749 (46.5)	1,097 (47.1)	0.163
1	971 (24.7)	425 (26.4)	546 (23.5)	
2	515 (13.1)	204 (12.7)	311 (13.4)	
3+	607 (15.4)	234 (14.5)	373 (16.0)	
Number of lines of chemotherapy, N (%)				
No Chemotherapy	2,295 (58.3)	1,011 (62.7)	1,284 (55.2)	<0.001
(Neo-)Adjuvant Only	477 (12.1)	191 (11.8)	286 (12.3)	0.676
LOT1+	1,167 (29.6)	410 (25.4)	757 (32.5)	<0.001
LOT2+	417 (10.6)	125 (7.8)	292 (12.5)	<0.001
LOT3+	144 (3.7)	44 (2.7)	100 (4.3)	0.010

IQR, interquartile range; LOT, line of therapy

Healthcare Resource Use

Cystectomy

- 47% of stage III and 30% of stage IV patients received a cystectomy.
- Median time to cystectomy was 2.5 months after UC-diagnosis for both stage III and stage IV patients.

Imaging

- Patients who received LOT1+ had multiple cystoscopies, with a median (interquartile range [IQR]) per patient of 3 (1 – 5) for stage III and 2 (1 – 3) for stage IV patients (Table 2).
- Patients who received LOT1+ had multiple computed tomography (CT) scans, with a median (IQR) per patient of 6 (4 – 10) for stage III and 5 (3 – 8) for stage IV patients.
- Additional imaging procedures received by patients included bone scan (41% stage III, 48% stage IV), magnetic resonance imaging (MRI); 26% stage III, 28% stage IV), and positron emission tomography-computed tomography (PET-CT); 21% stage III, 24% stage IV).

Admissions

- More than half of patients had a UC-related hospitalization, with a median length of stay (LOS) of 10-14 days (Table 2).
- Although a higher proportion of patients treated with chemotherapy had a UC-related intensive care unit (ICU) visit, the median LOS (4 - 5 days) was similar regardless of stage or receipt of chemotherapy.
- The proportion of patients with at least one UC-related emergency department (ED) visit was lowest in those not treated with chemotherapy.

Table 2. Healthcare Resource Use by Stage at Diagnosis and Receipt of Chemotherapy

UC is a resource intensive disease with more than half of LOT1+ patients having hospitalization and emergency department admissions.

UC-related HCRU	Stage III			Stage IV		
	No Chemotherapy (N = 1,011)	(Neo-)adjuvant only (N = 191)	LOT1+ (N = 410)	No Chemotherapy (N = 1,284)	(Neo-)adjuvant only (N = 286)	LOT1+ (N = 757)
Admissions						
Office visit						
N (%)	919 (90.9)	191 (100)	398 (97.1)	1,103 (85.9)	286 (100)	735 (97.1)
Visits PPPM, Mean (SD)	1.1 (2.5)	1.5 (1.1)	1.4 (1.1)	1.9 (4.8)	1.8 (1.0)	2 (1.3)
Emergency department						
N (%)	319 (31.6)	96 (50.3)	191 (46.6)	475 (37)	151 (52.8)	433 (57.2)
Visits PPPM, Mean (SD)	0.1 (1.0)	0.05 (0.08)	0.07 (0.1)	0.3 (1.8)	0.08 (0.1)	0.1 (0.2)
Hospitalization						
N (%)	465 (46)	135 (70.7)	224 (54.6)	585 (45.6)	207 (72.4)	480 (63.4)
Length of stay, Median (IQR)	10 (6 to 19)	11 (7 to 21)	11.5 (6 to 22)	10 (5 to 17)	14 (8 to 24)	11 (5 to 20)
Intensive Care Unit						
N (%)	190 (18.8)	74 (38.7)	90 (22)	206 (16)	99 (34.6)	173 (22.9)
Length of stay, Median (IQR)	5 (3 to 9)	5 (3 to 10)	5 (3 to 8)	5 (3 to 8)	4 (3 to 8)	5 (2 to 9)
Imaging						
CT-Scan						
N (%)	922 (91.2)	190 (99.5)	404 (98.5)	1,131 (88.1)	286 (100)	736 (97.2)
Median (IQR) †	3 (2 to 6)	7 (4 to 10)	6 (4 to 10)	2 (1 to 3)	7 (4 to 9)	5 (3 to 8)
Cystoscopy						
N (%)	779 (77.1)	153 (80.1)	361 (88.0)	781 (60.8)	233 (81.5)	623 (82.3)
Median (IQR) †	1 (1 to 2)	1 (1 to 2)	3 (1 to 5)	1 (0 to 1)	1 (1 to 2)	2 (1 to 3)
TURBT						
N (%)	819 (81)	179 (93.7)	327 (79.8)	921 (71.7)	266 (93)	587 (77.5)
Median (IQR) †	1 (1 to 1)	1 (1 to 1)	1 (1 to 2)	1 (0 to 1)	1 (1 to 2)	1 (1 to 2)
Bone Scan						
N (%)	335 (33.1)	99 (51.8)	227 (55.4)	498 (38.8)	176 (61.5)	431 (56.9)
Median (IQR) †	0 (0 to 1)	1 (0 to 1)	1 (0 to 1)	0 (0 to 1)	1 (0 to 1)	1 (0 to 1)
MRI						
N (%)	213 (21.1)	60 (31.4)	152 (37.1)	265 (20.6)	104 (36.4)	293 (38.7)
Median (IQR) †	0 (0 to 0)	0 (0 to 1)	0 (0 to 1)	0 (0 to 0)	0 (0 to 1)	0 (0 to 1)
PET-CT						
N (%)	115 (11.4)	66 (34.6)	158 (38.5)	149 (11.6)	102 (35.7)	319 (42.1)
Median (IQR) †	0 (0 to 0)	0 (0 to 1)	0 (0 to 1)	0 (0 to 0)	0 (0 to 1)	0 (0 to 1)

†Imaging per patient

HCRU, health care resource use; IQR, interquartile range; LOT, line of therapy; PPPM, per patient per month; SD, standard deviation; UC, urothelial carcinoma; CT, Computed tomography; MRI, Magnetic resonance imaging; PET-CT, positron emission tomography-computed tomography; TURBT, transurethral resection of bladder tumor.

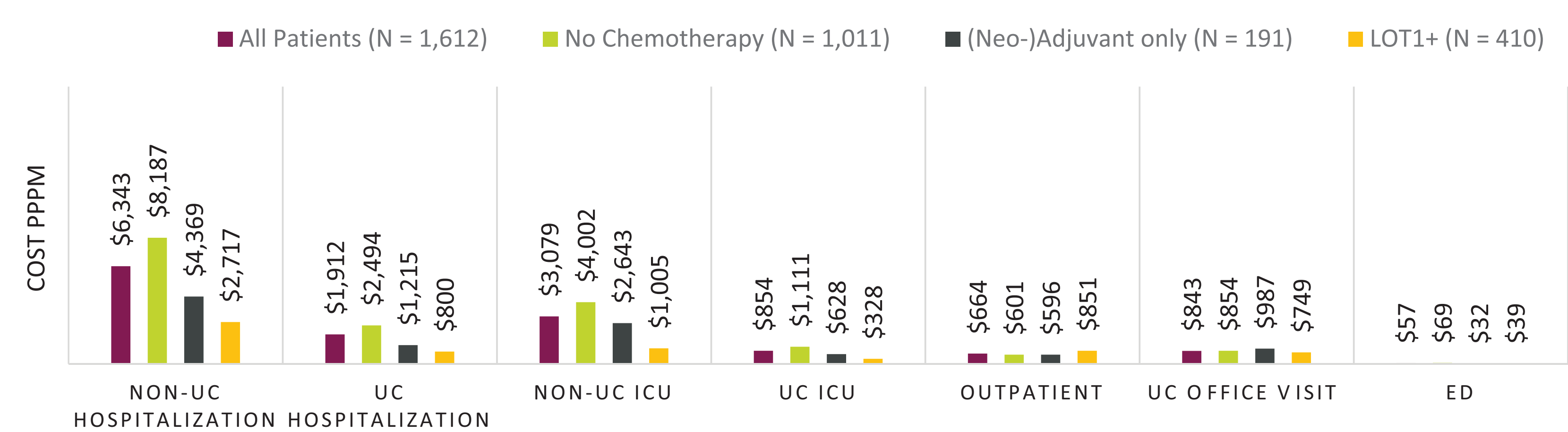
Costs

- Total cumulative lifetime costs for stage III and IV patients over the follow-up period was \$190,996 and \$117,503, respectively (data not shown).
- For both stage III and IV, patients who did not receive chemotherapy had the highest per patient per month (PPPM) hospitalization, ICU, and ED costs compared to patients who received (neo-)adjuvant chemotherapy only or LOT1+ (Figure 2a/2b).
- For stage III patients, (neo-)adjuvant chemotherapy patients had the highest UC-related office visit costs and LOT1+ patients the highest outpatient costs.
- Stage IV patients not treated with chemotherapy had the highest outpatient and UC-related office visit costs.

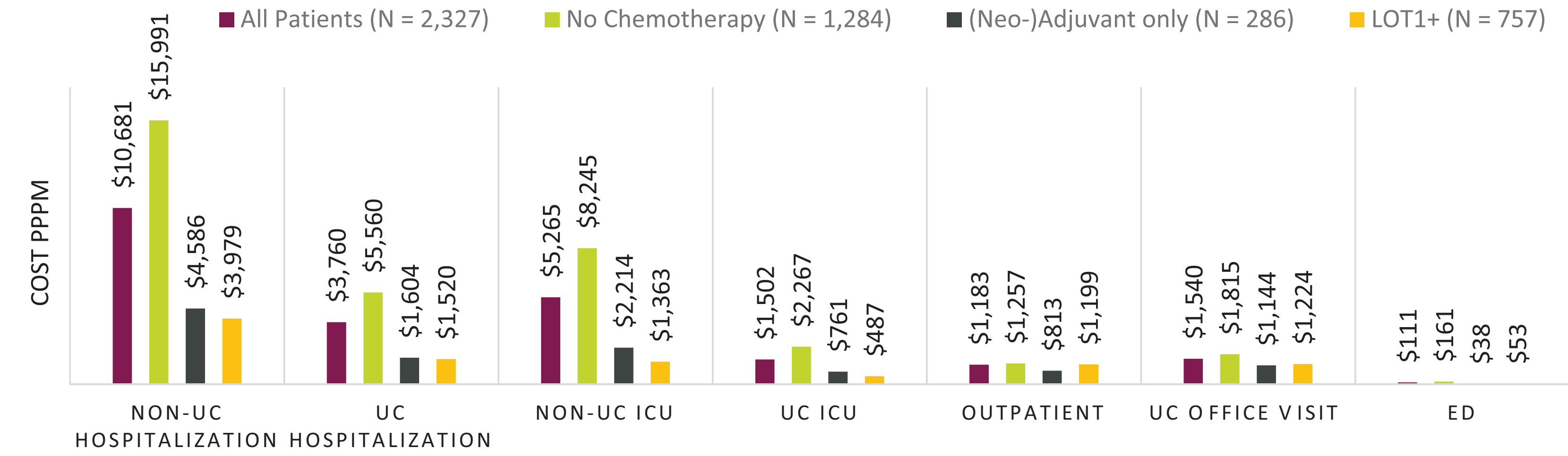
Figure 2a and 2b. Mean PPPM Costs by Setting of Care

Patients not treated with chemotherapy generally had higher PPPM costs, especially hospitalization costs.

2A. STAGE III



2B. STAGE IV



PPPM, per patient per month; UC, urothelial carcinoma; ICU, intensive care unit; ED, emergency department; LOT, line of therapy

Limitations

- Results are not generalizable to younger or non-Medicare populations.
- ICD-9/10 and HCPCS codes were used to define specific HCRU which may be subject to coding errors.
- Analyses are reflective of treatments for UC that were available from 2004 to 2014, thus immunology therapies were not available for analysis.

Conclusion

- Over half of UC patients did not receive chemotherapy.
- Patients not receiving chemotherapy were older and sicker, and incurred the highest monthly costs; patients receiving ≥ 1 LOT had the lowest monthly costs.
- As immunotherapy becomes integrated with the treatment landscape, this study provides a benchmark for the relative costs associated with current UC treatment.

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Disclosure

This study was sponsored by AstraZeneca. AA, YD, and RS are employees and own stock of AstraZeneca. CJ and LL are employees of Pharmerit International and were consultants for AstraZeneca. AH was a consultant to AstraZeneca.