

Healthcare burden associated with cystectomy and trimodal therapy among patients with muscle invasive bladder cancer in the United States

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Key Takeaway



Patients with MIBC incur significant healthcare costs in the US, especially those undergoing CYS or receiving TMT, underscoring the necessity for effective new treatment options for this population, including those who are older or with more comorbidities who may not be candidates for surgery

Conclusions



In the CYS subgroup, all-cause healthcare costs in the US amounted to \$1,327 PPPM during the ≥12-month baseline period and \$11,342 PPPM over a mean follow-up period of 23.7 months



In the TMT subgroup, all-cause healthcare costs in the US amounted to \$1,990 PPPM during the ≥12-month baseline period and \$11,579 PPPM over a mean follow-up period of 19.0 months



The higher healthcare costs in the US after MIBC were mostly driven by inpatient costs among patients with CYS and outpatient costs among patients receiving TMT



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Background

- Muscle invasive bladder cancer (MIBC) accounts for approximately 25% of newly diagnosed bladder cancer (BC) cases¹ and prognosis is poor, with only 40% surviving 5 years post-diagnosis²
- Current treatments for MIBC include radiotherapy, systemic antineoplastic therapy, cystectomy (CYS), and trimodal therapy (TMT)^{3,4}
- Radical CYS is associated with significant surgery-related complications, a 90-day post-operative mortality rate of up to 9%, and substantial negative impacts on patients’ social and emotional functioning^{5,6} while TMT is associated with worse long-term survival than radical CYS⁷
- Prior research has estimated the healthcare costs associated with BC by stage, with one claims-based analysis reporting lifetime per-patient direct healthcare costs of \$149,728 for stage II (ie, T2) and \$190,996 for stage III (ie, T3–T4) BC among Medicare beneficiaries⁸
- However, data characterizing the economic burden of MIBC among patients treated with CYS and TMT are limited

Objective

- To describe real-world healthcare costs of patients with MIBC, particularly those treated with CYS or TMT, in the US

Methods

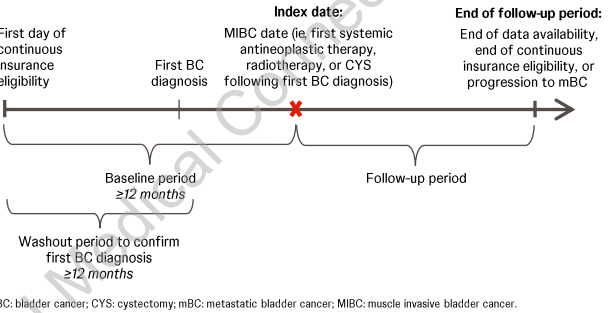
Data source

- The following data sources from IBM® MarketScan® were used:
 - Commercial and Medicare Supplemental Databases (1/1/2010–2/28/2021), comprising data on over 264 million individuals (employees covered by employer-sponsored private health insurance, their spouses, and dependents), as well as retirees with employer-paid Medicare Supplemental insurance
 - Multi-State Medicaid Database (1/1/2010–12/31/2019), containing the pooled healthcare experience of approximately 7 million Medicaid enrollees from 11 states
- Data were de-identified and comply with the Health Insurance Portability and Accountability Act (HIPAA) regulations

Study design and study population

- A retrospective longitudinal study design was used (**Figure 1**)
- Given the lack of an International Classification of Diseases, Ninth/Tenth Revision, Clinical Modification (ICD-9-CM/ICD-10-CM) diagnosis code for MIBC, patients were considered as having MIBC if they had a claim for any systemic antineoplastic therapy, radiotherapy, or CYS following the first observed BC diagnosis code (ICD-9-CM: 188; ICD-10-CM: C67); the first claim for any of the MIBC indicators described above was defined as the index date
- The baseline period spanned the entire period of eligibility preceding the index date (≥12 months); a washout period of ≥12 months of continuous eligibility prior to the first BC diagnosis was required to confirm identification of the initial BC diagnosis
- The follow-up period spanned from the index date until the earliest of end of data availability, end of continuous insurance eligibility, or the censoring date associated with diagnosis of metastatic BC
- CYS was identified based on the occurrence of either partial or radical removal of the bladder following the first observed BC diagnosis
- TMT was identified based on initiation of concurrent radiotherapy and chemotherapy within 14 days of each other, and within 80 days following a transurethral resection of bladder tumor (TURBT)
- The sample selection criteria used to identify the study population are presented in **Figure 2**

Figure 1: Study design scheme



Results

Patient characteristics

- A total of 2,249 patients with MIBC were analyzed, among whom 456 (20.3%) had CYS and 183 (8.1%) had TMT
- Patient characteristics evaluated over the ≥12-month baseline period are presented in **Table 1**

Table 1: Baseline patient characteristics

	Total MIBC population N = 2,249	CYS subgroup N = 456	TMT subgroup N = 183
Age at index date, mean ± SD [median]	65.3 ± 12.9 [64.0]	63.4 ± 9.9 [62.0]	75.4 ± 11.1 [78.0]
Sex, n (%)			
Male	1,597 (71.0)	344 (75.4)	126 (68.9)
Female	652 (29.0)	112 (24.6)	57 (31.1)
Year of index date, n (%)			
2011-2013	805 (35.8)	158 (34.6)	80 (43.7)
2014-2017	984 (43.8)	203 (44.5)	82 (44.8)
2018-2021	460 (20.5)	95 (20.8)	21 (11.5)
Payer at index date, n (%)			
Commercial	1,146 (51.0)	273 (59.9)	41 (22.4)
Medicare	977 (43.4)	162 (35.5)	138 (75.4)
Medicaid	126 (5.6)	21 (4.6)	4 (2.2)
Time from first BC diagnosis to index date ¹ , mean ± SD [median]	6.6 ± 13.0 [1.4]	2.3 ± 5.6 [1.2]	4.1 ± 8.4 [1.7]
Prior BC-related diagnostic and treatment received ¹ , n (%)			
Imaging	2,171 (96.5)	437 (95.8)	182 (99.5)
Cystoscopy/cystourethroscopy	1,982 (88.1)	399 (87.5)	182 (99.5)
TURBT	1,333 (59.3)	341 (74.8)	178 (97.3)
Urinary bladder catheterization	411 (18.3)	82 (18.0)	50 (27.3)
Intravesical therapy	221 (9.8)	36 (7.9)	22 (12.0)
Quan-CCI ¹ , mean ± SD [median]	3.7 ± 2.4 [3.0]	3.3 ± 2.0 [3.0]	4.6 ± 2.2 [4.0]
Comorbidities ¹ , n (%)			
Urinary tract infection	1,054 (46.9)	241 (52.9)	94 (51.4)
Smoking	754 (33.5)	180 (39.5)	56 (30.6)
Kidney stone	393 (17.5)	77 (16.9)	25 (13.7)
Bladder stone	66 (2.9)	15 (3.3)	5 (2.7)

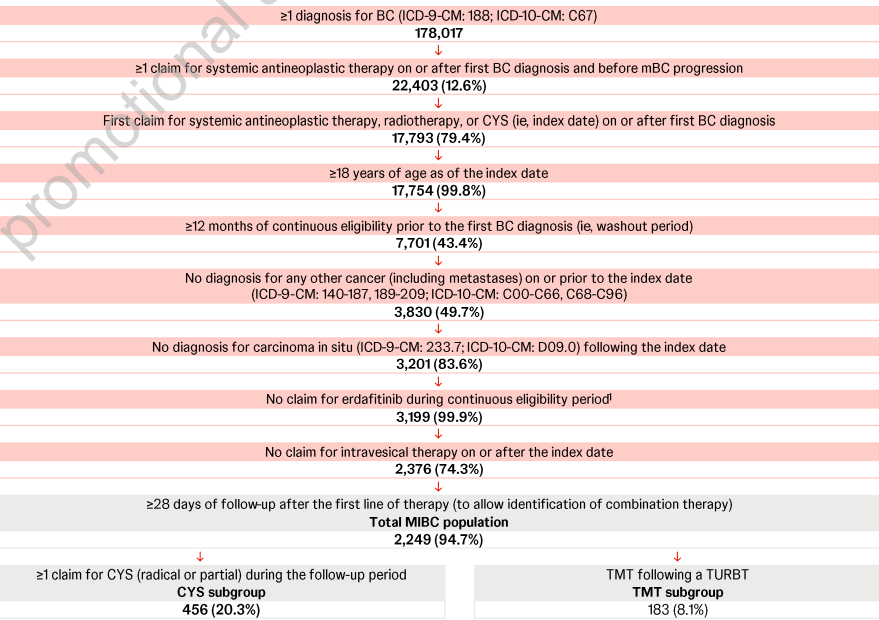
BC: bladder cancer; CCI: Charlson Comorbidity Index; CYS: cystectomy; MIBC: muscle-invasive bladder cancer; SD: standard deviation; TMT: trimodal therapy; TURBT: transurethral resection of bladder tumor.

Note:
1. Diagnoses, testing, and treatments received were assessed during the baseline period which spanned the entire period of eligibility prior to the index date (≥12 months).

References

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Figure 2: Sample selection



BC: bladder cancer; CYS: cystectomy; ICD-9-CM/ICD-10-CM: International Classification of Disease, Ninth/Tenth Revision, Clinical Modification; mBC: metastatic bladder cancer; MIBC: muscle invasive bladder cancer; TMT: trimodal therapy; TURBT: transurethral resection of bladder tumor.

Note:
1. Approved for metastatic urothelial carcinoma with fibroblast growth factor receptor (FGFR)3 or FGFR2 genetic alterations.

Study measures and statistical analysis

- Comprehensive all-cause healthcare costs (2021 US dollars), which included both payer costs and patient out-of-pocket costs, were reported per-patient-per-month (PPPM) during the baseline (≥12 months) and follow-up periods for the total MIBC population as well as separately for the CYS and TMT subgroups
- Healthcare costs were further stratified by inpatient, outpatient, and other categories. Other healthcare costs included pharmacy, emergency room, durable medical equipment, dental care and vision care costs
- Results were reported descriptively using means, standard deviations (SDs), and medians for continuous variables, and frequencies and proportions for categorical variables

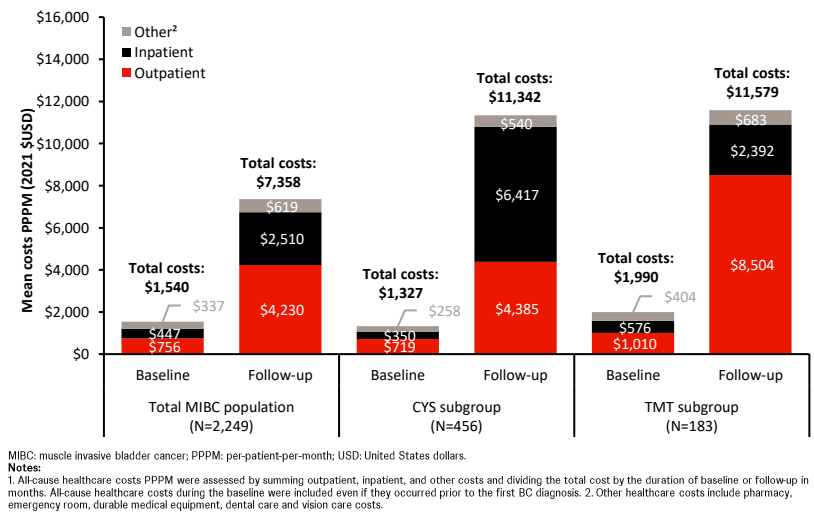
Treatment patterns

- Overall, the median follow-up time was 13.2 months (CYS: 17.1 months; TMT: 13.4 months)
- Among patients with CYS, the median time from the index date to CYS was 3.3 months
- Among patients with TMT, 8 (4.4%) had a CYS and the median time from the index date to CYS was 5.9 months

Healthcare costs (Figure 3)

- Mean healthcare costs for MIBC patients were higher in the follow-up (\$7,358 PPPM) than baseline period (\$1,540 PPPM)
- The difference in follow-up and baseline healthcare costs was greater for patients with CYS (follow-up: \$11,342 PPPM, baseline: \$1,327 PPPM) and TMT (follow-up: \$11,579 PPPM, baseline: \$1,990 PPPM)
- Monthly healthcare costs were highest during the first month of treatment for patients with CYS (\$61,963) and TMT (\$31,902)

Figure 3: Comprehensive (payer and patient paid) all-cause healthcare costs during the baseline and follow-up periods¹



MIBC: muscle invasive bladder cancer; PPPM: per-patient-per-month; USD: United States dollars.

Notes:
1. All-cause healthcare costs PPPM were assessed by summing outpatient, inpatient, and other costs and dividing the total cost by the duration of baseline or follow-up in months. All-cause healthcare costs during the baseline were included even if they occurred prior to the first BC diagnosis. 2. Other healthcare costs include pharmacy, emergency room, durable medical equipment, dental care and vision care costs.

Limitations

- Coding inaccuracies and omissions in the claims data may have led to misidentification of patients with MIBC
- Additionally, given the lack of staging information in claims data, MIBC stage could not be confirmed. To minimize the risk of misclassification, patients were required to have evidence of treatment for MIBC (ie, systemic antineoplastic therapy, radiotherapy, or CYS) following the first recorded BC diagnosis and no record of intravesical treatment following MIBC treatment
- The risk of identifying patients who used antineoplastic agents for cancers other than BC existed, but was minimized by the exclusion of patients with other cancers prior to BC diagnosis
- The study findings may not be generalizable to patients without health insurance coverage

