An Assessment of the Direct and Indirect Costs of Bladder Cancer Preceding and Following a Cystectomy: A Real-World Evidence Study

Joseph Tkacz[1], Andrea Ireland[2], Kris Norris[1], Barnabie Agatep[1], Craig Forman[1], Lorie Ellis[2], Ali Raza Khaki[3]

[1]Inovalon, Bowie, MD, United States; [2]Janssen Pharmaceuticals, Titusville, NJ, United States; [3]Stanford University, Stanford, CA, United States

BACKGROUND

- Bladder cancer is the 4th most common cancer in men and 12th most common cancer in women, making it the 6th most common cancer in the United States (U.S.) overall[1]
- Between 2012-2018, the 5-year relative survival rate was estimated at 77.1%[2]
- Some models have estimated the total medical costs of bladder cancer in the U.S. to be approximately 6 billion USD annually[3-5]
- Neoadjuvant chemotherapy followed by radical cystectomy (removal of all or parts of the bladder) is a standard treatment for stage II and III bladder cancer,[6] along with non-muscle invasive bladder cancer patients classified as high risk or BCG-unresponsive; however, this treatment is associated with a significant economic burden due to elevated resource utilization, inclusive of hospital, laboratory, and pharmacy costs[7]
- Further, indirect costs due to delayed mobilization and pain may prolong hospitalization and recovery, which may impact work productivity
- Currently, these indirect costs of bladder cancer are not well understood

OBJECTIVE

- To estimate the direct and indirect costs of bladder cancer prior to and following cystectomy

METHODS

Data source

- This study utilized the following databases:
  - The MarketScan Commercial Claims & Encounters Databases (10/1/2015 – 12/31/20) which contains the inpatient, outpatient medical, and outpatient prescription-drug experience of several million employees and their dependents
  - The Health & Productivity Management (HPM) Databases which contain absenteeism, short-term disability (STD), and long-term disability (LTD) data among a subset of patients

Sample selection

- The sample selection criteria may be viewed in **Figure 1**
- Adult patients 18+ years were required to present a bladder cancer diagnosis and cystectomy procedure on the same visit (index date), and were required to present ≥ 6 months of continuous enrollment/ data availability in each claims and productivity management databases both preceding (baseline period) and following (follow-up period) the index date
- Patients were excluded if they presented any claims for erdafitinib

FIGURE 1: Sample selection

Diagnosis Criteria: ≥1 claim with a Current Procedural Terminology (CPT) code for cystectomy and an International Classification of Disease (ICD-10) code of bladder cancer
N=1,359

↓

Age Criteria: Age ≥18 at the index date
N=1,355

↓

Exclusion Criteria: Patients with ≥1 pharmacy claim (i.e., National Drug Code (NDC) of Balversa (erdafitinib) any time during the study period will be excluded from the analysis
N=1,351

↓

Enrollment Criteria: ≥6 months of continuous enrollment with both medical and pharmacy benefits before and after the index date in the Commercial Claims and Encounters database
N=720

↓

Enrollment Criteria 1: ≥6 months of continuous data availability before and after the index date in the Health and Productivity Management database
N=142

Outcomes

- Patient demographics were assessed on the index date, while clinical characteristics were assessed during the 6-month baseline period

Direct Costs

- All-cause and bladder cancer-related healthcare resource use and expenditure were reported in the service categories of physician office, emergency room, durable medical equipment, supportive care, inpatient hospital, and pharmacy in the baseline and follow-up periods
  - Bladder-cancer related costs included any inpatient admission with a primary diagnosis of bladder cancer, any outpatient claim with a bladder cancer diagnosis anywhere on the claim, and any prescription fill for a treatment indicated for bladder cancer
- Summary total medical (inpatient and outpatient) and total healthcare (total medical and pharmacy) cost variables were also computed, and all costs were adjusted for inflation to 2021 dollars using the medical care component of the Consumer Price Index obtained from the U.S. Bureau of Labor Statistics[8]

Indirect Costs

- Indirect costs attributable to absence, STD, and LTD were assessed for all patients during the 6-month baseline and follow-up periods
  - Total hours lost and total costs were assessed for absences, STD claims, and LTD claims
  - Wages for absence-related costs were based on the 2021 geographic region-adjusted mean wage rate reported by the U.S. Bureau of Labor Statistics[9]

Analyses

- All analyses were descriptive in nature; means and standard deviations are presented for continuous variables, while frequencies and proportions are presented for categorical variables

RESULTS

Patient characteristics

- Patient demographic characteristics may be viewed in **Table 1**
- The mean ± standard deviation (SD) patient age was 56±6 years; the majority of patients were male (76%)
- Patients presented a mean±SD Deyo-Charlson Comorbidity Index of 1.9±0.9
- 48% of patients presented with comorbid hypertension, and over 36% of patients were active smokers

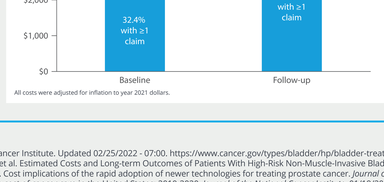
TABLE 1: Patient demographics

Measures	N=142	
	Mean/N	SD/%
Age in years (Mean, SD)	**56.3**	**5.8**
Age Category (N, %)		
30-39 years	2	1.4%
40-49 years	13	9.2%
50-64 years	127	89.4%
Sex (N, %)		
Male	108	76.1%
Female	34	23.9%
U.S. Census Region (N, %)		
Northeast	20	14.1%
Midwest	40	28.2%
South	60	42.3%
West	22	15.5%
Insurance Type (N, %)		
Comprehensive	8	5.6%
Preferred provider organization	58	40.8%
Health maintenance organization	16	11.3%
Other	60	42.3%
Employment Status (N, %)		
Active Full Time	101	71.1%
Active Part Time or Seasonal	4	2.8%
COBRA Continuee	1	0.7%
Long Term Disability	11	7.7%
Other/Unknown	25	17.6%
Comorbidities (N, %)		
Hypertension	68	47.9%
Tobacco Use	51	35.9%
Cardiovascular Disease	30	21.1%
Anxiety	23	16.2%

Direct costs

- Total direct healthcare costs nearly doubled from pre- to post-cystectomy (**Figure 2**)

FIGURE 2: Total mean direct healthcare costs pre- and post-cystectomy



All costs were adjusted for inflation to year 2021 dollars.

- Pre-cystectomy total healthcare costs were driven by costs associated with physician office visits (81.3%), while post cystectomy inpatient costs contributed to 77.1% of total healthcare costs (**Table 2**)

TABLE 2: Specific healthcare costs pre- and post-cystectomy

Care Setting	Mean		Change
	Pre	Post	
Physician Office/Clinic Costs	$41,843	$16,713	**-$25,130**
Emergency Department Costs	$529	$589	$60
Other Outpatient Costs	$2,628	$3,049	$421
Inpatient Hospital Costs	$4,842	$76,727	$71,885
Durable Medical Equipment Costs	$152	$990	$838
Supportive Care Costs	$16,461	$7,096	**-$9,365**
Pharmacy Costs	$1,812	$1,221	**-$591**
Total Medical Costs	$49,661	$98,303	$48,642
Total Healthcare Costs	$51,473	$99,524	$48,051

All costs were adjusted for inflation to year 2021 dollars.

Indirect costs

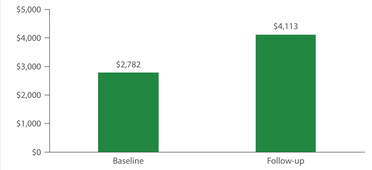
- 32.4% of patients filed ≥ 1 STD claim during the baseline period, which increased to 44.0% of patients during the follow-up; costs associated with STD claims increased from pre- to post-cystectomy (**Figure 3**)

FIGURE 3: Mean short term disability costs pre- and post-cystectomy

All costs were adjusted for inflation to year 2021 dollars.

- The proportion of patients presenting with ≥ 1 LTD claim was 1.4% in the baseline period and increased to 2.8% in the follow-up period. Likewise, the proportion of patients presenting with ≥ 1 workplace absence increased from 4.9% in the baseline period to 5.6% in the follow-up period
- Total indirect costs associated with absences, STD claims, and LTD claims increased 47.8% pre- to post-cystectomy (**Figure 4**)

FIGURE 4: Total mean indirect costs pre- and post-cystectomy



All costs were adjusted for inflation to year 2021 dollars.

Discussion

- Bladder cancer patients in the present study presented elevated direct and indirect costs in the 6-month period following a cystectomy procedure
- Direct healthcare costs nearly doubled from ~$51,000 per patient to ~$99,000 per patient in the time period preceding and following surgery
- In addition, the rates of absences, STD claims, and LTD claims also increased from pre- to post-cystectomy, leading to overall elevated indirect costs also associated with this procedure

LIMITATIONS

- The study was limited to only those individuals < age of 65 with continuous commercial health coverage, and results may not be generalizable to patients receiving Medicare or those with other or no insurance
- It is difficult to discern non-muscle invasive bladder cancer (NMIBC) and muscle invasive bladder cancer (MIBC) patient subtypes in claims data, and the treatment pathways prior to cystectomy are likely different across these cohorts. Future analyses should examine neoadjuvant therapy patterns among patients receiving a cystectomy
- For a subset of patients, a portion of the data collection period coincided with the COVID-19 pandemic, during which time there was a restriction in access to care in the U.S. This may have also affected indirect costs, as patients were more likely to telework during this period, potentially decreasing the likelihood of filing for disability
- Patients in the HPM database represent a small subset of the overall sample available in the MarketScan databases; additionally, for some patients in the HPM database, costs directly associated with absences were unavailable, requiring imputation; additionally, specific reasons for the time missed from work may not be clearly delineated, as bladder cancer may only be partly associated with observed productivity losses

CONCLUSIONS

- The present findings quantify the substantial economic burden cystectomy imposes on bladder cancer patients and to society, which includes increased direct healthcare costs, along with decreased work productivity following the procedure
- Results highlight the need for additional bladder-sparing treatment options within the bladder cancer treatment landscape, which may aid to reduce costs and improve patient quality of life

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DISCLOSURES

J. Tkacz, K. Norris, B. Agatep and C. Forman, employees of Inovalon, assisted with design and analysis of this research on behalf of Janssen Scientific Affairs. Scientific interpretation and oversight were provided by A. Ireland and L. Ellis who are employees of Janssen Scientific Affairs and are stockholders in Johnson and Johnson. Dr. A. Khaki provided medical and scientific expertise as a consultant to Janssen Scientific Affairs.

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