

# Real-World Healthcare Resource Utilization and Economic Burden Among Patients with High-Risk Carcinoma-in-situ Non-Muscle Invasive Bladder Cancer: A Cohort Study Using a Large Medicare Dataset

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### Key Takeaways

- Patients with high-risk CIS NMIBC, especially those treated with iBCG and iGEM experienced high all-cause and BC-related healthcare costs and HCRU during the study period
- Disease progression, recurrence, and comorbidities among high-risk patients are likely to contribute to increased inpatient stays, more frequent physician visits, and greater use of outpatient services compared to the low-risk population
- Inpatient costs accounted for nearly 50% of both all-cause and BC-related healthcare expenditures

### Conclusions

- Patients with high-risk CIS NMIBC treated with iBCG and iGEM face substantial all-cause and BC-related HCRU and economic burden
- New treatments that reduce HCRU could provide significant benefits for both patients and the health system

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**Disclosures**  
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## Introduction

- Bladder cancer (BC) is the sixth most common cancer in the United States (US), with non-muscle invasive bladder cancer (NMIBC) accounting for 75% of cases<sup>1</sup>
- BC is among the most expensive cancers to treat in the US, with total treatment costs for newly diagnosed and recurrent cases exceeding an estimated \$6.5 billion in 2021<sup>2</sup>
- Carcinoma-in-situ (CIS) NMIBC, a high-risk subtype, has a high likelihood of progression despite common treatments such as intravesical Bacillus Calmette-Guérin (iBCG) and intravesical gemcitabine (iGEM)<sup>3</sup>
- Real-world data on the economic burden of CIS NMIBC are limited

## Objective

- To assess healthcare resource utilization (HCRU ) and costs among Medicare beneficiaries with high-risk CIS NMIBC treated with iBCG or iGEM

## Methods

### Study design and data source

- This is a retrospective cohort study using the Surveillance, Epidemiology, and End Results (SEER)–Medicare database

### Study cohort selection criteria

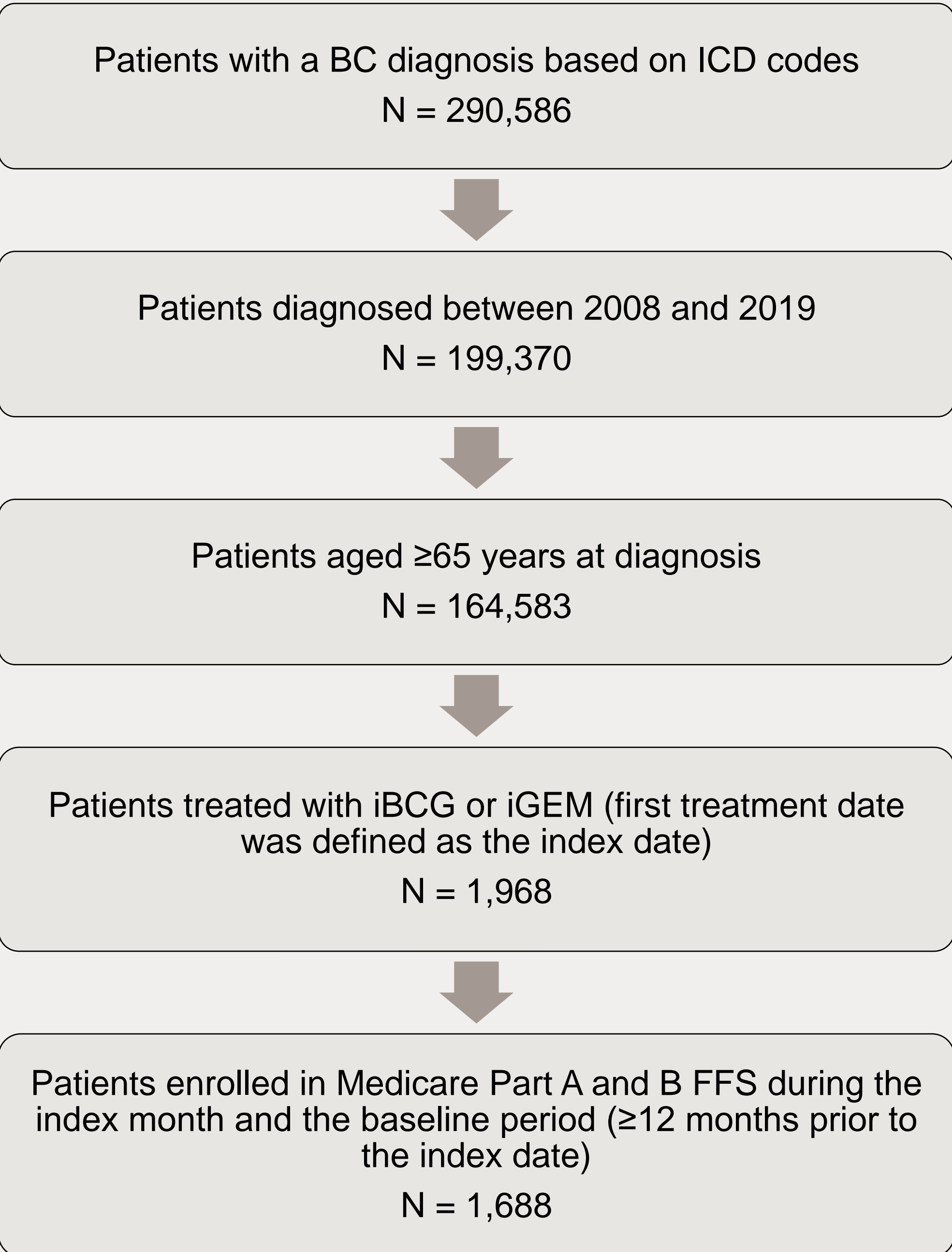
- Medicare beneficiaries newly diagnosed with bladder cancer at age 65 or older between 2008 and 2019
- Tumor, Node, Metastasis (TNM) stage of Tis, N0, M0

## Results

### Patient Characteristics

- A total of 1,688 patients met the study selection criteria, including 1,662 patients treated with iBCG and 26 patients treated with iGEM (**Figure 1**)
- Patient demographic and baseline clinical characteristics are summarized in **Table 1**

Figure 1. Patient Flowchart



Abbreviations: BC, bladder cancer; iBCG, intravesical Bacillus Calmette Guérin; CIS, carcinoma in situ; FFS, Fee-For-Service; iGEM, intravesical gemcitabine; ICD, International Classification of Diseases; NMIBC, non-muscle invasive bladder cancer.

### HCRU

- During a mean follow-up period of 4.6 years, high percentage of patients had all-cause and BC-related physician office visits (99.3% vs 92.4%), received outpatient services (97.0% vs 73.2%), and had cystoscopy or cystourethroscopy (96.4% vs 86.5%)
- Additionally, a majority of patients had all-cause emergency room visits (75.6%) and hospital admissions (67.7%)
- The mean HCRU rate was 1.0 (SD, 2.6) for emergency room visits, 1.0 (SD, 2.9) for the hospital admissions, 14.2 (SD, 9.8) for physician office visits, and 8.4 (SD, 9.3) for outpatient encounters (**Table 2**)

Table 1. Patient characteristics (N = 1,688)

| Demographics  |                 |
|---|-----------------|
| Age at index, mean (SD), years                              | 77.0 (6.7)      |
| Sex, n (%)  |                 |
| Male  | 1,406 (83.3)    |
| Female  | 282 (16.7)      |
| Race, n (%)   |                 |
| White   | 1,602 (94.9)    |
| Other races   | 86 (5.1)        |
| Ethnicity, n (%)  |                 |
| Non-Hispanic  | 1,628 (96.4)    |
| Hispanic  | 60 (3.6)        |
| Marital status, n (%)                                       |                 |
| Married (including common law)                              | 1,110 (65.8)    |
| Other   | 578 (34.2)      |
| Rural-urban classification, n (%)                           |                 |
| Urban   | 1,450 (85.9)    |
| Rural   | 238 (14.1)      |
| Census tract-level income, mean (SD), dollar                | 72,227 (33,223) |
| Census tract-level education, %                             |                 |
| Less than high school                                       | 10.9 (8.7)      |
| High school   | 25.5 (10.8)     |
| Some college  | 28.9 (8.0)      |
| College   | 34.6 (19.1)     |
| Clinical characteristics                                    |                 |
| Time from first BC diagnosis to index date, mean (SD), days | 157.8 (359.6)   |
| BC grade, n (%)   |                 |
| High  | 727 (43.1)      |
| Low grade   | 192 (11.4)      |
| Unknown   | 769 (45.6)      |
| Charlson Comorbidity Index, mean (SD)                       | 2.1 (2.0)       |
| BC histology, n (%)   |                 |
| Transitional cell papillomas and carcinomas                 | 1,563 (92.6)    |
| Epithelial neoplasms, NOS                                   | 114 (6.8)       |
| Other   | 11 (0.7)        |
| BC grade, n (%)   |                 |
| High  | 727 (43.1)      |
| Non-high  | 192 (11.4)      |
| Unknown or other  | 769 (45.6)      |
| TURBT history, n (%)  | 1,478 (87.6)    |
| Selected comorbidities, n (%)                               |                 |
| Diabetes  | 573 (33.9)      |
| COPD  | 503 (29.8)      |
| Peripheral vascular disease                                 | 484 (28.7)      |
| Cerebrovascular disease                                     | 333 (19.7)      |
| Renal disease   | 288 (17.1)      |
| Congestive heart failure                                    | 281 (16.6)      |
| Prior diagnostic procedures and treatments                  |                 |
| Cystoscopy or cystourethroscopy, n (%)                      | 1,215 (72.0)    |
| Other intravesical therapies <sup>a</sup> , n (%)           | 118 (7.0)       |
| Other active treatments <sup>b</sup> , n (%)                | 35 (2.1)        |

Abbreviations: BC, bladder cancer; COPD, chronic obstructive pulmonary disease; NOS, not specified; SD, standard deviation; TURBT, transurethral resection of bladder tumor.

<sup>a</sup> Includes mitomycin, epirubicin, valrubicin, and docetaxel.

<sup>b</sup> Includes radical cystectomy, radiotherapy, and systemic therapy.

### Study cohort selection criteria (Cont.)

- Received iBCG or iGEM based on Medicare claims
- Continuous Medicare Part A and B Fee-for-Service (FFS) enrollment for ≥12 months prior to the first intravesical treatment (the index date)

### Outcomes and measures

- All-cause and BC-related HCRU and costs were captured using Medicare FFS claims during the follow-up period, starting from the index date until the earliest of the following: end of Medicare data availability (12/31/2020), Medicare Part A and B FFS disenrollment, or death
- HCRU and cost outcomes were descriptively summarized on a per-patient-per-year (PPPY) basis, calculated as the total number of events or cost divided by the total patient-years of observation
- All costs were adjusted to 2023 US dollars

Table 2. All-cause and BC-related HCRU rates (PPPY)

| HCRU   | All-cause mean ± SD | BC-related mean ± SD |
|--|---------------------|----------------------|
| ER visits  | 1.0 ± 2.6           | 0.1 ± 0.4            |
| Inpatient admissions   | 1.0 ± 2.9           | 0.3 ± 2.5            |
| Inpatient stay, days   | 8.3 ± 21.2          | 2.6 ± 10.9           |
| PO visits  | 14.2 ± 9.8          | 4.0 ± 6.4            |
| Outpatient services  | 8.4 ± 9.3           | 2.3 ± 4.1            |
| Treatment-related encounters (not mutually exclusive from above) |                     |                      |
| Cystoscopy/cystourethroscopy                                     | 9.2 ± 6.7           | 6.0 ± 5.6            |
| Radiotherapy   | 1.2 ± 5.4           | 0.5 ± 3.5            |
| Systemic therapy   | 1.0 ± 4.0           | 0.7 ± 3.5            |
| Supportive care  | 0.6 ± 1.9           | 0.3 ± 1.4            |

Abbreviations: BC, bladder cancer; ER, emergency room; HCRU, healthcare resource utilization; PO, physician office; PPPY, per-patient-per-year; SD, standard deviation.

### Costs

- The average all-cause healthcare cost was \$33,046 (SD, \$70,637) PPPY, whereas the average BC-related healthcare cost was \$11,602 (SD, \$44,220) PPPY (**Figure 2** and **Table 3**)
- Inpatient costs accounted for nearly 50% of both all-cause (mean, \$15,472; SD, \$48,326) and BC-related expenditures (mean, \$5,865; SD, \$42,258) (**Figure 2** and **Table 3**)

Figure 2. All-cause and BC-related healthcare costs (PPPY)

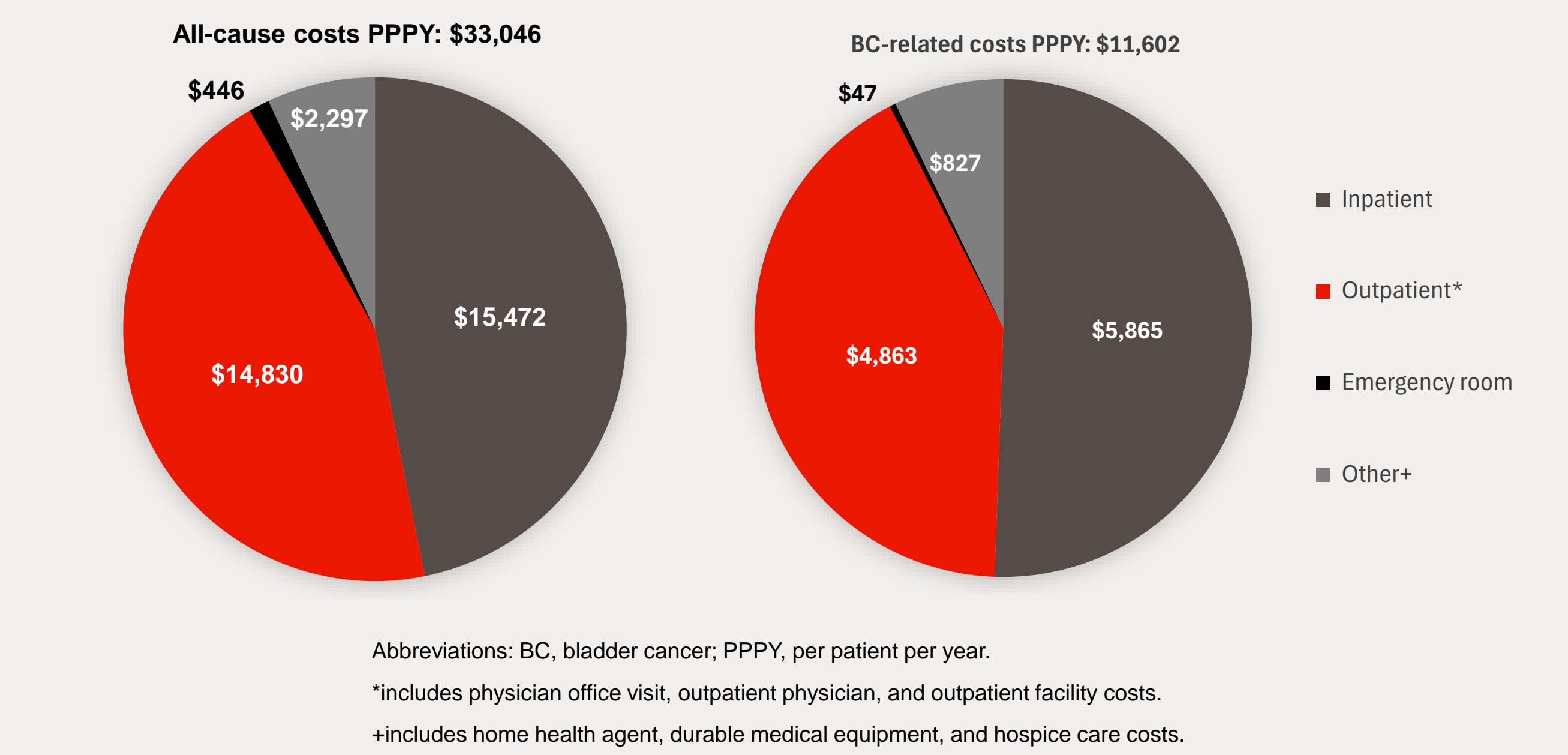


Table 3. All-cause and BC-related costs (PPPY, 2023 US dollar)

| Costs                     | All-cause mean ± SD | BC-related mean ± SD |
|---------------------------|---------------------|----------------------|
| Total                     | 33,046 ± 70,637     | 11,602 ± 44,220      |
| Emergency room            | 446 ± 1,477         | 47 ± 184             |
| Inpatient                 | 15,472 ± 48,326     | 5,865 ± 42,258       |
| Outpatient total          | 14,830 ± 23,306     | 4,863 ± 7,667        |
| Physician office visit    | 1,197 ± 856         | 321 ± 459            |
| Outpatient physician      | 8,452 ± 16,608      | 2,658 ± 5,011        |
| Outpatient facility       | 5,181 ± 9,040       | 1,884 ± 4,809        |
| Other                     | 2,297 ± 5,449       | 827 ± 3,597          |
| Home health agent         | 1,077 ± 2,770       | 377 ± 1,504          |
| Durable medical equipment | 427 ± 1,265         | 28 ± 170             |
| Hospice care              | 793 ± 4,242         | 423 ± 3,181          |

### References

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