

# The Total Economic Burden of Overactive Bladder in the United States: A Disease-Specific Approach

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## Abstract

**Objective:** To employ results from a recent US population-based survey to calculate disease-specific total costs of overactive bladder (OAB).

**Study Design:** Disease-specific total cost-of-illness method using population prevalence estimates.

**Methods:** Cases were identified as community-dwelling adults reporting the presence of urinary urgency or urgency urinary incontinence. Two OAB classifications were used based on Likert scale responses of OAB symptoms: “often” (base case) or “sometimes” (alternative). The study estimates disease-specific total costs of OAB from the societal perspective and using an average costing method. A population-based survey, a claims data analysis, and the published literature provided the prevalence and resource utilization data.

**Results:** The prevalence of OAB as defined in the base case (alternative) was 18.6% (28.7%) in the adult US population, accounting for 42.2 million (65.1 million) community-dwelling adults. The disease-specific total cost of OAB is estimated at \$24.9 billion for the base case and \$36.5 billion for the alternative case. Total direct costs were \$22.3 billion in the base case and \$33.5 billion in the alternative case. Costs were higher among adults younger than 65 years of age, compared with adults 65 years or older. This relative cost burden was lower for the base case compared with the alternative case in the full sample, with a larger gap among men.

**Conclusion:** The total cost of OAB among community-dwelling adults is significant and varies with demographic groups. Future research is needed to determine whether the differential cost burden is robust to alternate cost-of-illness estimation methods.

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For author information and disclosures, see end of text.

Overactive bladder (OAB) syndrome is a collection of debilitating symptoms affecting millions of people worldwide and resulting in billions of dollars of additional expenditure. The International Continence Society (ICS) defines OAB syndrome as urinary urgency with or without urgency incontinence, usually with increased daytime frequency and nocturia in the absence of a pathologic or metabolic condition.<sup>1</sup> Left unaddressed, OAB can lead to emotional stress, depression, and social isolation.<sup>2</sup> The impact of untreated OAB can be particularly burdensome among community-dwelling adults who may see their social and professional relationships negatively impacted.<sup>3</sup> Many symptomatic patients will not present to their provider for treatment<sup>4-6</sup> because they see symptoms as a nuisance or as an embarrassment.<sup>7-9</sup> More information on the economic impact of OAB among community-dwelling adults is needed and could call more attention to a syndrome that affects many adults and yet may be grossly underreported.

The economic burden of OAB comprises direct medical costs, direct nonmedical costs, indirect costs, and intangible costs.<sup>10</sup> Direct medical and nonmedical costs include the cost of diagnostics, pharmacologic and other treatment, routine care, and OAB-related consequences.<sup>8</sup> The consequences of OAB syndrome include falls, fractures, urinary tract infections, skin infections, and depression,<sup>7,11</sup> the treatment of which constitutes the consequence costs of OAB. Indirect costs include caregiver wages and worker productivity losses resulting either from disability or absenteeism due to illness<sup>8,12</sup> and can be substantial.<sup>4,13</sup> Intangible costs include the quality-of-life impact and psychological burden.<sup>8</sup>

The most recent estimates in a US population indicate that 33 million people in 2000 were diagnosed with OAB and spent an additional \$12.6 billion per year to manage their urinary symptoms with much of this expenditure, in particular among institutionalized adults, related to incontinence (eg, pads).<sup>5</sup> The estimated economic burden of OAB in the United States was most sensitive to the prevalence estimate,<sup>5</sup> which is a function of the definition of OAB that was used to select the cases. The NOBLE (National Overactive Bladder Evaluation) study, on which the most recently available US cost estimate was based, estimated the prevalence of OAB using an older definition of OAB. The EpiLUTS (Epidemiology of

Lower Urinary Tract Symptoms) survey represents the first epidemiologic study of lower urinary tract symptoms in the US population that uses the current ICS definition of OAB. The current study uses prevalence estimates from the EpiLUTS survey to calculate the disease-specific total cost of OAB in the United States.

## METHODS

**Data and study population.** The study rationale and methods, including the advantages and disadvantages of Internet data capture, have been previously described.<sup>14,15</sup> Briefly, the EpiLUTS survey respondents were at least 40 years of age, able to read English, able to provide informed consent, were computer-literate, and had access to the Internet. Respondents (20,000 targeted, 60% response rate) were representative of the United States by age, sex, race, and education. Cases were identified as individuals reporting the presence of urinary urgency or urgency urinary incontinence (UUI).<sup>16</sup> The urgency question (UQ) asked: “During the past 4 weeks, have you had a sudden need to rush to urinate? By sudden need to rush to urinate we mean a sudden intense feeling of urgency where you feel you must urinate immediately.” The available Likert scale responses were: “Never/Rarely/Sometimes/Often/Almost always.” The UUI question (UUIQ) asked: “During the past 4 weeks, did you leak urine in connection with a sudden need to rush to urinate?” The available responses were “no/yes.” Based on responses to UQ and UUIQ, 2 OAB classifications were created:

1. Base case: UQ = “Often” or “Always” or UUIQ = “Yes”
2. Alternative: UQ = “Sometimes,” “Often,” or “Always” or UUIQ = “Yes”

The “base case” is referred to as OAB at least “often,” while the “alternative” definition is referred to as OAB at least “sometimes.”

**Prevalence and costs.** Weighted prevalence estimates were imputed for the 18- to 39-year-old age group (Table 1). Prevalence estimates were determined for age- and sex-strata by extrapolating linear trends in the respective age- and sex-strata in the EpiLUTS dataset. Weighted prevalence es-

**Table 1. Age- and Sex-Stratified Prevalence Estimates<sup>a</sup>**

Sex	Age	OAB at Least “Often”	OAB at Least “Sometimes”
M	18-34	<b>0.04</b>	<b>0.09</b>
M	35-44	<b>0.06</b>	<b>0.14</b>
M	45-54	0.10955	0.21053
M	55-64	0.16063	0.28582
M	65+	0.2645	0.40409
F	18-34	<b>0.15</b>	<b>0.26</b>
F	35-44	<b>0.2</b>	<b>0.34</b>
F	45-54	0.3111	0.4195
F	55-64	0.34176	0.45229
F	65+	0.37903	0.46928

F indicates female; M, male; OAB, overactive bladder.  
<sup>a</sup>Boldfaced numbers are imputed.

timates for the adult population were combined with interim projections for the 2007 US population<sup>17</sup> to estimate the total number of US adults with OAB (ie, US OAB population). We estimate disease-specific total costs of OAB for the US OAB sample. The study is conducted from the societal perspective. Intangible costs are not included in the cost-of-illness (COI) calculation.

Sources of prevalence and/or cost data included the following: (1) EpiLUTS, (2) PharMetrics Patient-Centric Database, and (3) published literature. EpiLUTS provided self-reported estimates of disease prevalence and work productivity impacts. Work productivity impact was identified using the question: “In the past 2 weeks, how much of the time did your urinary symptoms make it difficult for you to work the required number of hours at your job?” Available responses were: “Difficult none of the time (0%)/Difficult a slight bit of the time/Difficult some of the time (about 50%)/Difficult most of the time/Difficult all of the time (100%).” A negative work productivity impact was identified as a response of “difficult most of the time” or “difficult all of the time.”

PharMetrics claims data provided age- and sex-stratified estimates of OAB-related inpatient, outpatient, and pharmacy costs. PharMetrics data include medical and pharmaceutical claims for more than 55 million individuals across the United States and is representative of the national, commercially insured population. The analysis in-

**Table 2.** Input Values From the Published Literature

Literature-Based Values	Prevalence	Annual Cost, \$	Reference
Pad use <sup>a</sup>	0.062	—	Reeves et al (2006)
Worker productivity loss <sup>b</sup>	—	2755.17	Hu et al (2004)
Urinary tract infection	0.2166	56.93	Wagner et al (2002)
OAB-related falls w/o fracture	0.127	42.92	Wagner et al (2002)
OAB-related fall-related wrist fractures	0.046	394.94	Wagner et al (2002)
OAB-related fall-related hip fractures	0.004	2367.27	Wagner et al (2002)
OAB-related skin/wound infections	0.48	45.02	Hu et al (2003)

OAB indicates overactive bladder.

<sup>a</sup>Prevalence of 0.18 among individuals with urgency urinary incontinence.

<sup>b</sup>Annual earnings loss per person based on 3.7 hours of a work week lost.

cluded patients aged 18 years or older with either 1 *International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM)* diagnosis code for OAB (596.5x [except 596.53 and 596.54], 788.3x, 788.41, 788.43) or 1 prescription for an oral antimuscarinic indicated for OAB. The enrollment period was January 1, 2005, through December 31, 2006, and all patients were followed for 1 year after their index date. All costs were expressed in 2007 US dollars and for the following utilization categories: OAB drug therapy, outpatient services (emergency department visits, physician office visits, laboratory diagnostic tests, all other outpatient care), and inpatient services. Services related to OAB were identified based on the presence of relevant *ICD-9-CM* diagnosis codes. Patient age for claims-based data was grouped as 18 to 34, 35 to 44, 45 to 54, 55 to 64, and 65+ years. Disease-specific total cost estimation for inpatient, outpatient, and prescription drug costs proceeded in the following manner: The total of individuals in a given age- and sex-stratum of the estimated US OAB population was multiplied by the average annual costs per patient for the age- and sex-stratum and then summed over the stratum.

Cost estimation for remaining cost components combined prevalence data with frequency (ie, resource units per year) and unit cost data. Sources for these inputs are described in **Table 2**. Input costs were adjusted using the general Consumer Price Index to the year 2007. In sensitivity analyses, we recalculated the COI estimate after varying the following: (1) disease prevalence by  $\pm 10\%$ , (2) costs by  $\pm 30\%$ ,<sup>18</sup> and (3) healthcare utilization prevalence estimates by  $\pm 10\%$ .

## RESULTS

The prevalence of OAB at least “often” was 18.6% in the adult US population and was higher among women (26.1%) compared with men (10.7%). The results indicate that 42.2 million adults in the United States have OAB. The prevalence of OAB varied depending on the grouping of the Likert responses. Comparable disease prevalence and OAB adult population totals for OAB at least “sometimes” were 28.7% and 65.1 million, respectively.

The societal cost of OAB among community-dwelling adults totaled \$24.9 billion per year (**Table 3**) for OAB at least “often” and totaled \$36.5 billion for OAB at least “sometimes.” The economic burden of OAB differed by age groups. The costs of managing OAB symptoms were 2.5 times as high among adults younger than 65 years of age compared with adults 65 years or older for OAB at least “often.” Costs were 2.6 times as high among adults less than 65 years of age compared with adults aged 65 years or older for OAB at least “sometimes.” The relative burden among adults 65 years and older was lower for OAB at least “often” when stratifying by sex, with a larger difference among men (1.6 times for OAB at least “often” vs 2.1 times for OAB at least “sometimes”) compared with women (2.4 times for OAB at least “often” vs 2.8 times for OAB at least “sometimes”).

Sensitivity analyses on prevalence estimates (**Figure 1**) indicated that the disease-specific total costs of OAB were most sensitive to variation in disease prevalence. The COI also was sensitive to variation in the prevalence of pad use and worker

productivity impacts. As shown in Figure 2, total costs were most sensitive to variation in the average outpatient costs, cost of pads, and the cost of worker productivity losses for OAB at least “often,” whereas the COI estimate was most sensitive to average outpatient costs, cost of pads, and average inpatient costs for OAB at least “sometimes.” The ranking of the top 3 parameters to which the COI estimate was most sensitive did not vary between OAB at least “often” and OAB at least “sometimes” when considering prevalence parameters.

## DISCUSSION

The potential for underreporting of OAB syndrome and its work and life impact among community-dwelling adults motivated the analysis of the economic burden of OAB among community-dwelling adults using the current ICS definition. Our results indicate that 18.6% of the US adult population reports OAB symptoms (defined for OAB at least “often”), which translates into 42.2 million US adults. Estimates from NOBLE for disease prevalence and population totals were 16.4% and 33 million adults.<sup>19</sup>

The sex-stratified weighted prevalence rates of OAB at least “often” in the current analysis were 26.1% among adult women and 10.7% among adult men. Sex-stratified weighted prevalence estimates from NOBLE were 16.9% in adult women and 16% in adult men.<sup>19</sup> Prevalence estimates used in the current COI study are higher than previous estimates reported from the NOBLE study and used in the study by Hu et al.<sup>5</sup> Variation in prevalence estimates was shown in the sensitivity analyses to have the largest impact on the current COI estimate. Thus, the different prevalence estimates between the NOBLE and EpiLUTS surveys may be largely responsible for the difference in COI estimates between the study by Hu et al<sup>5</sup> and the current study. The cost estimates between the 2 studies also will differ due to the differences in the COI method. The current study utilizes a disease-specific total-cost approach, while Hu et al<sup>5</sup> utilize an incremental cost approach.

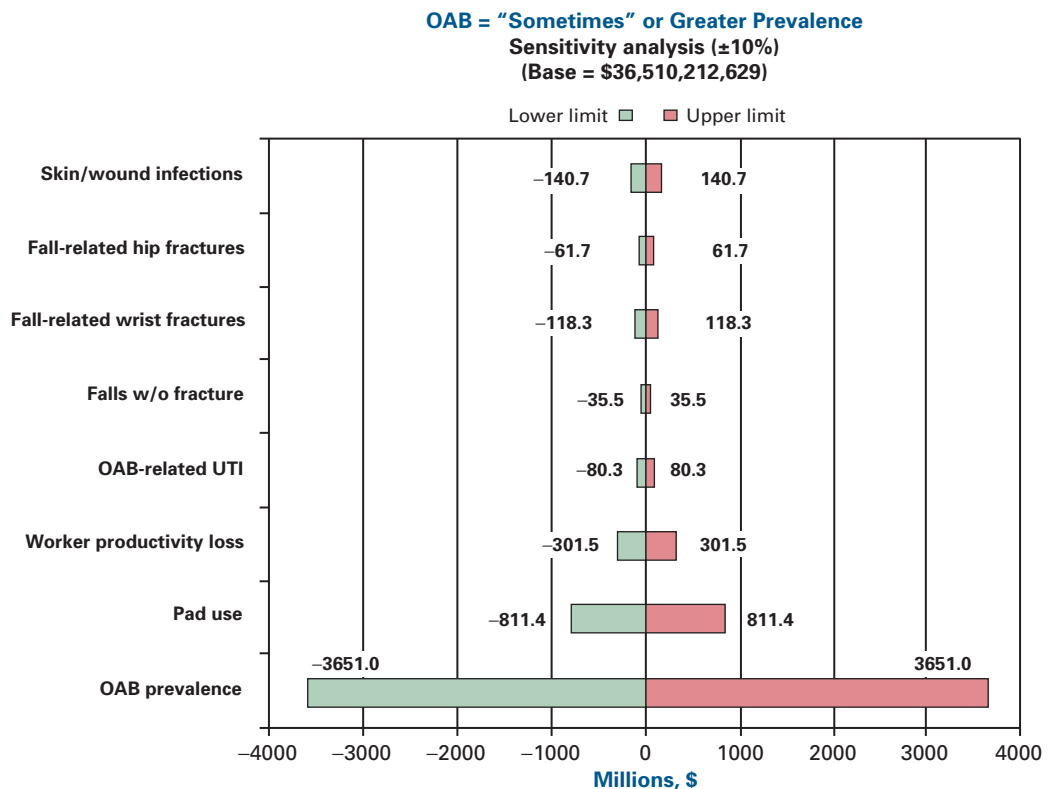
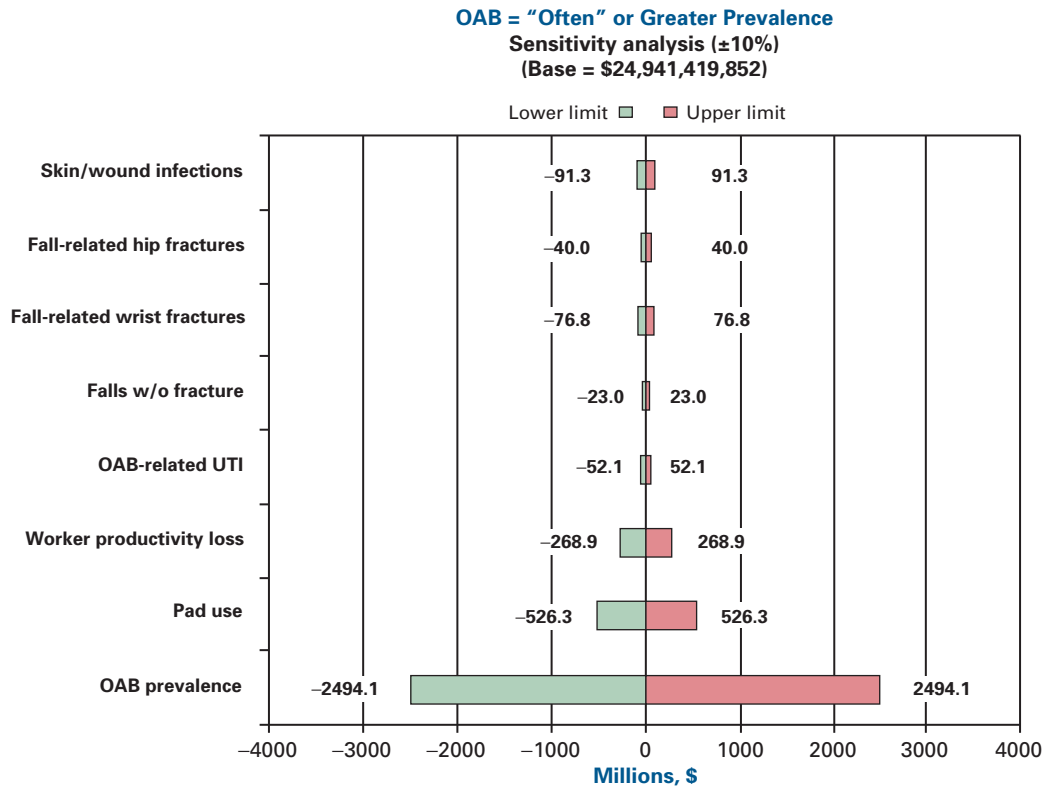
Results indicate that the estimated cost is impacted by the definition of OAB utilized. Estimated total costs differed across the 2 classifications of OAB. The economic burden of OAB differed across

**Table 3.** US Adult Population-Based Overactive Bladder (OAB) Cost of Illness (18+ Years of Age)

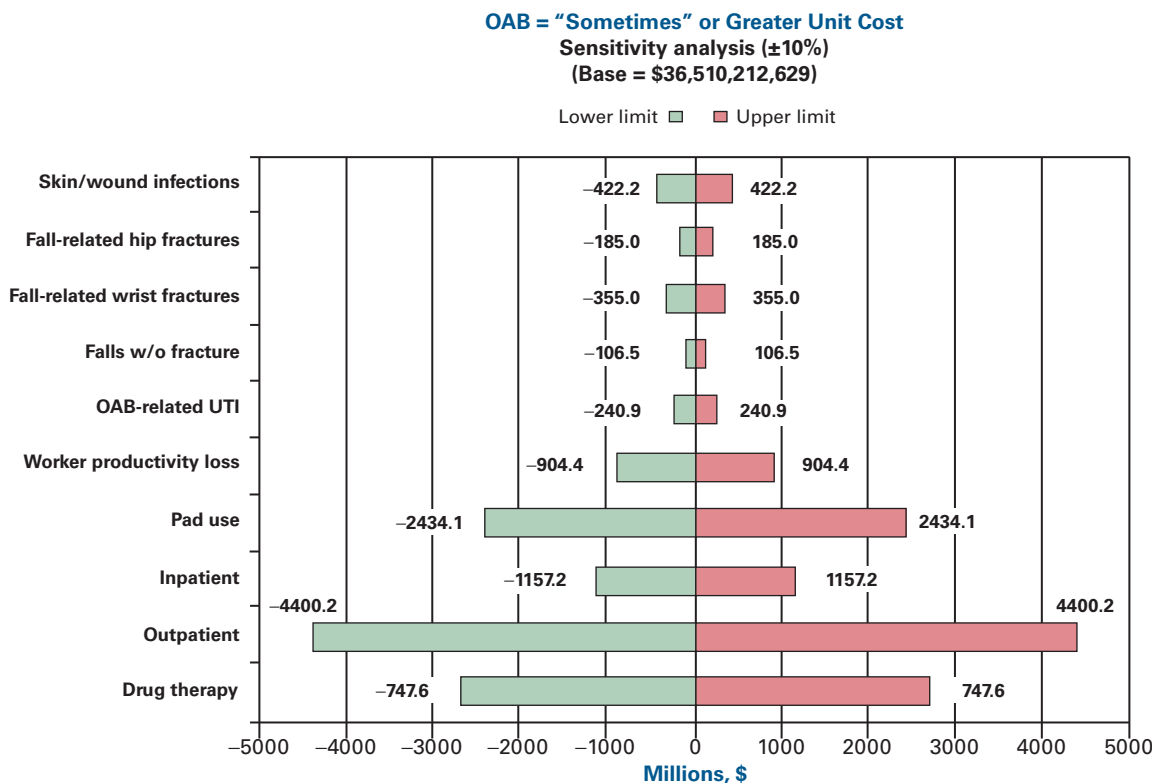
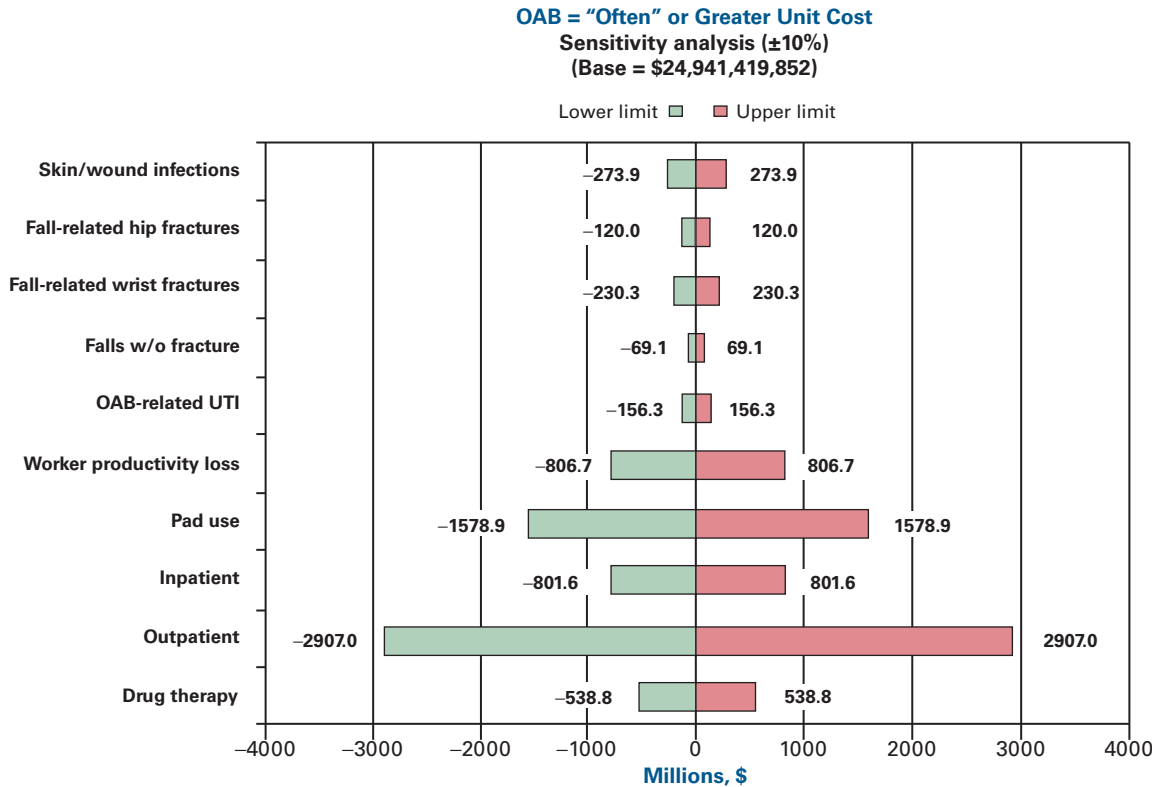
Parameter	OAB = “Often” or Greater Cost, \$ Millions	OAB = “Sometimes” or Greater Cost, \$ Millions
<b>Drug therapy</b>	1796M	2492M
<b>Outpatient</b>	9690M	14,667M
<b>Inpatient</b>	2672M	3857M
<b>Pad use</b>	5263M	8114M
<b>Worker productivity losses</b>	2689M	3015M
<b>OAB-related consequences</b>		
Urinary tract infections	521M	803M
Falls w/o fracture	230M	355M
Fall-related wrist fractures	768M	1183M
Fall-related hip fractures	400M	617M
Skin/wound infections	913M	1407M
<b>Total direct costs</b>	22,253M	33,496M
<b>Indirect</b>	2689M	3015M
<b>Total costs</b>	24,941M	36,510M
<b>Per patient total costs</b>	\$590	\$561
<b>Cost burden by groups</b>		
<b>Sex</b>		
Men	6132M	11,186M
Less than 65 y	3798M	7620M
At least 65 y	2334M	3566M
Women	18,809M	26,455M
Less than 65 y	13,247M	19,568M
At least 65 y	5562M	6886M
<b>Age</b>		
Less than 65 y	19,380M	27,188M
At least 65 y	7896M	10,453M

age subgroups and may reflect differences in the epidemiology and management of OAB.<sup>7,20</sup> In addition, the relative economic burden of illness does not differ according to the OAB definition employed. The percentage increase in costs between the group younger than 65 years of age and the group 65 years of age or older was comparable for the 2 classifications of OAB and among women but was less comparable among men. In all cases, the relative economic burden was lower for OAB at least “often” compared with OAB at least “sometimes.” Compared with the

■ **Figure 1.** Sensitivity Analysis on Prevalence Estimates for Overactive Bladder (OAB) at Least “Often” and OAB at Least “Sometimes”



**Figure 2.** Sensitivity Analysis on Unit Cost for Overactive Bladder (OAB) at Least “Often” and OAB at Least “Sometimes”





alternative, the base-case definition of OAB may include cases that are more severe in their symptom severity. If this is true, then defining OAB using the base case would lead to a narrowing of the differential cost burden across subgroups compared with the results using the alternative-case definition.

A few limitations are worth mentioning. The use of self-reported disease-specific measures in a total cost approach may provide a less accurate measure of disease-attributable economic burden compared with an incremental cost approach in the presence of unobserved differences between groups. The use of disease-specific health services utilization is preferred to adding up costs in a population of patients with OAB and then attributing the total costs to the treatment of OAB.<sup>10</sup> However, other differences between cases and noncases, including underlying health status, smoking behavior, and mental health status, that also may contribute to higher healthcare expenditures are not specifically accounted for in a total cost approach.

## CONCLUSION

We calculated the total economic burden of disease among community-dwelling adults using the current ICS definition of OAB. The total cost of disease is estimated at \$24.9 billion, with a significantly higher burden among adults younger than 65 years of age. If institutional costs were included, this figure would be even higher. Future research is needed to determine whether any differential cost burden across age groups is robust to alternative COI analysis methods and using current ICS definitions of OAB. Information on the differential economic burden across demographic groups can be used to guide the development of treatment and program interventions designed to improve the management of OAB symptoms.

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