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## Burden and Cost of Outpatient Hemorrhoids in the United States Employer-Insured Population, 2014

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### Abstract

**Background.**—Although hemorrhoids are a common indication for seeking health care, there are no contemporary estimates of burden and cost. We examined data from an administrative claims database to estimate health care use and aggregate costs.

**Methods.**—We conducted a cross-sectional study using the MarketScan<sup>®</sup> Commercial Claims and Encounters Database for 2014. The analysis included 18.9 million individuals who were aged 18-64 and continuously enrolled with prescription coverage. Outpatient hemorrhoid claims were captured using *International Classification of Diseases, Ninth Revision, Clinical Modification* diagnosis codes in the first position, as well as Common Procedural Terminology codes. Prescription medications were identified using National Drug Codes. Annual prevalence and costs were determined by summing gross payments for prescription medications, physician encounters and facility costs. We used validated weights to standardize annual cost estimates to the US employer-insured population.

**Results.**—In 2014, we identified 227,638 individuals with at least one outpatient hemorrhoid-related claim (annual prevalence, 1.2%). Among those, 119,120 had prescription medication claims, 136,125 had physician claims and 28,663 had facility claims. After standardizing, we estimated that 1.4 million individuals in the US employer-insured population sought care for hemorrhoids in 2014 for a total annual cost of \$770 million. This included \$322 million in

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physician claims, \$361 million in outpatient facility claims and \$88 million in prescription medication claims.

**Conclusions.**—The estimated economic burden of hemorrhoids in the employer-insured population approaches \$800 million annually. Given the substantial and rising burden and cost, expanded research attention should be directed to hemorrhoidal etiology, prevention, and treatment.

### Keywords

hemorrhoids; MarketScan; burden; employer-insured; hemorrhoidectomy; hemorrhoidopexy; anoscopy; hemorrhoid ligation; infrared coagulation

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## INTRODUCTION

Patients in the United States commonly report symptomatic hemorrhoids. Hemorrhoids were the third most common outpatient gastrointestinal diagnosis in 2010, with nearly 4 million office and emergency department visits annually.<sup>1</sup> Extrapolating using data from Florida,<sup>2</sup> there were an estimated 1.9 million outpatient procedures in 2005 and there were 306,000 hospital discharges for hemorrhoids in 2004.<sup>3</sup> There are millions of over-the-counter prescriptions for hemorrhoids despite lack of evidence to support the use of hemorrhoid preparations containing low-dose anesthetics, steroids, keratolytics, protectants, or antiseptics.<sup>4</sup> Unfortunately, there are no published cost estimates for the use of these preparations.

There are no contemporary economic figures for hemorrhoid therapy in the US. Information on hemorrhoid expenditures could serve a number of purposes. The data might motivate comparative effectiveness and cost effectiveness studies. A high economic burden might justify training programs for physicians or non-physician providers. Economic information can be of interest to payers, funding agencies, and physicians.

In order to estimate expenditures for hemorrhoid therapy, we examined data from a large claims database representing employer-insured patients in the US. By extrapolating to the entire US employer-insured population, we aimed to provide an accurate estimate of annual spending on hemorrhoid diagnosis and therapy.

## MATERIALS AND METHODS

### Study Population

We conducted a cross-sectional study using the Truven IBM Health Analytics' MarketScan<sup>®</sup> Commercial Claims and Encounters (CCAE) Database for the year 2014. The MarketScan data, which include fully adjudicated claims for more than 160 million unique patients between 2000 and 2014, contain inpatient, outpatient, and pharmaceutical claims and encounter data linked with patient demographic and enrollment information for individuals with employer-based insurance in the United States.<sup>5</sup> Individuals remain enrolled in the MarketScan database even if they switch health insurance plans, which allows for

longitudinal follow-up of patients while under the same employer.<sup>6</sup> The study was determined to be exempt from full Institutional Review Board review.

For this study, we used claims from the 2014 MarketScan CCAE Database for all eligible adults aged 18 to 64 years. There were 47.3 million people included in the 2014 MarketScan CCAE Database; 18.9 million were continuously enrolled with prescription coverage for the entire year of 2014 and were therefore eligible for study.

### Event Definition

Beneficiaries with a diagnosis of hemorrhoids were identified using outpatient *International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM)* diagnosis codes in the first position. Outpatient procedures to treat hemorrhoids were identified using ICD-9-CM and Common Procedural Terminology procedure codes for hemorrhoidectomy, hemorrhoidopexy, lower endoscopy with band ligation and outpatient office procedures (i.e., rubber band ligation). Medications to treat symptoms attributed to hemorrhoids were identified using National Drug Codes for hydrocortisone, lidocaine, and pramoxine/pramocaine. Hemorrhoid-related event definitions are listed in Supplementary Table 1.

### Measures of Disease Burden

The annual prevalence of diagnosed hemorrhoids was computed using all individuals with at least one hemorrhoid-related claim in 2014, and was calculated for the overall study population as well as for subgroups of interest including age (18-34, 35-44, 45-54, 55-64) and sex. Disease-specific annual costs were determined by summing gross payments for services across patients<sup>7</sup> associated with hemorrhoid-related diagnostic, procedure, and prescription claims. To identify the specific sources of disease and financial burden associated with hemorrhoids, we additionally stratified hemorrhoid-related annual prevalence and cost estimates by claim type (diagnosis only vs. procedure) and setting of care (prescription medication, outpatient facility, and physician encounter) using a combination of the claim setting and the facility-professional claim indicator.

### Sensitivity Analyses

Acknowledging that defining hemorrhoid encounters using first-position diagnosis codes alone represents a conservative approach and likely underestimates the burden associated with hemorrhoid diagnoses, we repeated analyses using diagnosis claims in both the first and second positions.

### Statistical Analyses

The annual prevalence of hemorrhoid-related diagnosis and treatment in 2014 was calculated with the numerator as the number of patients with at least one hemorrhoid-related encounter in 2014 and the denominator as all individuals aged 18 to 64 who were continuously enrolled in 2014. Total annual costs associated with hemorrhoids were estimated for all hemorrhoid-related claims as well as for specific types and settings of care. To project aggregate costs associated with hemorrhoid diagnosis and care in the US in 2014, we used the MarketScan weights to standardize our annual cost estimates to the age and sex distributions of the Medical Expenditure Panel Survey, which is a nationally-representative

sample of the US employer-insured population.<sup>8,9</sup> All analyses were performed using SAS version 9.4 (SAS Institute, Cary, NC).

## RESULTS

### Annual Prevalence of Hemorrhoid Claims

Among a total of 18.9 million eligible individuals, aged 18 to 64, who were continuously enrolled in the MarketScan database with prescription coverage between January 1, 2014 and December 31, 2014, we identified 227,638 (1.2%) individuals who had at least one hemorrhoid-related claim. On average, these individuals received 2.7 hemorrhoid-related claims in 2014; the majority (71%) had a single hemorrhoid-related claim, whereas 16% had two claims and 12% had three or more claims.

### Health Care Use

Among all patients with at least one hemorrhoid-related claim in 2014, 119,120 (52%) received at least one prescription medication claim. The most commonly prescribed medications contained hydrocortisone (98%). Among all patients with at least one hemorrhoid-related claim, 136,125 (60%) received at least one physician encounter claim and 28,663 (13%) received at least one outpatient facility claim. Among all patients with at least one hemorrhoid-related claim, 13,116 (6%) had a claim for a diagnostic anoscopy, 19,634 (9%) had a claim for a diagnostic colonoscopy, and 30,164 (13%) were treated with an outpatient office procedure. Common co-diagnoses that appeared on the same claim as hemorrhoids diagnosis codes included 1) screening for colonic polyps or benign neoplasm of the colon; 2) hemorrhage of the rectum and anus; 3) diverticulosis of the colon; 4) constipation; and 5) blood in stool.

Table 1 describes the characteristics of individuals identified with hemorrhoid-related claims. Individuals with hemorrhoid-related claims were older, with individuals aged 45-54 and 55-64 years representing 30% and 29% of all patients, respectively. Women represented a higher proportion (55%) of all individuals with at least one hemorrhoid-related claim. Both age and sex trends were consistent across different settings of care.

### Financial Burden

In the study population, the diagnosis and treatment of hemorrhoids accounted for a combined cost of \$125 million in 2014 (Table 2). The bulk of these annual costs, about \$79 million, were associated with diagnostic claims (ones with hemorrhoid-related diagnosis codes, but no hemorrhoid-related treatments). Costs were concentrated among claims observed in the outpatient facility setting, which accounted for \$58 million, or 46% of total costs, with outpatient physician encounters and prescription claims accounting for the remaining 42% and 12% of costs, respectively.

Gastroenterologists, who billed for 8% of hemorrhoid-related claims, accounted for 8% (\$9,890,605) of total costs. Surgeons (general, colon and rectal, abdominal, proctologists) accounted for 12% of hemorrhoid-related claims and 16% (\$20,453,244) of total costs. General practitioners accounted for 12% of hemorrhoid-related claims and 6% (\$6,905,084)

of hemorrhoid-related costs. About 21% of all billed claims (53% of total costs) reported another specialty type, while provider specialty was not reported on 46% of claims (18% of total costs).

Recognizing that the MarketScan population is not completely representative of the adult US employer-insured population, aged 18 to 64 years, we standardized our estimates, using the MarketScan weights, to obtain a more accurate measure of contemporary disease and financial burden expected in the overall US employer-insured population (Table 3). After standardization, the total projected annual cost in 2014 associated with hemorrhoid diagnosis and treatment among the US employer-insured population was estimated to be approximately \$770 million.

### Sensitivity Analysis

Expanding the analysis to first- and second-position diagnoses increased the total number of individuals with at least one hemorrhoid-related encounter to 408,883, for an annual prevalence of 2.2%. Characteristics of individuals with hemorrhoid-related claims were largely similar between this analysis and the primary analysis (Supplementary Table 2). Compared to hemorrhoid diagnoses in the first position, which were most often accompanied by procedure codes for hemorrhoidectomy and diagnostic anoscopy, second-position hemorrhoid diagnoses were more commonly accompanied by diagnostic colonoscopy and biopsy.

The total annual cost associated with hemorrhoids also increased substantially in this analysis, to \$391 million (Supplementary Table 3). This rise in overall expenditures was attributed to a substantial increase in the annual costs associated with hemorrhoid-related diagnostic claims (\$79 million to \$345 million). Correspondingly, we observed no change in annual cost estimates when restricting to only claims with a hemorrhoid-related procedure. The standardized total annual cost estimate associated with hemorrhoids also increased substantially under this definition, from \$770 million to \$2.4 billion (Supplementary Table 4).

## DISCUSSION

Based on insurance claims data from 2014, we estimate that 1.4 million US employer-insured patients received a diagnosis or treatment for hemorrhoids with overall expenditures of \$770 million. The majority of the costs were concentrated among physician encounter (\$322 million) and outpatient facility claims (\$361 million). A more liberal definition of diagnosed hemorrhoids that included first- and second-position diagnosis codes estimated overall expenditures of \$2.4 billion accrued by 2.5 million patients. Recognizing that the use of first-position diagnoses alone represents a conservative approach to identifying hemorrhoids, we expect the true financial burden associated with hemorrhoids diagnosis and treatment to exceed the conservative estimate of \$770 million by as much as \$1.63 billion.

Annual costs for prescriptions were estimated to be \$88 million, and did not vary between primary and sensitivity analyses. Prescription claims in the MarketScan database are identified using the outpatient prescription dispensing file, which is independent of diagnosis

codes billed for inpatient and outpatient encounters and services. As a result, the total number of prescription dispensing claims would not change when expanding to both first- and second-position diagnosis codes. The last published data on prescription costs from 2004 reported 2 million prescriptions for hemorrhoids filled at retail pharmacies with an aggregate cost of \$43 million.<sup>10</sup> Over-the-counter medication costs are likely to be even more sizable. Worldwide sales of Preparation H, one of many over-the-counter remedies for hemorrhoids, was \$136 million in 2017.<sup>11</sup>

The value of prescription medications for hemorrhoid symptoms is uncertain because most topical remedies have not been evaluated in clinical trials. Phlebotonics, such as Daflon (diosmin/hesperidin), which are a class of drugs of plant origin that have been used to treat hemorrhoids. They are believed to improve venous tone, stabilize capillary permeability, and increase lymphatic drainage. A Cochrane review found that phlebotonics improved bleeding (odds ratio (OR) 0.12; 95% CI, 0.06-0.58), pruritus (OR 0.23; 95% CI, 0.07-0.79), and discharge or leakage (OR 0.12; 95% CI, 0.04-0.42).<sup>12</sup> The methodological quality of the studies was limited. A systematic review of fiber supplements identified seven treatment trials of moderate quality.<sup>13</sup> Hemorrhoid symptoms were improved over the short term.

There are a number of office-based treatment options for hemorrhoids that account for the treatment costs that we enumerated. These treatments include rubber band ligation, infrared coagulation, bipolar probes and sclerotherapy. The simplicity, speed, and favorable reimbursement for rubber band ligation account for the popularity of this treatment in the office setting. Reimbursement per minute for hemorrhoidal banding is higher than colonoscopy and endoscopy,<sup>14</sup> which may further increase outpatient claims and costs. Surgery may be a better option for patients with large external hemorrhoids or combined internal and external hemorrhoids with prolapse.<sup>15</sup> It is expected that, with the aging population, hemorrhoid treatments will increase by 23% over the next twenty years.<sup>2</sup>

Strengths of the present study include new data on the economic burden of hemorrhoid-related diagnosis and treatment. These data are the first since 2004, and were derived from a very large administrative claims database that is representative of the US employer-insured population and that represents a diverse group of individuals demographically and geographically. Because doctors and facilities use these claims to get reimbursed, the data are likely to be reasonably accurate. Because over-the-counter medications are not captured, the cost estimates for medications are likely an underestimate.

Additionally, our primary analysis aggregated claims and costs for first-position diagnoses only, which represents a conservative approach that yields prevalence and cost estimates for claims which we are confident are associated directly with hemorrhoids. In the claims database, hemorrhoid diagnoses could potentially be listed in four diagnostic positions. Diagnoses in secondary and lower positions are commonly used in observational studies to identify and estimate prevalence of clinical conditions in administrative healthcare databases.<sup>16</sup> When we expanded cost estimates to first- and second-position diagnoses in sensitivity analysis, the number of physician claims and outpatient facility claims observed was doubled to quadrupled compared to those observed in the primary analysis. Consequently, annual costs associated with hemorrhoid-related diagnostic claims increased



from \$79 million to \$345 million. Symptoms attributed to hemorrhoids, including rectal and anal bleeding, were common co-diagnoses to second-position hemorrhoid diagnoses and could lead to additional healthcare utilization and costs. For example, rectal bleeding could lead to a colonoscopy to identify sources of bleedings in a patient not otherwise slated for colonoscopy. If hemorrhoids were noted during colonoscopy, they might then appear in a secondary coding position. In the present study, second-position hemorrhoid diagnoses were commonly accompanied by procedure codes for colonoscopy. We did not perform a sensitivity analysis including all four positions, but would expect the aggregate costs to be higher than both analyses presented.

Limitations to the present analysis include the fact that our analysis was restricted to outpatient claims only and did not include inpatient claims. However, our preliminary analysis showed that inpatient claims comprised only 0.3% and 0.4% of all facility and physician claims, respectively, which confirmed that patients in the employer-insured population are rarely, if ever, hospitalized for hemorrhoid-related causes. Additionally, the observation that over two-thirds (71%) of patients had only a single hemorrhoid-related claim may reflect situations where an initial diagnosis of hemorrhoids was subsequently changed by a specialist, indicating that costs associated with these encounters may be attributed to the diagnostic process, rather than to actual presence, of hemorrhoids.

We also acknowledge limitations associated with use of the MarketScan CCAE database. First, as with all administrative claims databases, the MarketScan database does not provide information on over-the-counter medication use. However, we believe that this supports our previous assertion that the burden of hemorrhoid-related medication use is likely under-captured. Second, there are currently no validated claims-based definitions for hemorrhoids, although our restriction to first- and second-position diagnoses only, and to well-reimbursed hemorrhoid-related treatments, increased our confidence that captured claims were tied to hemorrhoid diagnosis and treatment. Third, the MarketScan data do not distinguish between individual patients' insurance policies, which may factor into per-patient costs. However, the current study does not aim to quantify the differences in hemorrhoids burden between patients on different health insurance plans, but rather to provide a summary estimate of the overall burden of hemorrhoids across employer-insured patients in the US. We do not expect heterogeneity across individual insurance plans to impact the validity of total costs associated with hemorrhoids. Moreover, the MarketScan data are the aggregate of approximately 350 payers that, when combined with the appropriate weights, have been demonstrated to represent the age- and sex-adjusted distributions of the Medical Expenditure Panel Survey, which is, in turn, representative of the overall US employer-insured population.<sup>8</sup>

Finally, our study was limited to one large administrative claims database, albeit one that includes fully adjudicated claims for more than 18.9 million unique patients continuously enrolled with prescription coverage for the entire year. We were able to use previously validated weights to standardize annual cost estimates to the US employer-insured population,<sup>8,9</sup> which is estimated to represent about half of the US population.<sup>17</sup> We expect the nonelderly, employer-insured population to be generally healthier than the over-age 65 and disabled populations covered by Medicare, and to the uninsured population, which could

limit the generalizability of present results to those population. However, the prevalence of hemorrhoids is believed to be higher in the older, disabled, and uninsured populations, indicating that the present estimates among employer-insured patients represent only a portion of the overall hemorrhoid prevalence and burden in the US and suggest an even greater, yet-unquantified burden of hemorrhoids across the entire US population.

Given the burden of hemorrhoids, it is surprising that hemorrhoids have received such little study. In the past 24 years, there has never been an NIH funded study of hemorrhoids.<sup>16</sup> While there are a large number of randomized trials of hemorrhoid treatment, all treatments have not been compared head-to-head.<sup>17</sup> The quality of the trials has been variable and many lacked blinding, randomization, or complete follow-up. There are no standard patient reported outcome measures for hemorrhoids. The lack of research on hemorrhoids is surprising given the economic costs and numbers of patients affected.<sup>17</sup> Perhaps the costs that we have enumerated will motivate funding agencies and researchers.

In summary, we have conservatively estimated that, in 2014, there were overall expenditures of \$770 million related to hemorrhoid diagnosis and treatment in the US employer-insured population, with a more liberal estimate of \$2.4 billion. The costs of hemorrhoids are expected to be much higher when the over-65 and uninsured are added. We predict that the costs associated with hemorrhoid diagnosis and treatment will rise with an aging population and with new, simple office-based therapies. The high costs and symptom burden observed in this study underscores the need for increased attention toward funding and research of hemorrhoid etiology and treatment effectiveness to understand and reduce disease burden. Better understanding of disease burden and etiologic factors can lead to improvements in diagnostic and treatment practice guidelines, which can ultimately reduce financial stress on the US medical system.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

## Acknowledgments

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## Abbreviations:

<b>ICD-9-CM:</b>	International Classification of Diseases, Ninth Revision, Clinical Modification
<b>CCAE:</b>	Commercial Claims and Encounters

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**Table 1.** Characteristics of Patients with Hemorrhoid-related Claims in the 2014 MarketScan Commercial Claims and Encounters Database, Primary Diagnoses Only

Characteristic	Individuals with 1 Prescription Medication Claim N (%)	Individuals with 1 Physician Claim N (%)	Individuals with 1 Outpatient Facility Claim N (%)	Individuals with any Hemorrhoid-Related Claim N (%)
<b>Total N (%)</b>	119,120 (100)	136,125 (100)	28,663 (100)	227,638 (100)
<b>Age</b>				
18-34	26,388 (22)	26,265 (19)	5,637 (20)	45,875 (20)
35-44	26,034 (22)	28,435 (21)	6,400 (22)	47,505 (21)
45-54	34,369 (29)	41,792 (31)	8,781 (31)	68,269 (30)
55-64	32,329 (27)	39,633 (29)	7,845 (27)	65,989 (29)
<b>Sex</b>				
Male	50,915 (43)	66,807 (49)	13,883 (48)	103,455 (45)
Female	68,205 (57)	69,318 (51)	14,780 (52)	124,183 (55)

**Table 2.** Total Annual Cost of Diagnosed and Treated Hemorrhoids in the 2014 MarketScan Commercial Claims and Encounters Database, by Setting of Care, Primary Diagnoses Only

	Individuals with Medication Claim	1 Prescription Claim	Individuals with Claim	1 Physician Claim	Individuals with Facility Claim	1 Outpatient Claim	Individuals with any Hemorrhoid- Related Claim
Total N (%)	119,120 (52)		136,125 (60)		28,663 (13)		227,638 (100)
Diagnostic claims (\$, %)	---		37,839,138 (48)		41,033,554 (52)		78,872,692 (100)
Procedure claims (\$, %)	---		15,326,429 (48)		16,521,687 (52)		31,848,116 (100)
Total annual cost (\$, %)	14,510,505 (12)		53,165,567 (42)		57,555,241 (46)		125,231,313 (100)

**Table 3.** Total Annual Cost of Diagnosed and Treated Hemorrhoids Standardized to the 2014 US Employer-Insured Population, by Setting of Care, Primary Diagnoses Only

	Individuals with 1 Prescription Medication Claim	Individuals with 1 Physician Claim	Individuals with 1 Outpatient Facility Claim	Individuals with any Hemorrhoid-Related Claim
Total N (%)	725,132 (53)	825,234 (60)	174,942 (13)	1,381,217 (100)
Diagnostic claims (\$, %)	---	225,510,749 (47)	256,702,549 (53)	482,213,298 (100)
Procedure claims (\$, %)	---	96,141,882 (48)	103,891,592 (52)	200,033,474 (100)
Total annual cost (\$, %)	87,793,349 (11)	321,652,632 (42)	360,594,141 (47)	770,040,121 (100)