INCREMENTAL HEALTHCARE RESOURCE UTILIZATION AND COSTS IN U.S. PATIENTS WITH CUSHING'S DISEASE COMPARED WITH DIABETES AND POPULATION CONTROLS

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BACKGROUND

- Cushing's disease (CD) is a form of Cushing's syndrome (hypercortisolism) caused by overproduction of adrenocorticotropic hormone (ACTH) from a pituitary corticotroph adenoma.

- The estimated U.S. incidence is 8 cases per million population.[1]

- CD is associated with substantial morbidity, ranging from hypertension, osteroporosis, cardiovascular disease, and opportunistic infections.[2]

- Healthcare costs and resource utilization for patients with CD have not been studied extensively.

OBJECTIVE

- To estimate the healthcare resource use and costs associated with Cushing's disease.

METHODS

Study Design and Patient Identification

- Matched cohort study using US insurance claims from the MarketScan® database from 1/1/2008 to 12/31/2012.

- **Patients with CD** were defined using CD case-finding algorithm by Burton et al.[3]:

  - At least 1 claim with a diagnosis of Cushing's syndrome (CS) (ICD-9-CM 255.0); AND

  - At least 1 claim with a diagnosis of either pituitary neoplasm; pituitary disorder (e.g., hyperfunction); hypophysectomy; radiosurgery; or bilateral inferior petrosal sinus sampling

- **Patients with DM** were selected from a 5% random sample of all enrollees with ≥2 claims of diabetes mellitus (ICD-9-CM: 250.x) and no claim of CS by ICD-9-CM code, thereby no claim of CD.

- **Population-based controls** were selected from a 5% random sample of all database enrollees with no claim of CS by ICD-9-CM code, thereby no claim of CD.

- Patients without 1 year of continuous enrollment were excluded.

- CD patients were matched to DM and population-based controls by age, gender, region, and year in a 1:2 ratio.

Study Measures

- All study measures were based on a 1-year observation period.

- Demographics: age, sex, geographic region

- Charlson Comorbidity Index (CCI) and number of chronic conditions

- Complications related to CD: cardiovascular disease/stroke, depression/anxiety, DM, kidney stones, infections, osteoporosis, vertebral compression fractures

- Healthcare utilization: number of hospitalizations, emergency department (ED) visits, office visits, prescription fills

- Costs: total, pharmacy and non-pharmacy

Statistical Analysis

- We conducted pairwise comparisons between CD and DM patients and between CD and control patients.

- To analyze differences between cohorts, chi-square tests and t-tests were performed for categorical and continuous variables, respectively.

- Statistical analyses were performed in SAS® 9.4 (SAS Institute, Cary, NC).

RESULTS

- The study included 1,852 patients with CD: 3,704 matched DM controls and 3,704 matched population controls.

- Mean age was 42.9 years (SD 12.3) and 78.2% were female.

- Patients with CD had statistically significantly higher rates of all comorbidities of interest than both patients with DM (other than DM itself) and controls (**Table 1**).

- Patients with CD were hospitalized more frequently, visited the ED more often, had more office visits, and filled more prescriptions than patients with DM (all p<.001; **Table 2**) or controls (all p<.001; **Table 2**)

- Mean total healthcare costs for patients with CD were $26,269, versus $12,282 for those with DM (p<.001) and $5,869 for controls (p<.001; **Figure 1**).

TABLE 1. Patient Comorbidities

Comorbidity, n (%)	CD (n=1,852)	DM (n=3,704)	Control (n=3,704)
Cardiovascular disease/stroke	203 (11.0)	302 (8.2)	132 (3.6)
Depression/anxiety	457 (24.7)	502 (13.6)	415 (11.2)
Diabetes mellitus	486 (26.2)	3,704 (100.0)*	266 (7.2)
Kidney stones	81 (4.4)	76 (2.1)	56 (1.5)
Infections	391 (21.1)	609 (16.4)	424 (11.4)
Osteoporosis	156 (8.4)	51 (1.4)	49 (1.3)
Vertebral compression fractures	17 (0.9)	5 (0.1)	5 (0.1)

* By definition, patients with DM were required to have a claim-based diagnosis of DM.
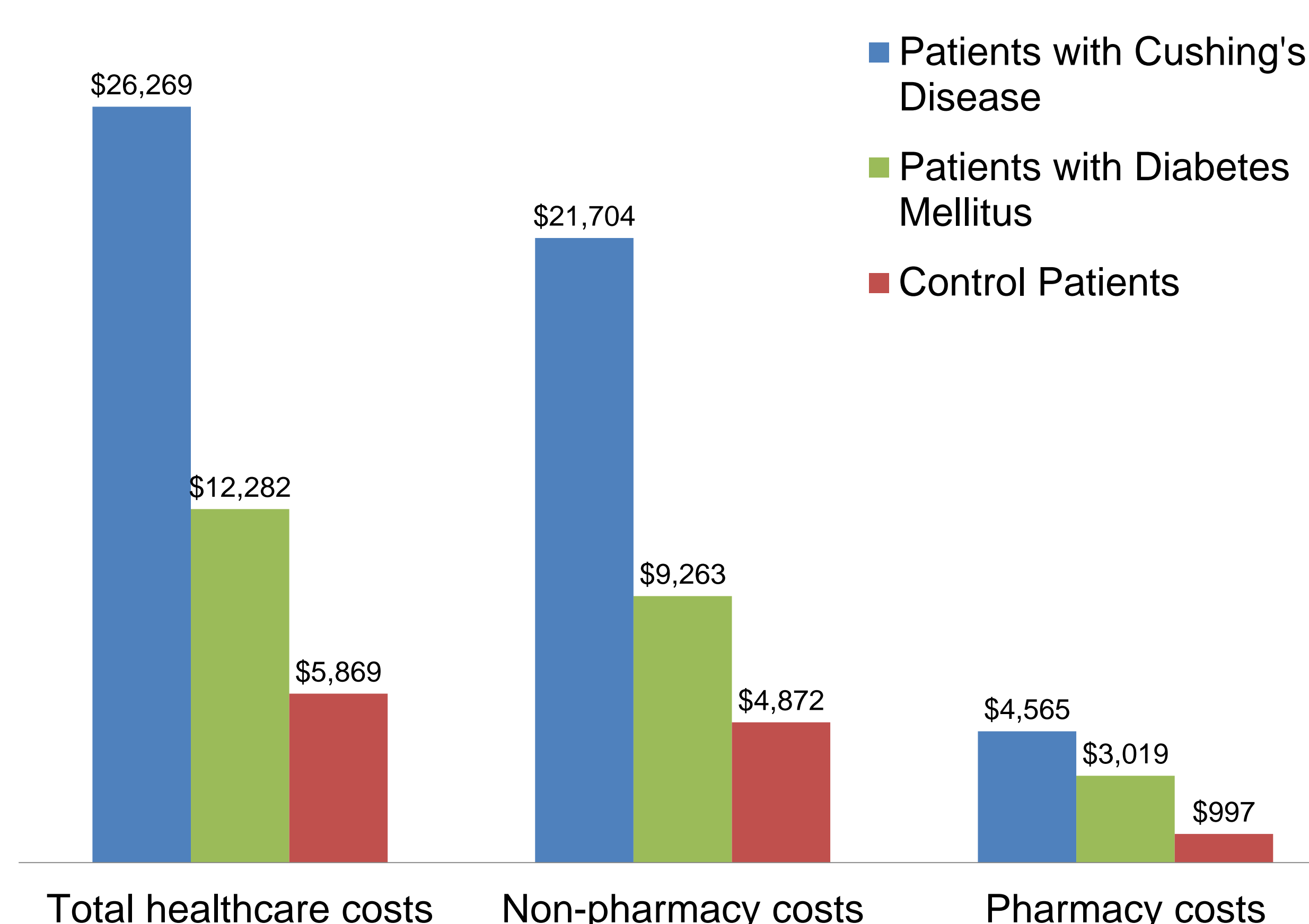
p<.001 for all comparisons (CD vs. DM and CD vs. control).

TABLE 2. Annual Healthcare Utilization

No. of inpatient hospitalizations, n (%)	CD (n=1,852)	DM (n=3,704)	Control (n=3,704)
0	1,495 (80.7)	3,296 (89.0)	3,497 (94.4)
1	226 (12.2)	324 (8.7)	176 (4.8)
2	74 (4.0)	55 (1.5)	25 (0.7)
3+	57 (3.1)	29 (0.8)	6 (0.2)
No. of ED visits, n (%)			
0	1,381 (74.6)	2,921 (78.9)	3,173 (85.7)
1	281 (15.2)	514 (13.9)	395 (10.7)
2	107 (5.8)	154 (4.2)	85 (2.3)
3+	83 (4.5)	115 (3.1)	51 (1.4)
No. of office visits, mean ± SD	19.1±17.5	10.7±11.3	7.1±9.7
No. of prescription fills, mean ± SD	51.7±48.6	42.7±34.1	20.5±23.6

p<.001 for all comparisons (CD vs. DM and CD vs. control).

FIGURE 1. Mean Annual Healthcare Costs

Legend: Patients with Cushing's Disease; Patients with Diabetes Mellitus; Control Patients

Total healthcare costs: $26,269 / $12,282 / $5,869
Non-pharmacy costs: $21,704 / $9,263 / $4,872
Pharmacy costs: $4,565 / $3,019 / $997

LIMITATIONS

- Total healthcare costs for controls may be over-estimated, since healthy controls not having claims would not be included in the claims database.

- There are no ICD-9-CM codes specific to CD. The CD algorithm has been published previously, but not validated using medical records.

- Insurance claims are collected for payment, not research.

- Study only included patients with commercial insurance.

CONCLUSIONS

- The total healthcare cost of CD care was observed to be more than double the cost for diabetic patients and quadruple the cost for population-based controls.

- Our study highlights two potential drivers of this increased cost: higher rates of comorbidities seen in patients with CD, and CD surgical care, a key component of non-pharmacy costs.

- Delay in CD diagnosis, which may prolong symptoms, is another possible cause of increased cost in patients with CD.

References

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