Healthcare Resource Utilization and Cost Burden of Hemophilia B in the United States

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INTRODUCTION

- The number of people living with hemophilia B worldwide is over 30,000 and in the United States (US) alone is over 6,000.[1,2]
- Despite the rarity of hemophilia B, it is associated with a substantial economic and societal burden.[3]
- Several studies have investigated the economic burden of hemophilia B using real-world administrative claims data, but focused on outcomes within the overall study sample[4,5] or among patients receiving extended half-life vs. standard half-life factor IX (FIX) treatments.[6]
- To date, no studies have examined the economic burden of hemophilia B with stratification by disease severity or clinical profile.

OBJECTIVES

- To construct an insurance database algorithm to identify clinical profile of hemophilia B.
- To quantify healthcare resource utilization (HRU) and healthcare costs associated with hemophilia B from a US health system perspective, both overall and by clinical profile.

METHODS

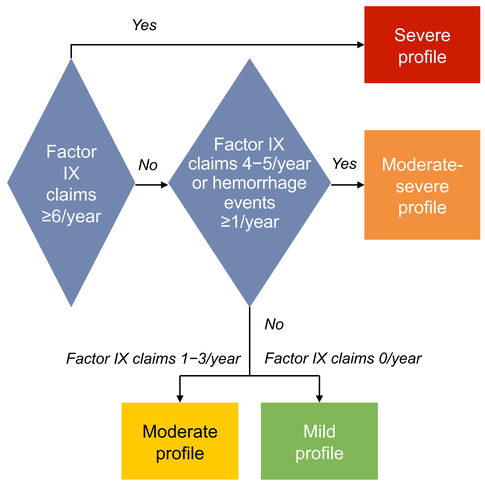
Data source and study population

- This study used the IBM MarketScan® Commercial and Medicare Supplemental databases (06/2011−02/2019).
- Patients were included in the hemophilia B cohort if they met the following criteria:
  - Adult male patients with ≥2 claims on separate dates with diagnosis of hemophilia B.
  - Patients continuously enrolled for ≥1 year after (study period) and ≥1 year prior to (baseline period) the index date (see definition below).
- The dates of all medical visits associated with a hemophilia B diagnosis were considered as potential index dates. For patients with multiple qualifying index dates, one was randomly selected as their index date.
- A demographic-matched control sample of enrollees without any diagnoses for hemophilia B, hemophilia A, or other coagulation disorders (e.g., Von Willebrand's disease) was also generated.

Algorithm for clinical profile

- The clinical profile of hemophilia B was categorized as mild, moderate, moderate-severe, or severe, using a claims-based algorithm informed by literature[7,8] and expert opinion (**Figure 1**).

Figure 1. Algorithm for clinical profile



Study outcomes and statistical analyses

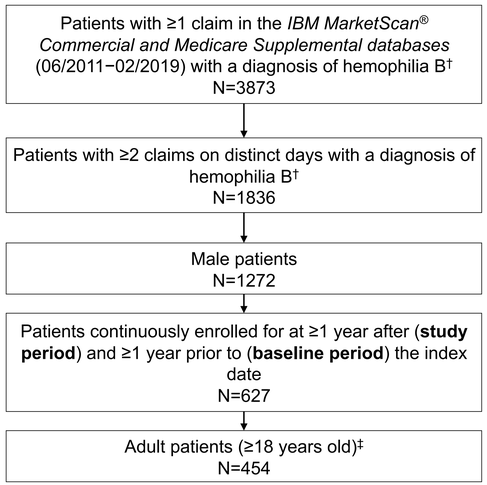
- Patient characteristics at baseline and all-cause HRU and healthcare costs during the 1-year study period were compared between patients with hemophilia B vs. matched controls, both overall and with stratification by clinical profile.
- Statistical comparisons between patients with hemophilia B vs. matched controls were conducted using Wilcoxon signed-rank tests for continuous variables, and McNemar test for categorical variables.

RESULTS

Baseline characteristics

- A total of 454 patients with hemophilia B and 454 matched controls were included in the analysis (**Figure 2**).
- Patients with hemophilia B had a significantly higher comorbidity burden compared to matched controls (Charlson Comorbidity Index: 0.9 vs. 0.3, p<0.001) (**Table 1**).

Figure 2. Sample selection flow chart



†Hemophilia B was identified using ICD-9-CM code 286.1 or ICD-10-CM code D67. ‡Patients with hemophilia B were matched 1:1 to control enrollees without hemophilia or other coagulation disorders (N=454).

Table 1. Baseline characteristics

Patient characteristics	Patients with hemophilia B N=454	Controls N=454	P-value
Demographics			
Age (years), mean (SD)	46.0 (18.4)	46.0 (18.4)	1.000
Geographic region, n (%)			1.000
North central	132 (29.1%)	132 (29.1%)	
Northeast	90 (19.8%)	90 (19.8%)	
South	163 (35.9%)	163 (35.9%)	
West	69 (15.2%)	69 (15.2%)	
Insurance type, n (%)			1.000
Comprehensive	33 (7.3%)	33 (7.3%)	
Preferred provider organization (PPO)	276 (60.8%)	276 (60.8%)	
Capitated	50 (11.0%)	50 (11.0%)	
Other	95 (20.9%)	95 (20.9%)	
Index year, n (%)			1.000
2012−2013	184 (40.5%)	184 (40.5%)	
2014−2015	131 (28.9%)	131 (28.9%)	
2016−2018	139 (30.6%)	139 (30.6%)	
Comorbidities			
Charlson Comorbidity Index, mean (SD)	0.9 (1.7)	0.3 (0.9)	<0.001
Hemophilia-related comorbidities, n (%)			
HIV/AIDS	17 (3.7%)	1 (0.2%)	<0.001
Hepatitis B	7 (1.5%)	0 (0.0%)	0.008
Hepatitis C	76 (16.7%)	2 (0.4%)	<0.001

HRU and costs

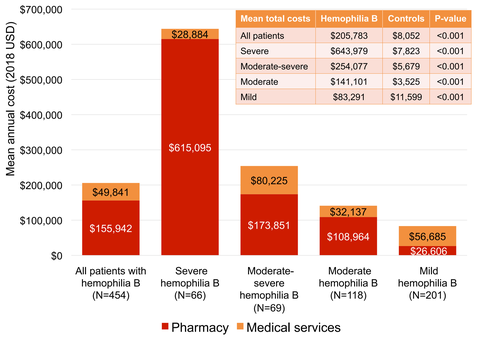
- Overall, patients with hemophilia B had over twice as many inpatient (IP) admissions (mean number of admissions: 0.3 vs. 0.1, p<0.001), emergency room (ER) visits (mean: 0.6 vs. 0.2, p<0.001), and outpatient (OP) visits (mean: 17.7 vs. 8.0, p<0.001; **Table 2**).
- Use of prescribed opioids was significantly higher among patients with hemophilia B compared to matched controls, with patients in the severe cohort receiving on average 2-month supply of opioid prescriptions.
- Consistent with HRU results, healthcare costs were greater among patients with hemophilia B than matched controls across every category (all p<0.05) (**Figure 3**).
- Annual total healthcare costs increased with increasing severity of clinical profile, ranging from $83,291 and $141,101 in the mild and moderate cohorts, to $254,077 and $643,979 in the moderate-severe and severe cohorts.
- Hemophilia-related treatment costs accounted for 72% of total healthcare costs in patients with hemophilia B, and 94% in the severe cohort.

Table 2. Annual all-cause healthcare resource utilization

	Patients with hemophilia B N=454	Controls N=454	P-value
≥1 admission, n (%)			
IP admission	87 (19.2%)	26 (5.7%)	<0.001
ER visit	133 (29.3%)	64 (14.1%)	<0.001
OP visit	454 (100.0%)	366 (80.6%)	<0.001
Number of admissions, mean (SD)			
IP admissions	0.3 (0.6)	0.1 (0.3)	<0.001
Days of hospitalization	1.2 (3.7)	0.3 (1.5)	<0.001
ER visits	0.6 (1.2)	0.2 (0.6)	<0.001
OP visits	17.7 (22.9)	8.0 (11.0)	<0.001
≥1 specialist visit,‡ n (%)			
Hematologist	289 (63.7%)	34 (7.5%)	<0.001
Orthopedist	151 (33.3%)	81 (17.8%)	<0.001
Psychologist/psychiatrist	45 (9.9%)	21 (4.6%)	0.002
Prescribed opioids			
≥ 1 prescription, n (%)	185 (40.7%)	102 (22.5%)	<0.001
Days of supply, mean (SD)	35.2 (114.1)	9.9 (39.1)	<0.001

‡Specialist visits were identified based on provider type or Current Procedural Terminology code reported on a claim.

Figure 3. Annual healthcare costs



Mean total costs	Hemophilia B	Controls	P-value
All patients	$205,783	$8,052	<0.001
Severe	$643,979	$7,823	<0.001
Moderate-severe	$254,077	$5,679	<0.001
Moderate	$141,101	$3,525	<0.001
Mild	$83,291	$11,599	<0.001

LIMITATIONS

- In the absence of laboratory data that is integrated with the administrative claims data, it was not feasible to formally validate the claims-based profile identification algorithm against clotting factor level.
- Administrative claims only capture clinical events that result in medical service use. Consequently, bleeding events were likely to be under-identified using claims data as a result of bleeding events that were treated and resolved at home.

CONCLUSIONS

- Hemophilia B is associated with substantial healthcare resource use and costs in the US. The significant economic burden measured in this study highlights that unmet needs remain in hemophilia B.
- The claims-based algorithm developed in the present study may support opportunities to expand uses of existing claims databases to understand the burden of disease of hemophilia B from a US health system perspective.

REFERENCES

1. World Federation of Hemophilia. Annual global survey 2017. October 2018.
2. CDC. Community Counts - Registry for Bleeding Disorders Surveillance.
3. Chen CX, et al. *Value Health.* 2017;20(8):1074-1082.
4. Eldar-Lissai A, et al. ISPOR 20th Annual International Meeting, May 2015.
5. Guh S, et al. *Haemophilia.* 2012;18(2):268-275.
6. Tortella BJ, et al. *J Manag Care Spec Pharm.* 2018;24(7):643-653.
7. National Hemophilia Foundation. MASAC recommendations concerning prophylaxis. February, 2016.
8. Castaman G. *Expert Rev Hematol.* 2018;11(8):673-683.

DISCLOSURES

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