

RESEARCH LETTER

Prevalence of Venous Thromboembolism Among Privately Insured US Adults

Venous thromboembolism (VTE) includes deep vein thrombosis (DVT) and pulmonary embolism (PE); DVT refers to the formation of 1 or more blood clots in a large vein, and PE results when a portion of the blood clot breaks loose, travels through the bloodstream, and partially or completely blocks a pulmonary artery.¹ Venous thromboembolism is an important and growing public health concern; however, a national surveillance system for this condition has not been established.² Therefore, many of the current estimates of VTE incidence were derived from geographically defined populations,^{3,4} single institutions,⁵ or hospital discharge databases.⁶ Hospital discharge data are particularly problematic because many patients are treated on an outpatient basis.⁵

Administrative data represent a potential source for monitoring VTE trends in the absence of established public health surveillance systems. We used health insurance claims data from a large, privately insured US adult population to estimate the prevalence of VTE during 2005 through 2006 within that population. To account for the potential for misclassification of DVT or PE diagnoses in claims data, we also explored using different algorithms to calculate our estimates.

Methods. The data were derived from the 2005-2006 MarketScan Commercial Claims and Encounters (CCAЕ) and MarketScan Medicare Supplemental and Coordination of Benefits (COB) research databases (Thomson Reuters, New York, New York). The CCAЕ database, which comprises privately insured individuals younger than 65 years, included approximately 17 million insured people annually during 2005 through 2006. The Medicare COB database, which comprises retirees 65 years or older with Medicare supplemental insurance paid for by employers, included approximately 2 million people annually during 2005 through 2006.

We restricted the analysis to individuals 20 years or older. Individuals with possible DVT were identified by the presence of the following *International Classification of Disease, Ninth Revision, Clinical Modification (ICD-9-CM)* codes in any inpatient or outpatient diagnosis field: 671.3x, 671.4x, 671.5x, 671.9x, 451.11, 451.19, 451.2, 451.81, 453.2, and 453.9. Pulmonary embolism was identified using *ICD-9-CM* codes 673.2x, 673.8x, 415.11, and 415.19. Unique identification numbers were used to track

individuals over time; therefore, each person with a VTE diagnosis was only counted once, regardless of the number of times the diagnosis was noted. Individuals in the population denominator were also tracked longitudinally and were included if they were enrolled in any health plan, even if no claims were submitted during the 2-year period. The administrative prevalence of VTE was calculated by dividing the number of individuals with a VTE diagnosis during the 2-year study period by the total number of individuals enrolled in health plans during the same period.

To reduce inaccurate reporting of DVT and PE diagnoses, we restricted outpatient diagnoses to those with a relevant *Current Procedural Terminology (CPT)* code listed and a filled prescription for an anticoagulant medication.

Results. Of the 15 066 488 adults enrolled in employer-sponsored health plans during 2005 through 2006, 131 393 (8.7 per 1000) had a DVT or PE diagnosis recorded on an inpatient or outpatient claim (**Table**). When the outpatient case definition was restricted to outpatient diagnoses with a relevant *CPT* code, the prevalence of VTE declined to 5.8 per 1000. Similarly, when only outpatient diagnoses linked to filled anticoagulant prescriptions were included, the prevalence of VTE was 5.5 per 1000. When outpatient diagnoses were restricted to individuals who had both a code for a related procedure and a filled prescription for anticoagulant medication, the prevalence of VTE declined to 4.3 per 1000.

Comment. Health insurance claims data may overstate the prevalence of VTE unless measures for improving the validity of code-based diagnoses are used, particularly for outpatient diagnoses. Our findings suggest that diagnostic imprecision associated with ascertainment of VTE cases using *ICD-9-CM* codes may be reduced by the application of multiple criteria for confirming disease status.

Estimates of the prevalence of VTE based on inpatient data alone understate the true prevalence of the condition. Almost half of DVT cases identified in this study were managed exclusively in the outpatient setting, which suggests that studies using hospital admission data as the only source for diagnostic information are likely to underascertain cases of VTE overall and DVT in particular.

The VTE prevalence estimates presented in this report cannot be compared with estimates of VTE incidence. Because the prevalence of a condition is related to the duration of the disease,⁷ and VTE is associated with a high rate of recurrence⁸ and related complications,^{1,2} prevalence estimates should exceed those of VTE incidence.

Table. Effect of Data Sources and Case Definitions on Estimates of VTE Prevalence in Adults 20 Years or Older^a

Location of Diagnosis	Adults, No. (%)			Prevalence VTE (per 1000)
	DVT	PE	VTE	
No restriction				
Inpatient claim (±outpatient claim)	21 361 (21)	20 377 (47)	37 125 (28)	2.5
Outpatient claim only	79 978 (79)	22 780 (53)	94 268 (72)	6.3
Total (any claim)	101 339 (100)	43 157 (100)	131 393 (100)	8.7
Procedure code restriction				
Inpatient claim (±outpatient claim)	21 361 (31)	20 377 (69)	37 125 (43)	2.5
Outpatient claim only	46 536 (69)	9145 (31)	49 686 (57)	3.3
Total (any claim)	67 897 (100)	29 522 (100)	86 811 (100)	5.8
Prescription drug restriction				
Inpatient claim (±outpatient claim)	21 361 (35)	20 377 (60)	37 125 (45)	2.5
Outpatient claim only	39 410 (65)	13 691 (40)	45 892 (55)	3.0
Total (any claim)	60 771 (100)	34 068 (100)	83 017 (100)	5.5
Procedure and prescription drug restriction				
Inpatient claim (±outpatient claim)	21 361 (46)	20 377 (73)	37 125 (58)	2.5
Outpatient claim only	25 224 (54)	7352 (27)	27 379 (42)	1.8
Total (any claim)	46 585 (100)	27 729 (100)	64 504 (100)	4.3

Abbreviations: DVT, deep vein thrombosis; PE, pulmonary embolism; VTE, venous thromboembolism; ±, with or without.

^aMarketScan Commercial Claims and Encounters and MarketScan Medicare Supplemental Coordination of Benefits databases, Thomson Reuters, New York, New York, 2005-2006.

The findings presented in this report are specific to privately insured individuals and may not be representative of the entire US population.⁹ Although limited by misclassification and diagnostic imprecision, administrative data represent a valuable source of information on the public health impact of VTE.

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COMMENTS AND OPINIONS

Could Proton Pump Inhibitors Cause Cancer?

In addition to increased risk of osteoporotic fractures, *Clostridium difficile*, and other infections,¹ proton pump inhibitors (PPIs) may have also contributed to the sharp rise in gastroesophageal malignant diseases seen over the past 2 decades. This is especially true for esophageal adenocarcinoma, which was previously uncommon, and mirrors the increased use of these drugs.^{2,3} It has been suggested that with PPIs, pancreatic enzymes that would have previously been inactivated by hydrochloric acid are able to irritate and cause dysplasia in esophageal tissue in patients with reflux disease. There is also evidence that gastroesophageal reflux disease (GERD) may not develop from direct superficial injury but rather from stimulation of esophageal cytokines that attract inflammatory cells to submucosal tissues.⁴