

Rethinking Guidelines for VTE Risk Among Nursing Home Residents

A Population-Based Study Merging Medical Record Detail With Standardized Nursing Home Assessments

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BACKGROUND: Nursing home (NH) residents are at increased risk for both VTE and bleeding from pharmacologic prophylaxis. Construction of prophylaxis guidelines is hampered by NH-specific limitations with VTE case identification and characterization of risk. We addressed these limitations by merging detailed provider-linked Rochester Epidemiology Project (REP) medical records with Centers for Medicare and Medicaid Services Minimum Data Set (MDS) NH assessments.

METHODS: This population-based nested case-control study identified all Olmsted County, Minnesota, residents with first-lifetime VTE October 1, 1998, through December 31, 2005, while a resident of an NH (N = 91) and one to two age-, sex-, and calendar year-matched NH non-VTE control subjects. For each NH case without hospitalization 3 months before VTE (n = 23), we additionally identified three to four nonhospitalized NH control subjects. REP and MDS records were reviewed before index date (VTE date for cases; respective REP encounter date for control subjects) for numerous characteristics previously associated with VTE in non-NH populations. Data were modeled using conditional logistic regression.

RESULTS: The multivariate model consisting of all cases and control subjects identified only three characteristics independently associated with VTE: respiratory infection vs no infection (OR, 5.9; 95% CI, 2.6-13.1), extensive or total assistance with walking in room (5.6, 2.5-12.6), and general surgery (3.3, 1.0-10.8). In analyses limited to nonhospitalized cases and control subjects, only nonrespiratory infection vs no infection was independently associated with VTE (8.8, 2.7-29.2).

CONCLUSIONS: Contrary to previous assumptions, most VTE risk factors identified in non-NH populations do not apply to the NH population. NH residents with infection, substantial mobility limitations, or recent general surgery should be considered potential candidates for VTE prophylaxis.

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ABBREVIATIONS: CMS = Centers for Medicare and Medicaid Services; MDS = Minimum Data Set; NH = nursing home; PE = pulmonary embolism; REP = Rochester Epidemiology Project

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VTE, including DVT and pulmonary embolism (PE), is relatively common, potentially life threatening, and costly.¹⁻⁴ VTE incidence can be reduced with appropriate prophylaxis. However, risk stratification is required to avoid unnecessary, costly therapy and potentially serious consequences.⁵ Risk stratification is especially critical within the nursing home (NH) setting. Using Rochester Epidemiology Project (REP) records-linkage resources, we previously reported that odds of VTE among NH residents were 5.6 times those for non-NH residents, even adjusted for other established risk factors.⁶ Furthermore, NH residency accounted for 13% of all incident VTE cases within the population.⁷ Thus, reducing VTE incidence among NH residents would contribute to reductions within the population generally. Importantly, however, NH residents exhibit several characteristics (eg, advanced age, low body weight, hypertension, stroke, and polypharmacy) associated with adverse consequences from anticoagulant thromboprophylaxis.^{8,9}

Despite growing recognition of the importance of risk assessment and appropriate targeting of prophylaxis within the NH setting,⁸⁻¹⁴ evidence needed to inform NH-specific recommendations is lacking. The very few population-based studies typically identified NH VTE using diagnosis codes from administrative data.^{15,16} Limitations of this approach were demonstrated in a previous study among Olmsted County, Minnesota, NH residents.¹⁶ Using REP resources, 161 cases were identified; only 53 were identified using NH administrative data. Other differences between REP and administrative data (ie, proportions with PE [62% vs 21%] and 1-year sur-

vival [45% vs 76%]) suggest that NH administrative data are biased against case subjects who died before next assessment.

Because of difficulties with NH VTE case ascertainment, recommendations for VTE risk stratification within the NH, including American College of Chest Physicians (CHEST) guidelines,^{5,9,16-20} have been largely restricted to extrapolation from general population or hospital studies. Such extrapolation was challenged with another REP study, published as a brief report.²¹ That study was limited to three factors known to account for the majority of VTE events among the general Olmsted County population (ie, recent hospitalization, recent trauma, and active cancer).⁷ These factors failed to sufficiently characterize VTE risk among Olmsted County NH residents.²¹ However, we did not explore other clinical characteristics or functional status and mobility limitations, two measures not routinely documented in REP resources but of potential relevance for NH residents.^{17,22}

The current study addresses the recognized need for data on VTE risk among NH residents.⁸⁻¹⁴ Previous limitations are minimized by using REP resources to identify both NH VTE cases and control subjects and comprehensively explore clinical factors and then by merging with Centers of Medicare and Medicare Services (CMS) Minimum Data Set (MDS) NH assessments²³ to obtain standardized measures of functional status and mobility. Combining data from both sources will help inform practice guidelines for reducing VTE and its adverse consequences within the NH setting.

Materials and Methods

This population-based case-control study was conducted in Olmsted County, Minnesota (2010 census population = 144,248). Rochester, the county seat, is geographically isolated from other urban centers and home to Mayo Clinic, one of the world's largest medical centers. Thus, county residents receive medical care from very few providers, primarily Mayo Clinic and another group practice, Olmsted Medical Center, and affiliated hospitals.²⁴ Since 1907, every patient at Mayo is assigned a unique identifier. All information (medical history, clinical assessments, consultations, dismissal summaries, surgical procedures, laboratory/radiology/pathology/autopsy results, correspondence, and death certificates) from every contact (eg, office, NH, ED, hospital) is contained within a unit medical record. Under auspices of the REP, this

records linkage was expanded to include non-Mayo providers of care to county residents.²⁴

Study Sample

REP resources were used to identify all Olmsted County residents with symptomatic objectively diagnosed VTE.^{7,25,26} Cases included all county residents, regardless of age, sex, or symptom-onset location (eg, community, hospital, NH). Explicit case criteria were applied following medical record review from date first seen until earliest of death or last REP encounter by trained experienced nurse abstractors under direction of a board-certified vascular medicine specialist (J. A. H.). Variables abstracted included diagnostic method, symptom-onset location, and event type (DVT, PE, or both; chronic thromboembolic pulmonary hypertension). DVT was considered objectively diagnosed when acute symptoms/signs were present and confirmed using venography, compression venous duplex ultrasonography, impedance plethysmography, CT venography, MRI, pathology examination of surgically removed thrombus, or autopsy. PE was considered objectively diagnosed when acute symptoms/signs were present and confirmed using pulmonary angiography, ventilation and perfusion lung scan interpreted as high probability for PE, CT pulmonary angiography, MRI, pathology examination of surgically removed thrombus, or autopsy.^{7,25,26}

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