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Editorial

Venous Thromboembolism Prophylaxis in the Nursing Home: To Do or Not To Do?

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In this issue, Reardon et al[1] provide data on the rates of venous thromboembolism (VTE) in 181 nursing homes between 2007 and 2009. They observed that 1 in 25 new nursing home admissions carried a diagnosis of VTE at arrival, and, postadmission, the incidence rate was 3.68 VTE cases per 100 person-years. Together, their findings point to significantly higher VTE incidence rates in long term care (LTC) than previously reported. In 2010, the *Journal* published a report[2] that identified a number of risk factors for VTE in the nursing home, prompting the authors to offer a Risk Assessment Tool for VTE to aid clinicians caring for LTC residents. In 2012, the *Journal* published a 2-article report[3,4] that described current VTE prophylaxis (VTE-P) practices before and after a modest educational intervention that included information from an American Medical Directors Association (AMDA) Antithrombotic Tool Kit,[5] along with the then-current Clinical Practice Guidelines (CPGs) on VTE-P as they applied to the LTC setting. Before intervention,[3] indications for VTE-P were identified in most nursing home residents, with some receiving pharmacological or nonpharmacological prophylaxis; further, more than 50% of residents had relative or absolute contraindications for VTE-P at their admission. Following an educational intervention,[4] indications for VTE-P and contraindications for anticoagulation remained similar to preintervention levels; however, after education, aspirin use as a sole means for prophylaxis declined significantly whereas the use of nonpharmacological approaches, such as compression devices, increased 2- to 4-fold. The authors suggested that even a modest educational intervention can improve provider knowledge pertinent to VTE risk assessment and to the risk-benefit considerations regarding VTE prophylaxis in LTC residents.

Scope of the Problem

Deep vein thrombosis (DVT) and its dreaded, life-threatening complication, pulmonary embolism (PE), are common in clinical practice.[6,7] Up to 600,000 new cases of VTE occur yearly in the United States,[8,9] resulting in 200,000 or more deaths yearly.[10,11] VTE is also more prevalent with age.[12,13] One in 20 individuals develop DVT during their lifetime, but only a third of the VTE cases are detected.[7,13] Following hip fracture surgery, DVT rates are approximately 50% without thromboprophylaxis.[14] By 2030, one-fifth or more of the US population will be 65 years or older and approximately one-half will enter a nursing home, at least once, during their lifetime.[15,16] Many of these residents will be at increased risk of DVT and VTE due to venous stasis resulting from limited mobility or immobility secondary to recent or chronic illnesses, such as heart failure, stroke, sepsis, post general or orthopedic surgery, fractures, and prior history of VTE or PE.[17–20]

VTE in the Nursing Home

The report by Reardon et al[1] is timely because of the observation that VTE risk in LTC may be 2- to 3-fold greater than a prior 2003 report, based on more than 18,000 LTC residents, that determined the incidence of VTE to be 1.30 events per 100 person-years of observation.[20] As a general statement, PE is perhaps underdiagnosed in mobility-impaired individuals. In one study, following screening of 221 patients who were immobile (either at home or in LTC) by compression ultrasound at bedside, DVT was observed in 18% of patients, with none symptomatic for PE.[21] Another study, compiled from 234 autopsy reports, found undiagnosed PE to be the cause of death in 8%, with a full 40% of these PE cases not suspected before autopsy.[22] The lesson to be learned here is that VTE may be asymptomatic and PE may be silent before death.[23]

Recommendations and CPGs for VTE prophylaxis in the hospital setting are abundant, but they are extrapolated for residents in LTC.[5,8,12,17,23–31] The 2008 CPGs on VTE prevention from the American College of Chest Physicians (ACCP) were updated and expanded in 2012.[25] The new guidelines include suggestions for the diagnosis and prevention of DVT[26]; for perioperative management of antithrombotic therapy[27]; and for prevention of VTE in orthopedic surgery, nonorthopedic surgery, and nonsurgical patients.[28–30] The guidelines also include a section on the newer antithrombotic agents.[31] The 2012 CPGs recommend a certain duration of VTE-P in specific settings. For example, after major orthopedic surgery, anticoagulation is recommended for 35 days rather than for 10 to 14 days (Grade 2B recommendation). This means that after orthopedic surgery, a patient discharged to an LTC or subacute setting should receive continued anticoagulation for up to 5 weeks. These new guidelines lead us to believe that a better understanding of the

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predisposing factors for VTE in LTC and the individualized approaches to VTE-P would be of interest to the *JAMDA* readership.

We are well aware of the need to assess patients for VTE risk when hospitalized for heart failure, sepsis, cancer, DVT with or without PE, recent trauma, or surgery; these patients will remain at risk at least for some time when transferred to a subacute or LTC setting. What are we to do in these individuals? Are we to discontinue prophylaxis? Has the risk of VTE really subsided? Do we deal with the patients in a LTC setting differently?

We suspect that there is a general tendency to underutilize anticoagulants when treating older individuals, and the tendency may be greater in the nursing home setting.[3,4] A 2010 editorial in this journal commented that when life expectancy is less than a year, the burden of pharmaco-prophylaxis likely may outweigh the benefits.[32] There is a clear need for additional research that focuses on the risk-benefit analysis and cost-effective management of VTE-P in the LTC setting. Nursing home residents present with unique characteristics: a high prevalence of dementia, are often bed-bound, have limited life expectancy with multiple chronic comorbidities, and commonly manifest undernutrition.[33] Often, they are without a caregiver or advance directives. Nevertheless, it is our task to provide the residents quality care (Table 1).

Table 1
Risk Factors for Venous Thromboembolism[2,3,5,12,14,18,19,21,25,32]

- Surgery, recent
  - Orthopedic surgery (hip fracture, total hip or knee replacement)
  - Arthroscopic knee surgery
  - Major nonorthopedic general and gynecological surgery
  - Laparoscopic surgery
- Medical illness
  - History of prior deep vein thrombosis or pulmonary embolism
  - Congestive heart failure
  - Ischemic stroke
  - Acute myocardial infarction
  - Chronic obstructive lung disease
  - Nephrotic syndrome
  - Cancer (active > history of)
  - Recent severe and multiple trauma (all trauma, excluding surgery)
  - Recent lower body trauma, including fracture of pelvis or hip
  - Morbid obesity
  - Recent hospitalization
  - Severe inflammatory disease
  - Infectious disease, including sepsis
  - Neurological disease with paresis
  - Spinal cord injury
  - Decreased mobility
  - Presence of a central or peripheral venous catheter
- Thrombophilic (or hypercoagulability) disorders
  - Antithrombin III deficiency
  - Protein C and S deficiencies
  - Hyperhomocystenuria
  - Antiphospholipid antibody syndrome
- Medication associated
  - Hormone replacement therapy
  - Megesterol acetate
  - Chemotherapy for malignant disease
  - Antipsychotic agents

Are Current CPGs for VTE-P Applicable to the LTC Setting?

In general, nursing home residents are highly vulnerable to VTE during acute medical or surgical illnesses; on return from the hospital, their risk factors for VTE continue during rehabilitation and sometimes beyond this stage during future residence.[1] They also possess many more relative or absolute contraindications to VTE-P. With current aging trends, the use or nonuse of VTE-P in LTC will remain a consideration for years to come. In 2006, AMDA published an Antithrombotic Tool Kit[5] to educate and reinforce caregiver understanding of current CPGs as they apply to VTE-P in the LTC setting. The 2012 AMDA Foundation–sponsored study[3,4] encouraged care providers to consider LTC issues, such as a resident's life expectancy and resident/caregiver wishes, in addition to the risk-benefit considerations related to VTE-P. The study observed a much greater diversity in choosing pharmacological and non-pharmacological measures following a modest educational intervention and recommended that new, comprehensive approaches be developed for VTE-P in LTC. To appropriately implement VTE-P, education must be imparted to all relevant staff on the team, including the physician, nurse(s), nutritionist, and pharmacist. Additionally, appropriate documentation of the rationale for VTE use or nonuse must be adequately documented in the patient's medical records.[24] Dietary intake or restrictions, and an understanding of the formulary available for anticoagulant therapy must not be overlooked.[34]

Traditional to Novel Anticoagulants: A Decades-Long Journey!

Much progress has been achieved over past decades regarding indications for VTE and the available choices of VTE-P agents[31,34–46]; however, these new choices come with a price. They present us new dilemmas related to cost concerns and adverse effect profiles; providers now and in the future need to be astute in drug selection and be willing to ensure adequate patient follow-up.

Vitamin K antagonists (warfarin) have been used for at least 5 decades and remain in common use. Warfarin therapy requires periodic monitoring of International Normalized Ratio. Warfarin dose need not be adjusted for renal function but there are numerous drug-drug, drug-nutrient, and drug-disease interactions that may mar its potential benefit.[27,34,42–45] Unfractionated heparins, low molecular weight heparins (LMWHs), and fondaparinux are administered by injection, and, accordingly, require a greater dependency on the nursing home staff or caregiver. Hyperkalemia, bleeding, and osteoporosis with long-term use are recognized adverse effects of heparin use. LMWHs and fondaparinux do not require regular monitoring. Because they are cleared by the kidney, there is a need to assess renal function to enable dose adjustments; a well-defined creatinine clearance cutoff below which they are contraindicated is not clear.[37]

The newer anticoagulants, dabigatran, apixaban, and rivaroxaban, provide the convenience of oral use, predictable pharmacokinetics, and a rapid onset of action.[31,35,36,38–41] Drug interactions, especially with CYP3A4 inhibitors and inducers do occur but they are not as profound as seen with the heparins and antiplatelet agents.[38] Dabigatran, a direct thrombin inhibitor, is dosed twice daily, as is apixaban, a factor Xa inhibitor, whereas rivaroxaban, another factor Xa inhibitor, is administered once daily. The 3 anticoagulants require dose adjustments tailored to declining renal function and are contraindicated when the creatinine clearance is less than 15 mL per minute. Should bleeding occur while on these agents, effective and reliable antidotes for reversibility are not currently available, which is not the case should bleeding occur with warfarin. The novel agents are expensive; however, they do not require regular monitoring (as with warfarin) and so may be cost-effective, depending on