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# The effect anticoagulation status on geriatric fall trauma patients



Julia Coleman, M.D., M.P.H.<sup>\*,1</sup>, Mustafa Baldawi, M.D.,  
David Heidt, M.D.

Department of Surgery, University of Toledo, 3000 Arlington Avenue, Toledo, OH 43614, USA

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Fall;  
Trauma;  
Geriatric;  
Anticoagulation;  
Clopidogrel;  
Warfarin

## Abstract

**BACKGROUND:** This research study aims to identify the effect of anticoagulation status on hospital course, complications, and outcomes among geriatric fall trauma patients.

**METHODS:** The study design is a retrospective cohort study, looking at fall trauma among patients aged 60 to 80 years from 2009 to 2013 at a university hospital in the United States. The statistical analysis, conducted with SPSS software with a threshold for statistical significance of  $P < .05$ , was stratified by anticoagulation status and then further by type of anticoagulation (aspirin, warfarin, clopidogrel, enoxaparin, and dipyridamole). Outcomes variables include mortality, length of stay (LOS), intensive care unit (ICU) admission, and complications.

**RESULTS:** The total number of patients included in this study was 1,121. Compared with patients not on anticoagulation, there was a higher LOS among patients on anticoagulation ( $6.3 \pm 6.2$  vs  $4.9 \pm 5.2$ ,  $P = .001$ ). A higher LOS ( $7.2 \pm 6.8$  vs  $5.0 \pm 5.3$ ,  $P = .001$ ) and days in the ICU ( $2.1 \pm 5.4$  vs  $1.1 \pm 3.8$ ,  $P = .010$ ) was observed in patients on warfarin. A higher mortality (7.1% vs 2.8%,  $P = .013$ ), LOS ( $6.3 \pm 6.2$  vs  $5.1 \pm 5.396$ ,  $P = .036$ ), and complication rate (49.1 vs 36.7,  $P = .010$ ) was observed among patients on clopidogrel.

**CONCLUSIONS:** In this study, a higher mortality and complication rate were seen among clopidogrel, and a greater LOS and number of days in the ICU were seen in patients on warfarin. These differences are important, as they can serve as a screening tool for triaging the severity of a geriatric trauma patient's condition and complication risk. For patients on clopidogrel, it is essential that these patients are recognized early as high-risk patients who will need to be monitored more closely. For patients on clopidogrel or warfarin, bridging a patient's anticoagulation should be initiated as soon as possible to prevent unnecessary increased LOS. At last, these data also provide support against prescribing patients clopidogrel when other anticoagulation options are available.

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\* Corresponding author. Tel.: +1-614-406-8829; fax: +1-303-724-2682.

E-mail address: [Julia.e.roberts@ucdenver.edu](mailto:Julia.e.roberts@ucdenver.edu)

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<sup>1</sup> Present address: University of Colorado Anschutz Medical Campus, Academic Office One Building Room 5401, 12631 East 17th Avenue, C302, Aurora, CO, 80045, USA.

The elderly population (>65 years old) currently accounts for approximately 14.2% of the population but is expected to account for more than 25% by 2060, with a growth rate significantly exceeding that of the rest of the population.<sup>1</sup> This represents a large and expanding subset of the health care patients with unique needs in the United States. This is particularly true within the realm of trauma, as elderly constitute 28% of traumatic deaths<sup>2</sup> and 75% of

fall-related death.<sup>3</sup> Trauma and injuries in the elderly population are directly associated with falls specifically, which account for most injuries in the elderly and more lengthy, complicated and expensive care.<sup>4,5</sup>

Falls represent the most common cause of injury in the geriatric patient population, with an annual incidence of 33% in those greater than 65 years old and 50% in those greater than 80 years old.<sup>6</sup> In comparison to their younger counterparts, most literature has indicated that elderly patients have a higher injury severity and higher mortality (up to 7% higher) with the same fall mechanism.<sup>6,7</sup> Furthermore, this relationship has been observed in a linear fashion, such that the most elderly patients fare worse than the “younger” elderly patients (65 to 75 compared to >75 years old), starting at as early as 50 years old.<sup>8</sup> The reasons for this are numerous, but one proposed culprit is the higher percent of the elderly population on anticoagulation, whether for cardiac stents, atrial fibrillation, or prior cerebrovascular accidents. Ultimately, it is essential as clinicians to understand the compounded risk of increased age and anticoagulation status on trauma outcomes.

Due to the frequency of fall trauma among geriatric patients and high percentage of these patients on anticoagulation, this study aims to identify and better understand the effect of anticoagulation status on fall trauma outcomes. Through retrospective chart analysis, this research study aims to identify the effect of anticoagulation status on complications, hospital course, outcomes, and disposition status among elderly patients who present to a trauma hospital status after fall. The hypothesis of the study is that those on anticoagulation will have a higher rate of mortality, length of stay (LOS), emergency department (ED) time, complications, procedures required, intensive care unit (ICU) admission, and skilled nursing facility or rehabilitation disposition status.

## Methods

The study design is a retrospective cohort study, looking at fall trauma among patients aged 60 to 80 years in the past 5 years at University of Toledo Medical Center. The statistical analysis, conducted with SPSS software, was stratified by anticoagulation status and then further stratified by type of anticoagulation. Anticoagulation and type were ascertained by history and/or review of the patient's electronic medical record. Outcomes variables include Injury Severity Score (ISS), mortality, LOS, ED time, complications, procedures required, ICU admission, and disposition status. Controlled variables included history of seizures, history of falls, atrial fibrillation, history of psychiatric disease, dementia, peripheral vascular disease, chronic kidney disease, cerebral vascular accident or transient ischemic accident, osteoarthritis or osteoporosis, diabetes mellitus, hypertension, coronary artery disease,

congestive heart failure, steroids, previous history of deep venous thrombosis (DVT) or pulmonary embolism (PE), asthma or chronic obstructive pulmonary disease, steroid use, alcohol use, and tobacco use. Comparison of continuous data (ISS, LOS, ICU time, ED time, and so forth) was done by nonparametric test, and comparison of categorical data was done by chi-square test. Statistical significant was determined by a *P* value less than .05.

## Results

The total number of patients included in this study was 1,121, 483 (43.1%) of which were males and 638 (56.9%) female. The average age was  $70.2 \pm 6.1$  years old. Data were originally stratified by gender (for the initial analysis and anticoagulation analysis), and there were no significant differences in our outcomes between genders. A total of 336 of the total patients (30.0%) were taking some form of anticoagulation as a home medication. Ninety-eight of the patients (29.1% of the patients on anticoagulation) were taking aspirin as a home medication, 102 (30.4%) were taking warfarin, 112 (33.3%) were taking clopidogrel, 20 (5.9%) were taking enoxaparin, and 4 (1.2%) were taking dipyridamole. For the patients on warfarin, indications were as follows: 82 patients (80.2% of patients on warfarin) had a history of atrial fibrillation, 11 patients (10.4%) had a history of thromboembolic disease, 8 patients (8.3%) had a history of cerebrovascular accident, and 1 patient had a history of mechanical heart valve. For patients on enoxaparin, though Factor Xa levels were not available for all patients, they were all therapeutic in nature (as bridging therapy while warfarin was restarted). Of note, reversal of anticoagulation status was only undertaken for patients with a supratherapeutic international normalized ratio (INR; >4.0), who were actively hemorrhaging or who were undergoing emergent operation with INR less than 2.0.

On stratification by anticoagulation status, there was no statistically significant difference in ISS (average of 6.8 for patients not on anticoagulation and 6.5 for those on anticoagulation, *P* = .215; [Table 1](#)). There was no statistically significant relationship between overall mortality (*P* = .063), ICU admission rate (*P* = .547), number of ICU days (*P* = .187), or complication rate (*P* = .065). Please note in terms of ICU admission, patients were admitted to the ICU for a myriad of reasons including hemodynamic instability and respiratory failure, but there is no particular protocol in place for geriatric fall trauma patients on anticoagulation at our facility (however, all patients over 65 with intracranial hemorrhage (ICH) are admitted to the ICU for observation for 24 hours regardless of anticoagulation status).

Compared to patients not on anticoagulation, there was a higher LOS among patients on anticoagulation ( $6.3 \pm 6.164$  vs  $4.9 \pm 5.189$ , *P* = .001). Interestingly, contrary to what

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