

# Impact of Venous Thromboembolism on US Medicare Patients Undergoing Total Hip and Total Knee Replacement Surgery

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## Introduction

- ◆ Deep vein thrombosis, which can lead to fatal pulmonary embolism, is a major healthcare problem in the US today<sup>1</sup>
- ◆ It is estimated that up to 600,000 people experience either a deep vein thrombosis or a pulmonary embolism (collectively known as venous thromboembolism) each year in the US<sup>2</sup>
- ◆ Venous thromboembolism may be responsible for more than 100,000 deaths each year, with many of those who survive being at increased risk of experiencing another episode<sup>3</sup>
- ◆ Most venous thromboembolic events are related to specific, identifiable triggering events, such as hospitalization, major surgery, trauma, or a prolonged period of immobility<sup>4</sup>
  - In the case of total hip or knee replacement (THR or TKR) surgery, for example, such events can occur up to several months after surgery<sup>5</sup>

## Objective

- ◆ To evaluate the impact of post-discharge venous thromboembolic events on mortality, re-hospitalization, major bleeding, and inpatient costs during the first 30 days after initial hospitalization for THR or TKR surgery

## Methods

- ◆ Data were taken from the Medicare Provider Analysis and Review (MEDPAR) file from the national Medicare database for the years 2004–2006
  - Medicare is one of the largest government-administered health insurance plans, covering almost 65% of the US population undergoing THR or TKR surgery

- ◆ All patients who underwent THR (N=90,875) or TKR (N=110,628) were identified
  - A minimum of 3 months of continuous enrolment before the date of surgery and a minimum of 3 months of continuous enrolment after the date of surgery was required
  - Patients under 65 and over 99 years of age were excluded, as well as patients who had experienced a venous thromboembolism or orthopaedic surgery before the study period
  - It is estimated that the analysis did not include 6–18% of Medicare patients enrolled in managed care plans because they did not appear in the MEDPAR files
- ◆ Multivariate regression was used to control for differences in baseline characteristics between patients with and without subsequent venous thromboembolism
  - Baseline demographics, co-morbidities, geographical region, and type of hospital are some variables that are available in the MEDPAR database and were used in the analysis
  - Mortality was defined as death within 30 days of the event
  - Re-hospitalization was defined as occurring within 30 days of initial discharge
  - Major bleeding was defined according to The International Classification of Diseases (ICD)-9 codes<sup>6</sup>

## Results

- ◆ Out of the total of 201,503 patients (THR, N=90,875; TKR, N=110,628) identified based on all inclusion criteria, 1,556 had venous thromboembolism (0.77%). Of these 974 (62.6%) had codes for deep vein thrombosis only, 402 (25.8%) for pulmonary embolism only, and 180 (11.6%) for both (Table 1)
- ◆ For patients who underwent THR, the overall likelihood of mortality was more likely for patients with a venous thromboembolism than those without a venous thromboembolism (9.46% versus 2.25%, respectively;  $p < 0.0001$ ; Table 2)

Table 1. Distribution of patients by venous thromboembolic outcome and procedure

Outcome	Total hip replacement* n (%)	Total knee replacement† n (%)	Total‡ n (%)
Deep vein thrombosis only	525 (0.58)	449 (0.41)	974 (0.48)
Pulmonary embolism only	197 (0.22)	205 (0.19)	402 (0.20)
Deep vein thrombosis and pulmonary embolism	92 (0.10)	88 (0.08)	180 (0.09)
Venous thromboembolism	814 (0.90)	742 (0.67)	1,556 (0.77)
No venous thromboembolism	90,061 (99.10)	109,886 (99.33)	199,947 (99.23)

\*N=90,875; †N=110,628; ‡N=201,503.

Table 2. Descriptive statistics of outcome measures for patients undergoing total hip replacement surgery

Outcome	No venous thromboembolism (n=90,061)	Deep vein thrombosis only (n=525)	Pulmonary embolism only (n=197)	Deep vein thrombosis and pulmonary embolism (n=92)	Venous thromboembolism (n=814)
Mortality within 30 days, %	2.25	6.48 ( $p < 0.0001$ )	18.27 ( $p < 0.0001$ )	7.61 ( $p < 0.0005$ )	9.46 ( $p < 0.0001$ )
Re-hospitalization within 30 days, %	11.80	43.43 ( $p < 0.0001$ )	49.75 ( $p < 0.0001$ )	46.74 ( $p < 0.0001$ )	45.33 ( $p < 0.0001$ )
Major bleeding within 30 days, %	1.20	12.19 ( $p < 0.0001$ )	13.20 ( $p < 0.0001$ )	10.87 ( $p < 0.0001$ )	12.29 ( $p < 0.0001$ )
Length of stay, days	26.05	21.58 ( $p < 0.0001$ )	20.34 ( $p = 0.0055$ )	20.65 ( $p = 0.0317$ )	21.18 ( $p < 0.0001$ )
<b>30-day follow-up cost</b>					
Medicare cost, mean	\$12,409	\$14,009 ( $p = 0.0039$ )	\$13,848 ( $p = 0.1018$ )	\$15,864 ( $p = 0.0187$ )	\$14,178 ( $p < 0.0001$ )
Total healthcare costs*, mean	\$13,924	\$15,282 ( $p = 0.0224$ )	\$14,893 ( $p = 0.3134$ )	\$17,205 ( $p = 0.0473$ )	\$15,416 ( $p = 0.0026$ )

 $p$ -values versus no venous thromboembolism. International Classification of Diseases (ICD)-9 codes: 81.51, 81.40, 81.52, 81.53.

\*Total cost = Medicare cost + beneficiary cost + cost to payors.

Table 3. Descriptive statistics of outcome measures for patients undergoing total knee replacement surgery

Outcome	No venous thromboembolism (n=109,886)	Deep vein thrombosis only (n=449)	Pulmonary embolism only (n=205)	Deep vein thrombosis and pulmonary embolism (n=88)	Venous thromboembolism (n=742)
Mortality within 30 days, %	0.16	1.56 ( $p < 0.0001$ )	5.85 ( $p < 0.0001$ )	1.14 ( $p = 0.0234$ )	2.70 ( $p < 0.0001$ )
Re-hospitalization within 30 days, %	5.42	34.74 ( $p < 0.0001$ )	30.24 ( $p < 0.0001$ )	36.36 ( $p < 0.0001$ )	33.69 ( $p < 0.0001$ )
Major bleeding within 30 days, %	0.58	10.02 ( $p < 0.0001$ )	11.71 ( $p < 0.0001$ )	10.23 ( $p < 0.0001$ )	10.51 ( $p < 0.0001$ )
Length of stay, days	14.85	14.88 ( $p = 0.9778$ )	10.48 ( $p < 0.0001$ )	13.85 ( $p = 0.5772$ )	13.54 ( $p = 0.0266$ )
<b>30-day follow-up cost</b>					
Medicare cost, mean	\$9,930	\$11,915 ( $p = 0.0052$ )	\$11,004 ( $p = 0.0966$ )	\$12,077 ( $p = 0.0280$ )	\$11,682 ( $p = 0.0003$ )
Total healthcare costs*, mean	\$10,504	\$12,457 ( $p = 0.0076$ )	\$11,257 ( $p = 0.2776$ )	\$12,570 ( $p = 0.0496$ )	\$12,138 ( $p < 0.001$ )

 $p$ -values versus no venous thromboembolism. International Classification of Diseases (ICD)-9 codes: 81.54, 81.42–81.47, 81.55.

\*Total cost = Medicare cost + beneficiary cost + cost to payors.

## Conclusion

- ◆ This is the first population-based retrospective analysis to show that the occurrence of venous thromboembolism after total hip or knee replacement surgery appears to have a major clinical impact on US Medicare patients and increases the economic burden on the US healthcare system
- ◆ Patients with a venous thromboembolism were more likely to be re-hospitalized than patients without a venous thromboembolism (45.33% versus 11.80%, respectively;  $p < 0.0001$ )
- ◆ Patients with a venous thromboembolism were also more likely to have complications such as major bleeding than patients without a venous thromboembolism (12.29% versus 1.20%, respectively;  $p < 0.0001$ )
- ◆ For patients who underwent TKR, the rates of mortality (2.70% versus 0.16%), re-hospitalization (33.69% versus 5.42%), and major bleeding (10.51% versus 0.58%) were higher for patients with a venous thromboembolism versus patients without a venous thromboembolism ( $p < 0.0001$ ; Table 3)
- ◆ In both types of surgery, the cost of inpatient care was significantly higher for patients with a venous thromboembolism compared with patients without a venous thromboembolism (\$15,416 versus \$13,924 for THR [ $p = 0.0026$ ]; \$12,138 versus \$10,504 for TKR [ $p = 0.001$ ])

## References

- Silverstein MD *et al.* *Arch Intern Med* 1998;158:585–593.
- US Census Bureau News. 2006. Available at: <http://www.census.gov/Press-Release/www/releases/archives/population/007616.html>.
- Heit JA *et al.* *Arch Intern Med* 2000;160:761–768.
- Prandoni P *et al.* *Ann Intern Med* 1996;125:1–7.
- Warwick D *et al.* *J Bone Joint Surg Br* 2007;89:799–807.
- National Center for Health Statistics. 2008. Available at: <http://www.cdc.gov/nchs/icd9.htm>.

## Disclosure of conflict of interest

This study was supported by Bayer Schering Pharma AG and Johnson & Johnson Pharmaceutical Research & Development, L.L.C. The data contained within this poster do not support or recommend the use of rivaroxaban in indications or countries in which it is not licensed.

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