

Trends in the Utilization of Venous Thromboembolism Prophylaxis following Hip Fracture from 2010 to 2023

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INTRODUCTION: Venous thromboembolism (VTE), including deep vein thrombosis (DVT) and pulmonary embolism (PE), are associated with increased morbidity and mortality in patients who sustain hip fractures. Although pharmacologic prophylaxis is known to reduce VTE risk, current guidelines vary in their recommendations of specific prophylactic agents. The purpose of this study was to examine trends in the utilization of VTE prophylactic agents in patients who sustain hip fractures from 2010 to 2023.

METHODS:

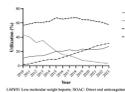
Patients aged 55 and older who underwent arthroplasty or internal fixation for hip fractures and who were prescribed VTE prophylaxis within 14 days of surgery were identified using the TriNetX database. In total, 46,973 patients were identified and included in this study. Trends in the utilization of various prophylactics, including low-dose aspirin (81 mg), low-molecular weight heparin (LMWH), direct oral anticoagulants (DOACs), and warfarin were observed. Additionally, 90-day incidences of VTE were calculated. All trends were analyzed using the compounded annual growth rate (CAGR) and linear regression.

RESULTS: Between 2010 and 2023, there was a significant increase in the utilization of low-dose aspirin (CAGR: +7.5%; $P < 0.001$) and DOACs (CAGR: +25.5%; $P < 0.001$), and a decrease in utilization of warfarin (CAGR: -17.4%; $P < 0.001$). LMWH utilization remained stable (CAGR: +0.1%; $P = 0.44$) (Figure 1, Table 1). Use of aspirin alone rose (+14.1% CAGR; $P < 0.001$), including in both high-risk (CAGR: +12.2% CAGR; $P < 0.001$) and standard-risk (CAGR: +17.1% CAGR; $P < 0.001$) groups (Tables 2-4). During the study period, rates of VTE (CAGR: -0.4%; $P = 0.04$) and DVT (CAGR: -1.2%; $P = 0.01$) declined, while rates of PE remained unchanged (Table 5).

DISCUSSION AND CONCLUSION:

Utilization of aspirin and DOACs for VTE prophylaxis after hip fractures has increased significantly between 2010 and 2023. Further research is needed to identify the most effective VTE prophylactic agents and inform national guidelines for this high-risk population.

Figure 1. Trends in Venous Thromboembolism Prophylaxis from 2010 to 2023 by Type of Prophylaxis



Year	Total	Aspirin	Warfarin	LMWH	DOAC
2010	10,000	1,000	5,000	3,000	0
2011	10,500	1,100	4,800	3,100	0
2012	11,000	1,200	4,600	3,200	0
2013	11,500	1,300	4,400	3,300	0
2014	12,000	1,400	4,200	3,400	0
2015	12,500	1,500	4,000	3,500	0
2016	13,000	1,600	3,800	3,600	0
2017	13,500	1,700	3,600	3,700	0
2018	14,000	1,800	3,400	3,800	0
2019	14,500	1,900	3,200	3,900	0
2020	15,000	2,000	3,000	4,000	0
2021	15,500	2,100	2,800	4,100	0
2022	16,000	2,200	2,600	4,200	0
2023	16,500	2,300	2,400	4,300	0

Year	Total	Aspirin	High-Risk	Standard-Risk
2010	10,000	1,000	500	500
2011	10,500	1,100	550	550
2012	11,000	1,200	600	600
2013	11,500	1,300	650	650
2014	12,000	1,400	700	700
2015	12,500	1,500	750	750
2016	13,000	1,600	800	800
2017	13,500	1,700	850	850
2018	14,000	1,800	900	900
2019	14,500	1,900	950	950
2020	15,000	2,000	1,000	1,000
2021	15,500	2,100	1,050	1,050
2022	16,000	2,200	1,100	1,100
2023	16,500	2,300	1,150	1,150

Year	Total	Aspirin	Warfarin	LMWH	DOAC
2010	5,000	500	2,500	1,500	0
2011	5,200	550	2,400	1,500	0
2012	5,400	600	2,300	1,500	0
2013	5,600	650	2,200	1,500	0
2014	5,800	700	2,100	1,500	0
2015	6,000	750	2,000	1,500	0
2016	6,200	800	1,900	1,500	0
2017	6,400	850	1,800	1,500	0
2018	6,600	900	1,700	1,500	0
2019	6,800	950	1,600	1,500	0
2020	7,000	1,000	1,500	1,500	0
2021	7,200	1,050	1,400	1,500	0
2022	7,400	1,100	1,300	1,500	0
2023	7,600	1,150	1,200	1,500	0

Year	Total	Aspirin	Warfarin	LMWH	DOAC
2010	5,000	500	2,500	1,500	0
2011	5,300	550	2,400	1,500	0
2012	5,600	600	2,300	1,500	0
2013	5,900	650	2,200	1,500	0
2014	6,200	700	2,100	1,500	0
2015	6,500	750	2,000	1,500	0
2016	6,800	800	1,900	1,500	0
2017	7,100	850	1,800	1,500	0
2018	7,400	900	1,700	1,500	0
2019	7,700	950	1,600	1,500	0
2020	8,000	1,000	1,500	1,500	0
2021	8,300	1,050	1,400	1,500	0
2022	8,600	1,100	1,300	1,500	0
2023	8,900	1,150	1,200	1,500	0

Year	Total	VTE	DVT	PE
2010	10,000	1,000	800	200
2011	10,500	950	750	200
2012	11,000	900	700	200
2013	11,500	850	650	200
2014	12,000	800	600	200
2015	12,500	750	550	200
2016	13,000	700	500	200
2017	13,500	650	450	200
2018	14,000	600	400	200
2019	14,500	550	350	200
2020	15,000	500	300	200
2021	15,500	450	250	200
2022	16,000	400	200	200
2023	16,500	350	150	200