Comparison of Outpatient Anticoagulation Management Clinic with Standard Medical Care for VTE Patients at Lions Gate Hospital Emergency Department (COAST VTE Study)

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Background

- Venous thromboembolism (VTE) is frequently diagnosed in the emergency department (ED), with an estimated annual incidence of ~0.1%.
- Standard treatment of VTE involves a minimum of three months of warfarin started concomitantly with a rapid-acting parenteral anticoagulant, such as unfractionated heparin or low-molecular-weight heparin (LMWH), which is continued until INR is therapeutic for two consecutive measurements.
- Outpatient management of VTE with LMWH was similar or superior to inpatient management with unfractionated heparin in randomized-controlled trials (RCTs) of selected patients.
- Prior observational studies of outpatient VTE management, including data from Vancouver General Hospital, have demonstrated substantial cost savings, high patient satisfaction, and outcomes similar to reported RCTs.
- The internist-managed Lions Gate Hospital Outpatient Thrombosis Clinic was established in May 2011.

Methods

- **Design:** Retrospective "before-and-after" chart review.
- **Setting:** "Before" (ED) group selected from Lions Gate Hospital (LGH) Emergency Department paper charts (Jan 2008-May 2011); "After" (Clinic) group selected from LGH Outpatient Thrombosis Clinic Plexia Electronic Medical Record (EMR) system.
- **Eligibility:** Receiving warfarin and meeting criteria for outpatient care:
  - Age 18-80;
  - VTE not requiring hospital admission;
  - Hemodynamically stable (systolic blood pressure >100 mm Hg, oxygen saturation >90%, no clinical signs of pulmonary hypertension, no troponin elevation, no right ventricular dysfunction on echocardiogram);
  - No active bleeding, coagulopathy (INR >1.5) or thrombocytopenia (platelet count <100 x 10^9/L);
  - No allergy to heparin, LMWH or warfarin;
  - No history of previous heparin-induced thrombocytopenia (HIT);
  - Adequate renal function for receipt of LMWH (eGFR > 30 mL/min);
  - Able to self-administer subcutaneous injections;
  - Pain adequately controlled with oral analgesics.
- **Outcomes:** Primary – Time to therapeutic INR (first INR > 2.0); secondary – Recurrent thrombosis, bleeding events.
- **Analysis:** All statistical analyses done using SPSS and GraphPad QuickCalcs. Unpaired *t* test, Mann-Whitney U test, and Fisher's exact test were used to compare differences in means, medians and categorical variables, respectively.

Figure 1. Patient Eligibility in Clinic Group

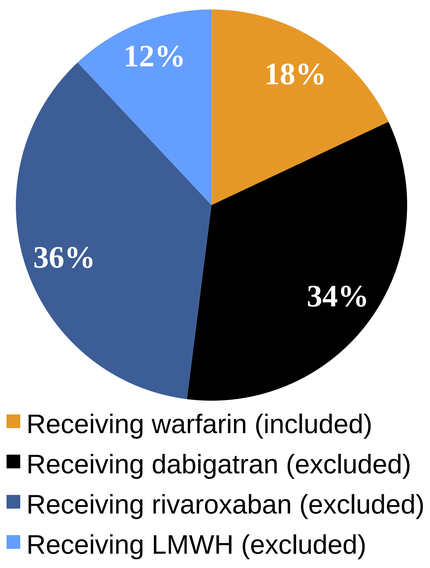

Table 1. Baseline Characteristics

	ED (n = 30)	Clinic (n = 22)	p-value
Age (y), mean (SD)	54 (13)	59 (15)	0.21
Male, %	63	50	0.40
Weight (kg), mean (SD)	84 (13)	86 (31)	0.90
Type of VTE, %			0.49
DVT	83	73	
PE	17	27	
Unprovoked, %	30	46	0.24
Comorbidities, %			
Cancer	7	0	0.50
Heart disease	13	18	0.70
Renal disease	7	5	0.38
Labs, mean (SD)			
Creatinine (μmol/L)	91 (20)	81 (31)	0.51
Hemoglobin (g/L)	140 (21)	128 (16)	0.09
Platelets (10^9/L)	234 (71)	213 (127)	0.60

DVT = deep venous thrombosis, PE = pulmonary embolism, SD = standard deviation, VTE = venous thromboembolism, y = years

Results

- Only 22 of 120 patients treated in the Clinic were receiving warfarin, and therefore eligible for our study.
- Median time to therapeutic INR was not shortened in the Clinic group, and in fact prolonged compared to the ED group.
- More patients in the ED group reported a bleeding event, all minor.

Table 2. Outcomes

	ED (n = 30)	Clinic (n = 22)	p-value
Time to therapeutic INR (days), median (IQR)	4 (3, 5)	6 (4, 8)	0.001
Recurrent VTE, %	0	4.5	0.42
Bleed, %	20	0	0.03

IQR = interquartile range, TTINR = time to therapeutic INR, VTE = venous thromboembolism

Limitations

- **Observational, retrospective design**
  - Residual confounding and biases
    - Examples include selection bias, socioeconomic bias for treatment with warfarin in the "after" cohort.
  - Missing data for up to 30% of patients for certain variables
    - Limited ability to adjust for potential baseline imbalances.
- **Before-and-after design**
  - Changing standard of care due to trials in 2009-2012 showing efficacy in treatment of VTE with dabigatran and rivaroxaban, leading to few patients in our clinic cohort receiving warfarin.
- **Differential outcome measurement frequency**
  - INR measured less frequently in Clinic (every-other-day or less frequently) versus ED (daily), leading to perceived delay in TTR time to therapeutic INR.
- **Small sample size**
  - Insufficient power to adequately compare rates of major clinical outcomes.

Conclusions

- We could not detect a more rapid achievement of therapeutic INR in our study population.
- Multiple sources of bias and confounding for which we could not control may account for these findings.
- At the LGH Outpatient Thrombosis Clinic, novel oral anticoagulants quickly replacing warfarin plus LMWH as the standard of care.