Evaluation and Standardization of Current Practices for Reinitiation of Warfarin Post-procedurally at a VA Healthcare Facility

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OBJECTIVE

To improve the current process at VA Connecticut (VACT) for reinitiation of warfarin therapy following a procedure in patients bridged with low molecular weight heparin (LMWH).

BACKGROUND

Current anticoagulation guidelines do not address optimal dosing of warfarin following interruption post procedure in patients bridged with low molecular weight heparin (LMWH). Several strategies are being used post-operatively, including reinitiation of the pre-operative maintenance dose, which results in prolonged reestablishment of a therapeutic INR and continued need for bridging with LMWH.[1,2] Alternatively, a loading dose strategy has been found to achieve a therapeutic INR more rapidly.[2]

There is currently no standardization of post-procedural warfarin reinitiation in patients bridged with LMWH at VACT. While there is consistency in that most Anticoagulation Clinic pharmacists choose to use a loading dose strategy for warfarin post-procedurally, the way in which this is done differs between individual pharmacists. Variation in dosing is expected to have an effect on time to a therapeutic INR.

1. Crowther MA, Ginsberg JB, Kearon C, et al. A randomized trial comparing 5mg and 10mg warfarin loading doses. *Arch Intern Med*. 1999; 159; 46-8.
2. Schulman S, Hwang HG, Eikelboom JW, et al. Loading dose vs. maintenance dose of warfarin for reinitiation after invasive procedures: a randomized trial. *J Thromb Haemost*. 2014; 12: 1254-9.

METHODS

Study Design

Single center, two-phase, prospective, Institutional Review Board-exempt quality improvement project from October 7, 2015 — December 31, 2015

Phase 1

Survey of Anticoagulation Clinic pharmacists to evaluate current practices for post-procedure reinitiation of warfarin therapy at VA Connecticut

Phase 2

Strategy 1	Strategy 2
• 6 weeks (10/7-11/18/2015) • Day 1 (day of procedure): Double dose Day 2: Double dose Day 3: Resume maintenance dose • INR follow-up at day 10 post-procedure (+/- 1 day for holidays and weekends)	• 6 weeks (11/19-12/31/2015) • Day 1 (day of procedure): Double dose Day 2: 1.5x maintenance dose Day 3: Resume maintenance dose • INR follow-up at day 10 post-procedure (+/- 1 day for holidays and weekends)

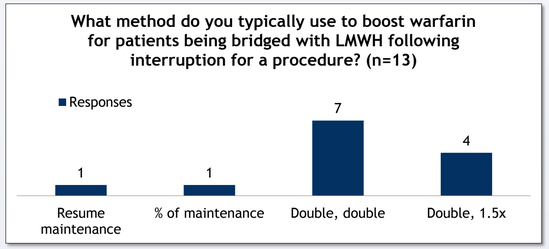
Enrollment Criteria

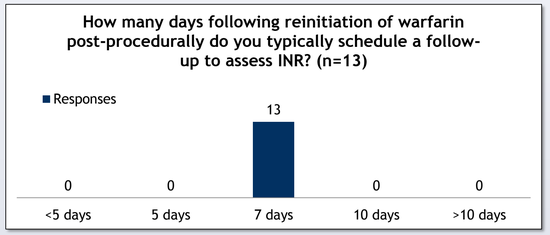
Inclusion Criteria	Exclusion Criteria
• Anticoagulation bridge consult placed between 10/7/15-12/31/15	• Deviated from bridge schedule for any reason • First INR follow up other than 10 days • Cancelled procedure

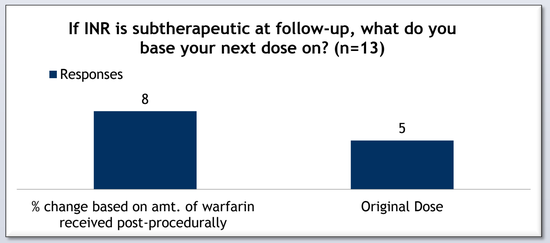
Data Analysis

Time to a therapeutic INR and discontinuation of LMWH
Bleeding or thrombotic events within 30 days of procedure

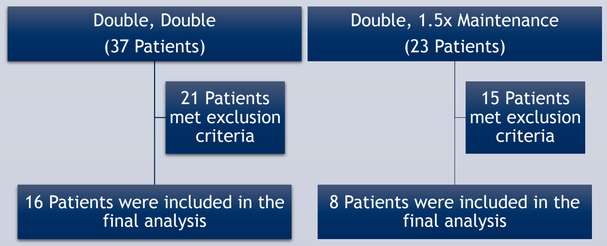
PHASE 1 RESULTS







PHASE 2 ENROLLMENT



PHASE 2 RESULTS

	Double, Double (n=16)	Double, 1.5x maintenance (n=8)
Average time to initial INR follow-up (days)	10.06	10.12
Therapeutic INR at initial follow-up	7 (44%)	3 (37%)
Non-therapeutic INR at initial follow-up	9 (56%)	5 (63%)
- Subtherapeutic	7 (78%)	3 (60%)
- Supratherapeutic	2 (22%)	2 (40%)
Average time on LMWH post-procedure in those subtherapeutic at initial INR follow-up (days)	13	14

	Double, Double (n=16)	Double, 1.5x maintenance (n=8)
Complication within 30 days of procedure	2 (12%)	0 (0%)
- Post-procedural bleeding complication	2 (12%)	0 (0%)
- Post-procedural thrombotic complication	0 (0%)	0 (0%)
Death within 30 days of procedure	0 (0%)	0 (0%)

CONCLUSIONS

- The majority of patients seen for initial INR follow-up post-procedure were not in therapeutic range.
- Patients were most frequently subtherapeutic at follow up requiring additional “boosted” doses and longer duration of LMWH.
- Difficult to determine if there is an increased risk of bleeding with double, double strategy given several confounders.