

Time in therapeutic range when testing international normalized ratio at home versus in clinic: A retrospective chart review

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Background

- Warfarin is an anticoagulant that is commonly used to prevent or treat venous and arterial thrombosis. Chronic warfarin therapy is recommended for patients in several instances including, but not limited to, the presence of a mechanical heart valve, history of atrial fibrillation, history of stroke, and current or previous DVT or PE.¹
- Achieving and maintaining a therapeutic range is often difficult due to significant interactions with food, medications, comorbidities, or an illness. Patients require frequent INR (international normalized ratio) monitoring because serious complications can occur when a patient's INR falls outside of recommended goals.²
- Several strategies exist for monitoring INR and managing warfarin including physician office-based testing, anticoagulation clinics, or home INR/PT monitoring with patients reporting results. In recent years, home testing of INR is an avenue which is being studied to assess if there is a difference in the patients' adherence, time in therapeutic range, cost, clinical events, and many additional outcomes.

Objectives

Primary: Determine whether patients taking warfarin that monitor their INR at home have higher rates of time in therapeutic range compared to patients who have their INR monitored in-clinic.

Secondary: Identify if there is an increased risk for a clinically significant event including major bleeding, deep vein thrombosis (DVT), pulmonary embolism (PE), or stroke that leads to an encounter with a healthcare provider for patients who test INR at home versus in-clinic.

Methods

- Single-center, crossover, retrospective chart review
- Dates of data collection inclusion: May 2019 to August 2020

Inclusion	Exclusion
<ul style="list-style-type: none"> ≥18 years of age In clinic monitoring of warfarin for at least 3 months Long-term management with warfarin (>6 months) 	<ul style="list-style-type: none"> Patients with > 56 days between test Patients with goal INR range with a value that is less than 1 (i.e. 2.0-2.5) Patients actively receiving chemotherapy

- Data from the first month of warfarin after initiation, as well as data from the first month after transitioning to home testing (training window) was excluded
- Time in therapeutic range calculated using the Rosendaal Method³
- Statistical tests used include paired t-test, Wilcoxon signed rank test, and McNemar test

Data collection points

Age	Gender	BMI	Tobacco use	Warfarin indication	Date INR was taken
INR value	Location of test (home vs. clinic)	Episode of major bleeding	DVT	PE	Stroke
Antibiotic initiation	Anticoagulant initiation	Antiplatelet initiation	Steroid initiation	Antifungal initiation	Supplement initiation

Results (n=33)

Baseline Characteristics	
Age—mean years	75.42
Female Sex--no. (%)	18 (54.5%)
Tobacco Use-- no. (%)	1 (3%)
BMI-- mean	30.51
Indication—no. (%)	
• Atrial fibrillation/flutter	• 26 (78.8%)
• Mitral valve replacement	• 1 (3%)
• Multiple indications	• 2 (6%)
• Other	• 4 (12.1%)
Goal range--no. (%)	
• 2-3	• 24 (72.7%)
• 2.5-3.5	• 9 (27.3%)
Interacting medication --no. (%)	
• Antibiotic	• 15 (45.5%)
• Antiplatelet	• 1 (3%)
• Steroid	• 2 (6%)
• Antifungal	• 0 (0%)
• Supplements	• 0 (0%)
• Multiple	• 5 (15.2%)

Primary Outcome			
	Clinic Testing	Home Testing	P-value
• Time in therapeutic range, % days in range-- median	61.4	71.1	0.0013

Secondary Outcomes			
	Clinic Testing	Home Testing	P-value
Clinically significant event-- no. (%)	0 (0)	2 (6.06)	0.0001

Additional Findings			
Measure--median	Clinic Testing	Home Testing	P-value
Days in range	172.1	65.6	0.0087
Total days	283	98	0.0004
Total number of tests	16	10	0.025
Number of tests in range	9	7	0.526
Percent of tests in range	56.3	72.7	0.0002
Minimum INR	1.5	1.9	<0.0001
Maximum INR	4.1	3.5	0.109

Discussion

- Baseline characteristics were the same in both clinic and home testers since each patient was their own control
- 72.7% of patients had an INR goal of 2-3
- 78.8% had an indication of atrial fibrillation
- Antibiotics were the most common interacting medication initiated (45.5%)
- Median percent of days in range for clinic vs. home testers were 61.4 and 71.1 (p= 0.0013)
- The number of patients who experienced a clinically significant event for clinic vs. home testers were 0 and 2, respectively (p=0.0001)
- Clinic testers had a wider range of INRs (1.5-4.1) compared to home testers (1.9-3.5) when looking at the median

Limitations

- Single-center study
- Small sample size
- Unable to assess hospitalizations that occur at outside hospitals
- Self-reported INR readings

Conclusion

- Transitioning to at-home monitoring of INR may provide improved time in therapeutic range when compared to patients that monitor their INR in clinic.
- There may be an increased risk of a clinically significant event for patients testing at home.
- Home testing allows for more convenient and more frequent monitoring for patients, but this method relies heavily on reported information by the patient to make clinical decisions of dose changes, how soon to re-check, or recommending for the patient to go to the emergency room.
- Larger studies are needed to assess the impact of long term home testing on the rates of time in therapeutic range as well as the impact on rates of clinically significant events.

References

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Disclosures

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