

# Outcomes of Warfarin use in Hemodialysis

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## Background & Aims

- Patients with end-stage renal disease (ESRD) are at significantly increased risk of major bleeding<sup>1</sup>
- There is debate about the safety of warfarin in hemodialysis (HD) patients<sup>2</sup>
- There is a published potential 4-fold increased bleeding risk in HD patients taking warfarin<sup>3</sup>
- HD patients regularly have their warfarin dosed by nephrologists, often following telephone advice based on blood tests taken in the dialysis unit
- We questioned if dosing efficacy on the dialysis unit, therefore, contributed to elevated bleeding risk

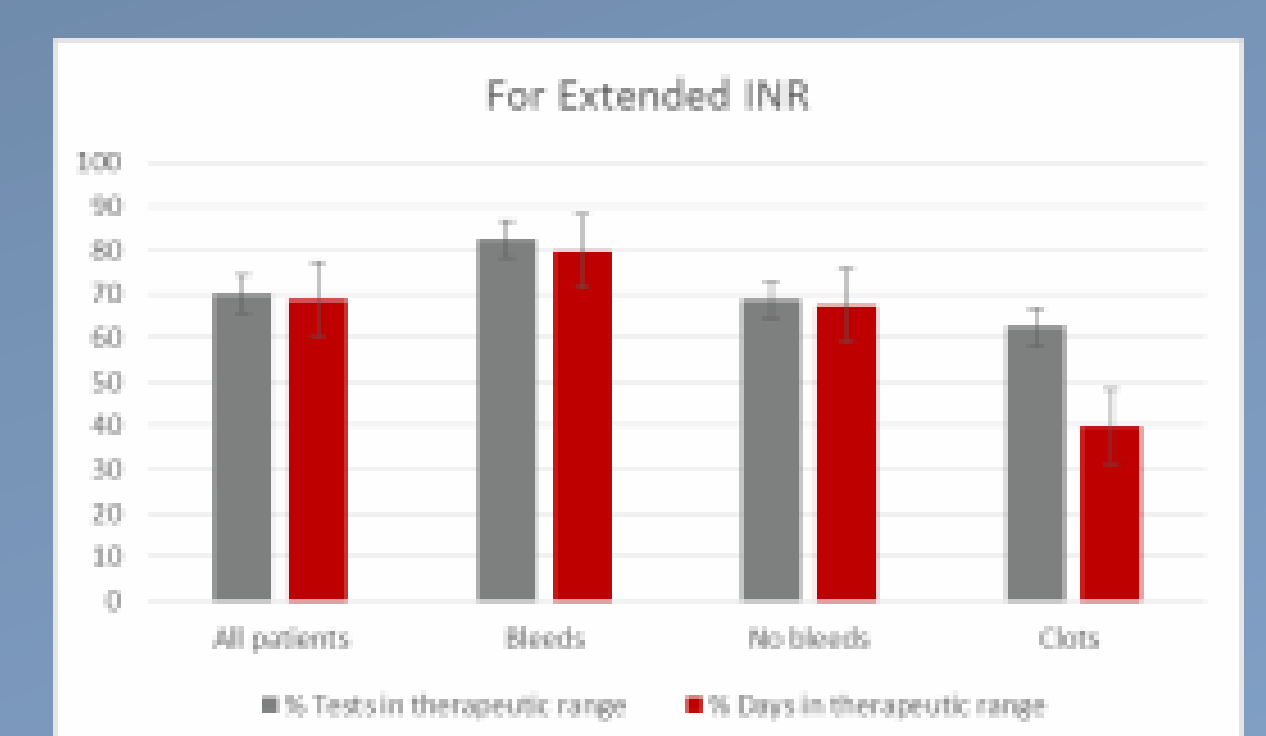
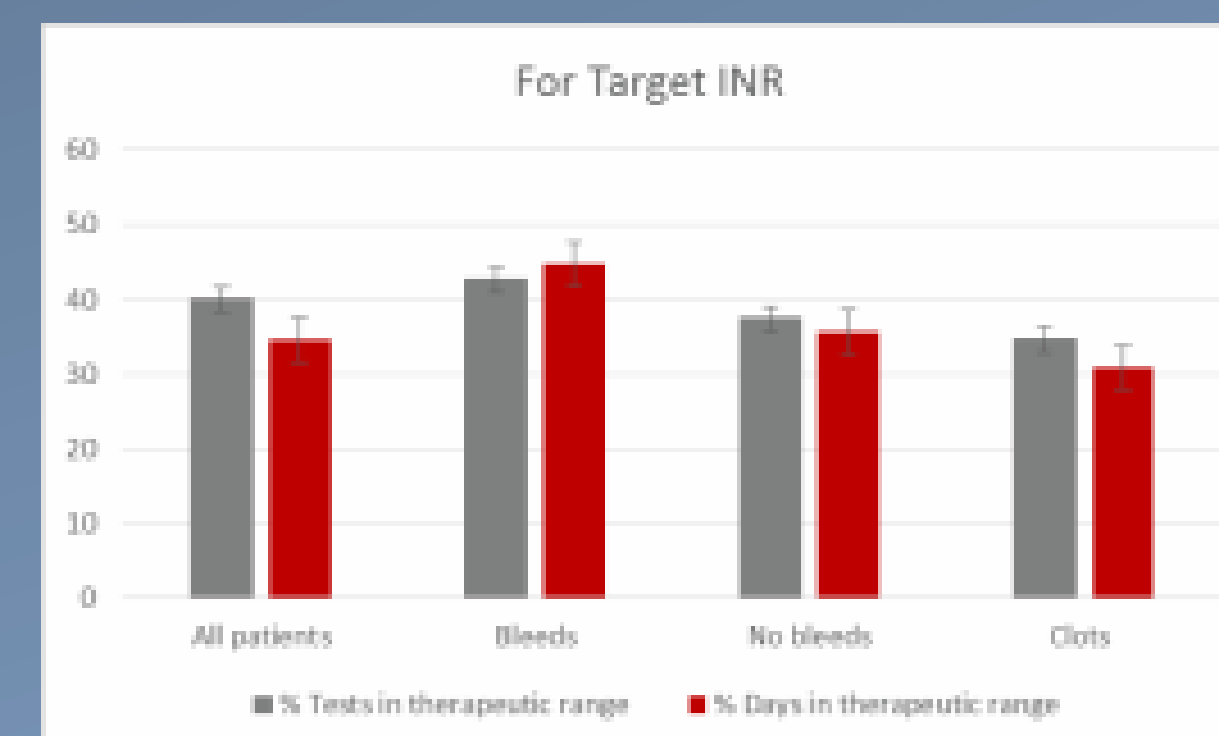
**We aimed to investigate whether time in the therapeutic range (TTR) was optimal in HD patients on warfarin**

## Methods

- We performed a retrospective examination of all patients taking warfarin for any reason whilst on HD on our programme
- Combined time on HD and warfarin was identified and examined
- Outcomes, including bleeding events, thrombotic events and calciphylaxis, were noted
- Rosendaal linear interpolation formula was used to calculate TTR based on target INR<sup>4</sup>
- TTR is widely used as a marker of safety in oral anticoagulants and a target of 66% is used<sup>5</sup>
- We also expanded the target range INR for the Rosendaal formula to a wider, and arguably more clinically relevant, therapeutic window of 1.5 – 4
- We noted peak INR results for each patient

## Results

- 214 HD patients concurrently taking warfarin were identified over a 10 year period
- A total of 514 patient-years were studied



- 81 major bleeding events were identified (by ISTH criteria) equalling a bleed rate of 15.9 events per 100-patient years (versus a published overall bleed rate of 2.5 per 100 patient years)
- 8 thrombotic/embolic events were identified
- 6 case of calciphylaxis (calcific uraemic arteriopathy) were identified, 4 fatal
- Median peak INR was 5.9 overall; 7.4 in patients with a bleed and 3.5 in patients with a thrombotic event
- 75 patients had an INR >5, and 24 >10

Reason for warfarin use	Number (%)
AF	61 (29)
Prosthetic heart valve	42 (19)
Thrombus	10 (5)
DVT	55 (26)
PE	26 (12)
Dialysis access patency	8 (4)
Other	12 (5)

TTR	Median (range)
<b>Rosendaal for target INR</b>	
- % tests in range	40 (4.2-96.6)
- % days in range	34.6 (0.8-99.7)
<b>Rosendaal for expanded INR</b>	
- % tests in range	70 (15-100)
- % days in range	68.7 (2.2-100)

## Conclusions

- Prevalent haemodialysis patients taking warfarin had a significant bleeding rate
- Thrombotic complications in these patients were low compared with bleeding events
- Of those who had a thrombotic event, the majority had AF and half of them had an embolic event
- Overall, TTR was suboptimal when analyzing for target INR
- Even allowing for expanded acceptable INR targets, TTR was still only just achieved
- Peak INR and number of INRs above 5 was higher in patients who had a bleed
- Interestingly patients who had a bleed tended to have a higher TTR, although this was not statistically significant

**There is little evidence to support the use of warfarin in hemodialysis patients, but when it is absolutely indicated, this study suggests that TTR in the dialysis population is suboptimal and that supratherapeutic INRs are associated with bleeding risk**

## References

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