Evaluation of IV Vitamin K for INR correction in patients with cirrhosis

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Introduction

- ~4.5 million patients are diagnosed with cirrhosis annually and results in more than 400,000 hospital admissions per year
- Patients with cirrhosis often have an elevated INR due to physiologic changes in coagulopathy
- In clinical practice, IV vitamin K is often utilized to "correct" the INR
- Data regarding the use of IV vitamin K in patients with cirrhosis to reverse coagulopathy is mixed
- To date, there is no guidance or algorithm on the most optimal use of IV vitamin K in patients with cirrhosis
- The objective of this Medication Use Evaluation (MUE) is to assess the change in INR after administration of IV vitamin K in patients with cirrhosis

Materials and Methods

- Retrospective chart review of patients admitted to Methodist University Hospital from June 30, 2022 to March 31, 2024

Inclusion Criteria

- ≥18 years old
- Cirrhosis
- Administration of at least two doses of IV vitamin K

Exclusion criteria

- Receiving warfarin, apixaban, or rivaroxaban prior to admission and/or during admission
- IV vitamin K use for pre-procedural reversal
- Acute liver failure
- Liver transplant recipients within the previous one year
- Patients required separate IV vitamin K doses more than 3 days apart

- Data collection points include patient demographics, consultation information, MELD 3.0 scores, Child-Pugh scores, vitamin K doses, INR changes, hemoglobin changes, bleeding events, and in-hospital mortality

Primary Outcome

- Change in INR from baseline*

Secondary Outcome

- Bleeding and mortality rates affected by changes in INR after 1 day

*Subgroup analysis were based on baseline INR, baseline MELD 3.0 score, cirrhosis etiology, and changes in INR on day 1

Results

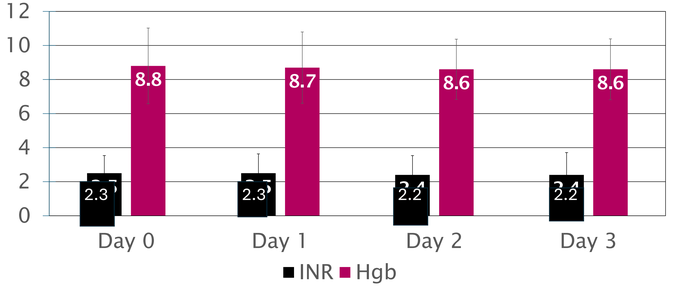
- 134 patients were included for analysis (Table 1)

Table 1. Patient Characteristics

Characteristic	N = 134
Male	69 (52)
White	78 (58)
Age, years (mean ± SD)	56 ± 13
LOS, days (mean ± SD)	11 ± 10
Etiology	
Alcohol	65 (47)
MASH	33 (24)
MELD Score 3.0 (mean ± SD)	29 ± 8
Child-Pugh Score C	110 (82)
Baseline INR (mean ± SD)	2.3 ± 0.81
Baseline Hgb, mg/dL (mean ± SD)	8.7 ± 2.1

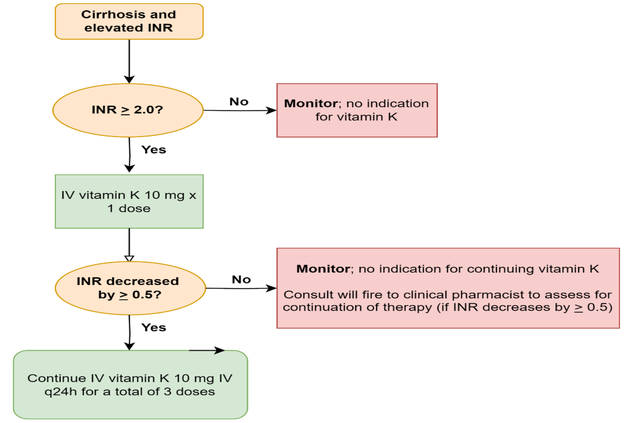
- The change (Δ) in INR from the initiation of IV vitamin K on day 0 to day 3 showed a non-significant change of -0.07 (p=0.07) (**Figure 1).**
- There was no statistically or clinically significant Δ INR for day 1 or 2
- Δ INR was not statistically significant when comparing different baseline INR levels (<2, >2, >2.5) with p-values of 0.11, 0.82, and 0.095, respectively.
- Δ INR were not significantly different for MELD 3.0 scores > 25 (p=0.16) or > 30 (p=0.31), nor etiology (alcoholic vs. non-alcoholic) (p=0.14).
- 14 patients had a decrease in INR on day 1 of ≥0.5 with bleeding and mortality rates of 5.8% and 8.7%, respectively.
- Bleeding rates for INR decreases on day 1 of ≥0.3 and ≥0.2 were 19.2% and 30.8%, respectively.
- Mortality rates for the same cutoffs were 17.4% and 21.7%

Figure 1. Mean INR and Hemoglobin after initiation of IV Vitamin K



Results Continued

Figure 2. Approved Institutional Algorithm for IV vitamin K use



Discussion

- Prior literature by Smith, et al and Meyer, et al have shown that IV vitamin K in patients with cirrhosis does not affect overall bleeding rates but may induce a slight decrease in INR
- This MUE provides further evidence that IV vitamin K may result in a decrease in INR by ~0.1, but does not result in a clinically significant INR reduction
- IV vitamin K should not be used routinely In patients with cirrhosis
- We have expanded the Pharmacy Scope of Practice at our medical center to allow pharmacists to ensure appropriate use of IV vitamin K
- INR decreases of ≥0.5 on day 1 were shown to significantly decrease bleed and mortality rates, which is different from prior studies
- Future areas of research will be to determine what patient or disease factors may preclude someone to acutely respond to IV vitamin K on day 1 to better guide IV vitamin K use

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