Role of electronic decision support in preventing anticoagulant-related medication incidents: Evaluation using medication taxonomy guidelines

Viviane Khalil[1,2], Yen Nie Yeoh[3], Julie Ngo[1], Jennifer Nguyen[1], Dr Vidya Muraleedharan[3], A/Prof Michael Franco[2, 3]

1. Pharmacy Department, Monash Health, Melbourne, Australia 2. Faculty of Medicine, Nursing and Health Sciences, Monash University, Melbourne, Australia 3. Digital Health Division, Monash Health, Melbourne, Australia

Introduction

Anticoagulants have revolutionised the management of many vascular diseases, however their use carries significant clinical risk. [1] Evidence suggests that clinician rather than system errors contributes to most anticoagulant related medication incidents(ARMI).[1] Recent data demonstrated that well designed electronic clinical decision support (CDS) and forcing functions in electronic medical record (EMR) systems reduce errors and are likely to improve patient safety.[2,3]

Aims

1. To measure the frequency, evaluate and categorise types of ARMI
2. To assess the type of CDS in EMR that may prevent ARMI

Methods

Retrospective data on ARMI was retrieved from the Victorian Agency for Health Information (VAHI) (Jan 2020 to Jan 2022). ARMI were classified according to the Victorian Therapeutics Advisory Group (VicTAG) medication error taxonomy guidelines and the relevant stage of the medication management process.

Information on CDS built in Victorian health services' EMR systems was collected via survey. The collected data was thematically analysed and mapped against reported incidents by informaticians to assess their potential usefulness in preventing future similar incidents.

Results

- A total of 5249 ARMI were reported and classified into the relevant stage of the Medication Management Pathway (see Figure 1).
- Over 58% (3053) of incidents were deemed to be potentially preventable with a CDS.
- Of the preventable ARMI, most occurred during the Prescribing/Charting (40%) and Administration (37%) stages.
- A total of 12 tertiary health services responded to the survey .
- Cerner™ and EPIC™ systems were implemented in 6 tertiary hospitals .
- A total of 36 custom build or modified commercially available CDS were identified that have the potential to reduce ARMI. Examples of these CDS are outlined in Figure 2.

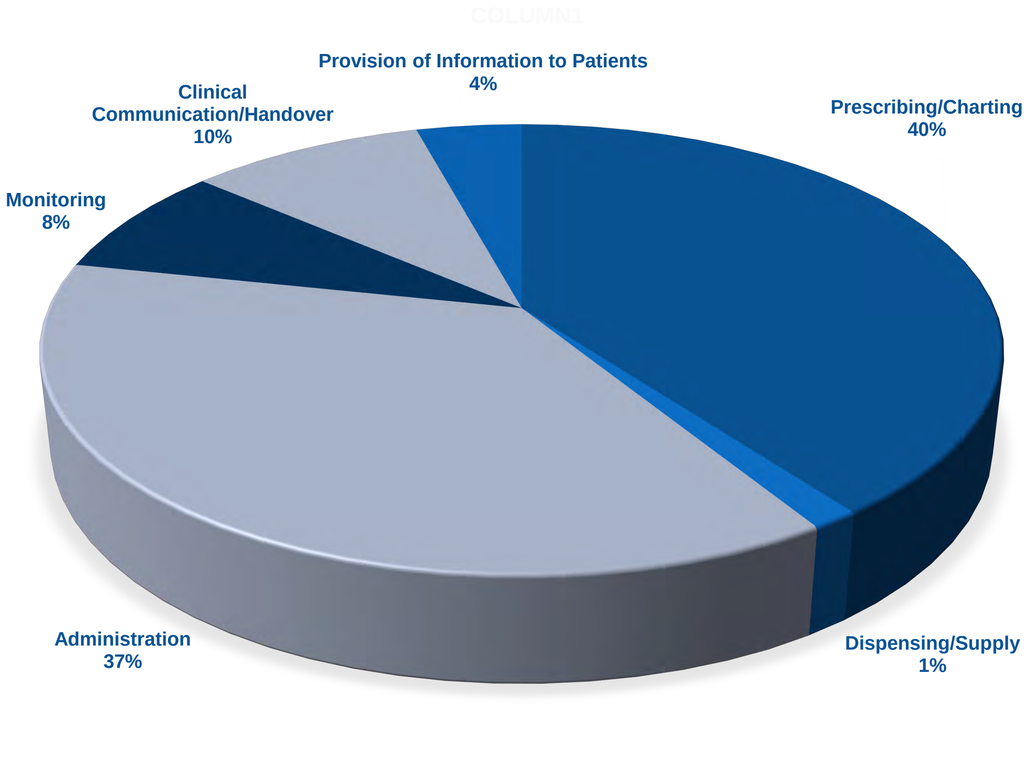

Figure 1: Anticoagulant related medication incidents deemed preventable by CDS classified into the Medication Management Pathway

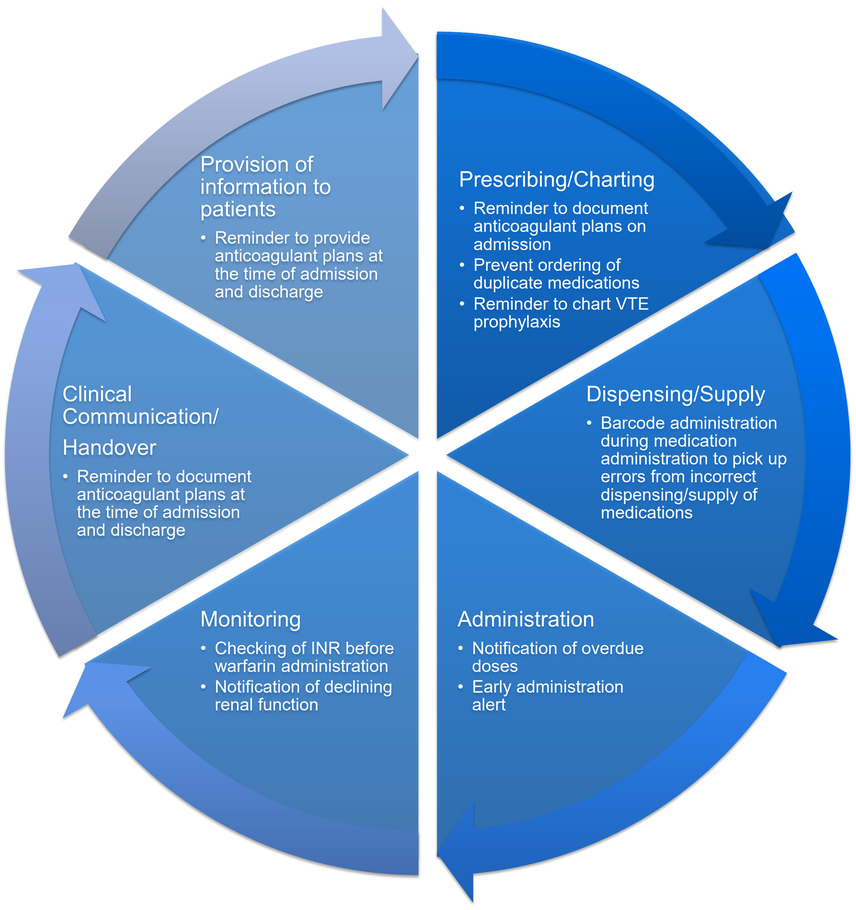

Figure 2: Top CDS built to prevent anticoagulant related medication incidents at each step of the Medication Management Pathway

Discussion

58% of ARMI were identified as preventable with if EMR CDS was built into various points of the medication management pathway .

The Survey identified considerable variability in the CDS built in EMR systems of the surveyed hospitals (examples in Figure 2). Most common CDS at the prescription stage include support for anticoagulant dose prescribing, charting venous thromboembolism (VTE) prophylaxis and reminders to document anticoagulant plans at the time of admission and discharge. Most common CDS at the administration phase were reminders for anticoagulant administration.

Limitations

- Information obtained from the VAHI report is dependent on user accuracy for data entry and completion.
- Data is not validated and involved subjective analysis, potentially affecting conclusions about root cause of errors.
- Data was de-identified thus it is not known what proportion of ARMIs where anticoagulant CDS system(s) are in use.
- The usefulness of this CDS is largely dependent on clinician training and compliance as these plans will not apply to every patient and data was not collected on what anticoagulation CDS training is provided at each health service.

Conclusion

Anticoagulant related medication incidents were most common at the points of prescription and administration. Well designed CDS have the potential to reduce these adverse incidents, but there is significant inconsistency in CDS approaches across health services. Prospective quantitative studies are warranted to evaluate efficacy of electronic CDS in preventing anticoagulant related medication errors.

Acknowledgements

The authors would like to acknowledge the assistance of the Clinical Informatics teams at Parkville Precinct, Austin Health, Alfred Health and Monash Health. Additionally, we would like to thank VICTAG for providing a research grant to conduct this project .

References

- Khalil V . Evaluation of oral anticoagulant prescribing patterns and associated hospital acquired complications – A single centre Australian study. Journal of Pharmacy Practice and Research. DOI. 10.1002/jppr.1777.
- J. Austin, M. Barras, C. Sullivan, Interventions designed to improve the safety and quality of therapeutic anticoagulation in an inpatient electronic medical record, Int. J. Med. Inform. 135 (March) (2020), 104066, https://doi.org/10.1016/j. ijmedinf.2019.104066. Epub 2019 Dec 26. PMID: 31923817.
- Sennesael AL, Krug B, Sneyers B, Spinewine A. Do computerized clinical decision support systems improve the prescribing of oral anticoagulants? A systematic review. Thromb Res. 2020 Mar;187:79-87. doi: 10.1016/j.thromres.2019.12.023. Epub 2020 Jan 7. PMID: 31972381.

VICTAG VICTORIAN THERAPEUTICS ADVISORY GROUP

Monash Health