A retrospective audit of digoxin therapeutic drug monitoring at The Royal Melbourne Hospital

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Introduction

Therapeutic drug monitoring (TDM) of digoxin is primarily managed at The Royal Melbourne Hospital by the medical team. It is used to guide appropriate dosing for patients. This analysis was undertaken to provide more insight into the quality of TDM and whether best practice is followed.

Aims

To retrospectively analyse digoxin TDM and determine compliance with evidence-based recommendations:

- Whether digoxin levels were taken at an appropriate time,
- Whether doses were adjusted accordingly, and in a timely manner,
- If a patient's digoxin level was outside the therapeutic range on discharge, whether there was documented communication to the GP regarding the need to follow-up post discharge.

Methods

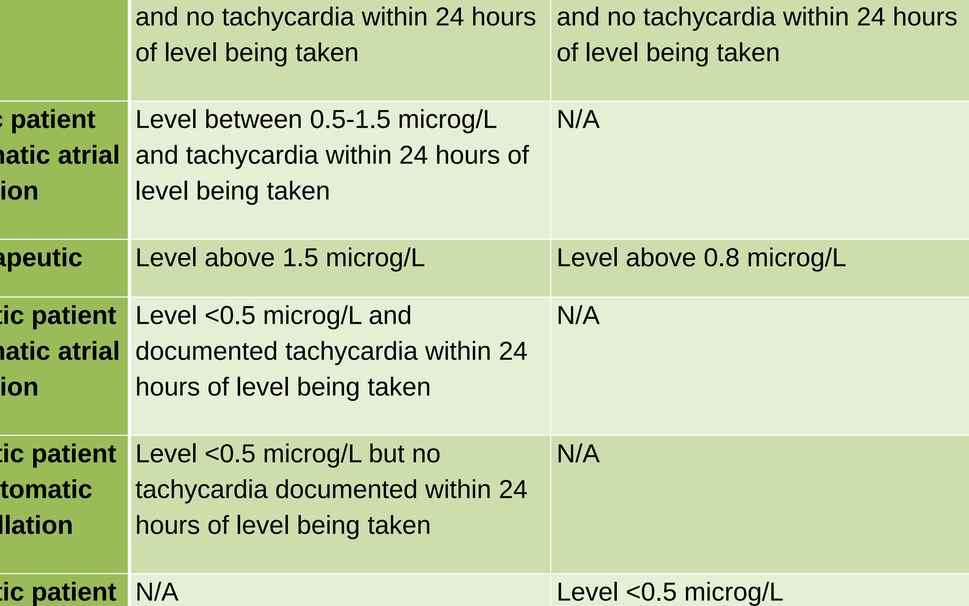
All 181 digoxin levels taken from January to March 2017 were reviewed and categorised using Table 1.

Categorisation of level	Atrial Fibrillation	Heart Failure
Therapeutic	Level between 0.5 - 1.5 microg/L and no tachycardia within 24 hours of level being taken	Level between 0.5 - 0.8 microg/L and no tachycardia within 24 hours of level being taken
Therapeutic patient with symptomatic atrial fibrillation	Level between 0.5-1.5 microg/L and tachycardia within 24 hours of level being taken	N/A
Supratherapeutic	Level above 1.5 microg/L	Level above 0.8 microg/L
Subtherapeutic patient with symptomatic atrial fibrillation	Level <0.5 microg/L and documented tachycardia within 24 hours of level being taken	N/A
Subtherapeutic patient with asymptomatic atrial fibrillation	Level <0.5 microg/L but no tachycardia documented within 24 hours of level being taken	N/A
Subtherapeutic patient with heart failure	N/A	Level <0.5 microg/L

Table 1: Categorisation of digoxin level (1). *Patient data such as dosage regimen of digoxin, age, thyroid function, heart rate and rhythm, indication for digoxin and documented follow up were accessed through scanned electronic medical records. Further information on electrolyte levels (potassium and magnesium), renal function (eGFR) were obtained from the pathology results viewer.*

Results

Graph 1 shows the categorisation of appropriateness for all levels taken.



Graph 1: shows the categorisation of appropriateness for all levels taken (n=181)

Table 2 outlines whether a correctly taken level that was out-of-range (n = 51) was dose adjusted before the next dose of digoxin was given, or at all, during the inpatient stay.

Actions taken	Number of levels
Supratherapeutic level not acted upon prior to next dose	1 of 12 (8.3%)
Supratherapeutic levels not acted upon during admission	0 of 12
Subtherapeutic patients with symptomatic atrial fibrillation not acted upon prior to next dose	22 of 26 (80.6%)
Subtherapeutic patients with symptomatic atrial fibrllation not acted upon during admission	16 of 26 (61.5%)
Therapeutic patients with symptomatic atrial fibrillation not acted upon prior to next dose	4 of 13 (30.8%)
Therapeutic patients with symptomatic atrial fibrillation not acted upon during admission	3 of 13 (23.1%)

Table 2: Actions taken for levels during inpatient stay

For the results not acted upon, there was no documentation of reasoning for continuing the same dosing regimen despite a result being out of the therapeutic range and/or the patient experiencing symptoms. Documentation of whether a second agent to manage the symptomatic AF was commenced or the dose increased was also lacking.

Table 3 outlines the presence of documentation of request for follow up to community healthcare providers of those patients who had an out-of-range level during their inpatient stay within seven days prior to discharge.

Type of level	No documentation of follow up requested
Supratherapeutic level within seven days prior to discharge	0 of 6
Subtherapeutic patient with symptomatic level within seven days prior to discharge	12 of 62 (63.2%)

Table 3: Number of patients with no follow up documented

Of the six patients who had a supratherapeutic level during their admission, digoxin was discontinued for four patients, three of whom had no record of digoxin on their discharge summary as a ceased medication. The other two patients continued on digoxin therapy were both in the therapeutic range and steady state at discharge. Of note however, one patient didn't have digoxin mentioned in their discharge summary, even though it was to be continued.

Conclusion

In this study we found that 30% of levels were not taken according to current best practice guidelines. All patients with a supratherapeutic level had a dose adjustment during their inpatient stay. In contrast, management of subtherapeutic patients with symptomatic AF could be optimised to potentially improve patient care and outcomes. Similarly, documentation of follow up required for patients with subtherapeutic levels may be improved.

Overall, this study suggests that implementation of strategies to improve digoxin TDM and thus patient care is warranted.

References

1. Pincus M. Management of Digoxin Toxicity. Australian Prescriber. 2016;39(1):18-20.