

Therapeutic Drug Monitoring (TDM) in the Intensive Care Unit (ICU)

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SUMMARY: Conducting monitoring of narrow therapeutic index drugs is an essential practice in ICU. Quality indicators for the provision of clinical pharmacy services to ICU patients include the monitoring of patients with toxic or sub-therapeutic drug concentrations. Current practice in the Gold Coast University Hospital ICU indicated monitoring practices which were costly and failed to inform clinical judgement accurately.

AIM: To evaluate the clinical appropriateness of TDM in the ICU of four commonly used drugs (gentamicin, vancomycin, phenytoin, sodium valproate).

BACKGROUND

- For patients in ICU the pharmacokinetic parameters of medications being administered can be affected during critical illness. TDM enables the individualisation of drug dosage by maintaining concentrations within a targeted therapeutic window however several factors such as the sampling time in relation to dose and dosage history need to be considered.¹ Worldwide initiatives such as 'Choosing Wisely' aim to improve quality of healthcare and promote the reduction in unnecessary tests.²

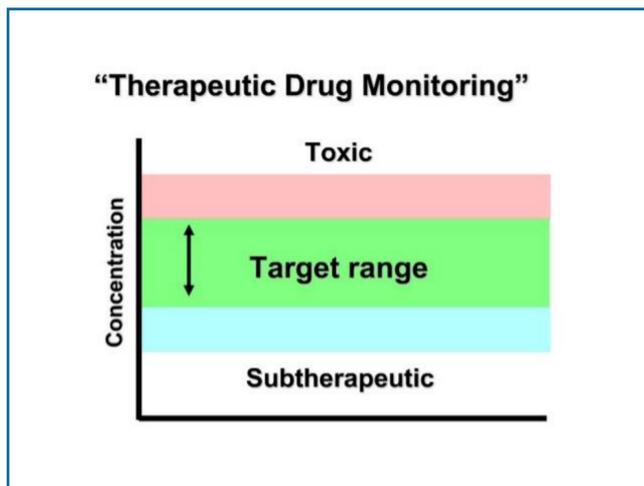


Figure 1: Therapeutic Drug Monitoring

METHOD

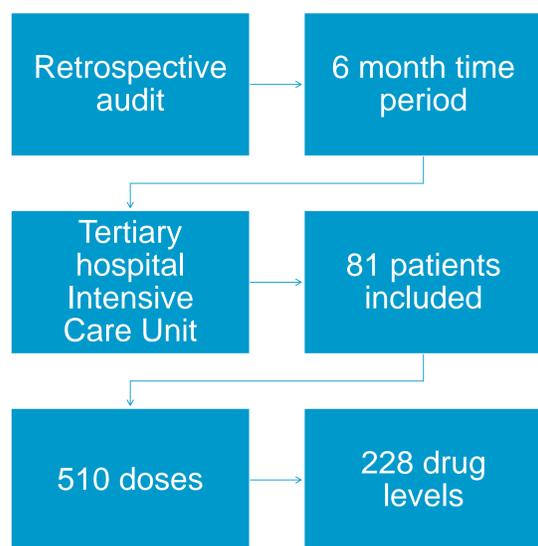


Figure 2: Method

- Local hospital guidelines as well as national therapeutic guidelines were used to ensure standardisation in defining clinical appropriateness. Clinical appropriateness was determined by the clinical indication for the drug, indication for serum sampling and timing of the level in relation to dose.

RESULTS

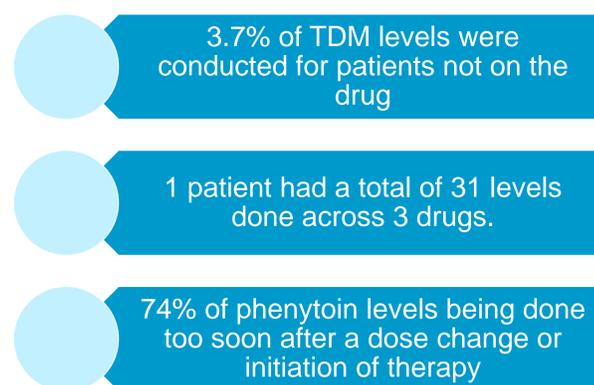


Figure 3: Results

- Gentamicin and vancomycin levels together comprised 65% of the drug levels tested with the frequency and number of tests per patient indicating a lack of awareness around empirical vs. guided therapy. The cost of the TDM levels for the four drugs examined was \$4723.37.

Table 1: Summary of costs

Drugs	Cost (\$) of each test	% classed as inappropriate	Cost (\$) of inappropriate levels
Gentamicin	\$24.38	42%	\$804.54
Vancomycin	\$18.55	35%	\$463.75
Phenytoin	\$13.98	74%	\$685.02
Sodium Valproate	\$15.62	69%	\$172.62
TOTAL			\$2125.93

CONCLUSION

- TDM in ICU for gentamicin, vancomycin, phenytoin and sodium valproate is often conducted at inappropriate times or clinically not indicated.
- Improved education to prescribers around the monitoring of narrow therapeutic index drugs is indicated to reduce unnecessary testing and improve patient care.
- An educational tool for prescribers in ICU has been developed to improve how narrow therapeutic drugs are monitored. Further study looking at the benefit of a standardised educational tool for Junior Registrars working in ICU is required to improve quality and safety of TDM.

REFERENCES

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