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 World wide initiatives such as ‘Choosing Wisely’ aim to improve quality of healthcare and promote the reduction in unnecessary tests.2

METHOD

Retrospective audit 6 month time period

Tertiary hospital
Intensive Care Unit

81 patients included

510 doses 228 drug levels

RESULTS

- 3.7% of TDM levels were conducted for patients not on the drug
- 1 patient had a total of 31 levels done across 3 drugs.
- 74% of phenytoin levels being done too soon after a dose change or initiation of therapy

Figure 3: Results

<table>
<thead>
<tr>
<th>Drugs</th>
<th>Cost ($) of each test</th>
<th>% classed as inappropriate</th>
<th>Cost ($) of inappropriate levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gentamicin</td>
<td>$24.38</td>
<td>42%</td>
<td>$804.54</td>
</tr>
<tr>
<td>Vancomycin</td>
<td>$18.55</td>
<td>35%</td>
<td>$463.75</td>
</tr>
<tr>
<td>Phenytoin</td>
<td>$13.98</td>
<td>74%</td>
<td>$685.02</td>
</tr>
<tr>
<td>Sodium Valproate</td>
<td>$15.62</td>
<td>69%</td>
<td>$172.62</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td>$2125.93</td>
</tr>
</tbody>
</table>

CONCLUSION

- 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.

- 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.

REFERENCES