Safety Brief: U-500 insulin
Issue 6, October 2013

Purpose
To provide clinicians with advice on the safe management of patients admitted to hospital on high concentration insulin (500 units/mL).

Background
High concentration insulin (500 units/mL; trade name Humulin R U-500) is five times the strength of all other insulin products available in Australia (e.g. Lantus, Novorapid and Actrapid are all insulin products at a concentration of 100 units/mL). It is only available via the Special Access Scheme and is occasionally prescribed for patients who have extreme insulin resistance and require more than 200 units of insulin each day.

Issues
When the patient is self administering their own insulin at home, there are usually no problems, however, when admission to hospital occurs, the lack of staff familiarity with U-500 insulin can result in administration errors.

In Australia, actual and near miss incidents have been reported where inpatients have received incorrect doses of U-500 insulin (underdoses and overdoses) as a result of incorrect calculation of the volume that is required to be administered.

Recommendations
- Ensure clinical staff are aware of the availability of U-500 insulin and its difference to 100 unit/mL insulin.
- Ensure that the order is clearly documented:
  - Use the Special Instructions area on the Insulin Subcutaneous Order and Blood Glucose Record form to note that the patient uses U-500 insulin.
  - Ask prescribers to order the dose as ‘X unit marks = XX units of insulin’ (see example).
- Place a ‘Patient Safety Alert’ on the front of the notes. This may include the following wording:

  This patient is using Humulin R U-500 Insulin (500 units/mL).
  This insulin is FIVE TIMES the strength of normal U-100 insulin (100 units/mL)
  Please prescribe as “UNIT MARKS” rather than units.

  Administer with a normal insulin syringe
  e.g. Dose of 150 units = 150/5 = 30 UNIT MARKS on an insulin syringe

- Pharmacists can use the comments section in iPharmacy to note that the patient uses U-500 insulin.
- Doctors, nurses and pharmacists should confirm the type and strength of insulin with patients.
- Ask patient to tell the doctors, nurses and pharmacists that he/she is using U-500 insulin when admitted.
- Utilise the clinical handover process and documentation to communicate that the patient is receiving U-500 insulin.
- Get your hospital’s experts involved – endocrinologists and physicians, pharmacists, diabetes nurse educators and nurse educators.

The following conversion chart shows the units and measurements required when using U-500 insulin with a conventional U-100 insulin syringe

<table>
<thead>
<tr>
<th>Humulin R U-500 dose (units)</th>
<th>U-100 Insulin syringe (unit markings)</th>
<th>Humulin R U-500 dose (units)</th>
<th>U-100 Insulin syringe (unit markings)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>1</td>
<td>250</td>
<td>50</td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>275</td>
<td>55</td>
</tr>
<tr>
<td>25</td>
<td>5</td>
<td>300</td>
<td>60</td>
</tr>
<tr>
<td>50</td>
<td>10</td>
<td>325</td>
<td>65</td>
</tr>
<tr>
<td>75</td>
<td>15</td>
<td>350</td>
<td>70</td>
</tr>
<tr>
<td>100</td>
<td>20</td>
<td>375</td>
<td>75</td>
</tr>
<tr>
<td>125</td>
<td>25</td>
<td>400</td>
<td>80</td>
</tr>
<tr>
<td>150</td>
<td>30</td>
<td>425</td>
<td>85</td>
</tr>
<tr>
<td>175</td>
<td>35</td>
<td>450</td>
<td>90</td>
</tr>
<tr>
<td>200</td>
<td>40</td>
<td>475</td>
<td>95</td>
</tr>
<tr>
<td>225</td>
<td>45</td>
<td>500</td>
<td>100</td>
</tr>
</tbody>
</table>

Use a U-100 insulin syringe
Divide prescribed dose (actual units) by 5 to determine the number of unit markings on a U-100 insulin syringe

Acknowledgements
Medicines Regulation and Quality would like to acknowledge the work of pharmacy, nursing and medical staff of the Princess Alexandra Hospital and Redlands Hospital for input into this Fact Sheet.

For more information please contact:
Medicines Regulation and Quality
Phone: 07 3328 9817
Fax: 07 3328 9821
Email: medicationsafety@health.qld.gov.au