Learning from an anthracycline error

Susan Ayers
Principal Pharmacist
Cancer Services
Summary of case

A 67 year old lady who had previously being treated with anthracycline chemotherapy for breast cancer received an overdose of anthracycline chemotherapy for the treatment of acute myeloid leukaemia (AML) and developed cardiac failure.

The previous chemotherapy course was not taken into account when prescribing the second cycle of chemotherapy for AML. The patient received 10% more than the recommended cumulative dose of anthracycline.
Anthracyclines

• Used for a variety of haematological malignancies and solid tumours

• All are associated with cardiotoxicity

• The most important risk factor is the total cumulative life-time dose

• Other risk factors include: > 70yrs, pre-existing cardiac disease; mediastinal radiotherapy; females; treatment with other cardiotoxic chemotherapeutic agents e.g. trastuzumab.
2011

• Patient was treated for breast cancer

• Received EC chemotherapy (epirubicin and cyclophosphamide)

• Received 60% of the recommended maximum cumulative dose of epirubicin
<table>
<thead>
<tr>
<th>Drug</th>
<th>Maximum recommended cumulative life-time dose (mg/m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daunorubicin $^1$</td>
<td>600</td>
</tr>
<tr>
<td>Doxorubicin $^{2,3}$</td>
<td>450</td>
</tr>
<tr>
<td>Epirubicin $^4$</td>
<td>900</td>
</tr>
<tr>
<td>Idarubicin (IV) $^5$</td>
<td>150</td>
</tr>
<tr>
<td>Idarubicin (PO) $^6$</td>
<td>400</td>
</tr>
<tr>
<td>Mitoxantrone $^7$</td>
<td>160</td>
</tr>
</tbody>
</table>
November/December 2016

- Diagnosed acutely with AML
- Recommended chemotherapy with daunorubicin and cytarabine
- Prescriber aware of previous epirubicin use
- Pharmacy calculated the patient could receive 40% of total daunorubicin dose
- Cycle 1 completed
- Acutely unwell post chemotherapy with multiple issues, her family were told she was unlikely to survive
January 2017

• Doing well!

• Decision to give cycle 2 of chemotherapy

• However, previous chemotherapy not accounted for.

• Cycle 2 of chemotherapy given
February 2017

- Patient complains of breathlessness
- ECHO shows ejection fraction <30% (previously 63%)
- Cumulative anthracycline dose reviewed
- Patient had received 10% more than the maximum cumulative anthracycline dose
Chemocare

- Highlights cumulative doses for anthracyclines
  However, does not recognise previous courses with anthracyclines
ChemoCare

- Cumulative dose is in mg, not mg/m2 which means a calculation is required when administering the chemotherapy

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Planned</th>
<th>Given</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALLOPURINOL</td>
<td>300.00</td>
<td>300.00</td>
<td>mg</td>
</tr>
<tr>
<td>CHLORPHENAMINE</td>
<td>60.00</td>
<td>10.00</td>
<td>mg</td>
</tr>
<tr>
<td>COTRIMOXAZOLE</td>
<td>5760.00</td>
<td>960.00</td>
<td>mg</td>
</tr>
<tr>
<td>CYCLOPHOSPHAMIDE</td>
<td>8400.00</td>
<td>0.00</td>
<td>mg</td>
</tr>
<tr>
<td>DOXORUBICIN</td>
<td>500.00</td>
<td>500.00</td>
<td>mg</td>
</tr>
<tr>
<td>EPIRUBICIN</td>
<td>450.00</td>
<td>450.00</td>
<td>mg</td>
</tr>
<tr>
<td>METOCLOPRAMIDE</td>
<td>60.00</td>
<td>10.00</td>
<td>mg</td>
</tr>
<tr>
<td>ONDANSETRON</td>
<td>48.00</td>
<td>8.00</td>
<td>mg</td>
</tr>
</tbody>
</table>
Chemocare

- Has a notes/alerts section on the front screen. However, no use was made of this section to document previous chemotherapy course and plans for maximum intended dose of daunorubicin in light of the previous epirubicin use.
ChemoCare

- Cumulative dose function relies on nurses recording administration of chemotherapy on ChemoCare - however, nurses did not document chemotherapy administration on ChemoCare till 2015, therefore, even if the cumulative dose function recognised 2 different agents the previous chemotherapy would not have been included.
Recommendations 1

Requested ChemoCare support CIS to update the software

- Highlight previous anthracycline course and calculate life-time cumulative dose of multiple anthracyclines

- Calculate and display cumulative dose as mg/m² or as a percentage rather than in mg
Recommendations to CIS

- Cumulative dose alert to highlight in both prescribing and pharmacy validation screens not just when nurse authorises just prior to administration
Response from CIS 31.7.17

Via email

- V6 ChemoCare has more access to lifetime dose data for confirm/authorise and clinical check.
- They are discussing the option to display previous anthracycline lifetime doses when a new one is prescribed.
Recommendations 2

Local Recommendations
Use notes section of ChemoCare screen to:
• Document dose discussions
• Document previous cycles of chemotherapy from other trusts or pre chemocare use at our trust
• Document cumulative dose percentage for anthracyclines in notes section till software updated
• Nurses to document chemotherapy administration on chemocare (already in place)
Recommendations 3

Share the learning

- Chemotherapy unit meetings
- Chemocare induction and training pack
- Through cancer network meetings
- Through MSO network

- ?? Other electronic chemotherapy prescribing systems (iQuemo and ARIA)