Guidelines Adherence for Therapeutic Drug Monitoring
glycopeptide and aminoglycoside antibiotics

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EISHOCKEY: NLA/NLB (20.09.)

NLA, 6. Runde
Ambri - Zug  nP  4:3 (0:1 1:0 2:2)
Biel - Genf  nV  4:1 (0:0 1:0 3:1)
Freiburg-Bern nV  2:3 (1:1 0:1 1:0)
Kloten - Davos  nV  5:6 (2:2 2:0 1:3)
SCL T. - Lausanne  0:5 (0:3 0:1 0:1)
ZSC L. - Lugano  4:1 (1:1 3:0 0:0)

NLB, 5. Runde
Lakers - Thurgau  5:1 (1:1 1:0 3:0)
Red Ice - EVZ Ac.  4:1 (2:0 2:1 0:0)
Visp - W'thur  0:2 (0:0 0:2 0:0)
Chx-Fds - Langent.  6:2 (2:0 3:1 1:1)
GCK L. - Ticino R  nV  3:2 (1:1 0:0 1:1)
Olten - Ajoie  3:2 (1:1 2:0 0:1)
Three points of interest

- Complexity and Variability of Antibiotic Therapies
- Bits and Bytes of the Electronic Health Record
- Challenge of Electronic Therapeutic Drug Monitoring (TDM)
Introduction

- glycopeptide and aminoglycoside antibiotics
  - narrow therapeutic windows
  - therapeutic efficacy
  - toxic overdosing
- therapeutic drug monitoring (TDM)
  - guidelines
  - adherence
Complexity and Variability

- **Vancomycin (normal dosage):**
  2 x 1g every 12 h

- **Vancomycin (normal dosage TDM)**
  no lather then before 5. administration
  ~ after 36 h or 48 h
Complexity and Variability - Renal Insufficiency

- **Vancomycin (dosing):**

<table>
<thead>
<tr>
<th>CrCl &gt; 80 ml/min:</th>
<th>1000 mg/12 h</th>
</tr>
</thead>
<tbody>
<tr>
<td>CrCl 60-80 ml/min:</td>
<td>750 mg/12 h</td>
</tr>
<tr>
<td>CrCl 40-60 ml/min:</td>
<td>750 mg/24 h</td>
</tr>
<tr>
<td>CrCl 20-40 ml/min:</td>
<td>500 mg/24 h</td>
</tr>
<tr>
<td>CrCl &lt; 20 ml/min:</td>
<td>500 mg/48 h</td>
</tr>
</tbody>
</table>

- **Vancomycin (TDM)**
  before 2nd administration
  no later then 24 h
# Complexity and Variability - Renal Insufficiency

<table>
<thead>
<tr>
<th>CrCl ml/min</th>
<th>0</th>
<th>12</th>
<th>24</th>
<th>36</th>
<th>48</th>
<th>60</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 80</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60 - 80</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40 - 60</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>20 - 40</td>
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</tr>
<tr>
<td>&lt; 20</td>
<td></td>
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</tbody>
</table>

- **Drug Administration**
- **TDM**

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*Graph showing drug administration and TDM at different time points for different CrCl ml/min values.*
Method

Data and Filtering
- three drugs: Gentamicin, Vancomycin and Teicoplanin
- 3-year-period (from 01/01/2012 to 31/12/2014)
- all inpatients admitted to the University Hospital Zurich
- all electronic orders of intravenous administrations
- all corresponding TDM-lab-orders

Guidelines of initial TDM
no later then:  
- 72 h for Gentamicin
- 60 h for Vancomycin
- 96 h for Teicoplanin
Result

■ Data  (115’509 analyzed inpatients including)

<table>
<thead>
<tr>
<th>Drug</th>
<th>Orders</th>
<th>Therapies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gentamicin</td>
<td>1’045</td>
<td>470</td>
</tr>
<tr>
<td>Vancomycin</td>
<td>6’168</td>
<td>2’396</td>
</tr>
<tr>
<td>Teicoplanin</td>
<td>2’184</td>
<td>807</td>
</tr>
</tbody>
</table>

■ Guideline adherence*

<table>
<thead>
<tr>
<th>Drug</th>
<th>Guideline</th>
<th>Adherence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gentamicin</td>
<td>≤ 72 h</td>
<td>72%</td>
</tr>
<tr>
<td>Vancomycin</td>
<td>≤ 60 h</td>
<td>67%</td>
</tr>
<tr>
<td>Teicoplanin</td>
<td>≤ 96 h</td>
<td>63%</td>
</tr>
</tbody>
</table>

*therapy duration ≥ 72 h
Vancomycin Therapy Monitoring
(coverage at a given point in time)

elapsed time [h]
percentage [%]
0 48 96 144 192 240 288 336 384 432
active therapies monitored
total active therapies
60 h
67%
Discussion

– TDM guidelines adherence ≤ 72%.
– quality assurance actions needed
– educational programs require continuous efforts.
– automated TDM reminders; implementation is a one time effort only
– algorithms may be reusable

Conclusion

specification and implementation of an automated TDM reminder
Thank you

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