Apps for paediatric dosing – an evaluation
Elisabeth V. Giger1, Priska Vonbach1
1Division of Pharmacy, University Children’s Hospital Zurich, Zurich, Switzerland

Objectives
Thousands of medical apps can be found in the apple app store and google play. This huge amount makes it difficult to find an appropriate app and to ensure quality and accuracy of an app.

Since we are interested to see whether the available apps are safe to use and to identify areas for possible improvement, we evaluated their quality and content. This evaluation was done in accordance with the European Statements of Hospital Pharmacy to be involved in eHealth/Health procedures and to decrease the risk of medication errors (statements 1.7, 5.5).1

Our website www.kinderdosierungen.ch provides paediatric dosages in two languages, German and French (the English version will be published soon).

To increase usability, we aim to develop a mobile version whereby the results of our evaluation might be useful.

Methods
Search for paediatric dosing apps
– Keywords such as paediatric, medical, app, dosing (in English or German)
– Perform a google search and search the apple app store and google play
– Search between April and June 2015

Inclusion criteria
– Part I: Selection of apps in either English or German containing structured paediatric dosages (preselection)
– Part II: Selection of apps with a dosage calculator and either more than 70 active ingredients or a calculator specific for preterm infants (in-depth evaluation)

Results & Discussion

Evaluation
Six main categories containing a total of 73 criteria were chosen (Table 1)

– Category weights chosen according to importance for usage by healthcare professionals (Table 1)

Criteria and weights defined by two experts

Suggestions for improvements
– Calculators, especially regarding integration of preterm infant calculations
– Data presentation: Large amount of information to be presented

Important to know
– No danger to use any of the 18 evaluated apps
– Quality of the dosages of seven randomly chosen active ingredients from different drug groups (e.g. amoxicillin, furosemide, paracetamol) were evaluated and displayed correct dosage ranges

Limitation of the evaluation
– Evaluation is based on criteria/weights that two experts defined
– End result could be different depending on criteria/weights chosen

Criteria and weights chosen according to importance for usage by healthcare professionals (Table 1)

Quality/Content (35%)
Updates, maximum dose, different dosages for different indications, accuracy of dosage, references

Quantity (10%)
Number of active ingredients and preparations, different routes of administration

Calculator (20%)
Integration, plausibility check weight/age, pre-term calculations

Features (15%)
Add bookmarks, calculation of volumes (liquid forms) or tablets (solid forms), different therapeutic categories

Usability (15%)
Data presentation, efficiency

Additional professional information (5%)
Adverse events, drug-drug interactions, compatibility

Conclusions
– Several high quality paediatric dosage apps are available.
– The apps Epocrates, Lexicomp and Safe Dose reached the highest scores in our evaluation, followed by AGN Emergency Booklet and EMRA Peds Meds.
– The calculator is the feature that could be improved in all five top apps.
– It is important to keep in mind that the appropriate medical app depends on the contents and features that are relevant for the individual user.

– We recommend that prior to using an app, a short evaluation is performed.

Table 1: In-depth evaluation of selected paediatric dosage apps

<table>
<thead>
<tr>
<th>Category (weight)</th>
<th>Criteria (examples out of 73 criteria)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality/Content</td>
<td>Updates, maximum dose, different dosages for different indications, accuracy of dosage, references</td>
</tr>
<tr>
<td>Quantity</td>
<td>Number of active ingredients and preparations, different routes of administration</td>
</tr>
<tr>
<td>Calculator</td>
<td>Integration, plausibility check weight/age, pre-term calculations</td>
</tr>
<tr>
<td>Features</td>
<td>Add bookmarks, calculation of volumes (liquid forms) or tablets (solid forms), different therapeutic categories</td>
</tr>
<tr>
<td>Usability</td>
<td>Data presentation, efficiency</td>
</tr>
<tr>
<td>Additional professional information</td>
<td>Adverse events, drug-drug interactions, compatibility</td>
</tr>
</tbody>
</table>

Table 3: Details of the top five paediatric dosing apps

<table>
<thead>
<tr>
<th>App</th>
<th>Quality/ Content</th>
<th>Price (CHF)</th>
<th>Language</th>
<th>Operation system</th>
<th>Features</th>
<th>Additional professional information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epocrates</td>
<td>English</td>
<td>Android</td>
<td>free</td>
<td>integrated manual calculation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lexicomp</td>
<td>English</td>
<td>German</td>
<td>free</td>
<td>not integrated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safe Dose</td>
<td>English</td>
<td>German</td>
<td>free</td>
<td>integrated automatic calculation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AGN Emergency Booklet</td>
<td>English</td>
<td>German</td>
<td>24</td>
<td>integrated automatic calculation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EMRA Peds Meds</td>
<td>English</td>
<td>iOS</td>
<td>3</td>
<td>integrated automatic calculation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>