RxNav
Providing Standard Drug Information

Kelly Zeng, Olivier Bodenreider,
John Kilbourne, Stuart Nelson
Outline

- Drug vocabulary standardization: RxNorm
- Visualization and processing of drug information: RxNav
- Future work: integrated drug information
Drug vocabulary standardization

RxNorm
Motivation

- Exchange of information requires standardized names
  - Ordering drugs
  - Checking interactions
  - Inventory management
- No standard naming conventions for drugs
Concepts

- Integrating terms from various drug vocabularies
- Unique identifiers for concepts (RXCUI)

<table>
<thead>
<tr>
<th>RXCUI</th>
<th>STR</th>
<th>SAB</th>
</tr>
</thead>
<tbody>
<tr>
<td>161</td>
<td>Acetaminophen</td>
<td>RxNorm</td>
</tr>
<tr>
<td>161</td>
<td>APAP</td>
<td>MMSL</td>
</tr>
<tr>
<td>161</td>
<td>Paracetamol</td>
<td>SNOMEDCT</td>
</tr>
<tr>
<td>...</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strength</td>
<td>Ingredient</td>
<td>Dose form</td>
</tr>
<tr>
<td>------------</td>
<td>-------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>4mg/ml</td>
<td>Fluoxetine</td>
<td>Oral Solution</td>
</tr>
</tbody>
</table>

Semantic clinical drug component

Semantic clinical drug form

Semantic clinical drug
Generic vs. Brand

Generic
- Ingredient (IN)
- Clinical drug form (SCDF)
- Clinical drug component (SCDC)
- Clinical drug (SCD)

Brand
- Brand name (BN)
- Branded drug form (SBDF)
- Branded drug component (SBDC)
- Branded drug (SBD)

tradename_of

Fluoxetine 4 mg/ml oral solution

Fluoxetine 4 mg/ml oral solution [Prozac]
Relations among drug entities
RxNorm database

**Data sources**
- Master Drug Data Base
- Multum MediSource Lex.
- Micromedex DRUGDEX
- National Drug Data File Plus Source Vocabulary
- FDA National Drug Code Directory
- VA National Drug File
- SNOMED Clinical Terms

**Content**
- 5,590 ingredients
- 11,148 brand names
- 13,756 clinical drug comp.
- 17,703 clinical drugs
- 13,938 branded drugs
- 13,336 branded drug comp.
- 8,308 clinical drug forms
- 10,496 branded drug forms
- 337,794 NDC code attributes

(as of 10/12/2006, excluding obsolete terms)
Visualization and processing of drug information
RxNav

- Visualization and navigation
  - RxNorm browser
  - Spelling correction
  - Search on names and codes
  - Standalone application
    - RxNorm database at NLM
    - Local RxNorm database

- Drug information processing
  - API to the RxNorm database
  - Web services
RxNav demo

RxNav: Search features

By:
- String: concept name
- GCN: Generic Code Number (First Data Bank)
- GFC: Generic Formula Code (Micromedex)
- GPPC: Generic Product Packaging Code (Medi-Span)
- LISTING_SEQ_NO: ID (FDA’s National Drug Code Directory)
- NDC: National Drug Code (FDA)
- RXCUI: unique identifier in RxNorm
- SNOMED ID: unique identifier in SNOMED CT
- UMLS CUI: unique identifier in the UMLS
- VUID Number: unique identifier in the VA National Drug File
Future work

Integrated drug information
Integration

- Equivalent strings and codes
- Links from RxNav to applications or vocabularies
  - MeSH
  - DailyMed
  - MyMedicationList
- Single entry point for a variety of information
  - One stop shopping for drug information
Equivalent strings and codes across sources

Equivalent strings
- Acetaminophen
- Paracetamol
- ...

Equivalent codes
- RXCUI:227257
- BRAND_CODE:2177
Links to applications or vocabularies

- MeSH
- DailyMed
- Equivalent strings and codes (authenticated users)
- MyMedicationList

U.S. National Library of Medicine
MeSH: Pharmacologic actions

- Fibrinolytic Agents
- Platelet Aggregation Inhibitors
Adverse reactions

- Agranulocytosis
- Thrombotic thrombocytopenic purpura
- …
MyMedicationList

- Patient owned, personal, confidential
- Standard drug information
- Personal drug list management
  - Add
  - Delete
  - Update/Notification
- Interface with EHR (electronic health record)
More information

- **RxNav**

- **RxNorm**

- **DailyMed**
MeSH Section

- UMLS Editing/Production
- RxNorm
- DailyMed
- Links at www.nlm.nih.gov/mesh