Organizing Drugs in RxNorm by Therapeutic Classes

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Abstract

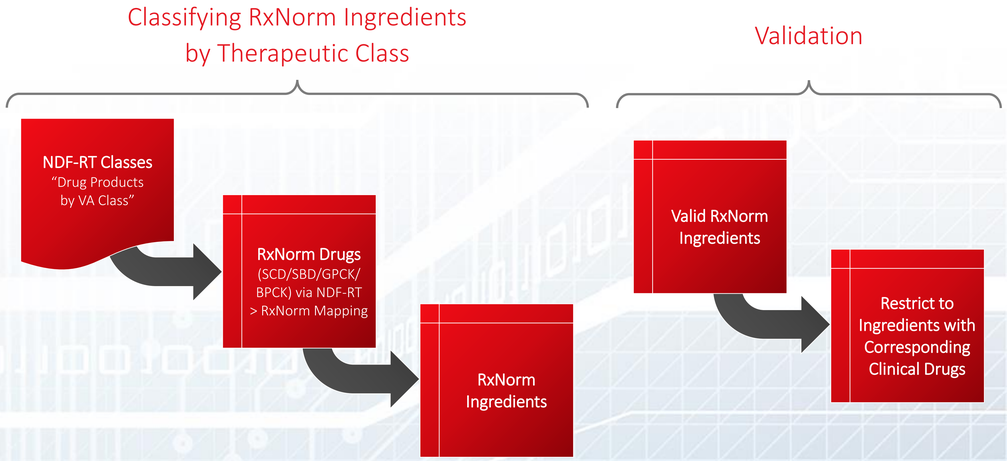
The therapeutic classification of drugs is used ubiquitously. In the public domain, NDF-RT's "Drug Products by VA Class" provides the ability to organize medications mapped to RxNorm. We used it to group RxNorm ingredients by therapeutic class. The result, while useful for analysis, is missing 13% of the valid RxNorm ingredients.

Introduction

The adoption of RxNorm for representing medications is gaining momentum. However, RxNorm does not address one of the key use cases for working with medications – classification. NDF-RT, a "sister" standard developed by the Veterans Administration (VA) is distributed alongside RxNorm and goes a long way toward addressing this need, but it falls short in certain areas.

Clinicians and researchers commonly think of medications in terms of therapeutic classes. We are very used to classes like "antibiotics" and "beta-blockers." A prototypical therapeutic classification that is certainly familiar to every clinician is found in the Epocrates app for mobile devices (Epocrates, Inc., San Francisco, CA), where users see therapeutic classes in an intuitive hierarchy of several dozen top-level nodes (e.g., Antimicrobials, Cardiovascular) and limited depth (only three levels). Organizing medications in this fashion facilitates electronic prescribing, use of medication information for reporting and business intelligence, and research.

While many software applications with user-facing medication information find it necessary to represent drugs in hierarchical structures, there is a paucity of therapeutic classification schemes in the public domain. The "Drug Products by VA Class" from NDF-RT is the most prominent1, but it is uncertain how frequently NDF-RT maintainers update this classification and its mappings to RxNorm; this presents a challenge in relying on this classification system.



Methods

Our goal was to group RxNorm ingredients by therapeutic class using NDF-RT. We downloaded RxNorm (http://www.nlm.nih.gov/research/umls/rxnorm/docs/rxnormfiles.html; accessed July 2014) and extracted the information into a relational database. NDF-RT therapeutic classification was derived from "Pharmaceutical Preparations/Drug Products by VA Class" parent node (NUI N0000010574). We traversed child-parent relationships to build our therapeutic classes hierarchy and "crossed over" into RxNorm at the level of clinical drugs (concept types SCD, SBD, GPCK and BPCK). Finally, clinical drugs were transformed into their corresponding ingredients using a "return the related concepts of specified term types" API call (http://rxnav.nlm.nih.gov/RxNormAPIREST.html).

To evaluate completeness of coverage, we obtained a list of all valid ingredients from RxNorm using a "return the RxNorm concepts for the specified term types" API call. We made certain that an ingredient had a corresponding clinical drug and excluded the ones that did not. We then compared the resulting ingredient list with the terminal nodes of the therapeutic class hierarchy we constructed.

Results

There are a total of 10,429 valid ingredients in RxNorm. The resulting NDF-RT therapeutic classification does not include 1,354 (13%) of them. This may be a reflection of the VA's patient population – older and predominantly male.

Conclusion

Therapeutic classification in NDF-RT is very useful for organizing medications mapped to RxNorm, but it is incomplete.

13% of valid RxNorm ingredients–a significant number of medications–are not accounted for in this classification.

Given how important therapeutic classification is for medication information, we would like to see it better addressed by standards in the public domain.

References

1. Palchuk MB, Klumpenaar M, Jatkar T, Zottola RJ, Adams WG, Abend AH. Enabling Hierarchical View of RxNorm with NDF-RT Drug Classes. AMIA Annu Symp. 2010.