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RxNav: Browser and Application Programming Interfaces for Drug Information Sources

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The *RxNav* browser

Developed at the National Library of Medicine, *RxNav* was originally designed for displaying graphically and navigating the relations among various kinds of drug entities (ingredient, brand name, clinical drug, branded drug, etc.) in *RxNorm*. The entry module supports autocompletion and spelling correction. In addition to drug names, *RxNav* provides access to the National Drug Codes (NDC codes) for clinical and branded drugs, as well as external links to resources, such as *DailyMed*.

RxNav was recently extended to provide access to additional drug information sources, including *RxTerms* (an interface terminology derived from *RxNorm*) and the Veterans Health Administration (VHA) National Drug File-Reference Terminology (*NDF-RT*). The three datasets are updated monthly (with additional weekly additions to *RxNorm*). *RxNav* always displays the most recent releases of the datasets (from our servers) and does not require users to maintain local copies of the datasets. *RxNav* is a standalone Java Web Start application and requires an Internet connection. *RxNav* can be used behind a proxy server and is available at: http://rxnav.nlm.nih.gov/.

Application Programming Interfaces (APIs)

Underlying *RxNav* are three APIs providing programmatic access to *RxNorm*, *RxTerms* and *NDF-RT*. These web services APIs come in two flavors, SOAP-based and RESTful. They are publicly available (see *RxNav*).

RxNorm. The RxNorm API enables users to integrate *RxNorm* data into their applications. For example, the API can be used for resolving "Zyrtec" into an *RxNorm* identifier (58930) and for finding which ingredients are associated with the branded drug "Bactrim 400 MG / 80 MG Oral Tablet" (Sulfamethoxazole + Trimethoprim). The API also helps map codes (e.g., NDCs) to *RxNorm* concepts and map obsolete identifiers to current ones.

RxTerms. The RxTerms API provides access to the display names created in *RxTerms* for clinical and branded drugs from *RxNorm*, and to information such as the strength of these drug entities.

NDF-RT. The major functions of the *NDF-RT* API enable users to find an NDF-RT entity by name or by identifier and to traverse the rich network of relations in *NDF-RT*. Clinically-oriented functions associate drugs with their pharmacologic classes and can list all interacting drug for a given drug or test interaction for a given pair of drugs.

Usage and uses

Usage has increased steadily over time, reaching about 10M queries in 2010 (browser and APIs) and 5000 monthly browsing sessions. The API is used in applications including *MyMedicationList* and *MyRxPad* (e-prescribing). Based on feedback from users, *RxNav* and the APIs have been used in academic environments, by health insurance companies, EHR vendors, and drug information providers. Mapping names and NDC codes to *RxNorm* concepts is one of the main uses of the API, which has been employed to process large amounts of queries.

Recent and future developments

Since 2010, we have established a redundant system for continuity of service, anticipating integration of our services in production applications. In addition to the *RxTerms* and *NDF-RT* APIs, and the corresponding tabs in *RxNav*, we recently developed an approximate matching algorithm for clinical drugs, soon to be available as a service. We are also working on a local implementation of the APIs to help users increase performance without having to redevelop the services locally. Finally, we are planning to release two new applications: *RxMap*, for mapping batches of names and codes to *RxNorm* identifiers and *RxCrossMap*, for navigation across the source vocabularies in *RxNorm*.