RESTful services for accessing RxNorm

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RxNorm[1] is a standardized nomenclature for clinical drugs developed by the National Library of Medicine. The *RxNorm* data set is organized around concepts with normalized drug names which can include information about ingredients, strengths and dose forms. The main drug entities are ingredients, brand names, clinical drugs, and branded drugs. *RxNorm* plays an important role in the certification criteria for electronic health record technology.

RxNav[2] is a browser for *RxNorm*, as well as an application programming interface (API) designed to allow users to manipulate *RxNorm* programmatically. Examples of use include mapping drug names to *RxNorm* (findRxcuiByString), finding the ingredient(s) corresponding to a brand name (getRelatedByType), and obtaining the list of NDCs for a given drug (getNDCs). *RxNav* and the API use the most recent data, with no need to maintain a local copy of the dataset.

The original API[3] is based on web services and relies on the Simple Object Access Protocol (SOAP). More recently, in order to facilitate the use of *RxNorm* by a wider range of users, we developed a RESTful version of the API[4], compatible with the Representational State Transfer (REST) architecture. In practice, querying *RxNorm* through the RESTful API involves creating URLs consisting of:

- the base URL for the service (http://rxnav.nlm.nih.gov/REST/)
- followed by a "resource" (e.g., /rxcui/151399/properties)

The list of resources (and the corresponding SOAP-based API functions) are shown in Table 1. The HTTP method GET is used to query the service (e.g., using the Linux command *curl*) and the results are returned in XML or JSON format. Figure 1 shows an example of RESTful query to RxNorm, along with the document returned by this query.

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[1] http://www.nlm.nih.gov/research/umls/rxnorm/index.html
[2] http://rxnav.nlm.nih.gov/
[3] http://rxnav.nlm.nih.gov/RxNormAPI.html
[4] http://rxnav.nlm.nih.gov/RxNormRestAPI.html

RESTful resource	SOAP-based function	RESTful resource	SOAP-based function
/	(none)	/rxcui/{*rxcui*}	(none)
/version	getRxNormVersion	/rxcui/{*rxcui*}/properties	getRxConceptProperties
/displaynames	getDisplayNames	/rxcui/{*rxcui*}/ndcs	getNDCs
/idtypes	getIdTypes	/rxcui/{*rxcui*}/allrelated	getAllRelatedInfo
/relatypes	getRelaTypes	/rxcui/{*rxcui*}/related?tty=*values*	getRelatedByType
/termtypes	getTermTypes	/rxcui/{*rxcui*}/related?rela=*values*	getRelatedByRelationship
/brands?ingredientids=*value*	getMultiIngredBrand	/rxcui/{rxcui}/unii	getUNII
/drugs?name=*value*	getDrugs	/rxcui/{rxcui}/quantity	getQuantity
/rxcui?name=*value*&srclst=*value* &allsrc=*value*&search=*value*	findRxcuiByString	/rxcui/{rxcui}/strength	getStrength
		/rxcui/{*rxcui*}/proprietary?srclst=*values* &ticket=*value*	getProprietaryInformation
/rxcui?idtype=*value*&id=*value* &allsrc=value	findRxcuiById	/spellingsuggestions?name=*value*	getSpellingSuggestions

Table 1— RESTful resources and corresponding SOAP-based functions for accessing RxNorm

XML output	JSON output
```<?xml version="1.0" encoding="UTF-8" standalone="yes"?>\n<rxnormdata>\n <idGroup>\n <name>bactrim</name>\n <rxcui>151399</rxcui>\n </idGroup>\n</rxnormdata>```	```{\n "idGroup" : {\n "rxcui" : "151399",\n "name" : "bactrim"\n }\n}```

Figure 1 — Result of the RESTful query http://rxnav.nlm.nih.gov/REST/rxcui?name=bactrim (get the RxNorm identifier for the drug "bactrim") in XML and JSON format