The issuing of medication requires the passing of several inspections to ensure that the drugs do not have an adverse reaction with the patient. We focused on the identification of possible interactions between the prescribed medication in question and those in the patient’s drug profile.

National Drug File (NDF) is the primary source of such information. It is an open source for Drug-Drug Interactions (DDI). The Department of Veterans Affairs uses Medication Order Check Healthcare Application (MOCHA) with support from the NDF. VistA Pharmacy and MOCHA 2.0 currently provide the NDF.

The VA is currently developing MOCHA 2.1, which will replace MOCHA 2.0 and eliminate the support for the NDF. The NDF will no longer be used and produced thus causing a monetary issue with the open source community. With the shift to MOCHA 2.1, users lose the open source DDI checking capabilities. With the help of our associates we have explored alternatives to MOCHA 2.1 that include DDI checking capabilities.

The MOCHA 2.1 alternatives are user-friendly formularies that also include other notable drug information. We acquired third-party drug knowledge methods from which we explored each one’s capabilities. Some require a membership before accessing the data, however, most are open source. Table 1 shows the list of the alternatives as well as their drug information capabilities.

 Using resources given to us by our colleagues, we explored other open drug information sources. The alternative sources explored were translated French drug tables, Canadian Drugbank and U.S. Prescriber Information. We designed a project plan to evaluate each option. We used the top five prescribed outpatient drugs of 2013 and top five prescribed children’s outpatient drugs 2002-2010 as the trials of the project plan. We then searched DDI for each drug using the alternative methods. We then compared the information gathered from the alternative sources to those gathered from the NDF. Table 4 shows a shortened version of the collected Rosuvastatin DDI from each source.

 After collecting all the data we made note of a few observations. The French data tables provide information on both interactions and their severity. There were a few top prescribed drugs that were not listed on the French drug tables but if it were listed the French drug tables had the most DDI data. The levels of severity were take into account, precaution for use, not recommended, and contraindication. The Canadian Drugbank had high-level interaction data but did not have information on severity and generally had the least number of interacting drugs listed. The Prescriber Information also had high-level interaction data and no severity information. In the U.S., it is the standard to which prescribers and pharmacists are held to in court. There were a few drugs that had interactions with several of the top prescribed drugs. Within a top prescribed drug there were only a few interacting drugs that overlapped with several alternatives.

We only explored a few of the many options available to the public. The alternatives evaluated are possible sources for DDI data as well as other drug information.

We’d like to thank our colleagues for giving us the alternative sources. French drug table and Canadian Drugbank sources were recommended and translated by George Lilly and Nancy Van Ness. U.S. Prescriber Information source was recommended by Sam Habiel. Additional collaboration was provided by Dr. Nancy Anthracite and Christopher Edwards.

Table 1 Third-Party Drug Knowledge Formularies and Capabilities

|  |  |
| --- | --- |
|  | Knowledge Base  |
| Gold Standard Drug Database | * Includes U.S.-approved brand and generic prescription drugs, OTC products, herbals, vitamins and nutritional products, medical devices and diagnostic kits
* Drug pricing file
* Drug image file
* Hierarchy database
* Interactions – drug-drug, drug-herb, drug-lifestyle, drug-food, drug-allergy
* Drug-condition and demographic
* Dose check
* Duplicate therapy
* Warning labels
* Pregnancy ratings
* Market classification system
* Patient education
 |
| Multum & First Databank (Cerner)* Has different packages (VantageRx™)
 | * Lexicon – Foundation Nomenclature Database
* Descriptions, images & imprint data
* Interactions – drug-drug & drug-food
* Drug allergy and cross-reactivity checking
* Side effects
* Pharmacology information
* Reproductive hazards: pregnancy and lactation
* Warnings
* Therapeutic categories
* Therapeutic duplication checking
* Article references
* Patient education leaflets
* RxNorm mappings
* CVx mappings
* Drug indications
* Common prescriptions
* Drug-disease interactions
* Dose range checking
* Patient-specific drug orders & prescriptions
* RxBuilder (advanced prescription writer)
 |
| Express Scripts Drug Digest Check Interactions\*need membership\* | * Drug-drug interaction
* Drug comparison
* Disease care pathways
* Side effect comparison
* Health risk assessments
* Pharmacy benfit management (PBM) service
	+ Network pharmacy claims processing
	+ Mail pharmacy services
	+ Benefit design consultation
	+ Drug utilization review
	+ Formulary management
	+ Disease management
	+ Medical and drug data analysis services
* Order status
* Medication information
* Pharmacy location
* Medication price
* Refill status
 |
| Micromedex Healthcare Series | * Scientific information
* Pharmacovigilance
* Medical information
* Encoding
* Regulatory affairs
* Pharmaceutical marketing
* Drug-drug interaction
* Side-by-side drug comparison
 |
| Drug-Reax Interactions Drug Interactions | * Interactions – drug-drug, drug-food, drug-disease, drug-ethanol, drug-tobacco & drug-laboratory
* Drug-alternative medicines
* Allergic reactions
* Drug specific information
* Generic names
 |
| Lexi-Comp | * Patient education
* Drug images
* Interactions – drug-drug, drug-herbal & drug-food
* RxNorm Mapping
* Easy Implementation
* Dosing information
* Warnings
* Adverse reactions
* Administration information
* Drug identification
* Diseases and conditions
* Poisoning and toxicology
* Lab and diagnostic
* Generic and international names
 |
| MedScape for WebMD Multi-Drug Interaction Checker  | * Patient education
* Interactions – drug-drug, drug-herbal
* Warnings
* Adverse reactions
* Drug identification
 |
| Medi-Span (Wolters-Kluwer Health) | * Drug information
* Drug-drug interactions
* Adverse reactions
* Drug contraindication
* Diseases and conditions
* Product information
* Generic and international names
 |

Table 2 Top Five Prescribed Outpatient Drugs Of 2013

|  |  |  |  |
| --- | --- | --- | --- |
| **Ranking** | **Brand Name** | **Generic Name** | **Disease/Medical Use** |
| 1 | Abilify | Aripiprazole | Psychosis; depression |
| 2 | Nexium | Esomeprazole | Gastrointestinal disorders |
| 3 | Humira | Adalimumab | Rheumatoid arthritis |
| 4 | Crestor | Rosuvastatin | Cholesterol  |
| 5 | Advair Diskus/Seretide | Fluticasone/ Salmeterol | Asthma |

\*\*Source: Medscape Medical News

Table 3 Top Five Prescribed Children’s Outpatient Drugs 2002-2010

|  |  |  |
| --- | --- | --- |
| **Ranking** | **Generic Name** | **Disease/Medical Use** |
| 1 | Amoxicillin | Antibiotic |
| 2 | Azithromycin | Antibiotic  |
| 3 | Albuterol (Salbutamol) | Asthma  |
| 4 | Amoxicillin/ Clavulanate | Penicillin antibiotic  |
| 5 | Cefdinir | Antibiotic |

\*\*Source: Pediatrics: Official Journal of the American Academy of Pediatrics

Table 4 Shortened List of DDI for Rosuvastatin From Different Sources

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **French** | **Canadian** | **VA** | **PI** |
| **Drug Name** | **Interactions** | **Severity** | **Interactions** | **Severity** | **Interactions** |
| Cyclosporine |  |  | Cyclosporine may increase the serum concentration of rosuvastatin. Limit rosuvastatin dosing to 5 mg/day and monitor for changes in the therapeutic and adverse effects of rosuvastatin if cyclosporine is initiated, discontinued or dose changed. | Critical | Cyclosporine increased rosuvastatin exposure (AUC) 7‑fold. Therefore, in patients taking cyclosporine, the dose of CRESTOR should not exceed 5 mg once daily [see Dosage and Administration (2.5), Warnings and Precautions (5.1), and Clinical Pharmacology (12.3)]. |
| Eltrombopag | Risk of increase of the toxicity of the statins, due to inhibition of their hepatic recapture | Precaution for useClinical monitoring and adjustment as needed of the dosage of the statin. |  | Significant |  |
| Amprenavir |  |  |  | Significant |  |
| Fosamprenavir |  |  |  | Significant |  |
| Nelfinavir Mesylate |  |  |  | Significant |  |
| Daptomycin |  |  |  | Significant |  |
| Colchicine | Risk of increase of the undesirable muscular effects of these substances, and notably of rhabdomyolysis | Precaution for useClinical and biological monitoring, notably at the beginning of the administration of these substances together. | Increased risk of rhabdomyolysis with this combination |  | Cases of myopathy, including rhabdomyolysis, have been reported with HMG‑CoA reductase inhibitors, including rosuvastatin, coadministered with colchicine, and caution should be exercised when prescribing CRESTOR with colchicine [see Warnings and Precautions (5.1)]. |
| Magnesium |  |  | Magnesium-containing antacids may decrease the absorption of rosuvastatin. |  |  |
| Fusidic Acid | Increased risk of undesirable effects (concentration-dependent)of the rhabdomyolysis type, due to decrease of the hepatic metabolism of the cholesterol lowering medication | Contraindication:-for use of the antibiotic for skin conditionsNot recommended:-for bone and joint condition |  |  |  |
| Ciclosporin | Increased risk of undesirable effects (concentration-dependant) of the rhabdomyolysis type, or of nephrotoxicity, due to decrease of the metabolism of the rosuvastatin | Contraindication |  |  |  |
| Niacin |  |  |  |  | The risk of skeletal muscle effects may be enhanced when CRESTOR is used in combination with lipid-modifying doses (≥1 g/day) of niacin; caution should be used when prescribing with CRESTOR [see Warnings and Precautions (5.1)]. |
| Coumarin Anticoagulants |  |  |  |  | CRESTOR significantly increased INR in patients receiving coumarin anticoagulants. Therefore, caution should be exercised when coumarin anticoagulants are given in conjunction with CRESTOR. In patients taking coumarin anticoagulants and CRESTOR concomitantly, INR should be determined before starting CRESTOR and frequently enough during early therapy to ensure that no significant alteration of INR occurs [see Warnings and Precautions (5.3) and Clinical Pharmacology (12.3)]. |