



Drug Availability in Canada

IMPROVING ACCESS TO INFORMATION USING PUBLIC DATA

Background

- *“The escalation in shortages of prescription drugs in the past few years and the ongoing disruptions to supply experienced in Canada and globally are matters of grave concern to the Canadian Medical Association”*
- *“In the United States the number of drug shortages from 2006 to 2010 grew by more than 200 percent.”*
- *“A CMA survey of physicians in September 2012 found that 66% of respondents indicated that drug shortages have gotten worse since 2010 and 64% stated that the shortages have had consequences for their patients or practice. Similarly, the results of the 2012 Canadian Pharmacists Association survey of pharmacists found that over 91% of pharmacists had been inconvenienced by shortages and 51% indicated that patients’ care had been compromised.”*

More background

- [Drug shortages the new normal and hard to fix](#)
- [Drug shortages: Patients and healthcare providers are all drawing the short straw](#)
- [See here for a list of articles.](#)

Plenty of data but no information

- It is now mandatory for manufacturers to report shortages and this data is available at drugshortagescanada.ca
- But this is just data and falls far short of *information*. For example, it may report that the 250 count bottle of APO-Fluvoxamine has been discontinued. But it fails to tell you anything about the 100 count bottle by that manufacturer or how many other forms by other manufacturers of the same medication are available.
- In other words, there is no *information* available on drug *availability*. Shortage and discontinuation data without the necessary context is of little value.

Where are people getting information now?

- Patients and subsequently physicians appear to be getting information via Facebook.
- A patient goes in to get a refill on their prescription. The pharmacist says they can't get it right now. The patient goes on Facebook and mentions this on a medically-relevant group. Then patients in the group on the same medication go to their pharmacists, discover that what they heard is true and then book appointments with their physician. Physicians are flooded with requests for appointments and scramble to get information on the availability of alternatives while at the same time booking all of these appointments.
- This inefficient & expensive process is well-documented in surveys done by the CMA.

The big idea

- Build a reporting mechanism to provide pharmacists and physicians with reliable information on the current availability of pharmaceutical medications.
- Build up a database over time to calculate and report the accuracy with which manufacturers estimate the duration of shortages.
- Build predictive modeling to enable physicians to anticipate shortages and prescribe alternate medications when appropriate.

Who needs this information

- Physicians to aid with patient care
- Pharmacists to aid with patient care
- Pharmaceutical suppliers (intermediary between manufacturers and pharmacies) to update their system to reflect accurate information.
- Provincial and federal governments to make informed decisions on drug formularies.



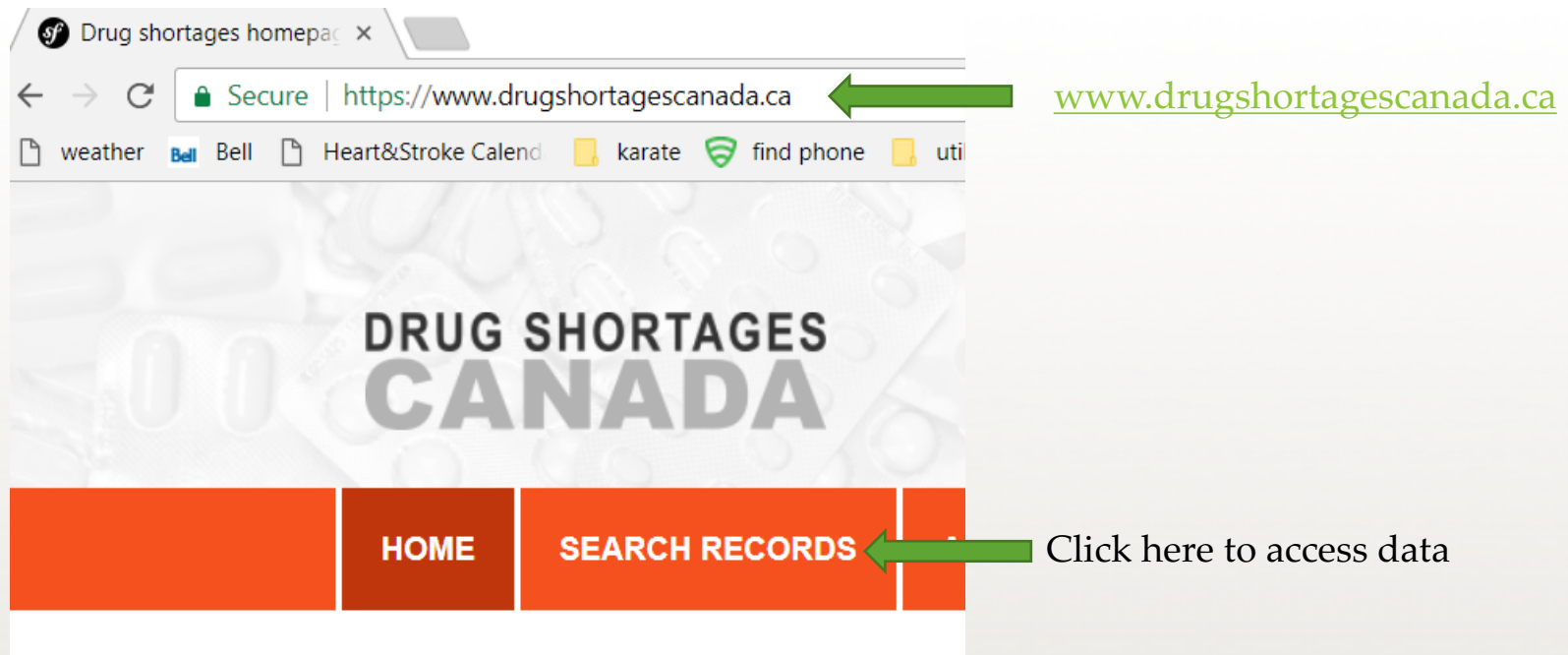
A note on ethics

- Stockpiling of medications is a danger. For this reason, the general public is not a target audience for this information.
- Different audiences require different information and the risk of stockpiling should be considered for each audience.



Data Source #1: drugshortagescanada.ca

Drug shortage/discontinuation data



Search results Can we automate the download process?

Below you can search for information on drugs that are, or are likely, to go into shortage, or, be discontinued. A drug shortage means a situation in which a company is unable to meet the demand for a product. A discontinuation occurs when a company decides to stop selling a product.

TOGGLE SEARCH FILTERS

The screenshot shows a search interface with the following elements:

- Keywords:** A text input field.
- Created between:** Two date range selectors, each consisting of a month, day, and year dropdown.
- Type:** A dropdown menu with options: All, Shortage, Discontinuation. A green arrow points from this menu to the 'Type' label.
- Status:** A dropdown menu with options: All, Anticipated shortage, Actual shortage, Avoided shortage, Resolved, Discontinued, To be discontinued. A green arrow points from this menu to the 'Status' label.
- Buttons:** 'Refine Search' and 'Clear Filter' are located below the filters. A green arrow points from the text 'Refine search before exporting' to the 'Refine Search' button.
- Export:** A green arrow points from the text 'Click to export csv file' to the 'Export Results' button.

There are two types of data files with slightly different fields.

There are six drug statuses.

Refine search before exporting

Click to export csv file

Export Results

Shortage Data Extracts

Have 1 'extra' line at the top



| | A | B | C | D | |
|---|------------------|------------|------------|-----------|-------|
| 1 | Shortage reports | | | | |
| 2 | Report | Drug Ident | Report Typ | Brand nam | Cor |
| 3 | 34506 | 1924303 | Shortage | 0.9% SODI | B. BI |
| 4 | 28240 | 1963937 | Shortage | 0.9% SODI | B. BI |
| 5 | 43080 | 436208 | Shortage | 2% LIDOC | HOS |
| 6 | 24792 | 2141450 | Shortage | 20% PROS | BAX |
| 7 | 27274 | 2248489 | Shortage | 4% ASTRA | DEN |
| 8 | 22272 | 2222125 | Shortage | 10% MAFON | HOS |

Have 2 'extra' lines at the bottom



| | A | B | C | D | |
|------|-------------------------|------------|------------|-----------|-----|
| 4719 | 21685 | 2340445 | Shortage | ZYCLARA | VAI |
| 4720 | 18241 | 2257270 | Shortage | ZYMAR | ALL |
| 4721 | 14132 | 2243684 | Shortage | ZYVOXAM | PFI |
| 4722 | Discontinuation reports | | | | |
| 4723 | Report | Drug Ident | Report Typ | Brand nam | Cor |
| 4724 | | | | | |

Can we automate deleting extra lines?

Discontinuation Data Extracts

Have 3 'extra' lines at the top



| | A | B | C | D | E |
|---|-------------------------|------------|------------|-----------|--------|
| 1 | Shortage reports | | | | |
| 2 | Report | Drug Ident | Report Typ | Brand nam | Compa |
| 3 | Discontinuation reports | | | | |
| 4 | Report | Drug Ident | Report Typ | Brand nam | Compa |
| 5 | 27502 | 2299119 | Discontin | 40(MEQ)M | HOSPIL |
| 6 | 4990 | 2303299 | Discontin | AC&am | PHARM |
| 7 | 4993 | 2303299 | Discontin | AC&am | PHARM |
| 8 | 6031 | 2303299 | Discontin | AC&am | PHARM |

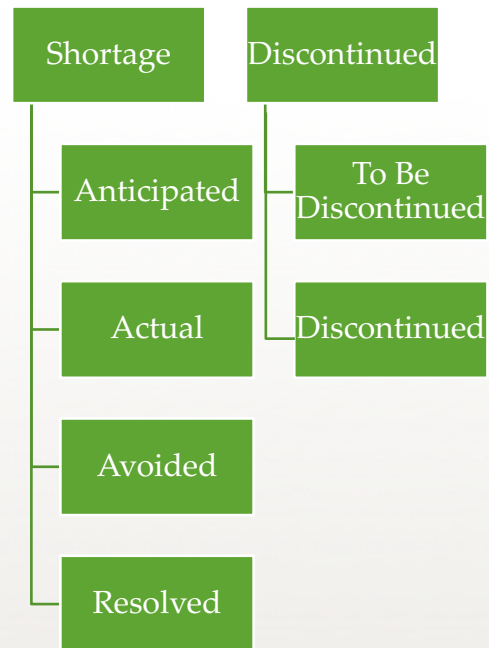
Have no 'extra' lines at the bottom



| | | | | | |
|-----|-------|---------|-----------|----------|------|
| 653 | 22614 | 2212358 | Discontin | ZANTAC | GLAX |
| 654 | 22617 | 2212366 | Discontin | ZANTAC | GLAX |
| 655 | 38344 | 2108208 | Discontin | ZEMURON | MER |
| 656 | 42342 | 2459620 | Discontin | ZINBRYTA | BIOG |
| 657 | 14030 | 2408082 | Discontin | ZOLEDRON | TEVA |
| 658 | | | | | |
| 659 | | | | | |

Can we automate deleting extra lines?

This is the drug-state information obtained from canadadrugshortages.ca





Data Source #2: The Canadian Drug Product Database

[Hyperlink to website](https://www.canada.ca/en/health-canada/services/drugs-health-products/drug-products/drug-product-database/what-data-extract-drug-product-database.html)

Secure | <https://www.canada.ca/en/health-canada/services/drugs-health-products/drug-products/drug-product-database/what-data-extract-drug-product-database.html>

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What is the DPD Data Extract? - Drug Product Database (DPD) Data Extract - Health Canada

The data extract is a series of compressed UTF-8 text files of the database. The uncompressed size of the files is approximately 65 MB. In order to utilize the data, the file must be loaded into an existing database or information system. The typical user is most likely a third party claims adjudicator, provincial formulary, insurance company, etc. For a casual user to use this file, they must be familiar with database structure and capable of setting up their own queries. The "Read me" file contains the data structure required to download the zipped files.

The DPD extract files contain complete product information for all approved (filename_ap.zip), marketed (filename.zip), cancelled (filename_ia.zip) and dormant (filename_dr.zip) products, for human, veterinary, disinfectant and radiopharmaceutical use.

For more information on the Data Extract structure consult the [Read me file](#).

Canadian Drug Product Database

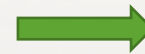
Scroll down to the bottom and select allfiles.zip



| | | |
|-----------|---------------------------------|------------|
| ALL FILES | allfiles.zip | 2018-04-03 |
| | allfiles_ia.zip | 2018-04-03 |
| | allfiles_ap.zip | 2018-04-03 |
| | allfiles_dr.zip | 2018-04-03 |

Can we automate the
download process?

Extract the files



- comp.txt
- drug.txt
- form.txt
- ingred.txt
- package.txt
- pharm.txt
- route.txt
- schedule.txt
- status.txt
- ther.txt
- vet.txt

This is the drug-state information obtained from the CDPD



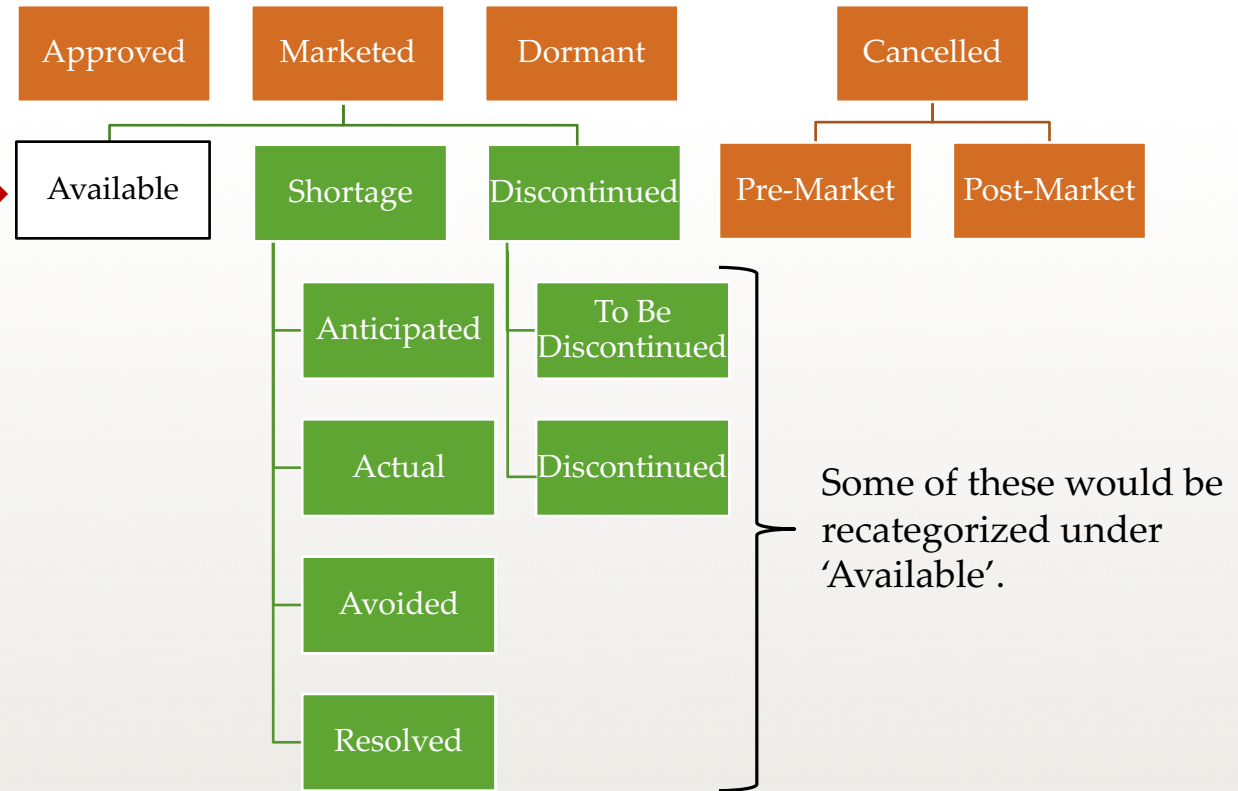


Putting it all together

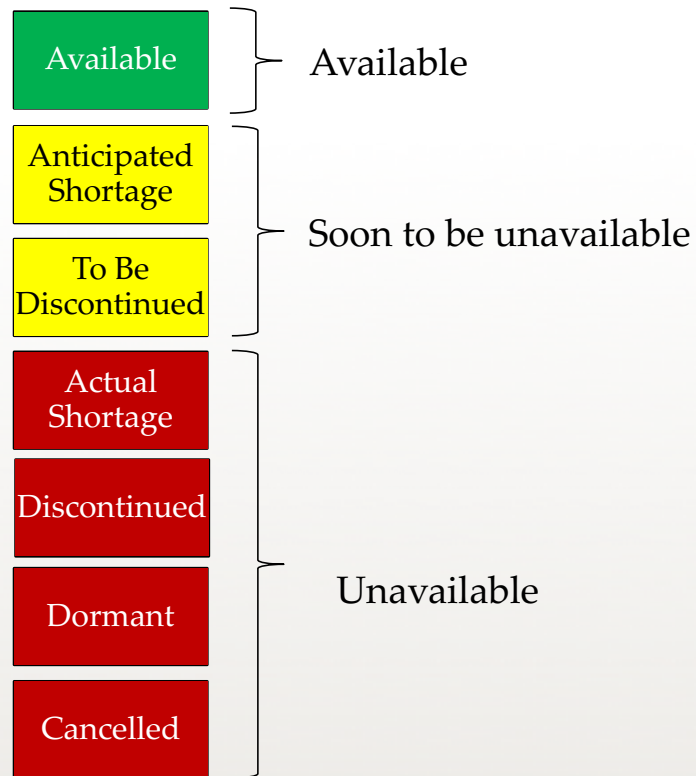
The two data sources identify all possible states

This important state can only be calculated by merging the two data sources together.

THIS is what physicians, pharmacists and patients REALLY need to know.



Group states to better reflect availability



What can be done with the data?

- Build reporting of current availability.
 - Use Tableau public to start but pursue possibility of app development.
 - Find influencers in the pharmaceutical supply chain (pharmacies, hospitals, suppliers) that want to have this capability built in to their systems (because they all currently have flawed information!)
- Build visual analytics to display historical availability. This will help reveal pending shortages.
 - Tableau public to start but pursue possibility of app development.
- Pharmaceutical companies often go in and edit their estimates of shortage durations. Need to build database that captures these changes. Once we have sufficient data over time build KPI to measure the accuracy of pharmaceutical company estimates. Provide reporting on this.
- Build predictive models to provide advanced notice of increased risk of shortages.
 - Tech chosen (SAS or R or Python) may depend on tech decisions made prior to this point.