**Updating CQL files with Card Attributes stored within an Excel file:**

**Program name:** CQL\_card\_updater.py

**Summary:**

This program enables rapid replacement of CDS Card Attributes from an Excel File allowing rapid refinement of motivating information.

**Purpose:** A significant portion of the high blood pressure investigative grant is motivating patients through bio-psycho-socio models. Different word choices and links to information could have a substantial effect on patient compliance. Rapid language and links iteration, akin to Google A vs B testing, would fine tune the messaging. Changing the wording of approximately 38 endpoints with 7 attributes from Excel cells into at least 6 different CQL files requires some automation for speed and error reduction. This program will strip out old card attributes from either CDS Author or previous iterations of the CQL file and then update them with the best-known-language practices extracted from the Excel file.

**Prerequisites**:

* Python with imports: pandas, shutil, re, glob, os
* A Python file named **CQL\_card\_updater.py**
* A directory named **CQL** in the same directory as **CQL\_card\_updater.py**
* Inside the CQL directory are:
  + An Excel file named **X*CQL\_cards.xlsx*Y**, where X and Y are chosen by the user. A file named HBP\_CQL\_cards.xlsx.rev3 would be fine.
  + Any .cql files that need card attribute updating. Frequently from CDS Author.
* The Excel worksheet names need to match the CQL file names without any extension.
  + It is okay if the cql names are longer than Excel will allow (31 characters). Just the first 31 need to match.

**Procedure:**

* Just type in the command line or double-click **CQL\_card\_updater.py**
* The program will make a backup of the original CQL files in a **CQL/Backup** directory. The files will be named as before through with a **.old** extension.
* Old files for constructing the updated CQL files are removed.
* The program will strip out any old card attributes from the CDS Hooks definitions, <https://cds-hooks.hl7.org/1.0/> , as well as the terms Rationale and Recommendation, which come from CDS Author Tool. These files will be named like the matching CQL file, though with a **.no\_cards** extension.
* New card attributes will be extracted from Excel by Python Pandas and placed into the expected CQL format. These files will be labelled like the matching CQL file, though with a **.cards\_to\_add** extension.
* The **.no\_cards** and **.cards\_to\_add** files will be merged. Excess blank lines are also deleted, though one is added between merging the files.
* The user is asked if they want to remove the **.no\_cards** and **.cards\_to\_add** files.
* The original CQL **.old** files remain in the backup directory. They will not be replaced until the **CQL/Backup** directory is removed, so they will not be overwritten by subsequent runs.

**Unknowns:**

* Some Card Attributes, such as **suggestions** and **source,** are not defined as strings, rather as an *array* and as an *object*, respectively. CQL has simply used strings in the past, so how we will enter these is not currently known. However, multiple links can be added within an Excel cell, so perhaps suggestion arrays will be facile.
* Additionally, many attributes only allow a few (or one) entry, for example **selectionBehavior** only uses *at-most-one* currently. and will be subject to updates in the cards.

**Sample output:**

* define "Recommendation":
* if "Pregnant Subpopulation" then 'Standard high blood pressure guidelines do not apply'
* else if "Secondary hypertension subpopulation" then 'Standard high blood pressure guidelines do not apply'
* else if "End stage renal disease" then 'Standard high blood pressure guidelines do not apply'
* else if "Possible structural heart disease" then 'Perform an echocardiogram to address potential structural heart disease'
* else if "Possible pregnancy" then 'Consider performing a 24-hour urinalysis to check albumin content'
* else if "Possible secondary hypertension" then 'Screen for specific suspected causes of secondary hypertension'
* else 'Perform additional screening as needed'
* define "Rationale":
* if "Pregnant Subpopulation" then 'Please see your Ob-Gyn provider for specialized care regarding your high blood pressure reading while pregnant'
* else if "Secondary hypertension subpopulation" then 'As you already have a high blood pressure diagnosis, please see your provider regarding your recent high blood pressure reading.'
* else if "End stage renal disease" then 'Please see your nephrologist for specialized care regarding your recent high blood pressure reading.'
* else if "Possible structural heart disease" then 'Your recent blood pressure is above your goal. Based on your healthcare history and current blood pressure readings, guidelines strongly recommend using an echocardiogram screening (taking pictures of your heart) to detect potential structural heart disease.'
* else if "Possible pregnancy" then 'Your recent blood pressure is above your goal. Pregnant women carry a risk of developing preeclampsia, a condition related to high blood pressure. Preeclampsia can turn into a more dangerous condition known as Eclampsia. The severity of these condition is related to an increase in urine albumin (protein) levels. '
* else if "Possible secondary hypertension" then 'Your recent blood pressure is above your goal. Secondary hypertension (high blood pressure due to another condition) is possible. Together we will use some tests to try to find any causes and treat it directly. However, sometimes there is no known cause.'
* else 'Your recent blood pressure is above your goal. We have not seen another cause for your hypertension (high blood pressure). Running additional screening tests to obtain whole picture of your health would be helpful.'
* define "indicator":
* if "Pregnant Subpopulation" then 'Info'
* else if "Secondary hypertension subpopulation" then 'info'
* else if "End stage renal disease" then 'info'
* else if "Possible structural heart disease" then 'warning'
* else if "Possible pregnancy" then 'info'
* else if "Possible secondary hypertension" then 'warning'
* else 'info'
* define "source":
* if "Pregnant Subpopulation" then 'https://www.ahajournals.org/doi/10.1161/HYPERTENSIONAHA.120.15015'
* else if "Secondary hypertension subpopulation" then 'https://www.ahajournals.org/doi/10.1161/HYPERTENSIONAHA.120.15016'
* else if "End stage renal disease" then 'https://www.ahajournals.org/doi/10.1161/HYPERTENSIONAHA.120.15017'
* else if "Possible structural heart disease" then 'https://www.ahajournals.org/doi/10.1161/HYPERTENSIONAHA.120.15018'
* else if "Possible pregnancy" then 'https://www.ahajournals.org/doi/10.1161/HYPERTENSIONAHA.120.15019'
* else if "Possible secondary hypertension" then 'https://www.ahajournals.org/doi/10.1161/HYPERTENSIONAHA.120.15020'
* else 'https://www.ahajournals.org/doi/10.1161/HYPERTENSIONAHA.120.15021'
* define "suggestions":
* if "Pregnant Subpopulation" then null
* else if "Secondary hypertension subpopulation" then null
* else if "End stage renal disease" then null
* else if "Possible structural heart disease" then null
* else if "Possible pregnancy" then null
* else if "Possible secondary hypertension" then null
* else null
* define "selectionBehavior":
* if "Pregnant Subpopulation" then 'at-most-one'
* else if "Secondary hypertension subpopulation" then 'at-most-one'
* else if "End stage renal disease" then 'at-most-one'
* else if "Possible structural heart disease" then 'at-most-one'
* else if "Possible pregnancy" then 'at-most-one'
* else if "Possible secondary hypertension" then 'at-most-one'
* else 'at-most-one'
* define "links":
* if "Pregnant Subpopulation" then 'https://www.mayoclinic.org/healthy-lifestyle/pregnancy-week-by-week/in-depth/pregnancy/art-20046098#:~:text=High%20blood%20pressure%20during%20pregnancy%20poses%20various%20risks%2C%20including%3A,birth%20weight%20or%20premature%20birth.'
* else if "Secondary hypertension subpopulation" then 'https://www.mayoclinic.org/diseases-conditions/secondary-hypertension/symptoms-causes/syc-20350679#:~:text=Secondary%20hypertension%20(secondary%20high%20blood,arteries%2C%20heart%20or%20endocrine%20system.'
* else if "End stage renal disease" then 'https://www.mayoclinic.org/diseases-conditions/end-stage-renal-disease/symptoms-causes/syc-20354532'
* else if "Possible structural heart disease" then 'https://intermountainhealthcare.org/services/heart-care/conditions/structural-heart-disease/#:~:text=Structural%20heart%20disease%20is%20a,will%20develop%20later%20in%20life.'
* else if "Possible pregnancy" then 'https://www.mayoclinic.org/diseases-conditions/preeclampsia/diagnosis-treatment/drc-20355751'
* else if "Possible secondary hypertension" then 'https://my.clevelandclinic.org/health/diseases/21128-secondary-hypertension'
* else 'https://labtestsonline.org/conditions/hypertension'