Serious Illness Code Script Overview

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**Preamble**

This code was developed to identify a population of seriously ill patients in real time across three health systems to allow for prospective quality improvement efforts. Our goal is to continuously improve this code over time and to make it broadly available. We expect that as more groups use this code, we will identify changes to improve the code. For now, we are maintaining the code, but we hope to partner with the Palliative Care Research Cooperative (PCRC) to assist with facilitating code sharing and ongoing enhancement of the code. Your team’s experience using this code will help us understand if this will be successful.

**Agreement**

Before using the code, we ask that you agree to the following:

1. The code will only be used for this project and will not be shared with others without our team's permission
2. Any publications from the code will reference the JPM Protocol Paper for the UC Health Care Planning project: Walling AM, Sudore R, Bell D, Tseng C, Ritchie C, Hays RD, Gibbs L, Rahimi M, Wenger NS. Population-based, Pragmatic Trial of Advance Care Planning in Primary Care in the University of California Health System. *J Palliat Med*. 2019 Aug 22;22(S1):72-81.
3. Provide us with a brief report including the following to inform continuous improvement of the code:

* For what purpose will you use the code?
* Characteristics of population including venue, size, inclusion criteria
* How many people you identify as seriously ill using the code
* If you check % agreement between the code and chart review (which we suggest), please share the findings with us.
* Feedback about using the code including reliability, errors, difficulty with implementation, or ways to improve the code.

**Background:**

The goal of this code is to identify a population of patients for whom advance care planning should be a priority, defined as: (1) poor short-term survival prognosis or (2) developing incapacity or (3) worsening functional status or (4) high burden of disease (causing excessive suffering, which may be related to health care utilization). The definition of serious illness requires that the patient have a diagnosis of serious illness (i.e. cancer, heart failure, chronic obstructive pulmonary disease, end-stage liver disease, end-stage renal disease, or amyotrophic lateral sclerosis) linked with advanced age or a level of severity as defined by advanced illness group definitions. Please see the Table with these definitions. We validated that this code identified patients that met at least one of these criteria for advance care planning by conducting chart abstraction. The patient population was 18 years and older and had at least two encounters with primary care within the past 12 months at a studied academic health system. Of 306 patients across three health systems, chart abstraction revealed that 301/306 (98%) met the ACP Priority criteria.

**SERIOUS ILLNESS CODE SCRIPT**

**Overview**

The script will create a main table with all potential patients (denominator) and a series of flags (i.e., problem list diagnosis, outpatient diagnoses, etc…) to help gauge the most accurate algorithm to define each sub-group. This code will pull all active problem list records and the last three years of outpatient diagnoses.

After this step, we will implement a series of more specific flags (beyond ICD codes) to pull/calculate additional indicators for each group:

* End stage liver disease (ESLD):
  + Lab results (Albumin, INR, Creatinine, Bilirubin, and sodium). Find the latest set of labs that took place within 48 hours.
  + MELD
  + Dialysis (limited since outpatient episodes don’t get recorded at UCLA\*)
* Heart failure (HF):
  + LVEF results (separate file)
  + Hospitalizations with a HF diagnosis in the last 12 months
* Chronic obstructive pulmonary disease (COPD):
  + Hospitalizations with COPD diagnosis in the last 12 months

Within the section for each criteria, there is a statement to export counts and sample data for chart review. A more detailed layout for each criterion can be seen in the Table.

**Specific instructions**

These are a few items that require special attention and/or customization:

* The code is written to pull from the Clarity datamart and it creates a series of temporary tables to store calculations and certain data used along the process. It’s compiled into a full executable package that runs a series of stored procedures to accomplish our goal.
* **Step 1:** A series of drivers are provided to standardize the data pull. Diagnoses use ICD codes that are translated into [dx\_id] at each site. The labs use LOINC codes.
* **Step 2:** The denominator uses the Primary care department driver from step 1, and it’s defined as “*A patient was considered to participate in a primary care clinic if he or she (1) had a “primary care physician” listed in the EHR that was a health system physician (not necessarily a primary care physician), (2) during the prior 12 months attended two health system primary care office visits, and (3) was alive at the time of study initiation*.” .This can be replaced by another denominator specification.
  + **Death function:** At UCLA we use a death function to accurately capture the patient’s status. This function is included as a support file [*XDR\_WALLING\_DEATH\_UCLA.sql*] but if you have your own method to make this assessment, feel free to use it instead.
* **Step 3:** The problem list has no time restriction and pulls all “active” records
* **Step 4:** The encounter diagnoses are extracted from “Office visit” encounters only and with a time limit of three years.
* **Step 5: ESLD.** It pulls a series of labs based on the driver from step 1.
  + The [**ord\_value**] is harmonized into [harm\_num\_val] to optimize the calculations and avoid errors. The variable [**order\_type**\_c] = 7 refers to “labs” at UCLA. Check the equivalent value at your site.
  + **MELD**: Additionally, the code builds a MELD score for each patient. The dialysis component doesn’t find many records because this procedure is done outside UCLA, but maybe other sites have this information in their EMR. This is used within the MELD calculation to cap creatinine to 4.0 max.
  + The criterion is:
    - PL cirrhosis + [hepatic decompensation (PL or Dx) or MELD >18]
* **Step 6: Advanced Cancer.** 
  + **Oncology:** The script pulls oncology encounters from the last two years based on department name.
  + **Chemo:** It also looks at chemotherapy treatment by pulling CPT codes (the codes are hardcoded into the script since there are just a few of them), and “not historical medications” where med name ‘%chemo%’. It builds a timeframe for each of these criteria, and applies them accordingly.
    - m.medication\_id != 800001 is used to exclude med dummy records in the UCLA system. Yours might be different.
  + The two criteria are :
    - PL advanced cancer + oncology visit in the past 12 months
    - Dx advanced cancer + chemotherapy in the past 2 years
* **Step 7: HF.** This section pulls hospitalization from table [pat\_enc\_hsp] in the last 12 months where there was a HF diagnosis (no need to qualify the code if the code was “primary”, “discharge”, “POA”, etc…)
  + **The ejection fraction extraction** code is also provided on an additional file. [*XDR\_WALLING\_LVEF\_UCLA.sql*]. The code looks for the lowest score in the last three years.
  + The two criteria are :
    - PL or Dx for HF and any EF < 31% OR
    - PL and 1 admission with a HF dx (not necessarily principal)
* **Step 8: COPD.**  This section pulls hospitalization from table [pat\_enc\_hsp] in the last 12 months, where there was a COPD diagnosis (again, no need to qualify the codes).
  + **The Supplemental oxygen** element, relevant to the criteria, is being calculated on the problem list and encounter diagnosis section and labeled “COPD\_SPO2”.
  + The criterion is:
    - PL COPD + [(V or Z code) OR 1 admission with a COPD dx (not necessarily principal)]
* **Step 9:** Age criterion. Use the patient’s age and problem list flags to identify this group.
* **Step 10: Create numerator.** Consolidate final group of selected patients by merging all criteria elements accordingly.
* **Step 11 (optional):** **Advance directive and POLST.** The script walks through the process of creating a [doc\_type] driver lists from the [ZC\_DOC\_INFO\_TYPE] table, which is specific for each site, and uses it to pull scanned documents. There are some new conditions added to exclude “deleted” and “expired” records.

**Additional script materials**

Additional list of files provided (drivers and such)

* **XDR\_WALLING\_LVEF\_UCLA.sql:** code to extract and calculate ejection fraction results.
* **XDR\_WALLING\_DEATH\_UCLA.sql:** Death SQL function at UCLA
* **XDR\_WALLING\_DX\_LOOKUP\_TEMP.csv:** reference codes to use when pulling diagnosis codes.
* **XDR\_WALLING\_LAB\_DRV.csv:** reference codes to use when pulling labs.

**Other materials**

* **Archive\UCLA\_event\_care\_planning\_code\_Walling\_08292018.sql**: original script to extract data from Clarity
* **Data\_dictionary.xlsx:** Brief explanation of the different fields in the data abstraction document, and instructions on how to review the charts.
* **Sample abstraction form COPD.xlsx:** This document shows what an abstraction document looks like. It includes two tabs loaded from the script (sample and aggregated counts), and the data dictionary.

For any questions regarding the script, feel free to contact Javi Sanz at [jsanz@mednet.ucla.edu](mailto:jsanz@mednet.ucla.edu)

**Table: Advanced Illness Definitions and Identification Criteria**

|  |  |  |
| --- | --- | --- |
| **Advance Illness Group** | **Advance illness Group Definition** | **Identification Criteria** |
| Advanced Cancer | Solid tumor or hematologic cancer that is incurable | (Problem List ICD-10 code for advanced cancer AND oncology visit in the last 12 months)  OR  (Ambulatory encounter billing ICD-10 code for advanced cancer AND chemotherapy in the last 2 Years) |
| Advanced Heart Failure (HF) | Diagnosed heart failure- heart failure substantially affects the patient’s function {{(Shortness of breath or weakness or chest pain or ectopy with exertion or edema affecting function or cannot do activities) and not due to another cause} or class 3 or 4} last known LVEF < 31% | (Problem List or Ambulatory encounter billing ICD-10 code for HF in the past year AND any left ventricular ejection fraction over the last 3 years <31%)  OR  (Problem List for HF AND at least 1 hospital admission with an ICD-10 code for HF) |
| Advanced Chronic Obstructive Pulmonary Disease (COPD) | Diagnosed COPD AND COPD substantially affects the patient’s function [(shortness of breath with exertion or cannot do activities and not due to another cause) or GOLD class 3 or 4] and FEV1<50% predicted) OR O2-dependent at home (all the time or for exertion but not just at night) | (Problem List ICD-10 code for COPD  AND  [(V or Z code for home oxygen)  OR  (At least 1 hospital admission with an ICD-10 code for COPD in the last year)] |
| Decompensated Liver Disease | Cirrhosis with evidence of decompensation represented by ascites, esophageal variceal bleeding, hepatorenal syndrome or hepatic encephalopathy | Problem List ICD-10 code for cirrhosis  AND  [hepatic decompensation measured by:  (Problem List or Ambulatory encounter billing ICD-10 code)  OR  (MELD >18)] |
| End Stage Renal Disease | Chronic kidney disease on hemodialysis or hemodialysis and/or renal transplant being actively considered or history of renal transplant | (Problem List AND Ambulatory encounter billing ICD-10 code for end stage renal disease)  OR  [(Problem List OR Ambulatory encounter billing ICD-10 code for end stage renal disease )  AND  (Nephrology visit in last year -inpatient or ambulatory-)] |
| ALS | ALS with progressive symptoms impacting functional status | (Problem List AND Ambulatory encounter billing ICD-10 code for ALS) |
| Vulnerable elder with serious illness | Age 75 or older with at least one serious illness | (Age 75 years or older )  AND  (Problem List ICD-10 for advanced cancer, heart failure, COPD, cirrhosis, end stage renal disease, or ALS) |