Analytics Exercise

This document contains the answers for each of the questions on the Analytics Exercise, as well as other observations, questions, or assumptions. ***All SQL code contains comments in line***. Code will be emailed directly to Jen King for distribution. Thank you for your time and consideration.

## Data Preparation

Data were loaded into an AWS PostgreSQL database. Data validation was performed. A couple key items of note:

* Duplication of rows exist on the physician\_compare table due to address changes, group information, etc. Caution was taken when writing aggregations.
* Assuming dataset is at the Physician level, not at the group level. On other datasets, NPIs can be included at the Physician or Group level (as well as others), using a provider\_type field to distinguish (ex. physician, organization, etc.)

## Question 1

*How many primary care practices are in the state of Delaware?*

### Observations, Questions and Assumptions

* How should we define Primary Care Practices?
  + Does Aledade already have a working definition?
  + Based on CMS Physician grouping methodologies: <https://www.cms.gov/medicare/quality-initiatives-patient-assessment-instruments/gem/downloads/gemmethodologies.pdf>
    - Primary care physicians include specialty codes 01, 08, 11, 16, 38, 70 and 84
    - 01 Physician/General Practice
    - 08 Physician/Family Practice
    - 11 Physician/Internal Medicine
    - 16 Physician/Obstetrics & Gynecology
    - 38 Physician/Geriatric Medicine
    - 70 Clinic or Group Practice
    - 84 Physician/Preventive
* Assuming that a practice can be defined as a Group Practice (group\_practice\_pac\_id) or a Physician (pac\_id) without a declared Group Practice - Solo Practice (group\_practice\_pac\_id is NULL)
  + Data shows this exists.
    - SELECT a.group\_practice\_pac\_id, b.group\_practice\_pac\_id, \*
    - FROM physician\_compare a
    - join physician\_compare b
    - on a.pac\_id = b.pac\_id and a.physician\_compare\_id <> b.physician\_compare\_id
* How should we define the Practice or Group’s specialty?
  + Ideally this will come from our data sources (like CMS)
    - I’m sure this exists because group specialties can be found here: <https://data.cms.gov/utilization-and-payment/related-data>
    - Did not use the above for the purposes of this exercise
  + **Proposed Option**: Look at the most prevalent specialty within the provider group, excluding NP and PA (which typically take on the specialty of the MD or practice).
    - Known Limitations:
      * This arbitrarily applies a rank when two specialities are equally represented in a group
      * This dataset doesn’t include all the physicians within the represented group practices.
      * Using primary specialty without considering secondary specialties.
  + Note: Hard coding primary care specialties is not preferable (as was done in the submitted SQL). Instead, a flag on the specialty table or a new table for primary care specialties would be created and used. <https://www.cms.gov/medicare/provider-enrollment-and-certification/medicareprovidersupenroll/downloads/jsmtdl-08515medicarprovidertypetohcptaxonomy.pdf>

### Q1 Answer

203 Primary Care Practices in DE, including both Solo and Group practices.

* 111 solo practice
* 92 group practices

## Question 2

*Which Delaware primary care practice performed the highest volume of Medicare Annual Wellness Visits in 2016?*

### Observations, Questions and Assumptions

* This CMS site was referenced to define Annual Wellness Visits: <https://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNProducts/Downloads/AWV_Chart_ICN905706.pdf>
  + HCPCS
    - G0438
    - G0439
    - G0468
* Note: NPIs can be attributed to multiple practices. For this exercise, all HCPCs for an NPI are attributed to each of the practices that NPI participates in.

### Q2 Answer

BEEBE PHYSICIAN NETWORK INC. at 2344 Annual Wellness Visits in 2016

## Question 3

*If a quality improvement organization was embarking on a campaign to increase the number of Delaware Medicare beneficiaries receiving Annual Wellness Visits from primary care practices, what actionable information would you provide to inform the campaign?*

### QIO Recommendation Overview

Recommend engaging high-volume Primary Care practices and NPIs using analysis results (SQL, Tableau attached with submission). Results provide a breakdown of each NPI that illustrates impact opportunity and drives engagement selection. Using the Tableau dashboard, the QIO can target which Practices and NPIs to engage first based on unique beneficiary volume, average risk, and current AWV adoption.

### Submitted Materials

* SQL for all answers and for the Tableau data source provided
  + Code can also be found at <https://github.com/jameswalk3r/analytics_exercise_awv>
* CSV of Tableau data source
* Tableau workbook
* Mock powerpoint presentation for QIO

### Dataset Analysis and Notes

Based on the objective outlined in question three, the QIO is seeking to increase the adoption of AWVs. One component of this could be providing a compelling argument to PCPs of the value of performing AWVs, both clinical and financial, and assisting with training and adoption. Another could focus on the logistics of which PCPs to engage and why. The dataset provided assists more directly with the latter.

Which providers should the QIO target for engagement? The greatest impact to improved patient care and overall financial opportunity can come from 1) impacting high volumes of medicare beneficiaries and 2) more significant reduction in utilization across a lower volume of higher acuity/risk beneficiaries. The provided Tableau dashboard *NPI Engagement List* allows users to prioritize either.

The dataset provided with the exercise *does not* allow for a correlation analysis to be performed between the performance of AWVs, patient risk, and cost. This is because the dataset doesn’t provide patient-level spend across facilities and providers for PMPM and patient attribution to be calculated, though the methodologies for both have their own complexities. In order to begin to draw correlations, all claim and line data (professional and facility spend) for all medicare beneficiaries with at least one service from a DE based NPI would be required.

Initially, I attempted to calculate a rough average cost per beneficiary using the total unique beneficiaries and the total allowed amount. This wasn’t useful however, becauseit doesn’t account for the patient’s overall spend… only the spend for that practitioner. Regardless, I’ve still provided the visualization *Risk, Cost Correlation* as an example analysis. Please note that given my generalized background between healthcare, analytics, and product development, the statistical methodologies used are *rudimentary at best.*

### Additional Notes or Thoughts

* When driving change, high confidence in improved financial outcomes is critical for initial adoption, along with clear improvements in the quality of patient care. Unfortunately, at the individual NPI level, the financial benefits for pushing AWVs aren’t very motivating in and of itself, averaging between $100-$150 per visit.
* A really compelling argument ***could*** be made however if we illustrate the financial and care opportunities above and beyond the AWV (reduced hospitalizations, AWVs leading to further preventative services, better coordination of care, reduced readmissions, overall reduced patient utilization costs, etc.). Unfortunately, this dataset is limited with little to no ability to attribute engagement with outcomes.
* Give special attention to providers that are already performing at least some Annual Wellness Visits. These will likely have a lower barrier to adoption and can champion the program to their peers within the practice.
* With additional data, QIO can provide providers with a list of patients to target for AWVs, prioritized by risk. Patients should be excluded if AWVs already performed in the past year by any provider.
* *Risk, Cost Correlation* Tableau notes
  + NOTE: **Not to be interpreted literally** due to dataset limitations, specifically around total costs, as mentioned previously.
  + “Outliers” identified as anything beyond one standard deviation. Other standard statistical methodologies for identifying outliers should be used instead. Qualitative analysis required to understand if outliers *should* be excluded.
  + Data are pre-aggregated. Many subsequent aggregations have serious flaws like
    - Averaging averages
    - Possible double counting of patients
    - AWV Performed % based on counts of AWV over total unique bene
  + Beneficiary average risk score was the only measure used. No other factors were considered, such age, gender, ethnicity, or patient acuity due to hypertension, diabetes, etc.
  + No patient level data. Therefore correlations cannot be made between patients who have received an AWV and patients who haven’t