VBP Measurement Validation

Code

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Code

Abstract

A study was conducted to validate the measurement of HEDIS My2022 [1] targets utilized in Health Choice's Value-Based Purchasing (VBP) program. Monthly Health Choice VBP Quality Reports and Health Choice adjudicated claims were used to analyze the validity of reported member events that were counted as Eligible for inclusion in the VBP Program measure, Follow Up after Hospitalization. We found that there are a significant number of false positive instances of eligibility, meaning that a person was counted as eligible by the VBP Report, but not validated against an adjudicated claim for the same time period. This has the effect of artificially inflating the overall number of eligible members in general, and the number of non-compliant events specifically.

Non-compliant events are inflated more than compliant events, driving the performance level downward.

Purpose

The purpose of this study is to investigate the nature and accuracy of Health Choice VBP reporting data when compared against Health Choice adjudicated claims. The results provide the Alliance with information that can be used to make advocacy decisions on behalf of the Alliance Providers.

This study will also develop a notebook that can be a primary source for core scripts that may be used in future validation studies.

Introduction

The Alliance ACO, a subsidiary of Health Choice[2] and The Narbha Institute[3], is a behavioral health ACO composed of integrated health homes located throughout the 5 northern counties of Arizona. Alliance Providers (AP) serve medicaid members of the AHCCCS Complete Care program [4]. The Alliance is a participant in the Health Choice Value Based Purchasing Program. Performance for the ***10/1/2022-9/30/2023*** contract year is measured against 3 HEDIS measures endorsed by NCQA. These are *AMM2*, *FUH7*, and *HDO*.

Alliance Providers have reported member events, meaning instances that a member is deemed eligible for a given HEDIS measure, have been counted as eligible on their VBP Reports; however, the identified member **does not** appear on their membership rosters, or in their electronic medical record.

In addition, it has been reported by multiple providers that the number of individuals identified in the FUH7 measure is significantly lower than what would be expected, meaning some claims have not been counted that should have been.

This study will address the validity of reported eligible member events when compared with adjudicated claims for the same time period. The results of this will give guidance regarding the providers concerns and any potential action steps.

Method

The ***CRISP-DM*** process for data mining was used for this project [5]. Cross Industry Standard Process for Data Mining (CRISP-DM) is a workflow that provides structure for data science.

Business Understanding

Clear Understanding of business objective

The business objective is to determine if the Alliance Providers (AP) are being measured accurately. Health Choice uses a third party, Cotivity[6], to measure its NCQA HEDIS goals reported in the VBP Quality Reports. Concerns have been raised from the providers that they have not been educated on the nature of the VBP reports, do not have easy access to the reports, and that the measurement results are inaccurate. Previous reports have addressed investigations and interventions regarding the first 2 concerns [7]. This study will address the concerns regarding accuracy of measurement.

Success Criteria

Success for this project includes:

1. A complete understanding of the health plan measurement of HEDIS NCQA targets
2. Conclusion on the question of accuracy of measurement
3. A working data model for us as an internal measurement tool, separate for Health Choice and its vendor.

The internal model can be used in the day-to-day management of patient care and provider activity, as well as health plan performance evaluations and payment.

Situation Assessment

The Alliance Providers have been in the current state of limited knowledge concerning VBP reporting for multiple years. All APs identified a ***lack of understanding about when and how*** the reports are disseminated by Health Choice. The few APs that did know how to access the VBP Quality Reports had little

understanding about the data contained within. ***None of the APs understood how to access the member level data*** that serves as the model for the VBP QR.

All of the APs stated a desire to utilize the member level data to improve practice. Alliance staff have informally investigated concerns of unknown members, and found evidence supporting further analysis.

Translate to analytical objectives (Determine Project Goals)

1. Aggregate and evaluate Health Choice Value-Based Purchasing (VBP) reports in order to define the population of eligible member events for VBP measures.
2. Evaluate Health Choice adjudicated claims in order to create a data model for the measurement and validation of VBP eligible member events.
3. Compare Health Choice VBP Quality Reports to Health Choice adjudicated claims in order to confirm or deny the reported discrepancy in FUH7 eligible member events.

Clearly understand how action can be taken based on outcomes

The results of this report will provide evidence of similarities and differences between Health Choice adjudicated claims and the Health Choice VBP Quality reports, and establish whether or not further intervention is necessary.

Identify the Business Problem

The problem is that a significant discrepancy between adjudicated claims and VBP reports could artificially inflate, or suppress, the reported performance level of the ACO, and we need to know if that is true.

Data Understanding

Identify data sources

The primary data sources for this project are:

1. Health Choice VBP (VBP) Quality Reports (QR)
2. Health Choice adjudicated claims

What are the formats?

1. Value-based Purchasing Quality Report
    - Excel (.xlsx) workbook containing a report of the members eligible for VBP HEDIS NCQA measures and their compliance status
    - PIVOT tables summarizing the performance of Alliance Providers on each measure
    - Member level data is not immediately viewable, but can be accessed through the data model management feature of Excel.
2. Adjudicated claims
    - Queried from Health Choice data warehouse
    - Data is extracted using SQL and exported to .csv files for processing
    - Minimal processing is done through SQL

Key fieldnames and targets

1. Value-based Purchasing Quality Report
    - MemberID

    - Provider_Shortname
2. Adjudicated Claims
    - Health Choice Medicaid ID (~MemberID)
    - svccode (Covered Service Code)

Data Quality

1. Value-based Purchasing Quality Report
    - Report quality is very high as it is compiled by Health Choice Business Intelligence staff.
    - APs are concerned about the completeness of the data set, meaning they are concerned that not all of the eligible members have been counted by Cotivity, and that people who ***are not*** members ***have*** been counted incorrectly.
2. Adjudicated Claims
    - Claims data is of the highest quality as it is compiled and reviewed extensively by Health Choice for its own business purposes. The quality of this data is also reviewed by state and federal regulation entities, like AHCCCS.

Data Preparation

Health Choice Value-based Purchasing Quality Reports (VBP QR)

The most recent Value-based Purchasing (VBP) Report ***(Report Date = 2023-01-30)*** for each Alliance Provider (AP) was gathered into the folder **(./data/VBPReports/Quality)**. The *Detail* sheet was extracted from each of the individual reports and compiled into a master data frame, ***Master_VBP_Rep_Comb***, that contains the results of all APs. The VBP Report data is cumulative over the VBP measurement year ***(2022-01-01 to 2022-12-31)*** and has a 60 day claims lag, such that the 2023-01-30 VBP QR contains claims adjudicated through 2022-11-30.

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The Table, ***Master_VBP_Rep_Comb,*** is then transformed in order to remove superfluous white space and other text and table titles that were imported by default. The key transformations are:

- Remove superfluous rows that contain tables names and descriptions.
- Promote data from the row with the column names [Row 6] into the column headers.
- Complete the removal of superfluous rows by filtering the *LOB* variable to include only the value *HCA*.
- Change the data types of the variables *Data Period, Numerator, Denominator*
- Change the variable name of *Denominator* to *TotalEligible*
- Store the transformed data as ***VBP_Rep_Comb_validation***

The resulting table is a complete, cleaned list of all of the individual member events, for all of the VBP Measures, for all of the Alliance Providers.

This table is used to construct the VBP Quality Report Dashboard as well as the Alliance Progress Report

Code

The data in the variable *Health Home Name* was used to create a new list of names called *Provider_Shortname*, and then filtered to only include Alliance Providers (CBI, CPIH, EHS, LCBHC, MMHC, Polara, SBHS, SHG, TGC).

Note: Encompass Health Services (EHS) is included in the data set for the time period that their results are reported separately from Community Bridges.

Finally, the *SubMeasureID* variable was filtered to only include the *FUH7* measure, and a list of the Member IDs was selected. A copy of the file ***VBP_Rep_Comb_validation,*** was stored as ***VBP_Rep_Comb_eval*** for use later.

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Health Choice Adjudicated Claims

Claims data was extracted from the Health Choice data warehouse for the period of ***2022-01-01 to 2022-11-30***, meaning claims adjudicated through 11-30-2023 in order to be consistent with the VBP Quality Report date ranges. This data includes adjudicated claims for members of the Norther GSA, ACC health plan, in other words, Alliance Members.

The resulting solution is exported to .csv and saved as: **(./data/data_original_cat_2022-11-30_IPClaims)**. The IP Claims data is loaded to the model for analysis. In addition, a data frame was loaded that contains the HEDIS My2022 eligible ICD10 diagnoses for the FUH7 measure.

Code

The IPClaims data was transformed in the following ways to prepare it for analysis:

1. Claims are filtered to only include Alliance Providers. There were 25,710 claims that were assigned to APs.
2. Claims are then filtered to include only those that have a qualifying HEDIS My2022 eligible inpatient code, using ***IP_Code_CPT*** and ***IP_Code_UBREV***, AND an associated eligible HEDIS My2022 mental health ICD10 diagnostic code, from ***data_reference_MHDxCodes***, in any of the diagnosis variables in the claim. There are 13 variables for diagnoses, from *Primary Diagnosis* to *Dx12*.
3. The resulting table is ***IPClaims_Summary***
    1. The resulting table contains all of the claims from Health Choice adjudicated claims, for those cases where there was an eligible FUH7 Inpatient code, AND and eligible Mental Health Diagnosis code, witin the VBP reporting period.

The variables *MemberID* and *svccode* were selected into a separate data frame, called ***IPClaims_Validation*** for further analysis.

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Modeling

Select Modeling Techniques

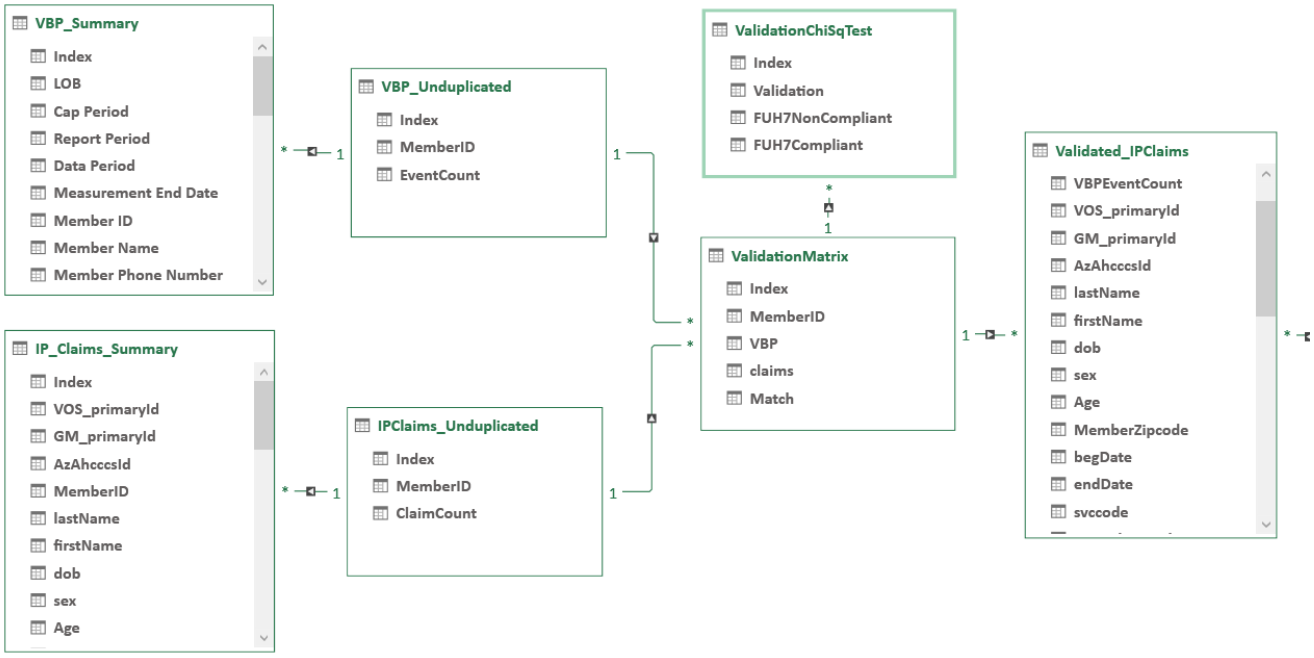
Conceptual Model

The model will compare health plan ***adjudicated claims*** and VBP ***eligible member events*** in order to highlight similarities and differences between Health Choice adjudicated claims and VBP Quality Reports. The model will describe the results in the context of performance measurement of FUH7. This model will help to define the systems surrounding measurement of FUH7.

Logical Model

This model outlines the logical rules and data structures that can be used to measure and validate performance across entities. This model extracts relevant data from individual VBP Quality Reports and aggregates them into a single data frame containing all records for all Alliance Providers. It also queries the Health Choice data warehouse to build data frames containing inpatient claims. Validation of the VBP reported member events against adjudicated claims will confirm or deny informal provider observation of discrepancy.

Generate Test Design



Build Model

VBP Reports

The VBP_Rep_Comb_validation data frame was loaded to the test model. The data was summarized, per member, by counting the instances of eligibility per member. This creates a vector of unduplicated Member IDs called ***VBP_Unduplicated***.

Code

Claims

The ***IPClaims_validation*** data frame was loaded to the test model. The claims data was then summarized by counting the instances of HEDIS My2022 eligible claims per member. This creates a vector of unduplicated Member IDs called ***Claims_Unduplicated***.

Code

Merge VBP QR and Claims Data to one Table

The ***VBP_Unduplicated*** and the ***Claims_Unduplicated*** were full outer joined, meaning that all rows of data from both variables are included, regardless of match, on the variable *MemberID*. The resulting data frame is called ***Validation_Matrix***.

- This table contains all of the unduplicated VBP QR MemberIDs, AND all of the unduplicated Claims MemberIDs
- The data is assessed for cases where a VBP MemberID is validated against a Claims MemberID
    - A positive result is called “Match”, and a negative result is called “NoMatch”

Code

Assess Model

VBP Reports

- **8** VBP report details sheets were imported, merged and cleaned, creating ***Master_Rep_Comb*** with ***98,116*** observations of **30** variables. After cleaning the data, there are **98,068** observations remaining.
- ***VBP_Rep_Comb_validation*** was created from the master to isolate instances of FUH7, and then select for *Member ID*, ultimately yielding **893** observations of MemberIDs.

Claims

- Adjudicated claims with qualifying HEDIS My2022 inpatient service codes are queried from Health Choice data warehouse and read in as ***IPClaims***, with 41,064 observations of **35** variables.
- ***IPClaims*** is filtered to only include Alliance Providers, and only observations with a qualifying mental health diagnosis. *MemberID* and *svccode*, are selected ultimately yielding a table called ***IPClaims_validation*** with **30,115** observations.

Validation Matrix

- The ***Validation_Matrix*** was created by reducing each of ***VBP_Rep_Comb_validation*** and ***IPClaims_validation*** to unduplicated observations of each *MemberID*, and then full outer joining them on *MemberID* yielding a table with **2,043** observations of **4** variables.

The Validation_Matrix is the table that will be used for evaluation! Phew! :)

Evaluation

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Validating VBP Reports and Claims

The ***VBP_Unduplicated (n=780)*** and the ***Claims_Unduplicated (n=1,785)*** were observed from left to right, meaning that all observations of data from ***VBP_Unduplicated*** are included, while ***Claims_Unduplicated*** are only included if matched with ***VBP_Unduplicated*** on the variable *Member ID*.

- 472 of the 780 **(60.51%)** VBP members were validated against an eligible IP member, with **308** not matched. There are **308** false instances of eligible member events.
- Conversely, from the perspective of IP Claims, there are **1,066** of **1,538 (69.31%)** IP Claims unique MemberIDs that ***are not matched*** with an eligible VBP member. There are as many as ***1,066*** instances of uncounted eligible events.

Results

The initial results suggest possible significance. Only **60.51%** of the members identified by the VBP QR as eligible for the FUH7 measure actually appear in an adjudicated claim for an eligible Inpatient claim. So, even at this high level assessment there is ***limited level validation***. This discrepancy could result in mis-reporting of performance scores to the detriment of the Alliance.

Creation of FUH7 Member Follow Up List

The ***Validation_Matrix*** was transformed and rejoined with ***IPClaims_Summary*** to create a table that will be used to generate Member Follow Up Lists. This new table is called ***ValMat_All***.

ValMat_All is the table that is used for creating the Member Follow Up List for the *FUH7* measure.

Code

Evaluation of Validated Data

The results were evaluated in several ways, including all eligible FUH7 eligible IP Claims (ValMat_Match):

1. By provider type:
    - There were 10 types observed
    - 71, 8, 19, and B1 are most common
2. By service code:
    - 20 svccodes were used
    - 0124 and 99232 are most common
3. By age:
    - Many different ages between age 7 and 79
    - The histogram shows many below age 20
4. By Diagnosis:
    - There were 75 distinct diagnoses used
    - That is too many distinct diagnoses for this evaluation, so diagnoses were grouped into ICD 10 mental health groupings.
    - F30-39 (Mood Disorders) and F40-48 (Anxiety Disorders) were most common.

- Previous studies have also noted the high proportion of Mood Disorders among inpatient services.

Code

```
## # A tibble: 10 × 2
## # Groups:   ProviderType [10]
##    ProviderType     n
##    <chr>        <int>
##  1 18              98
##  2 19             936
##  3 2              337
##  4 31             245
##  5 71            3791
##  6 8             1778
##  7 B1            2170
##  8 B3              34
##  9 B5             461
## 10 B6              12
```

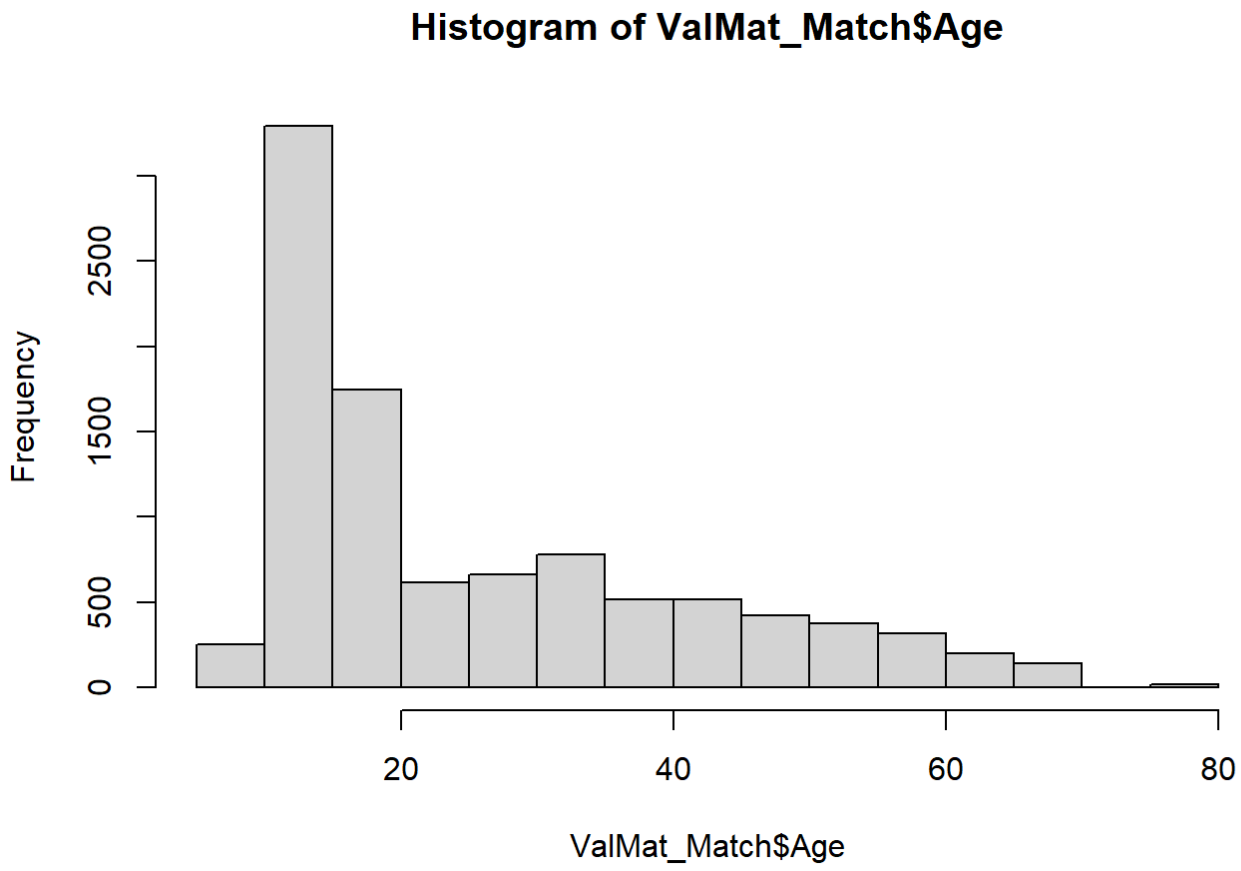
Code

```
## # A tibble: 20 × 2
## # Groups:   svccode [20]
##    svccode     n
##      <dbl> <int>
##  1     114    97
##  2     120     1
##  3     121     2
##  4     124  6580
##  5     126   122
##  6     204     1
##  7     206     2
##  8   99217    21
##  9   99220    21
## 10   99221    38
## 11   99222    80
## 12   99231   614
## 13   99232  1316
## 14   99233   568
## 15   99236     5
## 16   99238   157
## 17   99239   205
## 18   99253     9
## 19   99254    17
## 20   99255     6
```

Code

```
## # A tibble: 63 × 2
## # Groups:   Age [63]
##      Age     n
##    <dbl> <int>
##  1     7    32
##  2     8    47
##  3     9   110
##  4    10    65
##  5    11   208
##  6    12   683
##  7    13   333
##  8    14  1191
##  9    15   875
## 10    16   380
## # … with 53 more rows
```

Code



Code

```
## # A tibble: 76 × 2
## # Groups:   Elig_MHDx [76]
##    Elig_MHDx     n
##    <chr>     <int>
##  1 F20.0        27
##  2 F20.81        3
##  3 F20.89        2
##  4 F20.9       117
##  5 F22          10
##  6 F23          22
##  7 F25.0       296
##  8 F25.1        54
##  9 F25.9        48
## 10 F29         296
## # … with 66 more rows
```

Code


```
## # A tibble: 76 × 2
## # Groups:   Elig_MHDx [76]
##    Elig_MHDx     n
##    <chr>     <int>
##  1 F20.0        27
##  2 F20.81        3
##  3 F20.89        2
##  4 F20.9       117
##  5 F22          10
##  6 F23          22
##  7 F25.0       296
##  8 F25.1        54
##  9 F25.9        48
## 10 F29         296
## # … with 66 more rows
```

Code

Analysis of impact on false eligible member events:

Overall Compliance of All Reported VBP QR Events (Comp_ChiSq):

- 507 Non-Compliant
- 386 Compliant

Compliance by VBP Members Matched with Claim:

- 313: Matched, NonCompliant(MNC)
- 291: Matched, Compliant (MC)
- 194: NonMatched, NonCompliant (NMNC)
- 95: NonMatched, Compliant (NMC)

Chi Squared Test:

Q: What is the impact of the non-Matched member events?

Chi squared test was run at alpha = .05

- X-squared = 18.662, df = 1, p-value < 0.001

#Results

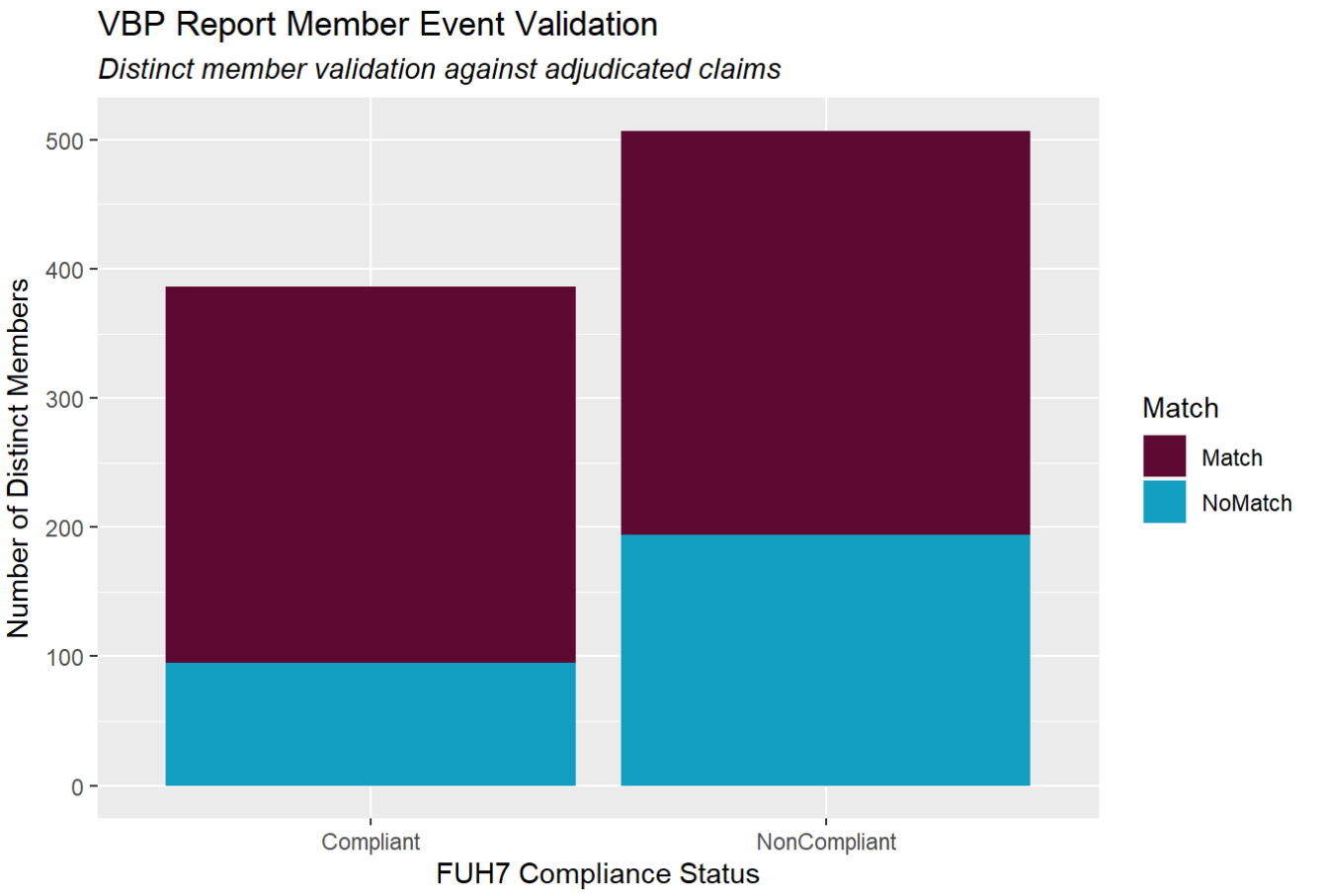
The differences observed between matched and non-matched, compliant and non-compliant is likely **NOT** due to chance.

- There is an unknown factor causing a disproportionate amount of non-compliant, non-matched member events.
- The difference is visible graphically as we can see below.

Code

```
##
##  Pearson's Chi-squared test
##
## data:  Comp_ChiSq[-1]
## X-squared = 18.662, df = 1, p-value = 1.56e-05
```

Code



From claims adjudicated through November 30, 2022

Conclusion

There is significant variance in the sample that is not due to chance. The effect of that difference is that the counting of eligible member events on the VBP Quality Reports that are ***not validated*** by eligible IP Claims is causing there to be ***false negatives*** disproportionately to false positives, leading to an artificial suppression of the Alliance's overall compliance score.

In addition, there is a large number of eligible claims that cannot be matched to a VBP eligible member event. The impact of that result cannot be known from this study, but could represent a substantial number of uncounted eligible member events. It is also unknown what proportion of those results are compliant or non-compliant. Further investigation will be needed.

In summary, this study **confirms the concerns of the Alliance Providers regarding accuracy of measurement**.

There are indeed members who are identified by the VBP Report as eligible, who do not have an eligible service, and thus may be unknown to the provider, and consequently unable to be followed up with after hospitalization. In addition, it appears that there are over 1,000 potential eligible members documented by adjudicated claims that have not been counted among the VBP report eligible member events.

Reviews

1. 3/16/2023 - Narbha Institute / Alliance Executive Leadership Meeting
2. 3/21/2023 - Health Choice / Alliance Joint Operating Committee

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1. https://www.ncqa.org/hedis/ (https://www.ncqa.org/hedis/)↩
2. https://www.healthchoiceaz.com/ (https://www.healthchoiceaz.com/)↩
3. www.narbha.org↩
4. https://www.azahcccs.gov/AHCCCS/Initiatives/AHCCCSCompleteCare/ (https://www.azahcccs.gov/AHCCCS/Initiatives/AHCCCSCompleteCare/)↩
5. https://www.ibm.com/docs/it/spss-modeler/saas?topic=dm-crisp-help-overview (https://www.ibm.com/docs/it/spss-modeler/saas?topic=dm-crisp-help-overview)↩
6. https://www.cotiviti.com/ (https://www.cotiviti.com/)↩
7. Kivela J.R., McMillian, J. & Tewa, V. (2023) Alliance ACO Progress Report, January 2023. *The Northern Arizona Regional Behavioral Health Authority*.↩