# 2023 CASE COMPETITION
# Blue and Gold Health

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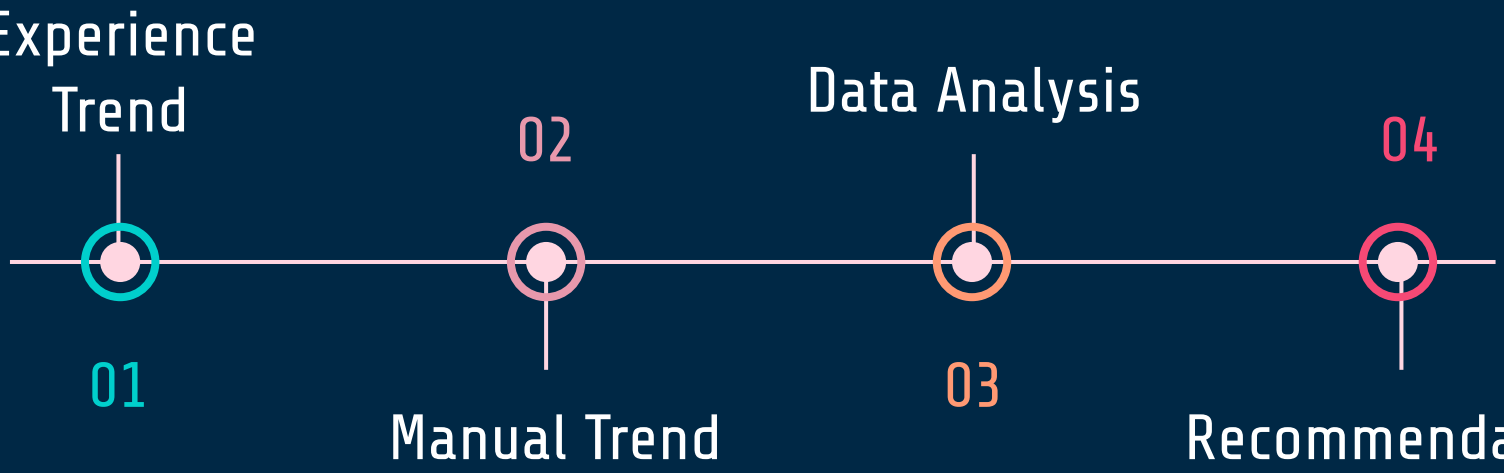
# Agenda


Experience Trend
01
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Manual Trend
Data Analysis
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Recommendation

# Case Study

**Some irregularities**

- Due to the lifting of COVID mandates, **Brand drugs expenditure is elevated by 5%** in January and February 2022.
- A new contract with the Pharmacy Benefits Manager (PBM) is expected to **generate 7% in generic drug savings** and **2% in brand drug savings** in the second half of 2022
- Some services are deferred in 2020 and 2021.

# Experience Trend

01

“ Trend calculated using a portion of the experience data that is deemed credible for the trend year.”

# Assumptions

1. Services are deferred evenly throughout different markets.
2. Services are deferred evenly throughout the year of 2021

| Type of Service | % Deferred |
|---|---|
| IP | 9.2% |
| OP | 1.4% |
| Prof | 0.8% |
| Anc | 17.3% |

# Seasonality

1. Divide into quarters and obtain average

2. Index = Quarterly claims/ Average claims

| Seasonality Index | | | | |
|---|---|---|---|---|
| **Benefit Category** | Index of quarter 1 | Index of quarter 2 | Index of quarter 3 | Index of quarter 4 |
| Ancillary | 0.98 | 1.00 | 0.99 | 1.03 |
| Brand | 0.92 | 1.01 | 1.02 | 1.05 |
| Generic | 0.95 | 0.95 | 0.99 | 1.11 |
| IP | 1.00 | 1.01 | 1.03 | 0.96 |
| OP | 0.97 | 1.01 | 0.99 | 1.04 |
| Prof | 0.98 | 0.99 | 1.00 | 1.04 |

# Second half of 2022

Average = units 1-3 / index 1-3

Units 7-9 = Average * index 7-9

| | | Allowed Dollars (in millions) | | | | | |
|---|---|---|---|---|---|---|---|
| **Benefit Category** | units 1-3 | index 1-3 | average 2022 | index 7-9 | units 7-9 | index 10-12 | units 10-12 |
| Ancillary | 155 | 0.98 | 158.49 | 0.99 | 157.37 | 1.03 | 163.23 |
| Brand | 381 | 0.92 | 413.86 | 1.02 | 421.86 | 1.05 | 436.27 |
| Generic | 71 | 0.95 | 74.72 | 0.99 | 74.26 | 1.11 | 82.59 |
| IP | 555 | 1.00 | 555.46 | 1.03 | 572.43 | 0.96 | 532.25 |
| OP | 597 | 0.97 | 616.98 | 0.99 | 608.50 | 1.04 | 640.10 |
| Prof | 552 | 0.98 | 564.78 | 1.00 | 562.55 | 1.04 | 585.53 |

# Manual Trend

02

# Year Selection

2014 – 2018

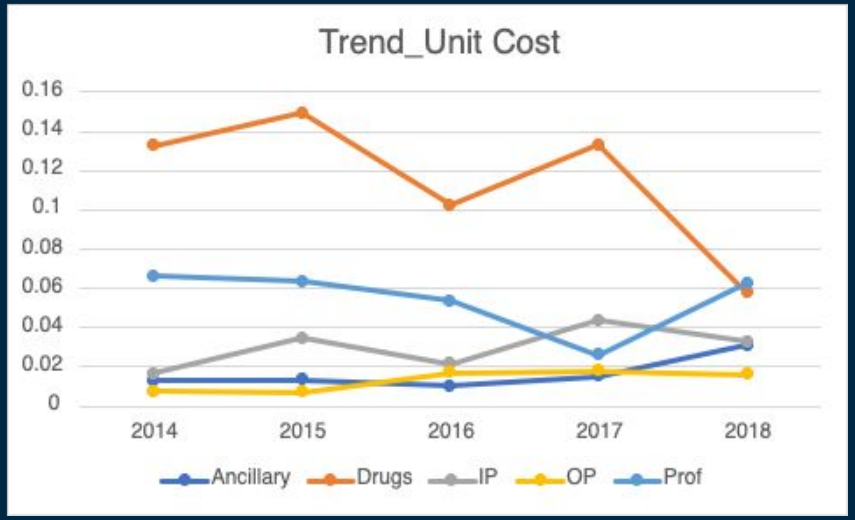
Underlying Trend

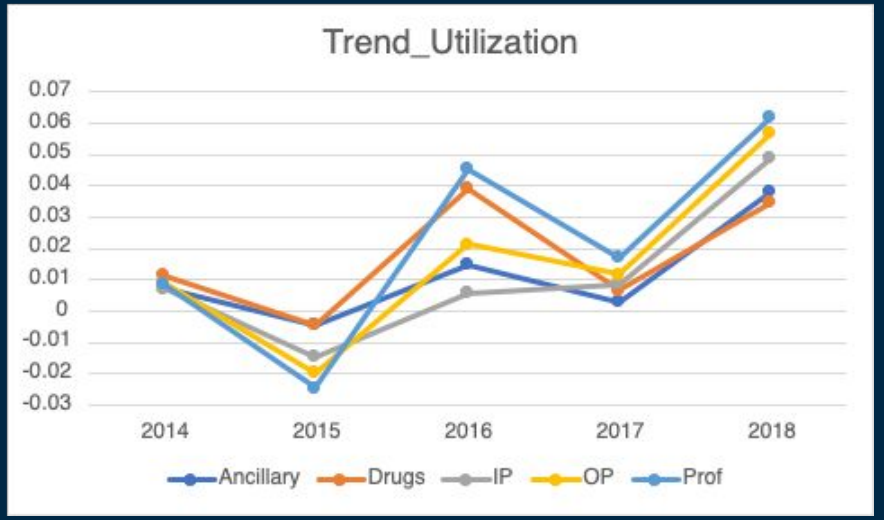
2019 – 2020

Event Trend

# Manual Trend

**Underlying Trend (2014 - 2018)**



# Methodology

## Annual Average

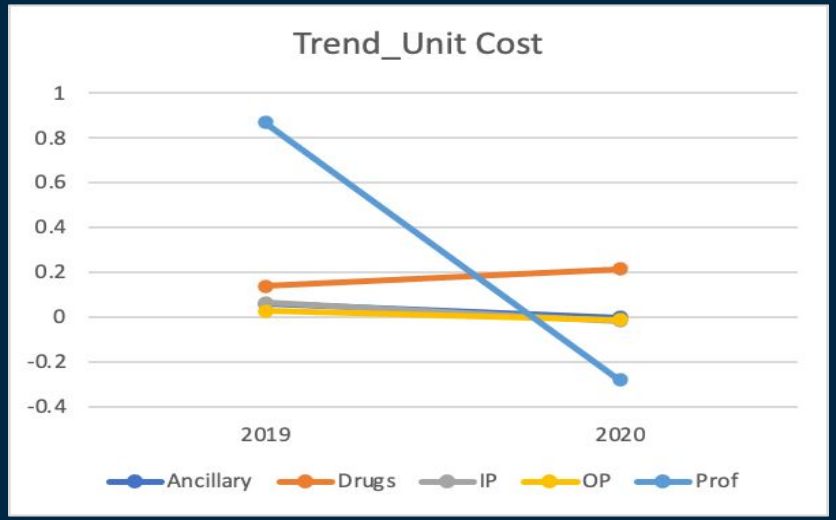
Annual average of unit cost and utilization data by service category

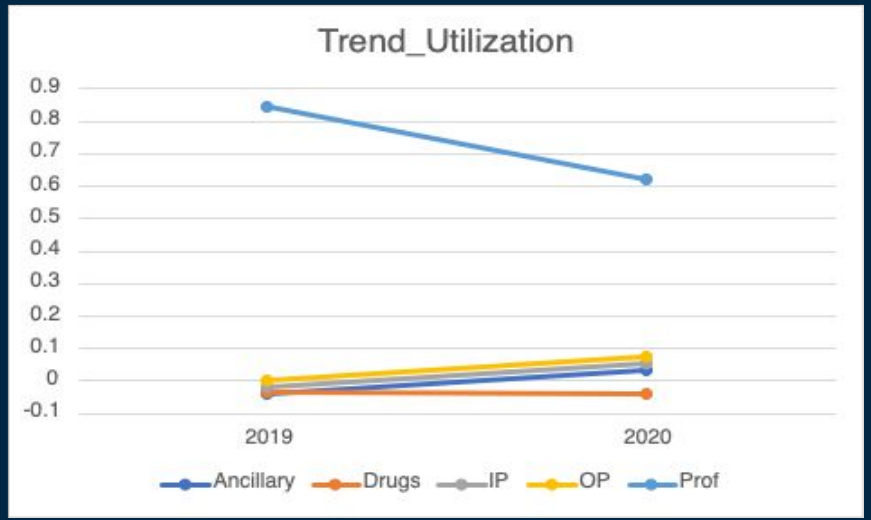
## Linear Regression Model

TREND function

# Manual Trend

**Event Trend (2019 - 2020)**

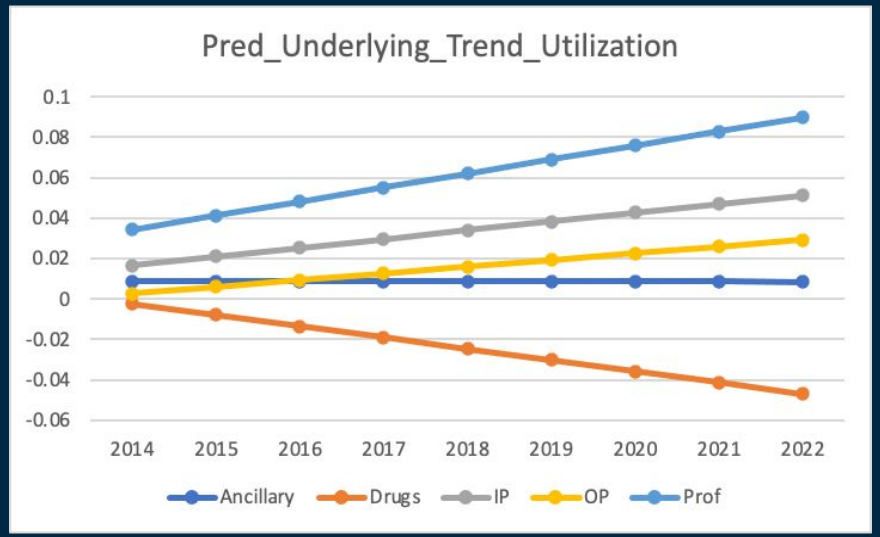


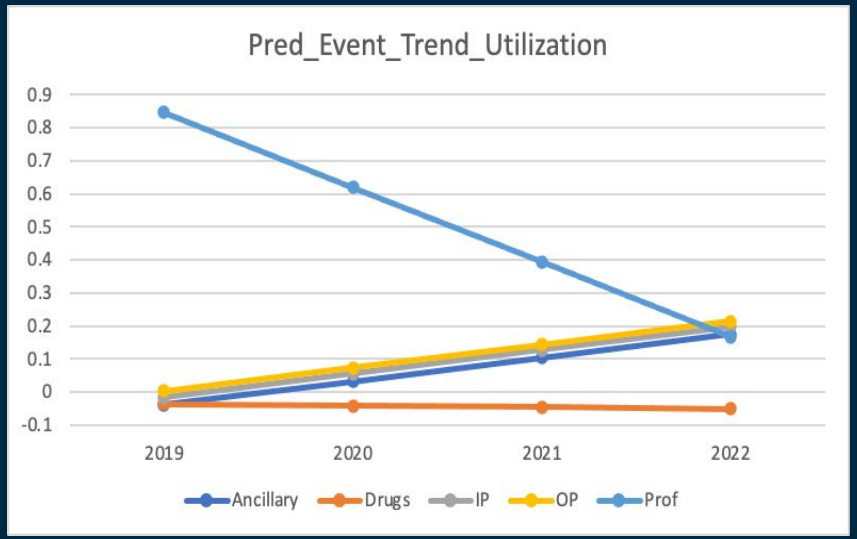



# Manual Trend

**Predicted Utilization Trends**

- Professional
  - Upward Underlying Trend
  - Downward Event Trend

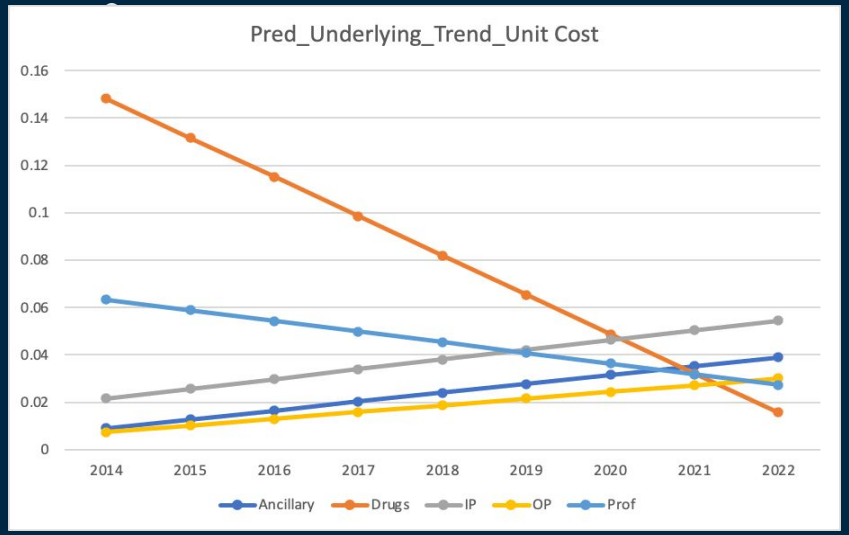


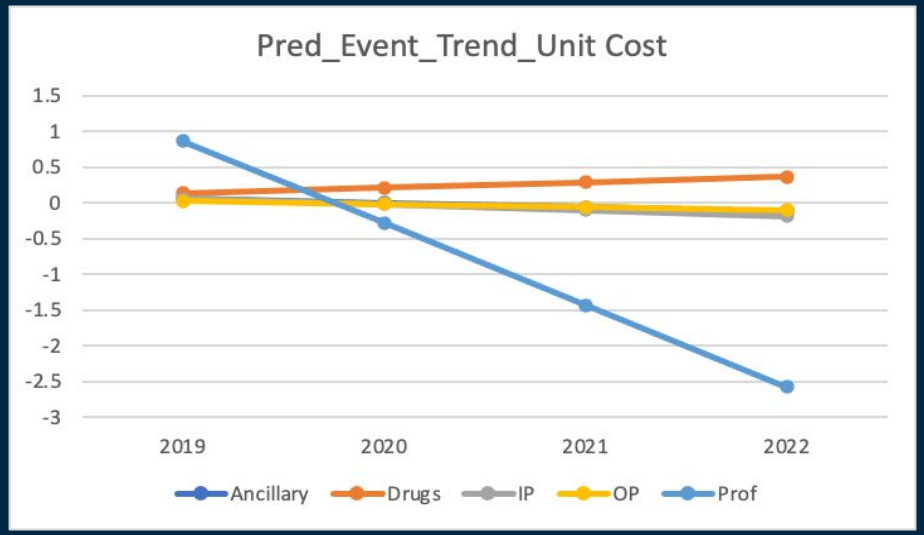



# Manual Trend

**Predicted Unit Cost Trends**

- Drugs
  - Downward Underlying Trend
  - Upward Event Trend



# Data Analysis

03

# Data Analysis

**Limited Fluctuation Model**

- Used for data blending
- Control fluctuation and calculates based off of emerging data

$$Credibility\text{-}Weighted\ Rate = (Z)Observed\ Rate + (1-Z)Prior\ Rate.$$

# Limited Fluctuation Model Application

## Calculating Z for formula

- 972 for number of claims used to observe 2022
- 1082 for confidence level of 90%

$$Z = \sqrt{\frac{972}{1082}}$$

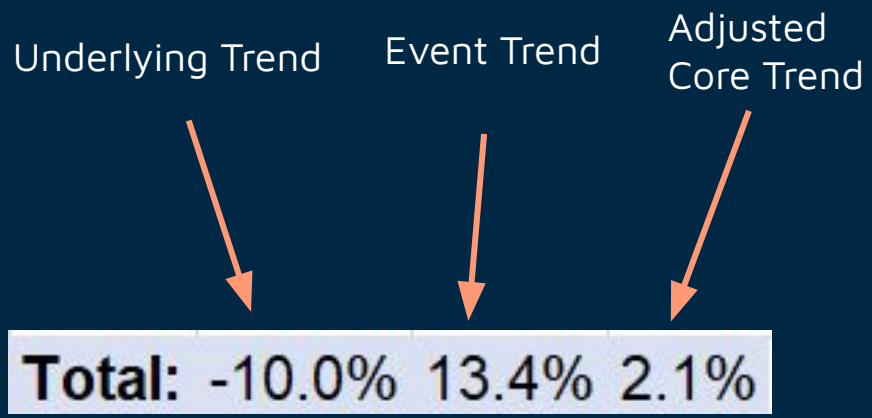
## Prior rate and Observed Rate

- Experience for observed rate
- Manual for prior rate

| | PMPM | | |
|---|---|---|---|
| Service | Underlying Trend | Event Trend | Adjusted Core Trend |
| Inpatient | -9.7% | 9.1% | -1.5% |
| Outpatient | 7.1% | 9.7% | 17.5% |
| Professional | 6.5% | 21.3% | 29.1% |
| Ancillary | -11.0% | 26.8% | 12.9% |
| Drugs | 37.8% | 26.6% | 74.5% |
| Total | -10.0% | 13.4% | 2.1% |

# Comparisons

After calculations, we make comparisons:




- Trends are around the same range with differences of a few percentages
- XGBoost model is more synthesized and has a larger sample size

| pred_trend_all |
|---|
| 4.3% |
| 6.4% |
| 5.9% |
| 12.1% |

| pred_trend_all |
|---|
| 4.0% |
| 7.0% |
| 9.4% |
| 11.0% |

(From ML Trends, Left: 3 months and Right: 6 months)

# Recommendation

04

# Recommendation

**The XGBoost Model**

- Decision trees and a network of true or false conditions leading to more accurate predictions

- Adding a weight to each tree at each round of iteration to reduce the influence of individual features
- Large set of data

- More memory needed
- Perform bad on sparse and unstructured data

# Big thanks to BAS Club

# Thank you!

– Team 16