Session 6: Data Governance and Techniques

Presenter:

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Data Methods
A Resource Perspective

Presented by:
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Introduction

- Valence Health has been helping provider organizations prepare for, and ultimately accept and manage, various value-based payment models – from shared risk programs, to full capitation, to provider-sponsored health plans – for nearly 20 years.

- Founded on a vision of empowering providers to be in charge clinically and financially, our mission evolved to “be indispensable in assisting providers to better manage their patient populations and accept financial responsibility for the quality of care they provide.”

- Over the years, we combined all the necessary actuarial analyses, population health technology, and ongoing management services for provider organizations to make the volume-to-value transition successfully.

- Brandon currently leads the R&D department by assuming responsibility for product innovation efforts to meet market demands.

- My team collaborates with population health, client analytics, and actuarial services to take new initiatives from a conceptual stage to a proof of concept state and assist/manage product implementation when necessary.
Outline

- Part I – Reporting Rules
  - Project milestones and quality assessment
- Part II – Presentation Essentials
  - Learn how to communicate with a non-technical audience
- Part III – Learning By Example
  - Health Insurance Exchange (HIX) Member Profitability
Begin Each Project with a Charter

• Define the project
  • What is the purpose, who is the end-user, and when is it due?

• Define the deliverables
  • Determine what output is required and how it will be delivered to the end-user
  • Prioritize and categorize by “Must-Haves” and “Nice-to-Haves”

• Determine dependencies
  • Identify external resources (if applicable) and potential issues that could impact deadlines

• Define participants
  • Determine which resource(s) will perform each task, projected hours required, and due dates
  • Construct a Gantt chart if necessary

• Based on requirements, are the project goals obtainable?
  • If not, revise scope

• Avoid Scope Creep
  • Require all participants and end-users to agree to the outline above
  • Scope creep is the enemy of efficiency!

• Project management software can be extremely helpful
You’ve Defined the Project – Now Define the Data

• Identify your study population(s)
  • Define the data elements that identify the population
    o Example: a study for pediatric asthmatics admitted to the ED would subset the study population to (1) patients aged < 18 years old at date of admission (age definition) AND (2) revenue codes 450-459 or place of service 23 (ED admission definition) AND primary ICD-9 diagnosis 493.XX (asthma definition)
  
• Identify population exclusions
  o Example: patients who expired during hospitalization should not be included in a study on readmission rates (because readmission is impossible)

• Does the study require a control population?
  o If so, distinguish the control population from the study group using data elements

• Obtain mutual agreement on data dictionaries from all stakeholders
  • Multidisciplinary teams bring their own definitions and explicit definitions will prevent confusion and unnecessary rework
    o Example: some organizations count hospitalizations admitted through the ED towards inpatient AND ED utilization. Valence Health only considers the discharge location and thus counts the previous event only towards inpatient utilization.
Construct Your Dataset

- Simplify the data
  - If your project requires 20 elements from a table with 200, there is no reason to retrieve every element
  - Similarly, if your project requires 25% of a dataset with 100 million records, then subset your data
  - If extraneous data is not in your sample, it can’t mistakenly appear in your report

- **Enforce efficient processing standards**
  - Big data means big consequences for project deadlines and IT resource constraints

- Use proper naming conventions for datasets and data elements
  - Make it easy for others to review your work or someone else to build from it

- Format your elements to make your dataset more understandable
  - Examples: Formatting implied percentages and currencies facilitates quick recognition of the element
Survey the Dataset

• Review distributions of essential variables
  • If the variable follows a coding standard, determine the % of the records that do not conform
  • Review valid distributions
    - Will your report be biased towards a specific population? Latent population characteristics could render your analysis irrelevant.
    - Example: forecasting suicide prevalence for a population in MST states is not appropriate if the data is derived from EST states.
• Identify outliers and data nuances
  • Three standard deviations from the mean is the traditional approach, but don’t treat it as a rule
  • Determine if “special cases” exist within the data that require separate analysis
    - Example: if you are creating a relative expense model for Medicare beneficiaries and 20% of the population is dual-eligible (for Medicaid), this population may require a separate model
      - Note: dual-eligibles are typically the sickest of the sick
• Standardize your library of techniques
  • Anticipate your next project by creating assessment methods in reusable/flexible formats
  • Promote knowledge sharing by adding your techniques and examples to a shared library for your colleagues

Accessed via CDC Web-based Injury Statistics Query and Reporting System (WISQARS)
“Information is the new oil of the 21st century, and analytics is the combustion engine.” – Peter Sondergaard, SVP, Gartner Research

Does your dataset contain enough observations for credibility?

- A popular DNA testing site claims the ability to uncover your entire ethnicity mix using a sample size of 3,000 people

Avoid data sampling to match your hypothesis, aka sampling bias

- Does your analysis hold true for every subpopulation?

Never steer the results

For model development, bootstrapping is an excellent technique for small sample sizes and bad behaving data
Analytics – The Fun Part

• With sufficient planning, executing the analysis should be easy
  • What we do is never easy, but proper planning yields more efficient execution
  • “Hide complexity […]. An elegant design makes easy things easy and hard things possible” – Brian W Fitzpatrick and Ben Collins-Sussman. Team Geek.

• Perform the analysis in as few steps as possible
  • More steps => more possible error locations

• Stumped? Walk away and reassess

• For model development
  • Identify collinear terms before and after modeling
    o If term pairs are strongly collinear, create interaction terms or drop the term least correlated to the outcome
    o If a term is positively correlated with the outcome yet produces a negative coefficient after modeling, it likely indicates collinearity with another predictor

• Variable transformation is an excellent way to extract more meaning from model terms
Analytics – Continued

- **Ensure you fulfilled the project objectives**
  - Did you answer the questions asked or did you substitute for easier ones?
  - This is the essence of intuitive heuristics: when faced with a difficult question, we often answer an easier one instead, usually without noticing the substitution.” – Daniel Kahneman, *Thinking, Fast and Slow*

- **Support your conclusions**
  - Include traditional measures of significance and error
  - Research for analogous studies and compare
  - **Satisfy the audience’s “System 1” (Stanovich and West) response with clear direction**

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**Generic Therapeutic Classification (GTC) Growth**

This report identifies GTCs with PMPM growth in the current reporting period compared to the prior reporting period.

**Current Reporting Period:** 1/1/2013 – 12/31/2013

**Prior Reporting Period:** 1/1/2012 – 12/31/2012

- **Highest Priority**
  - High Cost and High Growth Rate
- **High Priority**
  - Low Cost but High Growth Rate
- **Low Priority**
  - High Cost but Low Growth Rate
- **Lowest Priority**
  - Low Cost and Low Growth Rate

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Validate Your Results (Again)

- **Never make assumptions about your results**
  - It can take years to make believers in your work, but only minutes to make doubters

- Do the results conflict with conventional wisdom?
  - Example: if a model suggests asthma for patients less than 18 years old reduces risk of ED utilization, then the model has a problem.

- **Lean on others to vet your results**
  - You don’t have to know all the answers; use SMEs for “sanity checks”
  - What’s worse – a coworker finding an error in your report or a client?

- Test your results out of sample
  - In model development, exclude data from your derivation data for validation (e.g., 25% of original sample). Calculate error rates (e.g., MSE) and compare your error rate on the validation set to the rate for the derivation set.
    - Over-fitting Index = [Validation Set MSE] / [Derivation Set MSE]
    - If your over-fitting index deviates too far from 1, your model is over-fitted to your derivation set and will not perform similarly on new observations.
  - Use mean absolute percent error (MAPE) to quantify sample observed vs. predicted values
    - MAPE is one of the simplest validation statistics to explain to a non-technical audience

- Aggressively attempt to invalidate your results via counter-examples
Use Statistics Responsibly

- There is a BIG difference in correlation and causation – clever charts and scaling can distort reality
  - Did the introduction of a new element change the perceived impact of the existing elements?
    - Example: predicting lifespan using marriage is not the same as predicting with marriage AND wealth
- Leave your personal biases/opinions at home and admit when your study is inconclusive
  - Dead-ends are part of the job – learn to recognize them early
- Don’t allow statistics to manipulate human emotion
  - Examples: Airplane vs. car accident survival rates; nuclear energy vs. fossil fuel efficiency
  - Humans naturally associate stronger emotions with key words. Use statistics to differentiate perception vs. reality.
    - Which cancer is more deadly – brain or pancreatic?

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### New Cancer Diagnoses Per 100K

<table>
<thead>
<tr>
<th>Year</th>
<th>Brain</th>
<th>Pancreatic</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>6.4</td>
<td>12.4</td>
</tr>
</tbody>
</table>

### Cancer Survival Rate (5-Year)

<table>
<thead>
<tr>
<th>Year</th>
<th>Brain</th>
<th>Pancreatic</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>33.3%</td>
<td>7.2%</td>
</tr>
</tbody>
</table>

Source: National Cancer Institute: Surveillance, Epidemiology, and End Results Program
Part II
Presentation Rules
The Point of Each Slide Should be Clear!

• Avoid vague slide titles
  • Alternative title for this slide: “Slide Title Formats”
  • The reader should never need to guess the intent of the slide
• **State what the reader should learn from each table or chart – even if it is obvious**
• Ideally, your presentation could be interpreted without any explanation from the presenter
  • Test this by taking the reader’s perspective or allowing a colleague to read your presentation independently
• **Example**

#### Post-Discharge Data Mitigates Risk of Readmission

- Patients w/ follow-up office visits in 10 days after discharge are at significantly less risk for 30-day readmission
  - For 55-64 year olds, absence of office visits within 10 days of discharge resulted in a 27% higher rate of readmission
  - Using predictive risk models to target high-risk patients offers a potential solution to care management capacity constraints

![Readmission Rate Chart](chart.png)

- **Readmission Rate**: 16% for No Follow-up and Follow-up, with a +27.0% increase in Follow-up compared to No Follow-up.
- **Age Cohort**: 35-44, 45-54, 55-64, 65+
Use Your Report to Tell a Story

• The Minto Pyramid Principle\(^1\) identifies three requirements of every story
  • Situation
    o What is the issue or objective?
  • Complication
    o Why isn’t the solution to the situation immediately obvious?
  • Solution
    o How was the complication overcome and the situation resolved?

• Example: *The Odyssey*
  • Odysseus is trying to return home to his wife after the Trojan War
  • He is assumed dead and suitors for his wife have overrun his homeland
  • He secretly infiltrates his homeland and kills the suitors at an archery contest

Don’t Deviate from the Story

• Ask yourself if the slide is necessary or if the presentation can be understood without it
  • Move “interesting” but non-essential slides to the Appendix
  • When in doubt, drop it

• Spoil the Ending
  • Suspense is fine for movies, but not for analytics
  • The audience follows the story better when they know where it ends

• Don’t get caught up in the methodology
  • Analysts often provide step-by-step slides on how the report was conducted
  • Avoid this mistake and leave these slides in the appendix for those interested in technical details
Explaining Complex Results to a Simple Audience

- Decision-makers speak a different language; learn to speak it
  - *Part of your job is to perform the analysis. The other equally important part is communicating the results.*
  - **Example**

- Get to the point; don’t lose the audience through sidetracks
  - Non-pertinent information can lead to confusion
  - For example, don’t tell the audience about how bootstrapping your model resulted in an average 58% narrower confidence limit for the coefficients. What is exciting to you may be confusing to them.

- Use deductive reasoning when possible
  - Make sure the data clearly connects the dots and does not make unsupported conclusions

- **Listen carefully to your audience for key words to indicate your performance**
  - “Interesting” means they didn’t get it, “useful” means they did

Which is More Significant to a Non-Technical Audience?

- **Measure of Performance: c-statistic=0.73**
  - Over-fitting index = 1.01
  - Performed better than 20 of 21 readmission models with a published c-statistic
  - Of 21 published studies, only 5 reported a c-statistic > 0.70

<table>
<thead>
<tr>
<th>Risk Tranche</th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
<th>Total Readmissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>71.1%</td>
<td>13.4%</td>
<td>15.5%</td>
<td>100%</td>
</tr>
<tr>
<td>Medium</td>
<td>42.9%</td>
<td>20.1%</td>
<td>37.1%</td>
<td>100%</td>
</tr>
<tr>
<td>High</td>
<td>1.0</td>
<td>2.4</td>
<td>3.7</td>
<td></td>
</tr>
</tbody>
</table>

Relative Risk compared to “Low Risk”
In this study, I attempted to model mortality using two HGLM models: M1 and M2.

The models appeared nearly identical in performance using traditional statistics:

- M1: $c$-statistic=0.97; OFI=1.01
- M2: $c$-statistic=0.97; OFI=0.98

I wanted to dig deeper and visually inspect performance with distribution plots comparing distribution of discharges and deaths by model generated probabilities of death:

- I knew the best model would minimize the ratio of discharges to deaths for lower probabilities of mortality and maximize the same rate at higher probabilities of mortality, but how do I quantify this?
- I created a measure for Area Between the Curves (ABC) Ratio to measure the ratio of the distance between the distribution of discharges and deaths to the area under the distribution of deaths.
  - Note a perfect model’s ABC Ratio would equal 1 since it correctly predicted 100% of the deaths with a suggested 100% probability.
- M1 became the clear outperformer with a 24% greater ABC Ratio!
Five Contributing Factors Were Used to Determine Member Profitability

- Premium
  - Plan revenue
- Paid
  - Healthcare expenditures
- Reinsurance
  - Transfer of risk
- Premium Transfers
  - Redistribution to higher risk plans
- Cost Sharing Reductions (CSR)
  - Member subsidies
- Note the following analysis does NOT include
  - Risk corridors
  - Administrative expenses
Net Position Indicates $60 PMPM Profitability

- Negative premium factors reduced revenue by 98% or $321 PMPM
- Positive premium factors increased revenue by 16% or $52 PMPM
- The net position indicates a final loss ratio of 82%
The Top 1% of Profitable Members Account for 88% of Total Profit!

- The biggest difference in Top and Bottom 1% appears driven by paid amounts and transfers
  - Bottom 1% members’ paid PMPM is 127% higher, yet transfers are 80% lower than Top 1% members
- Members triggering reinsurance payments are “all or nothing” in regards to profitability
  - 97% of members requiring reinsurance were in the Top 5% or Bottom 5% of profitability

<table>
<thead>
<tr>
<th>Profitability Percentile</th>
<th>Risk Score</th>
<th>Premium PMPM</th>
<th>Paid PMPM</th>
<th>Transfer PMPM</th>
<th>Reinsurance PMPM</th>
<th>CSR PMPM</th>
<th>Profit PMPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top 1%</td>
<td>19.30</td>
<td>$440</td>
<td>$2,482</td>
<td>$4,260</td>
<td>$894</td>
<td>$367</td>
<td>$3,479</td>
</tr>
<tr>
<td>1-5%</td>
<td>3.92</td>
<td>$436</td>
<td>$313</td>
<td>$495</td>
<td>$12</td>
<td>$25</td>
<td>$657</td>
</tr>
<tr>
<td>5-10%</td>
<td>1.28</td>
<td>$430</td>
<td>$95</td>
<td>-$114</td>
<td>-</td>
<td>$6</td>
<td>$227</td>
</tr>
<tr>
<td>10-20%</td>
<td>0.77</td>
<td>$378</td>
<td>$63</td>
<td>-$196</td>
<td>$5</td>
<td>$4</td>
<td>$128</td>
</tr>
<tr>
<td>20-30%</td>
<td>0.55</td>
<td>$334</td>
<td>$30</td>
<td>-$224</td>
<td>-</td>
<td>$2</td>
<td>$81</td>
</tr>
<tr>
<td>30-40%</td>
<td>0.50</td>
<td>$305</td>
<td>$30</td>
<td>-$218</td>
<td>-</td>
<td>$2</td>
<td>$59</td>
</tr>
<tr>
<td>40-50%</td>
<td>0.46</td>
<td>$291</td>
<td>$25</td>
<td>-$221</td>
<td>-</td>
<td>$1</td>
<td>$46</td>
</tr>
<tr>
<td>50-60%</td>
<td>0.42</td>
<td>$273</td>
<td>$24</td>
<td>-$219</td>
<td>-</td>
<td>$2</td>
<td>$32</td>
</tr>
<tr>
<td>60-70%</td>
<td>0.40</td>
<td>$262</td>
<td>$29</td>
<td>-$223</td>
<td>-</td>
<td>$2</td>
<td>$12</td>
</tr>
<tr>
<td>70-80%</td>
<td>0.39</td>
<td>$250</td>
<td>$37</td>
<td>-$228</td>
<td>-</td>
<td>$2</td>
<td>-$13</td>
</tr>
<tr>
<td>80-90%</td>
<td>0.55</td>
<td>$262</td>
<td>$114</td>
<td>-$216</td>
<td>$7</td>
<td>$9</td>
<td>-$53</td>
</tr>
<tr>
<td>90-95%</td>
<td>0.85</td>
<td>$308</td>
<td>$294</td>
<td>-$201</td>
<td>$7</td>
<td>$26</td>
<td>-$155</td>
</tr>
<tr>
<td>95-99%</td>
<td>1.60</td>
<td>$365</td>
<td>$994</td>
<td>-$69</td>
<td>$14</td>
<td>$70</td>
<td>-$614</td>
</tr>
<tr>
<td>Bottom 1%</td>
<td>5.79</td>
<td>$357</td>
<td>$5,633</td>
<td>$879</td>
<td>$1,075</td>
<td>$428</td>
<td>-$2,894</td>
</tr>
<tr>
<td>Overall</td>
<td>1.22</td>
<td>$329</td>
<td>$245</td>
<td>-$76</td>
<td>$31</td>
<td>$21</td>
<td>$60</td>
</tr>
</tbody>
</table>

• The biggest difference in Top and Bottom 1% appears driven by paid amounts and transfers
• Bottom 1% members’ paid PMPM is **127% higher**, yet transfers are **80% lower** than Top 1% members
• Members triggering reinsurance payments are “all or nothing” in regards to profitability
• 97% of members requiring reinsurance were in the Top 5% or Bottom 5% of profitability
CSR Members are 120% More Profitable than Non-CSR Members

- CSR members
  - Risk Score = 1.52
  - 20% of member months
  - 120% more profitable than non-CSR members

- Non-CSR Members
  - Risk Score = 1.13
  - 80% of member months
  - Improved paid to premium ratio gains are offset by greater premium transfers and lower reinsurance payments
The unsymmetrical ratios of HCCs per member at similar cut points highlight the potentially deciding factor in member profitability:

- The Top 1% to Bottom 1% ratio of HCCs is 2.1 (Ratio = 3.6 / 1.7), i.e., the most profitable members have twice as many HCCs as the least profitable members.
- The 1-5% to 95-99% ratio is 2.8.

**Profitability is Skewed Toward Members with More HCCs**

*Computed as 12*(sum of HCCs/member months)
High-Cost Members are Going Undetected by the Risk-Adjustment Methodology

- The following chart identifies paid and transfer PMPM dollars as the primary contributors to differences between the top and bottom 5% profitable members
  - Bottom 5% members are 2.5 times more expensive for paid amounts
  - Bottom 5% members receive less than 10% the transfer amounts as top 5% members
- Transfers are primarily driven by risk scores and top 5% member risk scores are nearly three times higher than bottom 5% members
- Clearly, at least part of the profitability disparity can be explained by extremely high-cost members not being recognized by the risk-adjustment methodology
45% of Paid PMPM is Driven By 150 Members

- Reducing paid amounts by 25% for these members would lower plan paid to premium ratio from 75% to 66%
- Grouping members by total paid amounts during the plan year reveals a severely disproportionate member cost profile
- 5% of members account for 75% of total costs
  - This is slightly worse than what we see across similar plans (7% of members consume 75% of costs)
- Extraordinarily high-cost members are prime candidates for care management
Further Research on the 150 High-Cost Members Reveals Risk Scores Do Not Always Capture Costs

- When isolated from other enrollees, the paid PMPM is $8,000.
- For risk scores < 10, paid PMPM is 21 times the overall (all plans) paid PMPM.
  - This would imply risk scores are off by 2100%.
- Almost half of spend is inpatient services.

Members with risk scores < 1 are more costly than members with risk scores from 1-25!
Recall, the ACA provides for a permanent risk-adjustment program to mitigate the impacts of adverse enrollee selection and stabilize premiums by transferring funds from lower risk plans to higher risk plans.

Risk transfers offset differences in plan actuarial risk due to risk selection outside the collected premiums. The transfer formula measures the difference between:

- Premium with risk selection
- Premium without risk selection

If the difference is positive, the plan receives a transfer payment. If negative, the plan pays.

In its simplest form, the higher the plan risk score, the higher the expected transfer.

Risk scores are based on the HHS-HCC model.
Risk Profile is 4% Below Expected

- Dividing left-side numerator by right-side numerator of transfer formula provides insight into potential transfers
  - Ignore denominators since small plans have little influence on state averages
  - IDF and GCF will cancel from both sides of numerators
  - Risk transfers are supposed to be zero-sum; thus values > 1 indicate greater than expected risk within your plan (higher is better for positive premium transfers)
  - Females make up 55% of member months with a numerator ratio of 1.02
    - Indicates risk is 2% higher than expected
    - Females 60-64 are most transfer profitable on a weighted member month basis
  - Males make up 45% of member months with a numerator ratio of 0.88
    - Indicates risk is 12% lower than expected
    - Males 30-34 are most damaging to premium transfers, but more surprisingly is that males aged 55-59 are third most damaging

\[ T_i = \frac{PLRS_i \cdot IDF_i \cdot GCF_i}{\sum PLRS_i \cdot IDF_i \cdot GCF_i} \]

- Females make up 55% of member months with a numerator ratio of 1.02
  - Indicates risk is 2% higher than expected
  - Females 60-64 are most transfer profitable on a weighted member month basis

- Males make up 45% of member months with a numerator ratio of 0.88
  - Indicates risk is 12% lower than expected
  - Males 30-34 are most damaging to premium transfers, but more surprisingly is that males aged 55-59 are third most damaging
Risk Score is Certainly a Factor, but Alone is NOT a Predictor of Profitability

- Unprofitable members appear more densely populated for risk scores less than 5 compared to profitable members.
- $R^2$ is only 10%, which demonstrates that risk score alone is NOT a strong predictor of profitability.
  - Correlation coefficient is 31% (not strong).

*Outlier observations hidden due to scale*
89% of Member Months Were On the Wrong Side of Premium Transfers

- Optimizing risk scores is critical to achieving the best transfer results
- Transfers by risk score band demonstrate a risk score > 2 achieves positive transfer payments
Paid Amounts are Highly Predictive of Premium Transfers

- The following chart depicts member data points for each transfer and paid amount
- 41% $R^2$ indicates transfer variation is largely explained by a single predictor (paid)
- Isolating on paid and transfer amounts, we can identify profitable members from a paid and transfer perspective
  - Profitable: $(\text{transfer} - \text{paid}) \geq 0$
  - Unprofitable: $(\text{transfer} - \text{paid}) < 0$

### Diagram:

- **Profitability Line**: Extremely profitable members from a transfer perspective, i.e., very high transfers (via risk score) yet very low paid amounts
- **Profitable Members**
- **Unprofitable Members**
- *Outlier observations hidden due to scale*
Increasing risk scores results in improved profitability via premium transfers.

On average, each 1 point risk score increase is worth an extra $240 PMPM in transfers.

Profitable member groups have an average risk score opportunity of 15% compared to unprofitable members having an average opportunity of 44%.

This implies unprofitable members have a premium transfer opportunity of $105 PMPM compared to profitable members having opportunity of $41 PMPM.
We know bottom 5% members receive much less transfer PMPM.

Lower transfers can be explained by differences in member month distribution across risk bands:
- Recall that risk scores > 2 imply positive transfers.
- As illustrated below, we see that 80% of top 5% of profitability member months imply positive transfers vs. only 28% for the bottom 5%.
- Again, the risk-adjustment methodology is failing to recognize these high-cost members as high-risk (for bottom 5% members).
A Peek Into the Good, the Bad, and the Ugly of Disease Management

- The following table presents disease-specific prevalence and cost benchmarks for members with the listed morbidity

<table>
<thead>
<tr>
<th>HCC</th>
<th>Metric</th>
<th>Plan</th>
<th>MSA</th>
<th>State</th>
<th>Region</th>
<th>National</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIV/AIDS</td>
<td>Prevalence per 100K</td>
<td>59.9</td>
<td>5.5</td>
<td>8.0</td>
<td>14.9</td>
<td>17.0</td>
</tr>
<tr>
<td></td>
<td>Actual PMPM</td>
<td>$2,713</td>
<td>$2,670</td>
<td>$3,067</td>
<td>$3,008</td>
<td>$2,685</td>
</tr>
<tr>
<td></td>
<td>Risk-Adjusted PMPM*</td>
<td>$250</td>
<td>$269</td>
<td>$349</td>
<td>$327</td>
<td>$285</td>
</tr>
</tbody>
</table>

| Diabetes                           | Prevalence per 100K     | 891.1 | 482.2 | 416.2 | 465.7 | 587.2 |
|                                    | Actual PMPM             | $1,465 | $1,257 | $1,292 | $1,291 | $1,295 |
|                                    | Risk-Adjusted PMPM*     | $350 | $253 | $273 | $258 | $250 |

| Pancreatitis and Intestinal Malabsorption | Prevalence per 100K | 89.9 | 62.6 | 50.3 | 42.3 | 47.5 |
|                                          | Actual PMPM            | $3,391 | $1,763 | $1,941 | $2,640 | $2,401 |
|                                          | Risk-Adjusted PMPM*    | $397 | $224 | $219 | $258 | $234 |

*Risk-adjustment provides a way to standardize costs when members have multiple morbidities

- **The Good**
  - The plan attracts an abnormally high rate of HIV/AIDS population, but manages them well on an unadjusted and risk-adjusted cost basis

- **The Bad**
  - The plan attracts nearly twice as many diabetics than expected
  - Diabetic costs are extremely stable across the country, yet plan costs are nearly $200 PMPM more on an unadjusted basis or $100 PMPM more on a risk-adjusted basis

- **The Ugly**
  - The plan attracts a larger than expected population with pancreatitis
  - Costs are extremely out of line with expectations
End of Presentation
Questions?

“I have not failed 700 times. I have not failed once. I have succeeded in proving that those 700 ways will not work. When I have eliminated the ways that will not work, I will find the way that will work.” – Thomas Edison

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