
# Session 191: Accelerated Underwriting: Front-end and Back-end Best Practices

SOA Antitrust Compliance Guidelines
SOA Presentation Disclaimer

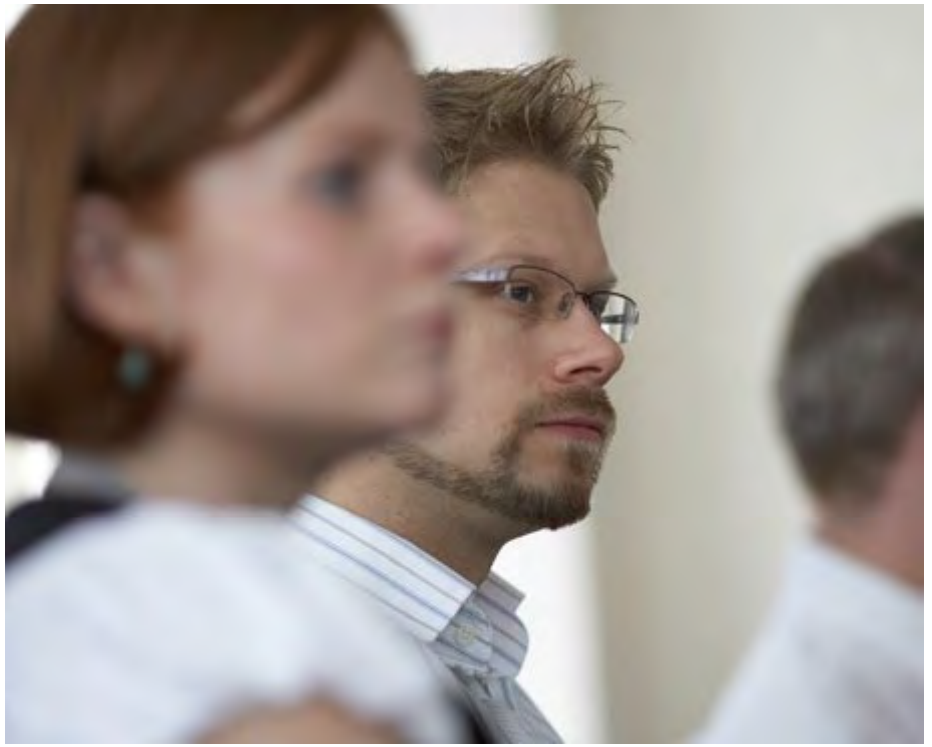
# Milliman IntelliScript

SoA Annual Meeting – Session 191
Accelerated Underwriting: Front end best practices

10/30/2019

# Agenda

- Current Underwriting Tools and Trends
- Review Underwriting Tools
- Mortality Expertise
- Predictive Model vs. Clinical Underwriting
- Future Underwriting Tools and Trends

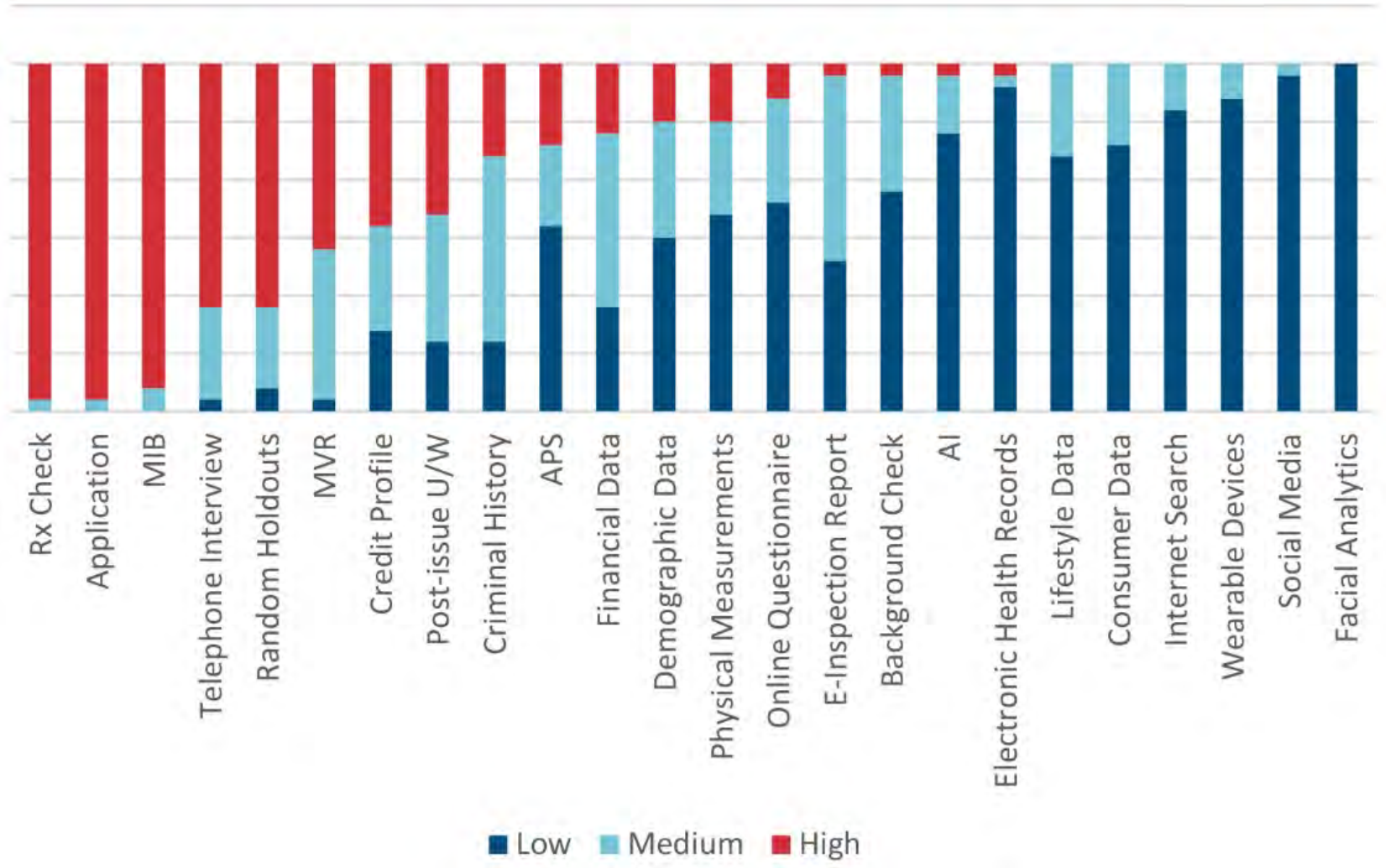


# The Future of Underwriting

| Increasing | Decreasing |
| --- | --- |
| ▪ Electronic requirements (Rx, Medical Data, MIB, MVR, Credit …)<br>▪ Decision engines driven by data<br>▪ Predictive Models<br>▪ Automation | ▪ Attending Physician Statements<br>▪ Labs<br>▪ Cycle times<br>▪ Costs |

**Better Customer Experience**

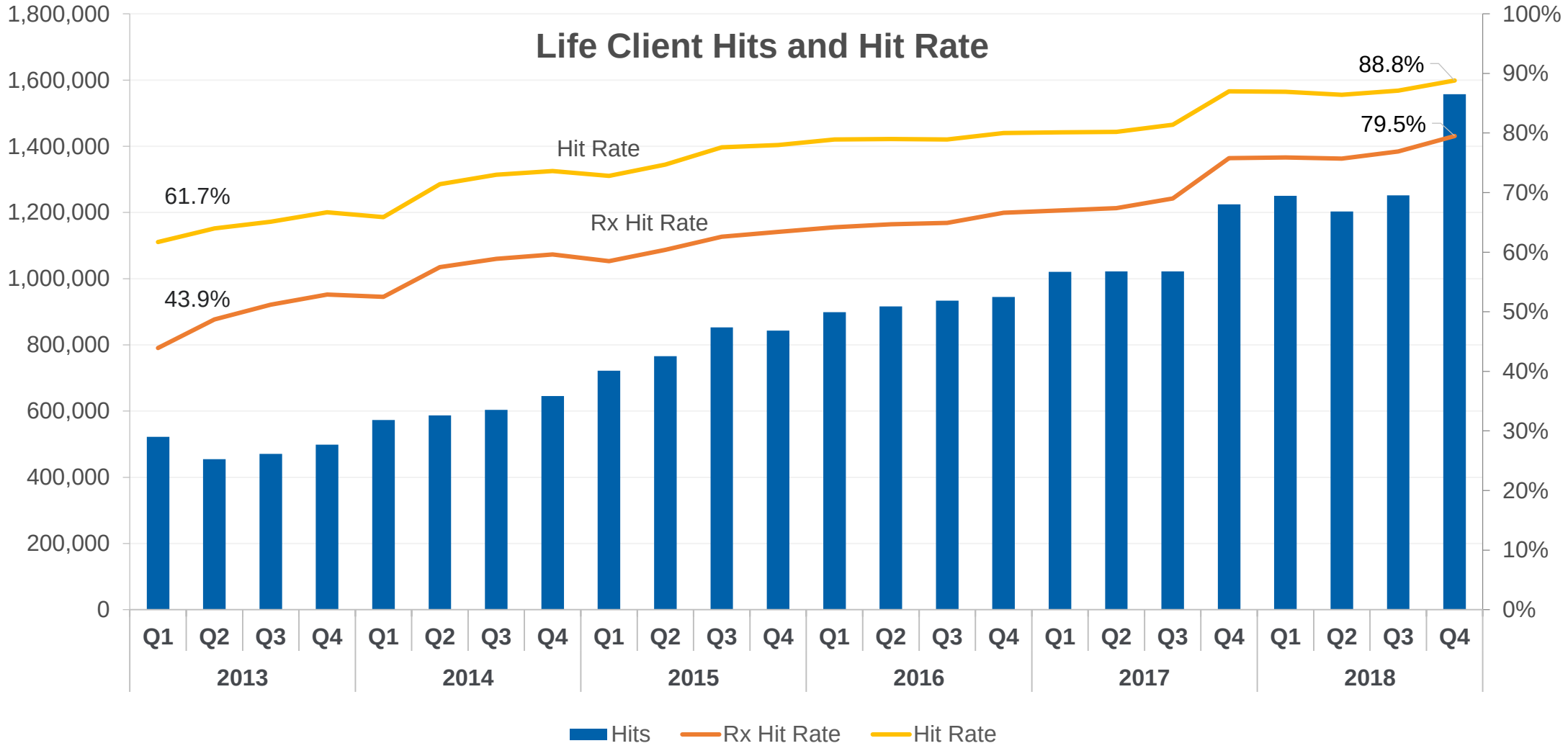
# What data is being used today to accelerate?




Source: Emerging Underwriting Methodologies in a PBR World, SOA Webinar, December 18, 2018

# Prescription Data

# Prescription Data Hit Rate

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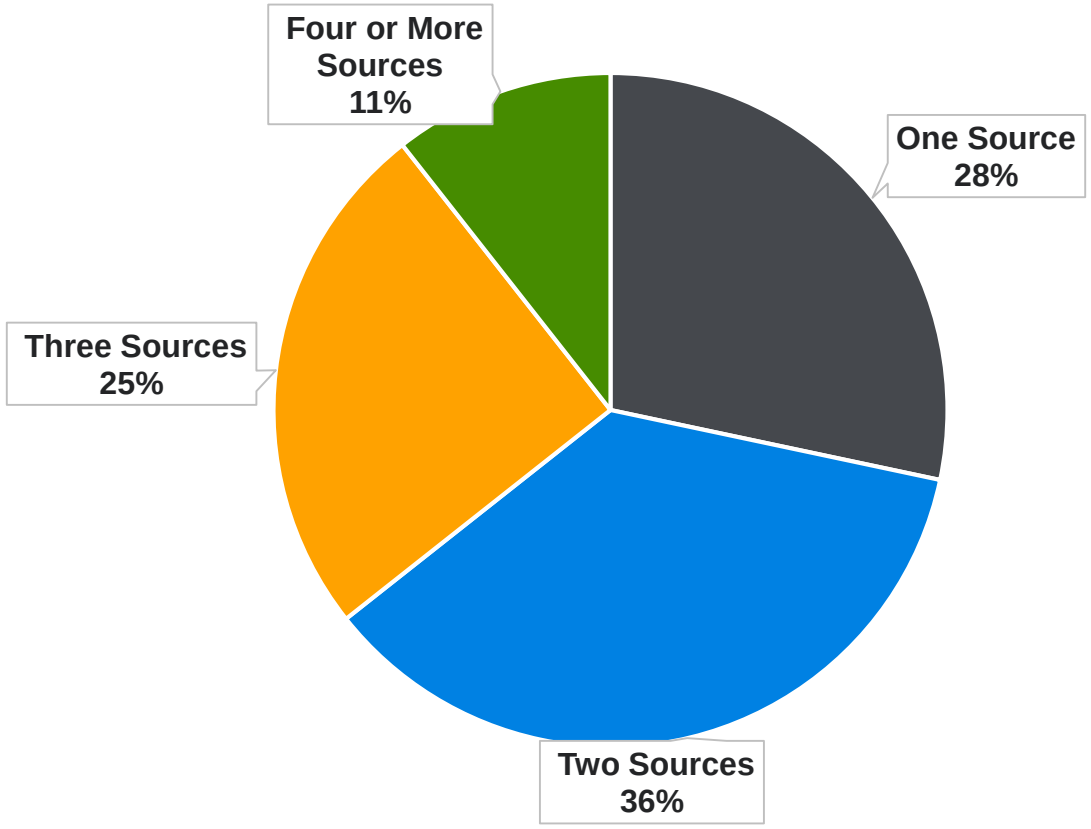
# Redundant Rx data protects you.




Data Sources per Rx Hit

We work with multiple types of sources:

- Health Plans
- Pharmacy Benefit Managers
- Clearinghouses
- Retail Pharmacies
- Data Aggregators

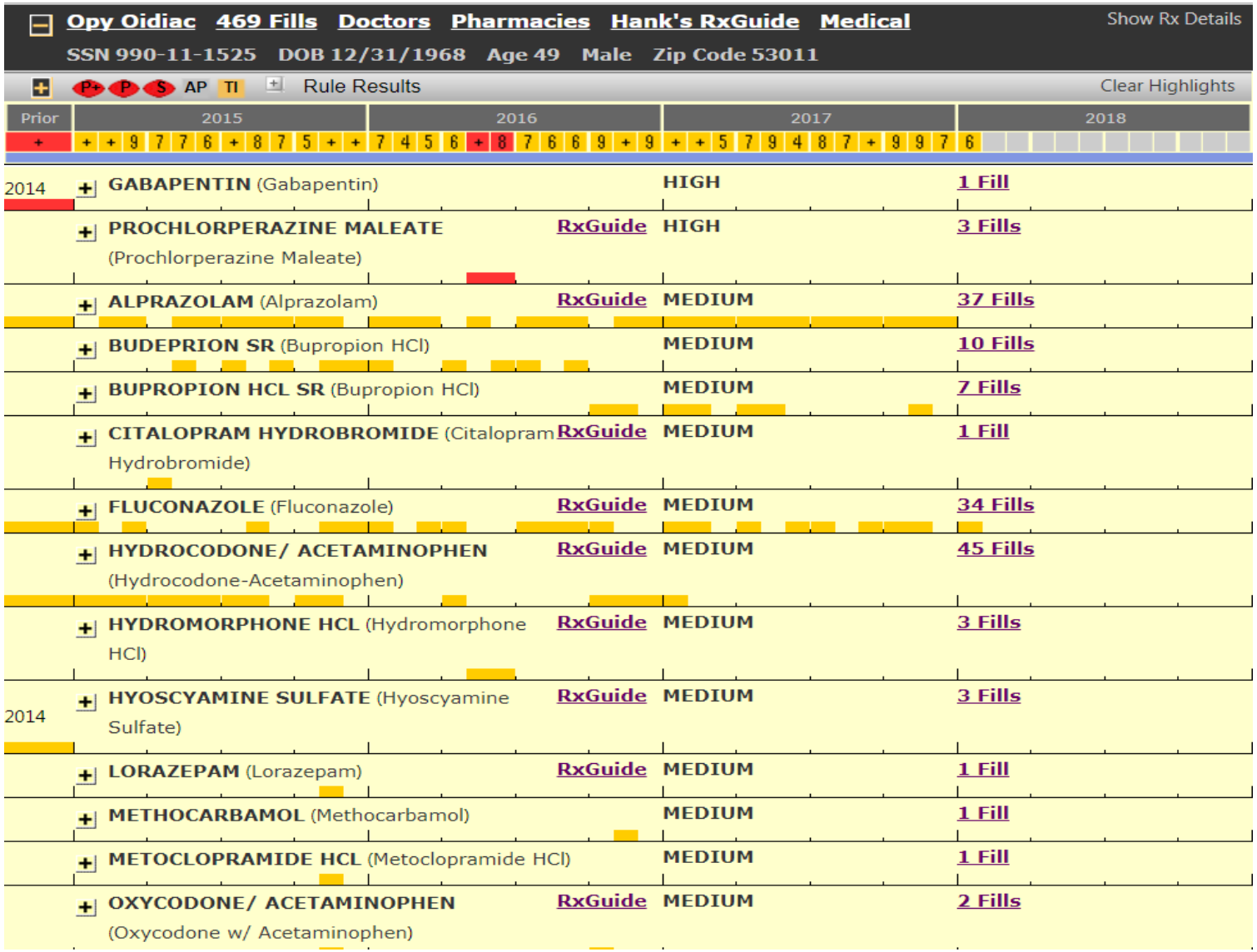
# An engine adds substantial value.

**Data Input**
- Rx
- Medical Data
- Application Data
- Credit
- Other (MIB, MVR …)

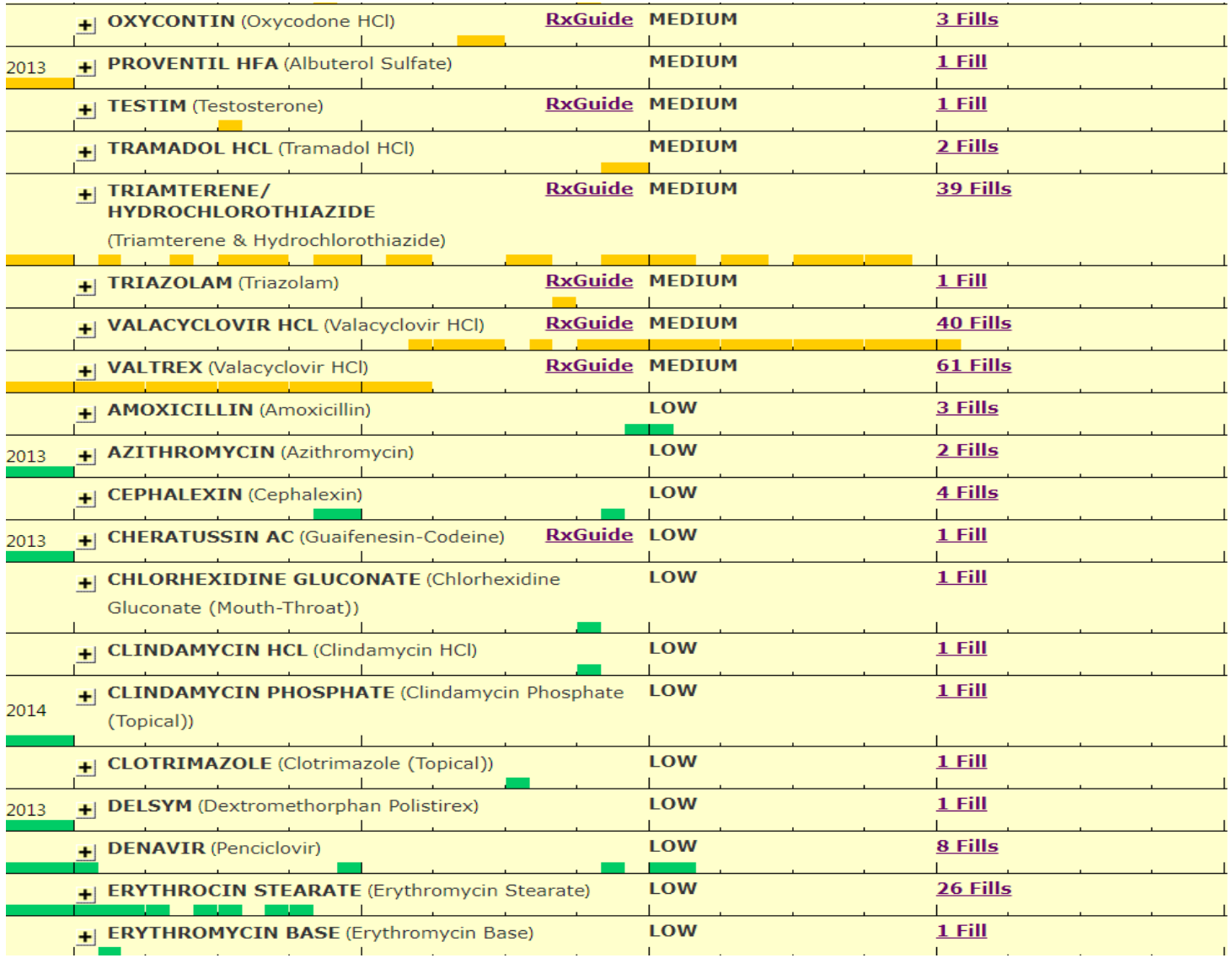

**UW Guidance**
- Conditions
- Severity
- Decisions
- Risk Score (optional)

**Rule Variables**
- Indication / Therapeutic class
- Drug combinations
- Fill timing (date or duration ranges)
- Physician specialty / count
- Gender / Age
- Diagnosis / Procedure combinations
- Drug / Diagnosis combinations
- Other variables

# Sample Case: 476 Fills – Fully Underwritten, Data Overload

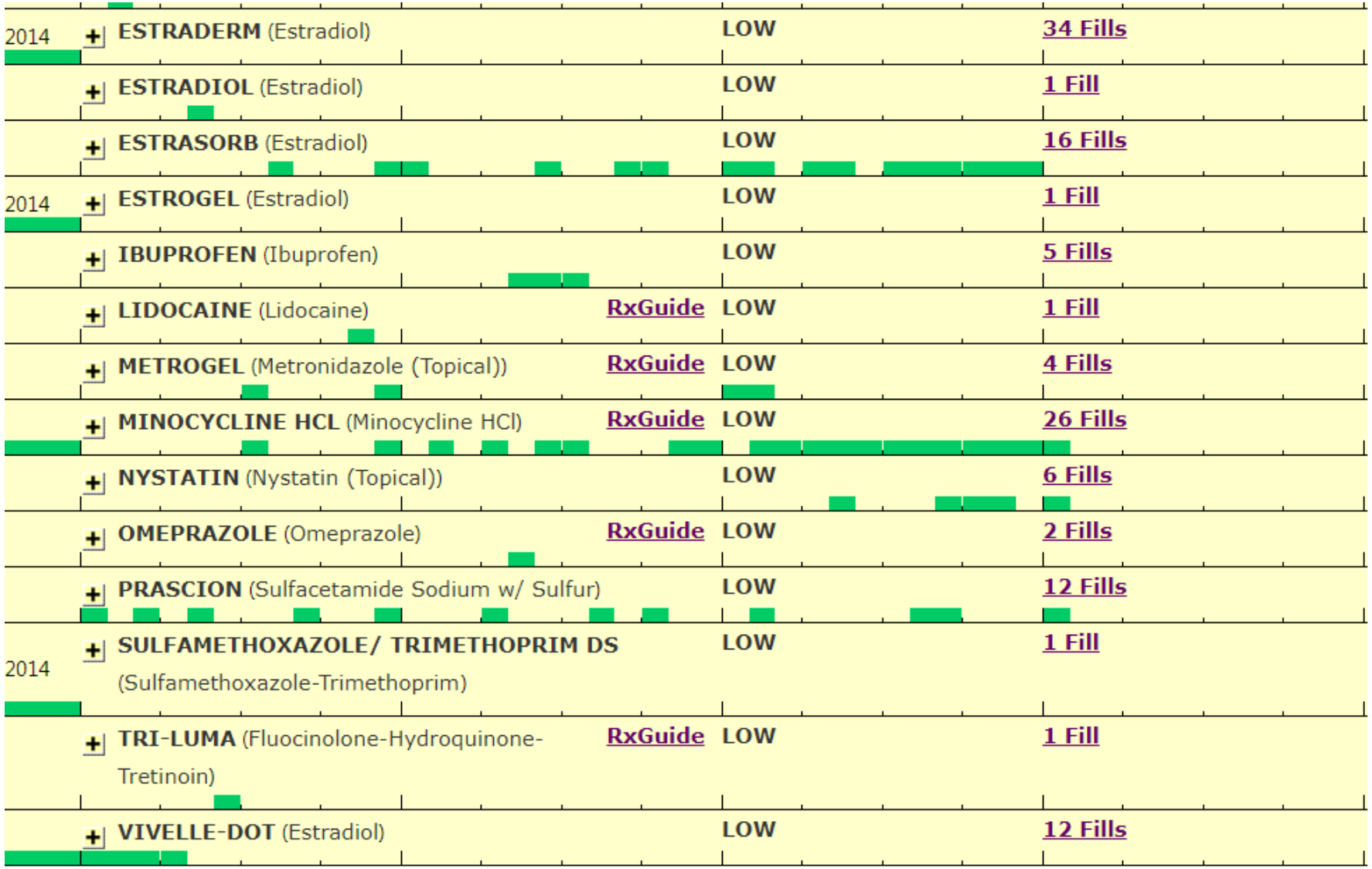


# Sample Case: Page 2

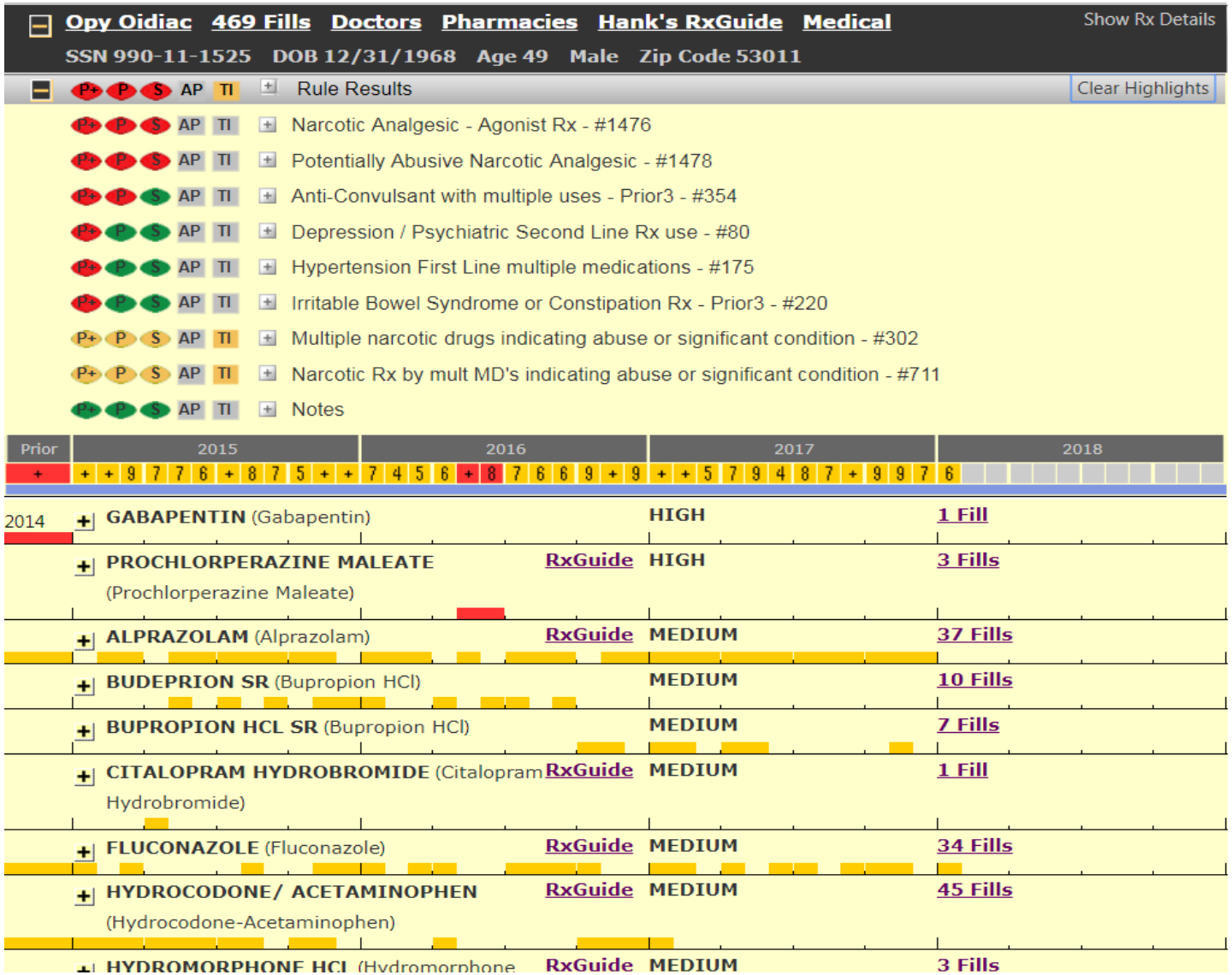


| | | | | |
|---|---|---|---|---|
| | **OXYCONTIN** (Oxycodone HCl) | RxGuide | MEDIUM | 3 Fills |
| 2013 | **PROVENTIL HFA** (Albuterol Sulfate) | | MEDIUM | 1 Fill |
| | **TESTIM** (Testosterone) | RxGuide | MEDIUM | 1 Fill |
| | **TRAMADOL HCL** (Tramadol HCl) | | MEDIUM | 2 Fills |
| | **TRIAMTERENE/ HYDROCHLOROTHIAZIDE** (Triamterene & Hydrochlorothiazide) | RxGuide | MEDIUM | 39 Fills |
| | **TRIAZOLAM** (Triazolam) | RxGuide | MEDIUM | 1 Fill |
| | **VALACYCLOVIR HCL** (Valacyclovir HCl) | RxGuide | MEDIUM | 40 Fills |
| | **VALTREX** (Valacyclovir HCl) | RxGuide | MEDIUM | 61 Fills |
| | **AMOXICILLIN** (Amoxicillin) | | LOW | 3 Fills |
| 2013 | **AZITHROMYCIN** (Azithromycin) | | LOW | 2 Fills |
| | **CEPHALEXIN** (Cephalexin) | | LOW | 4 Fills |
| 2013 | **CHERATUSSIN AC** (Guaifenesin-Codeine) | RxGuide | LOW | 1 Fill |
| | **CHLORHEXIDINE GLUCONATE** (Chlorhexidine Gluconate (Mouth-Throat)) | | LOW | 1 Fill |
| | **CLINDAMYCIN HCL** (Clindamycin HCl) | | LOW | 1 Fill |
| 2014 | **CLINDAMYCIN PHOSPHATE** (Clindamycin Phosphate (Topical)) | | LOW | 1 Fill |
| | **CLOTRIMAZOLE** (Clotrimazole (Topical)) | | LOW | 1 Fill |
| 2013 | **DELSYM** (Dextromethorphan Polistirex) | | LOW | 1 Fill |
| | **DENAVIR** (Penciclovir) | | LOW | 8 Fills |
| | **ERYTHROCIN STEARATE** (Erythromycin Stearate) | | LOW | 26 Fills |
| | **ERYTHROMYCIN BASE** (Erythromycin Base) | | LOW | 1 Fill |

# Sample Case: Page 3



# Sample Case: Using Rules Engine



# Applying Mortality Facts

**2009**

**Milliman / RGA study**

- 1M exposure years
- 2,500 deaths

**2012**

**Milliman study**

- 21M exposure years
- 45,000 deaths

**2015**

**Milliman study**

- 53M exposure years
- 231,000 deaths
- Milliman Risk Score

**2017**

**Milliman study**

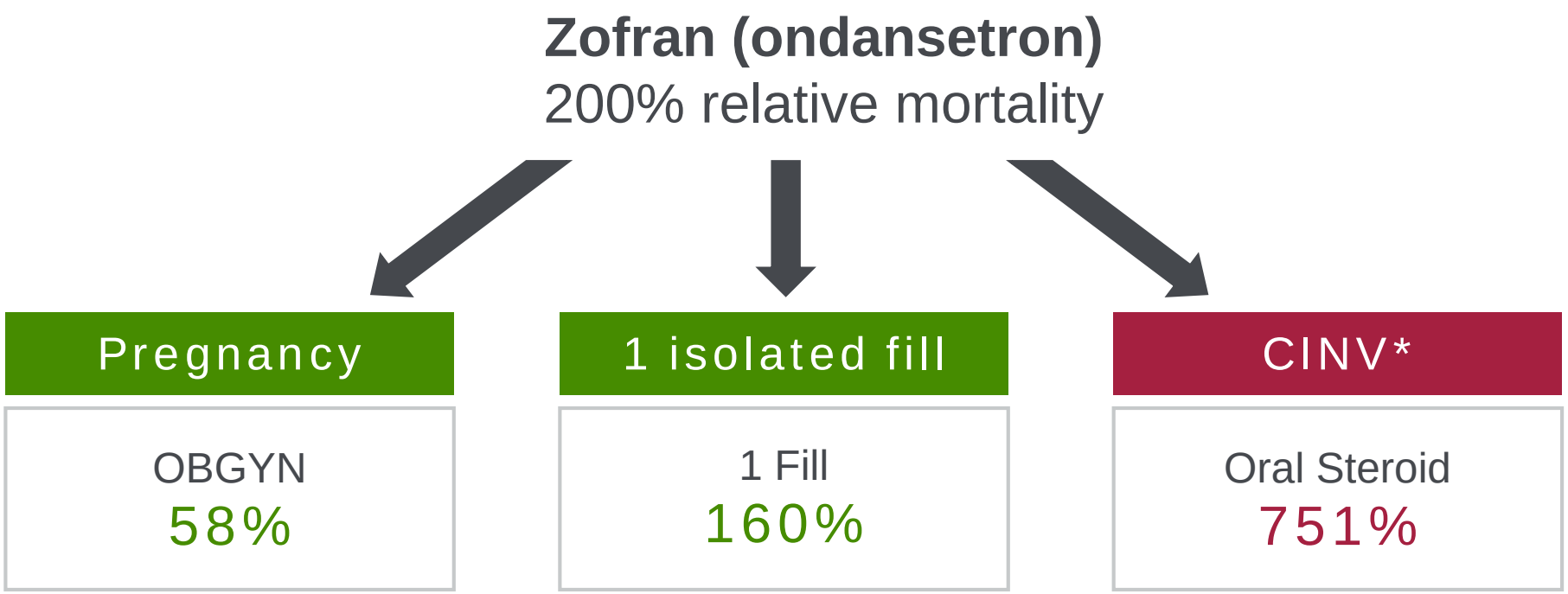
- 200M+ exposure years
- 500K deaths
- Milliman Risk Score

**2019**

**Milliman study**

- In process
- More data

# Mortality – Context Matters



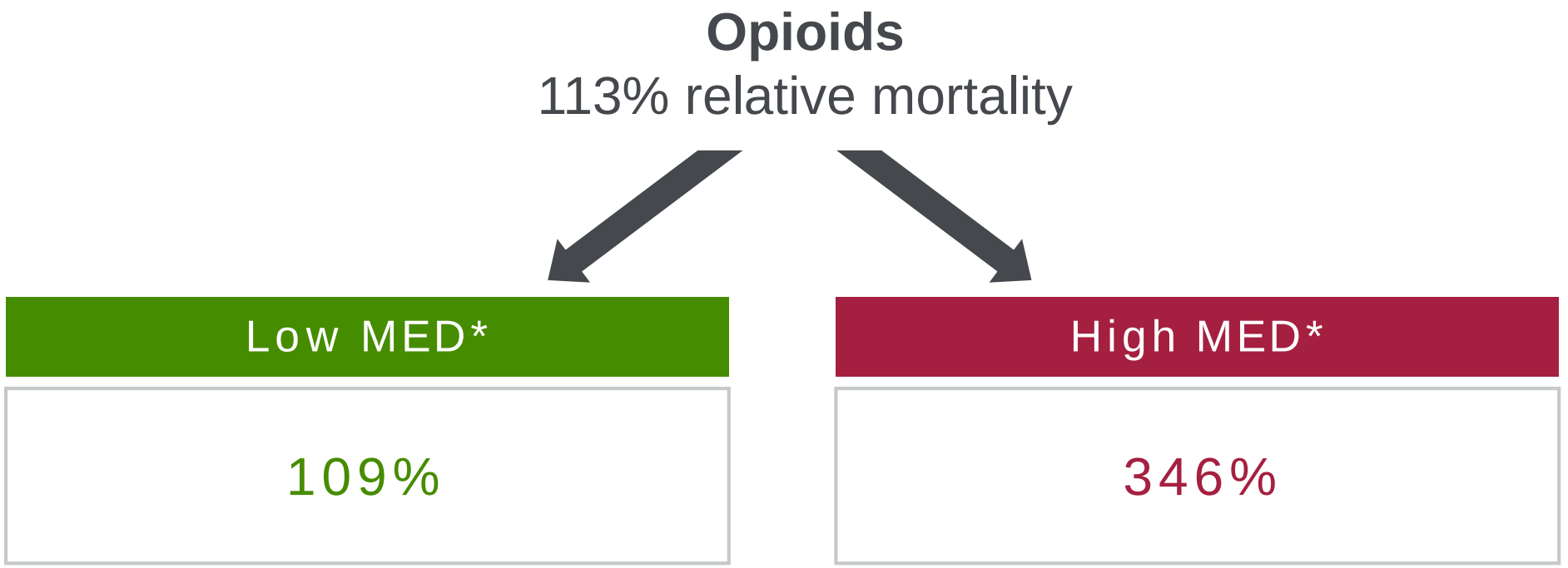

* CINV = Chemotherapy Induced Nausea and Vomiting

# Mortality – Drug Combinations Matter

**Spironolactone**
243% relative mortality

| With 2 out of 3 of: | Without 2 out of 3 of: |
| --- | --- |
| ▪ Thiazide Diuretics (177%)<br>▪ Ace / Angio II (ARBS) (119%)<br>▪ Beta Blocker (137%) | ▪ Thiazide Diuretics (177%)<br>▪ Ace / Angio II (ARBS) (119%)<br>▪ Beta Blocker (137%) |
| 338% | 169% |

# Mortality – Morphine Equivalence Matters




* MED = Morphine equivalent dosage

# Engine Summary

- Consistent interpretation of Rx fills
- Drug combinations and usage patterns
- Incorporate additional details from the Rx fill
  - Dosage
  - Timing and duration
  - Physician specialty
- Focus u/w resources where needed

# Medical Data

# Medical data integrated with Rx brings value.

More comprehensive picture of applicant's health status

More accurate condition / severity inference

May find conditions missed by other sources

Reduces need for APS

# What is Medical Data?

1

Query data sources in real time

- FCRA compliant – 7 years of data

2

Obtain applicant's claim data from recent medical encounters

- Diagnosis codes (ICD 9 / 10)
- Procedure codes (CPT)
- Durable medical equipment codes (HCPCS)
- Inpatient / clinic-administered medications (HCPCS)
- Provider, encounter information

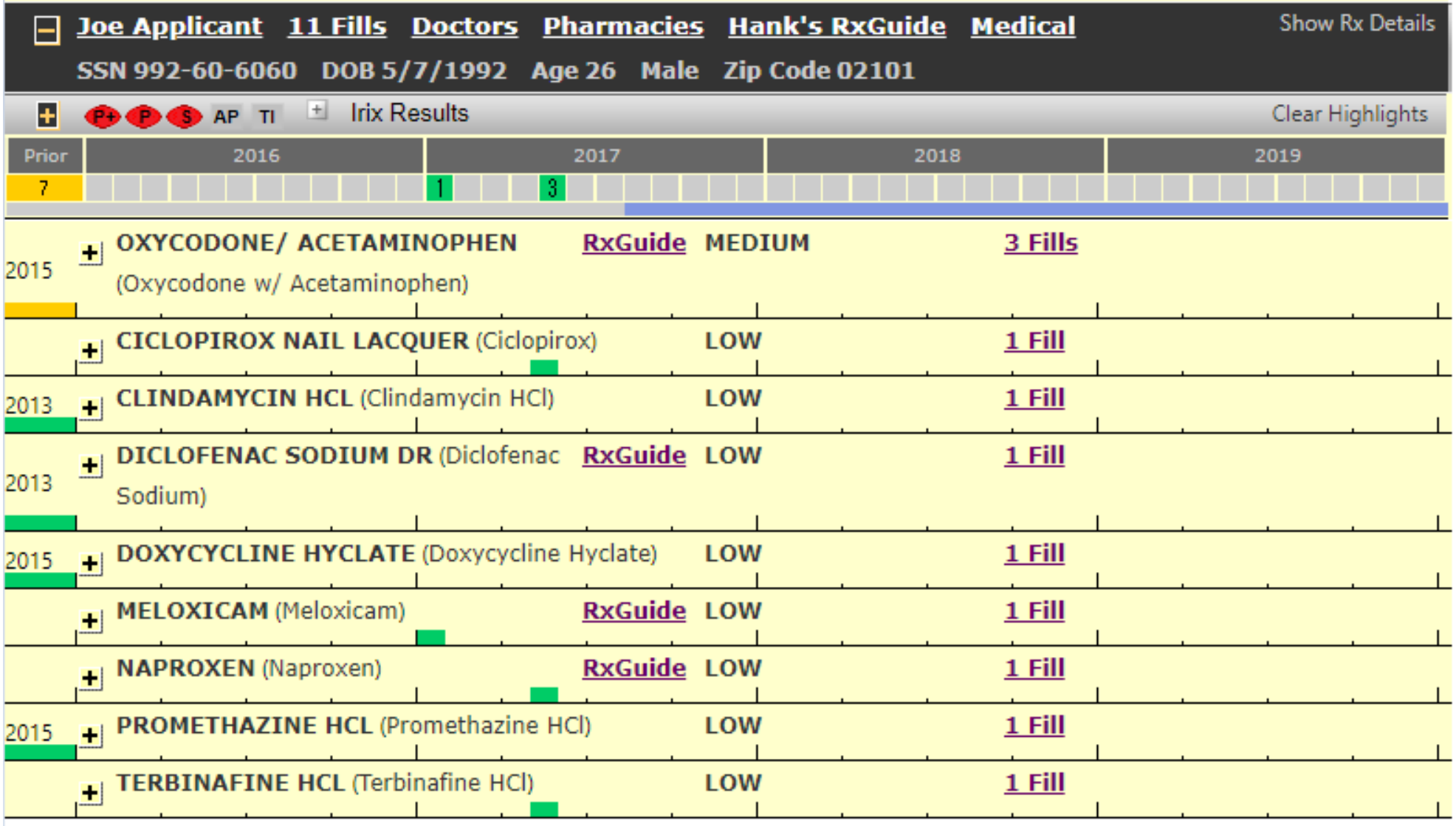
3

Irix interprets the data and makes decisions

- Application data, Rx, Medical Data, MIB, MVR, etc.

# Case 1 – Irix identifies opioid concerns.

- Age: 26
- Male
- Rx Fills: 11



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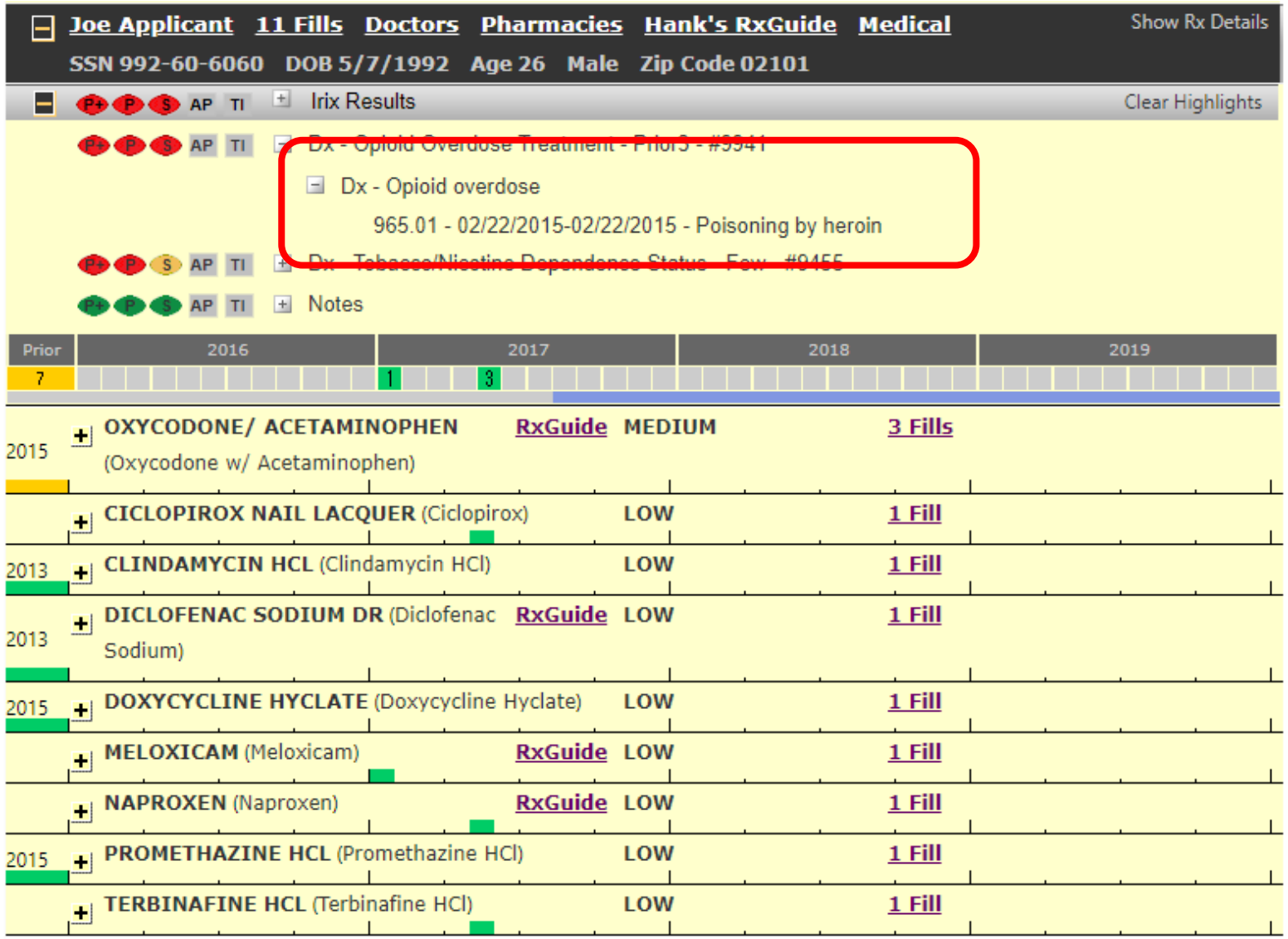

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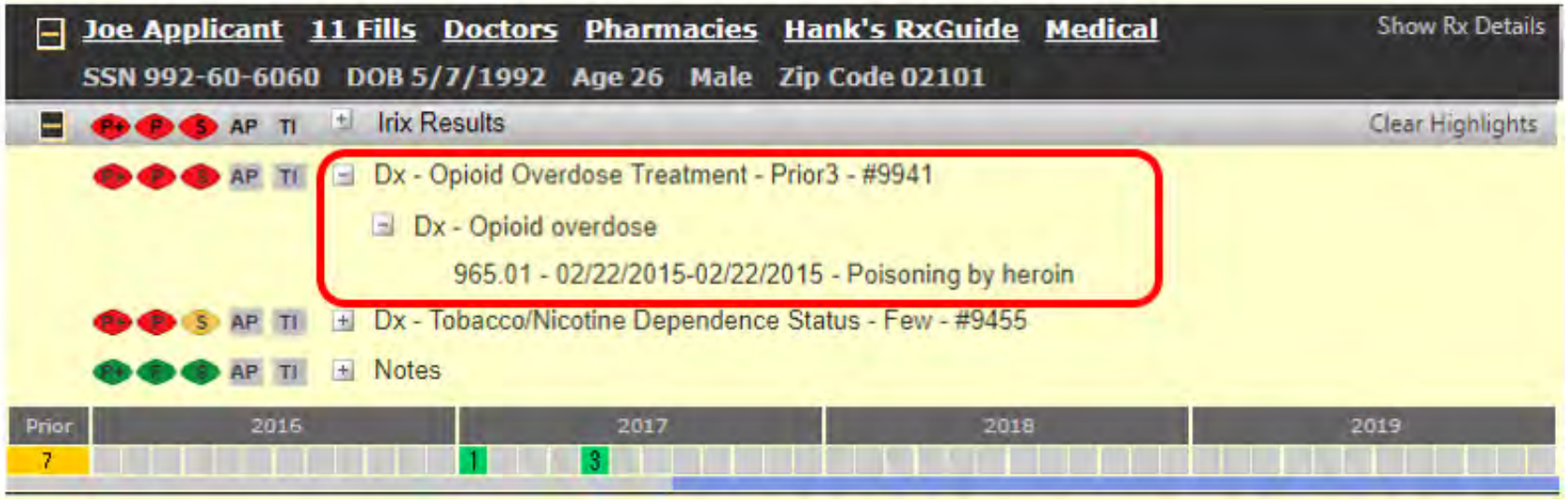



| | | | | |
|---|---|---|---|---|
| 02/22/2015-<br>02/22/2015 | JOHNSON COUNTY MED ACT<br>11811 S SUNSET DR STE 110<br>OLATHE KS 66061<br>041 - Ambulance - land | Ground mileage, per statute mile | HCPCS | A0425 |
| | | Ambulance service, advanced life support, emergency transport, level 1 (ALS 1 - emergency) | HCPCS | A0427 |
| 02/22/2015-<br>02/22/2015 | | Electrocardiogram routine ECG with at least 12 leads tracing only without interpretation and report | CPT-4 | 93005 |
| | | Poisoning by heroin | ICD-9 | 965.01 |
| | | Emergency department visit for the evaluation and management of a patient, usually the presenting problem(s) are of moderate severity. | CPT-4 | 99283 |
| 02/22/2015-<br>02/22/2015 | | Poisoning by heroin | ICD-9 | 965.01 |
| | WILCHER JONATHAN<br>3901 RAINBOW BLVD<br>KANSAS CITY KS 66160<br>022 - On Campus-Outpatient Hospital | Electrocardiogram routine ECG with at least 12 leads interpretation and report only | CPT-4 | 93010 |
| | | Emergency department visit for the evaluation and management of a patient, usually high severity and require urgent evaluation by the physician but do not pose an immediate significant threat to life or physiologic function (Significant, Separately Identifiable E&M Service by the Same Physician on the Same Day of a Procedure or Other Service) | CPT-4 | 99284 |

# There are powerful synergies with Medical Data.

Compare ICD with CPT codes to track conditions

Correlate ICD codes with Rx to identify diagnosis

Analyze ICD codes, Rx and HCPCS to determine severity of diagnosis

# Predictive Models

# Clinical underwriting and predictive models follow different underwriting paradigms.

## Paradigms

### Clinical Underwriting

- Condition based
- Univariate
- Uses clinical expertise

### Predictive Model

- Statistical basis
- Multivariate analysis
- Single risk metric for each case

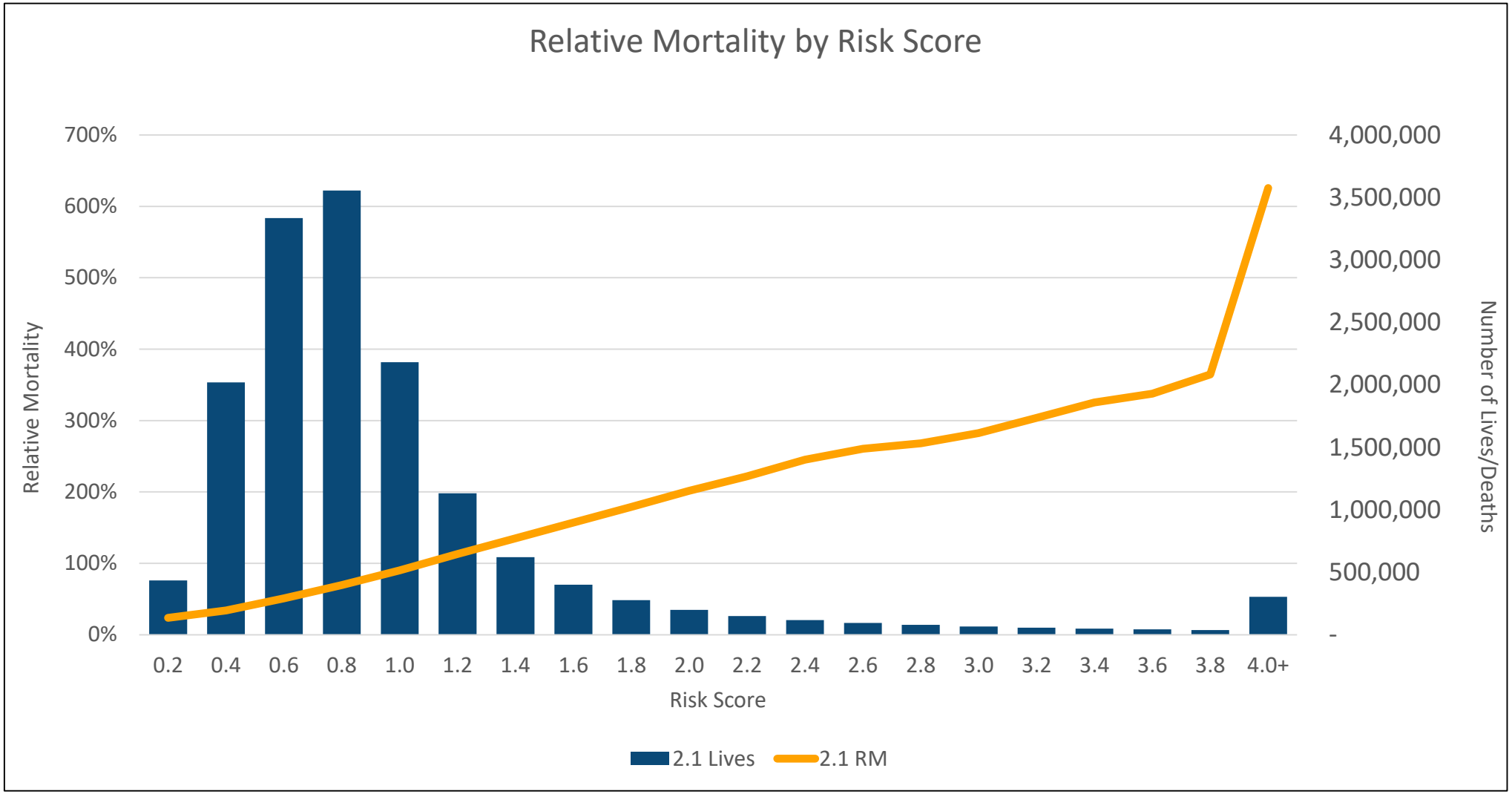
# What is an Rx Predictive Model?

Holistic multi-variate Rx model of mortality risk

Statistical model

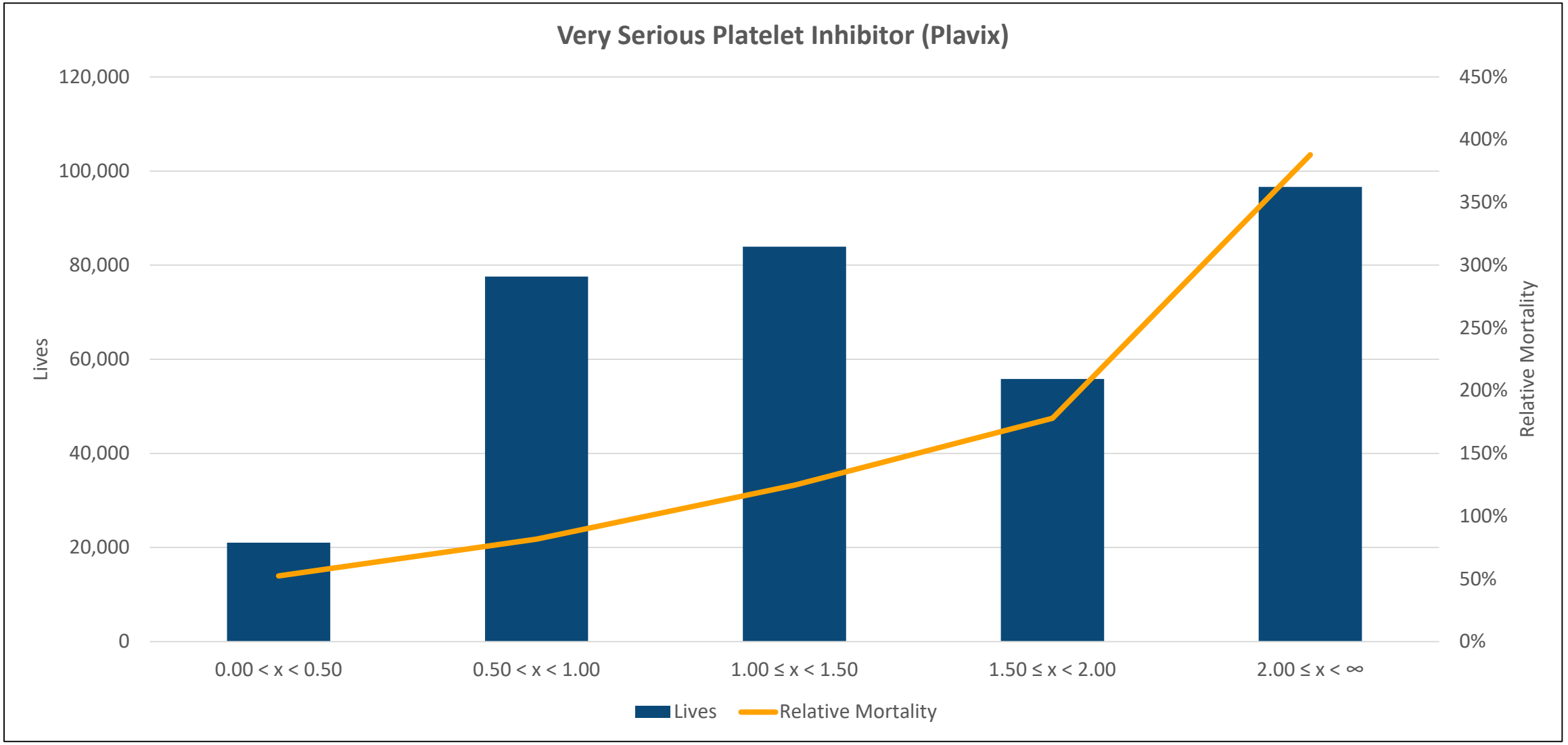
Predicts relative mortality of a life

# Rx model effectively predicts mortality.




2017 Milliman Mortality Study: 25M lives, 15M Rx hits, 469K deaths

# Predictive models can stratify risk within conditions.



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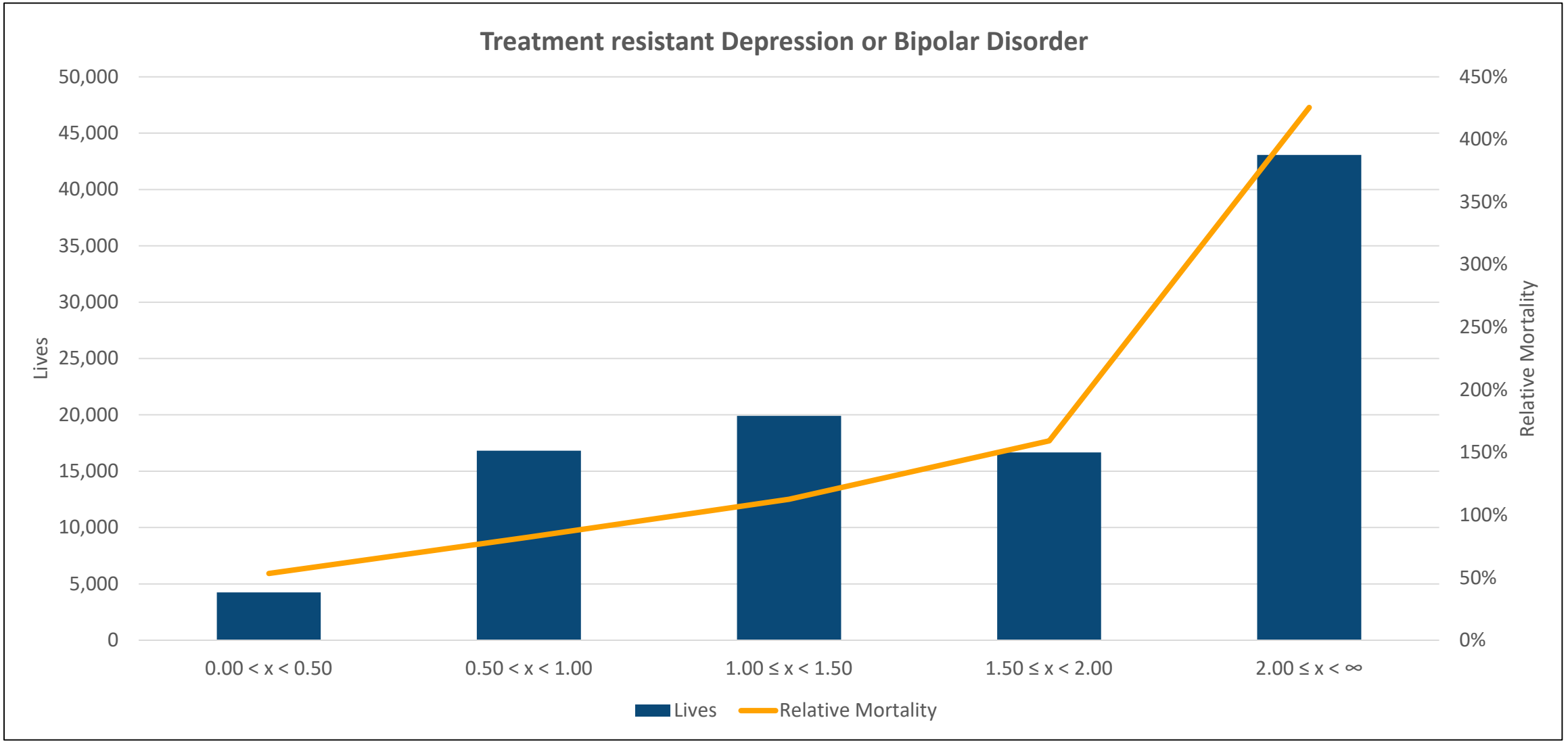

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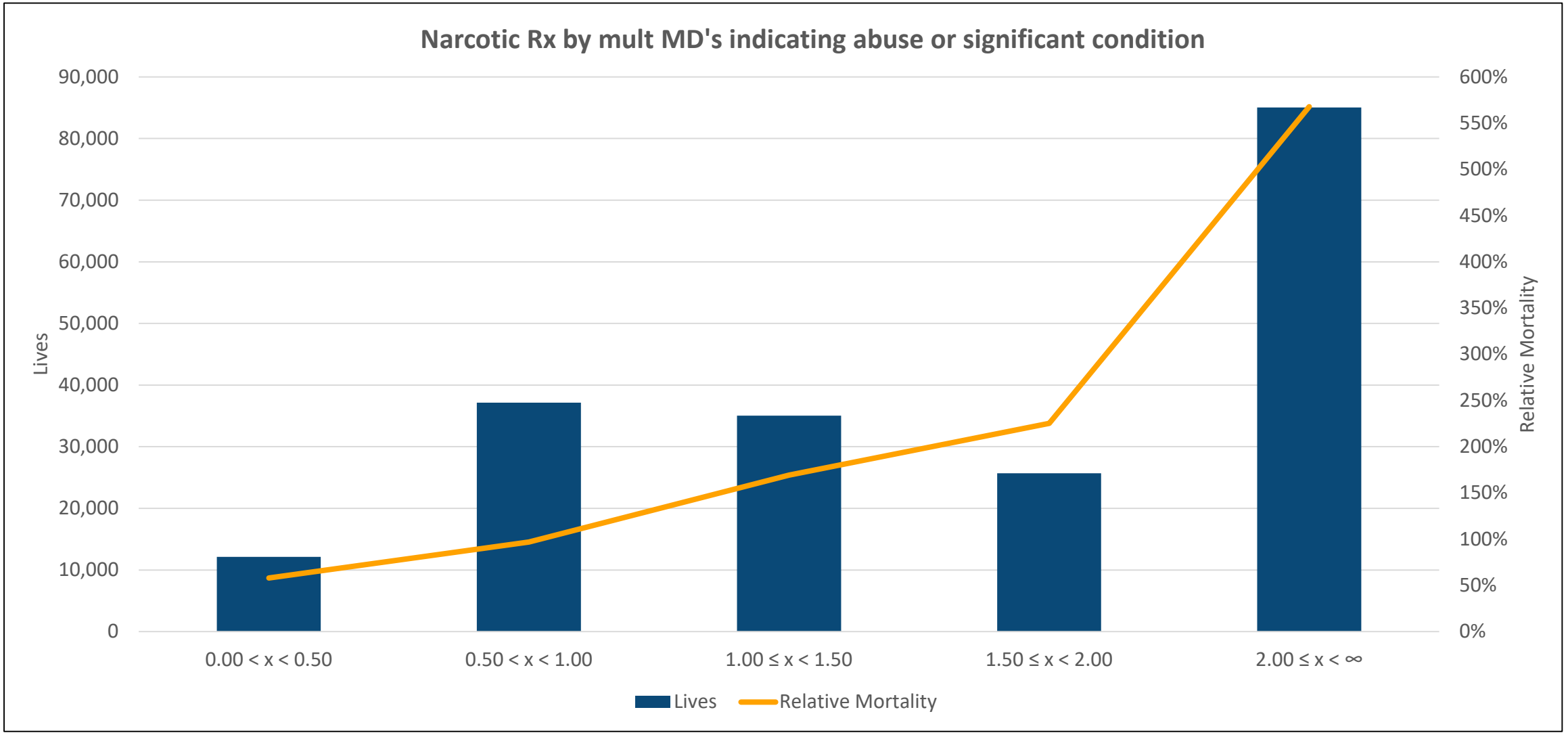


# Credit Data

# Adding credit data improves predictive models.

| Types of Data | |
|---|---|
| Inquiries | Payment behavior |
| Number of accounts | Credit limits |
| Types of accounts | Collections |
| Outstanding amounts | Foreclosures |
| Derogatory marks | Bankruptcies |

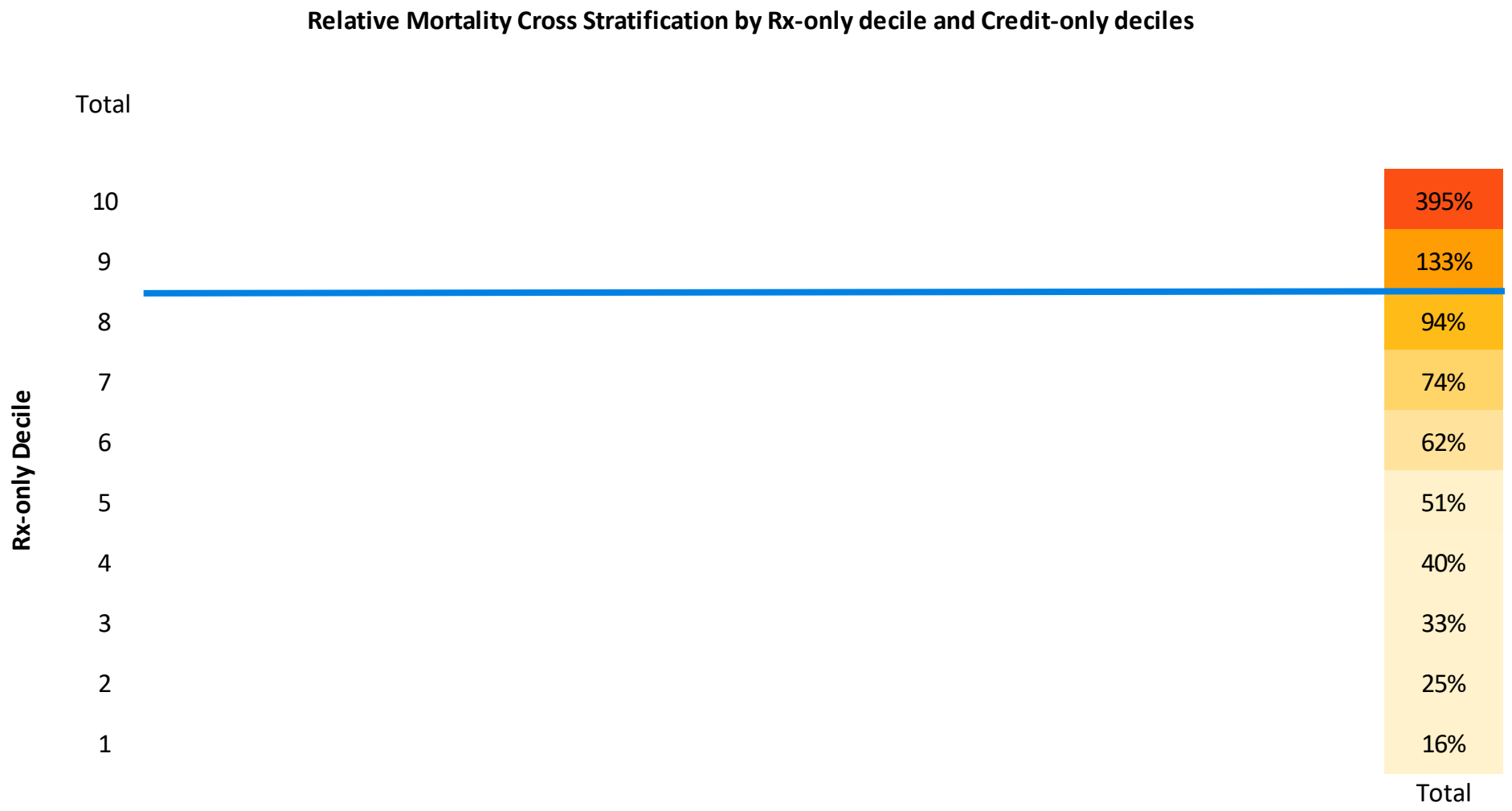
All data is FCRA compliant!

# The Credit Data model does NOT include…

- Non-FCRA data such as:
  - Magazine subscriptions
  - Purchase behavior
  - “Lifestyle” data
  - Income / modeled income

- Professional licenses
- MVR
- Criminal history

# Cross-Stratification: Rx-only against Credit-only Model



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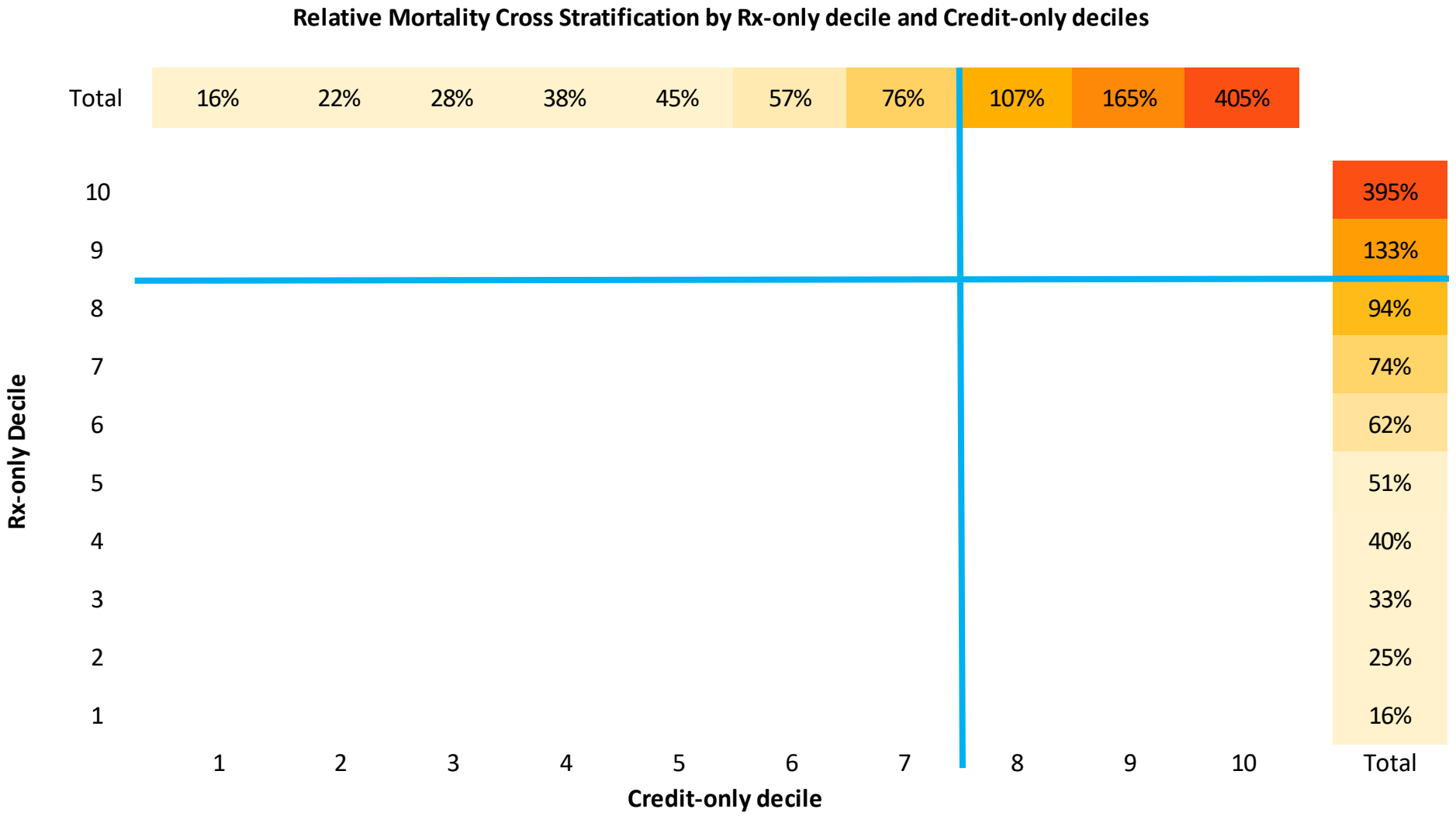

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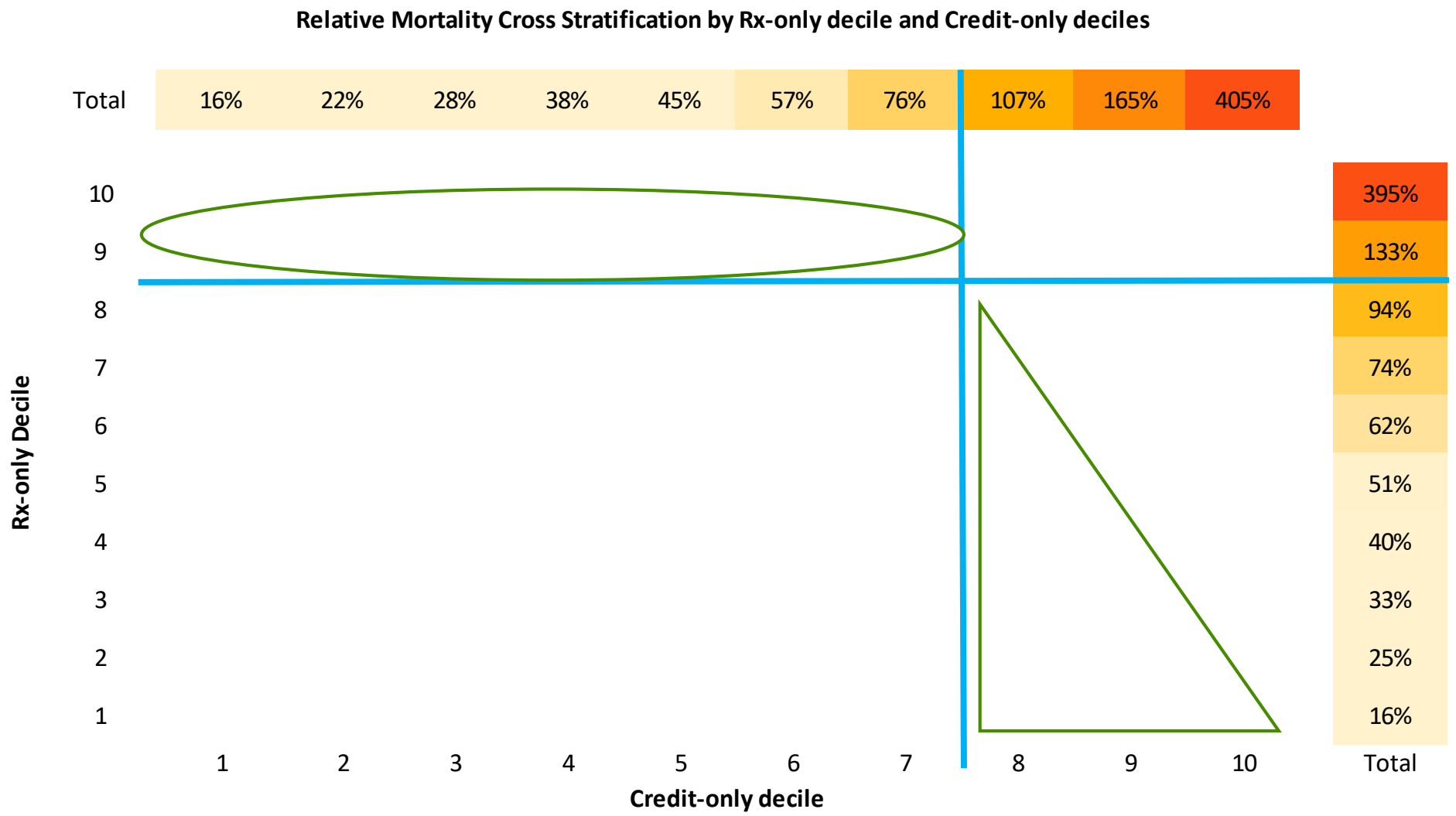

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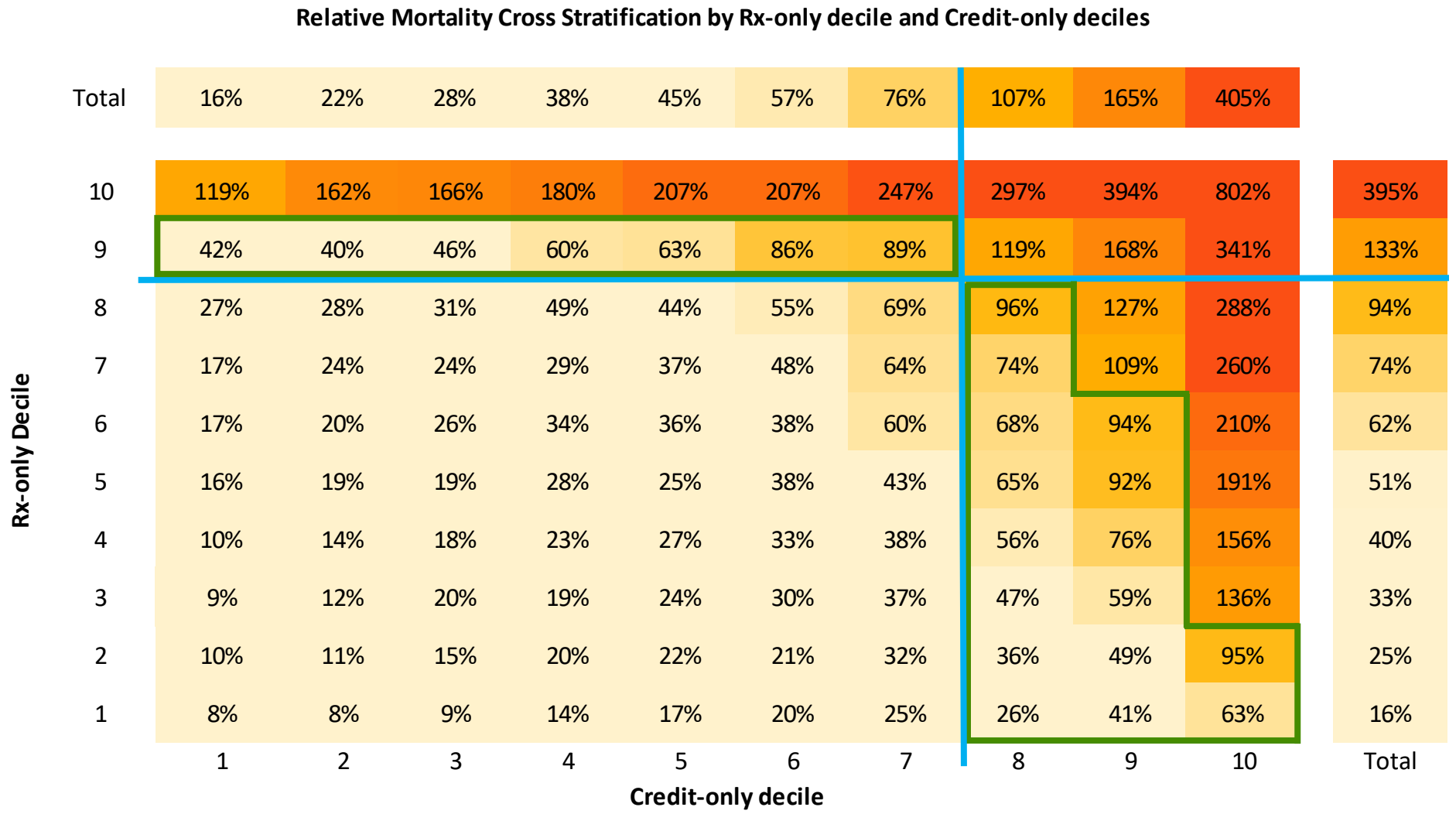
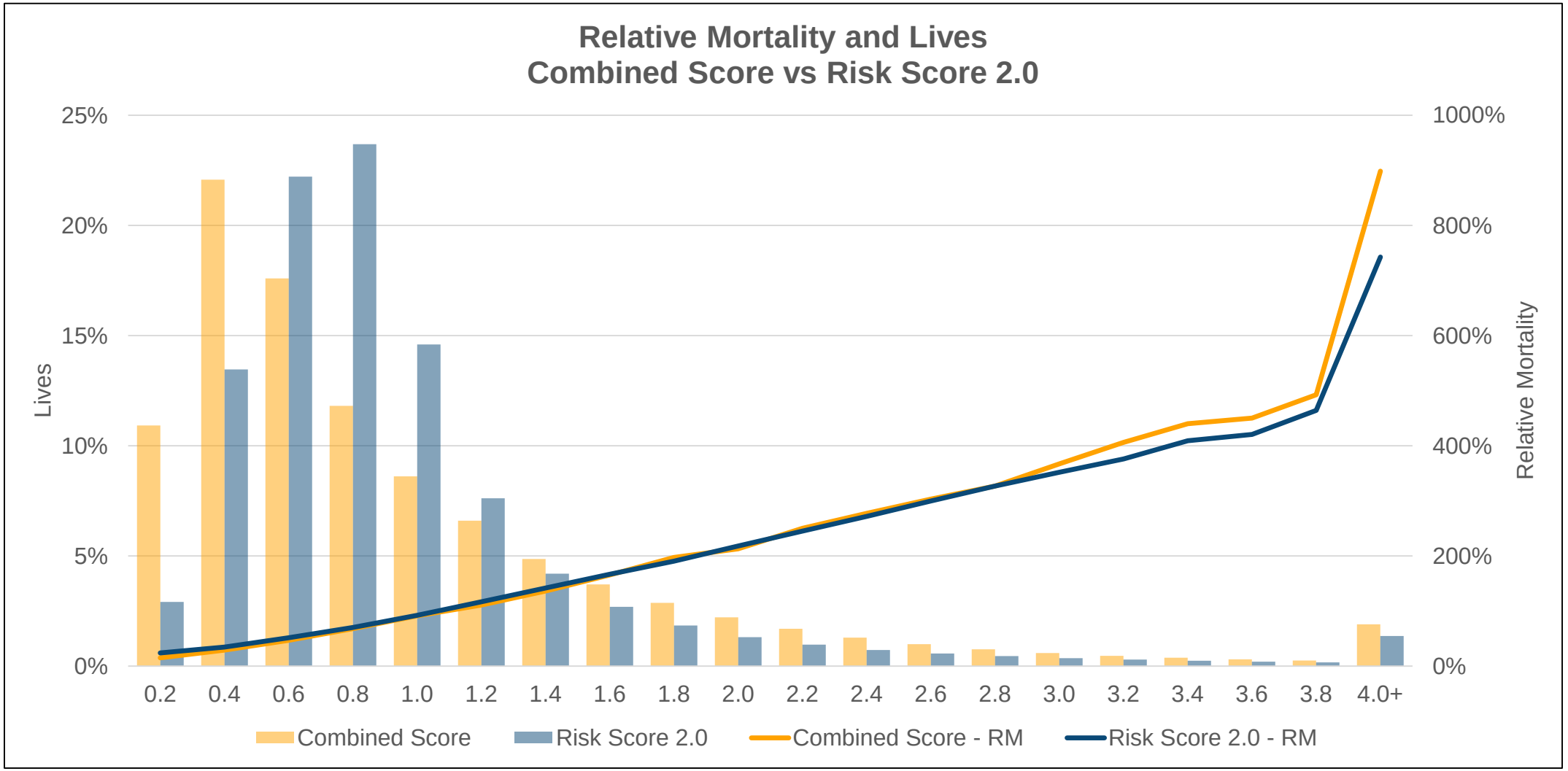
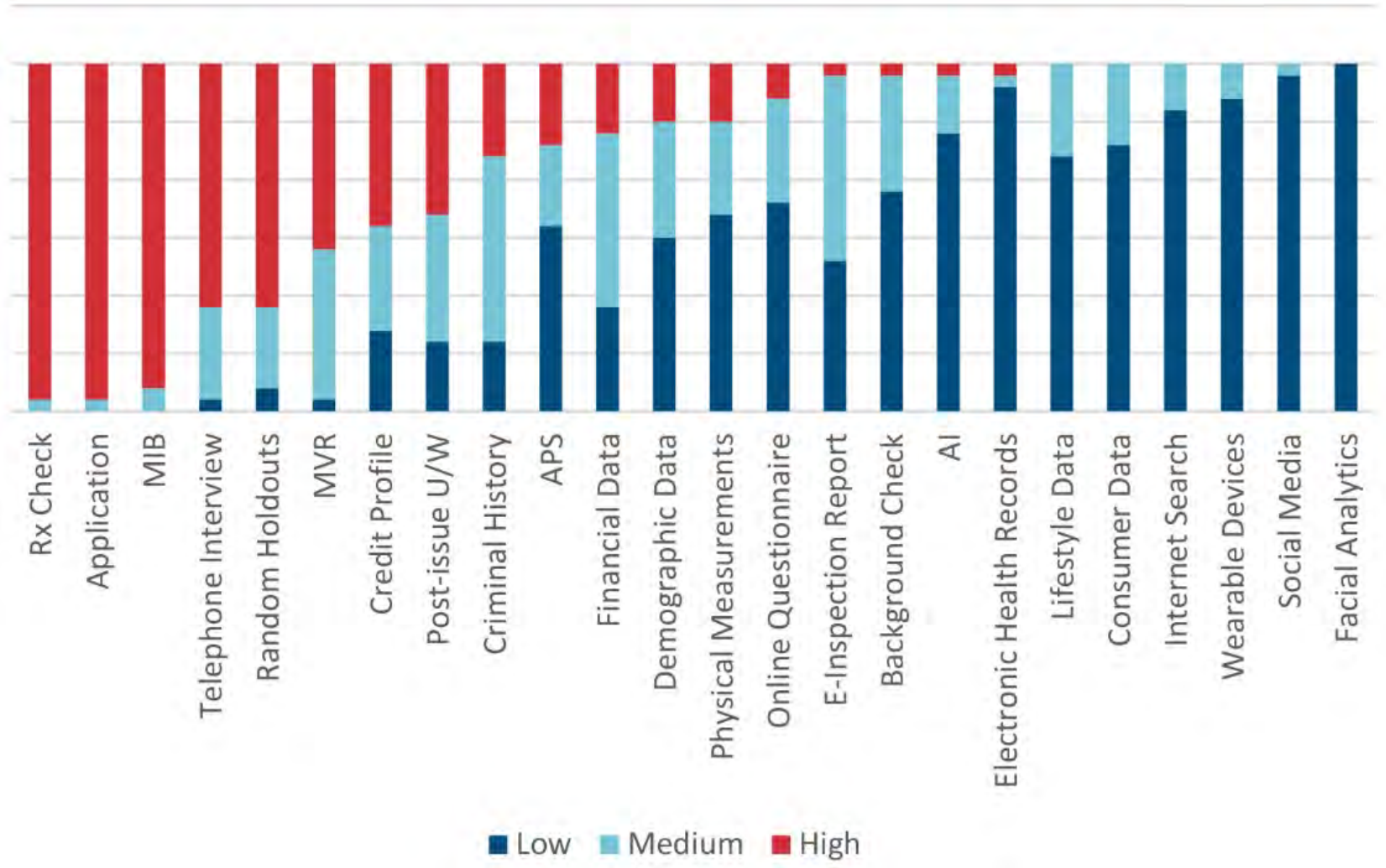


# A combined Risk Score further stratifies mortality.

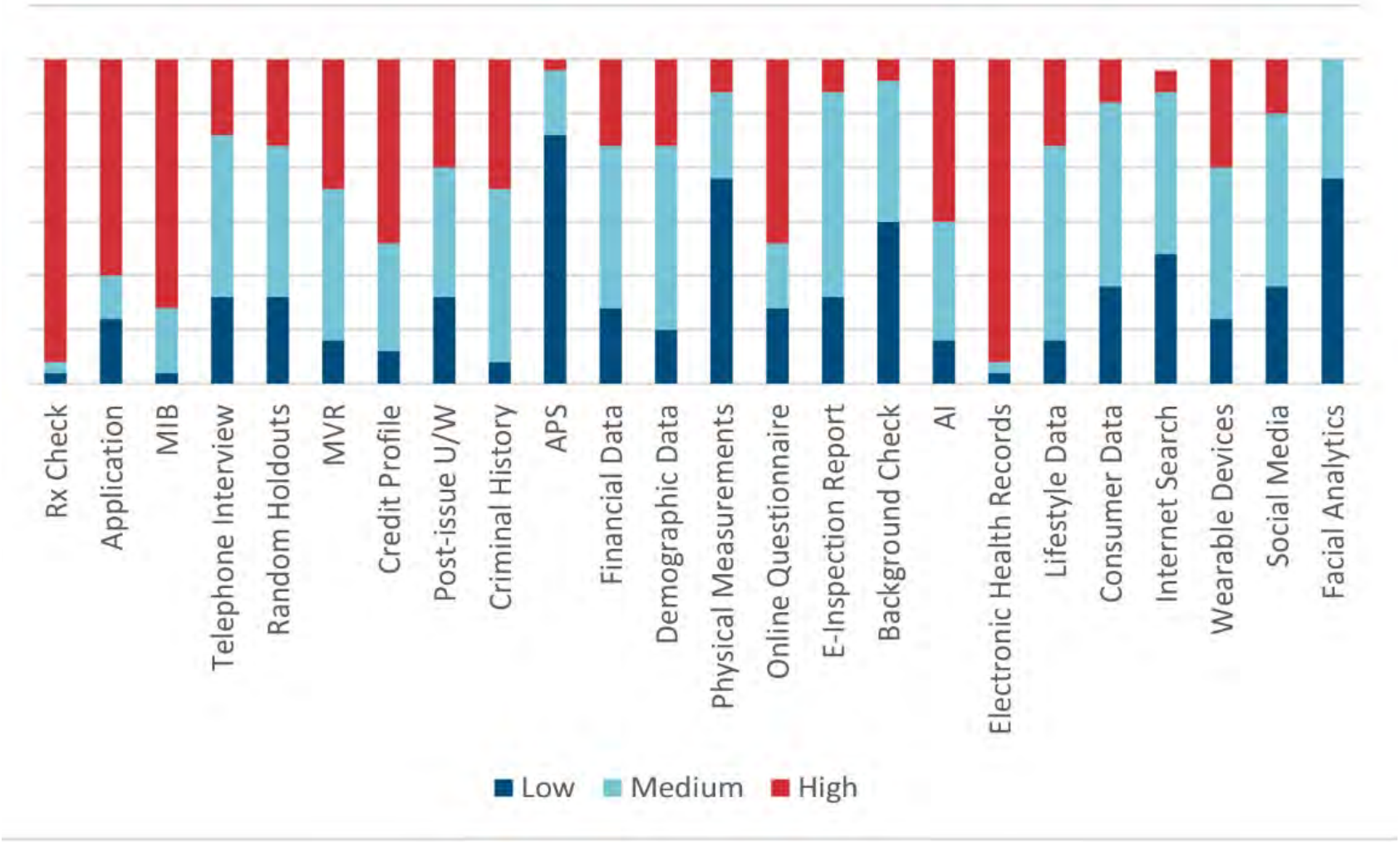


# What data is being used today to accelerate?




Source: Emerging Underwriting Methodologies in a PBR World, SOA Webinar, December 18, 2018

# What data might be used in 10 years to accelerate?




Source: Emerging Underwriting Methodologies in a PBR World, SOA Webinar, December 18, 2018

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# Thank you!

Eric Carlson, Principal and Life Actuary

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262-641-3537

# Accelerated Underwriting

## Front-end and back-end best practices

**Taylor Pickett FSA, MAAA**

10.30.2019

# Our Historical Paradigm

# What is Monitoring?

*Monitor – observe and check the progress or quality of (something) over a period of time;* ***keep under systematic review***

*As defined by Oxford*

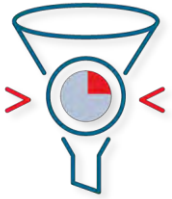
| Approach | Synopsis | Advantages | Disadvantages |
|---|---|---|---|
| Random Holdout | Full evidence ordered on a portion of "acceleratable" cases pre-issue | ▪ Preserve sentinel effect<br>▪ Compare to prior paradigm "apples to apples"<br>▪ Guarantee results (except dropouts) | ▪ Less seamless applicant experience<br>▪ Increased time to policy issue |
| Post-issue Audit | Add'l evidence (e.g. APS) ordered after policy is issued | ▪ More seamless applicant experience<br>▪ No delay to policy issue | ▪ Less consistency from case to case<br>▪ No guarantee of results<br>▪ More challenging to address discrepancies uncovered |

# Mortality Results

## How long until we reach credibility?  A simple example

**40,000 Applications Annually**

Across all products, ages, face amounts, etc.



**65% Eligible* for AU**

Not all cases will be eligible* for accelerated underwriting.

**40% Acceleration Rate**

Not all eligible* cases will be accelerated.

**85% Placement Rate**

Not all accelerated cases will place.

*Eligible group is ages 18-60 and amounts up to $1,000,000 in this example

# Mortality Results

## How long until we reach credibility? A simple example (cont.)

**2**
**Years to reach 10 claims**

**5**
**Years to reach 50 claims**

**16**
**Years to reach 1,000 claims**

**Credible experience does not emerge quickly.**

### Mortality indications needed for:

- Pricing assumptions
- Supporting PBR valuation assumptions
- Reinsurance partners
- Demonstrating program performance to senior management

# Estimating Mortality Impacts

An approximation for the interim

## Confusion Matrix

- Compare “true” class (mortality risk) with accelerated class (premium charged)
  - Calculate mortality slippage
- May be used at program launch for initial pricing assumptions
- Can be updated with random holdout results
  - Compare initial expectations vs. performance

| *Actual* | AU Decision | | |
|---|---|---|---|
| **Audit Decision** | **Best NT** | **Preferred NT** | **Standard NT** |
| Best NT | 750 | 0 | 0 |
| Preferred NT | 150 | 800 | 0 |
| Standard NT | 65 | 145 | 980 |
| Rated NT | 10 | 30 | 50 |
| Preferred Tobacco | 3 | 8 | 12 |
| Standard Tobacco | 1 | 2 | 8 |
| Rated T | 0 | 1 | 10 |
| Decline | 10 | 15 | 20 |

# Mortality Slippage

## Example Calculation

| *Actual* | AU Decision | | |
|---|---|---|---|
| **Audit Decision** | **Best NT** | **Preferred NT** | **Standard NT** |
| Best NT | 74 | 0 | 0 |
| Preferred NT | 12 | 76 | 0 |
| Standard NT | 8 | 15 | 87 |
| Rated NT | 2 | 3 | 4 |
| Preferred Tobacco | 3 | 2 | 2 |
| Standard Tobacco | 1 | 2 | 4 |
| Rated T | 0 | 1 | 1 |
| Decline | 0 | 1 | 2 |
| Mortality Slippage: | 121% | 125% | 120% |
| ***Wtd Avg MS:*** | ***122%*** | | |

| Category | Mortality Impact | Distribution |
|---|---|---|
| Better | 75% | 0% |
| Same | 100% | 79% |
| 1 Cls Worse | 125% | 9% |
| 2 Cls Worse | 150% | 3% |
| Substd/Tobacco | 225% | 8% |
| Decline | 400% | 1% |
| ***Wtd Avg. Slippage*** | ***117%*** | |

**Why the difference?**



Images from https://upload.wikimedia.org/wikipedia/commons/a/a7/Children%27s_pain_scale.JPG and have been altered from their original form.

# Mortality Slippage

## Calculation considerations

- Mortality differentials not uniform by class
- Some values are flatter (e.g. Decline) while others vary (Super Preferred, Preferred NT, etc.)
- Misclassification varies by class
  - True for both prevalence and severity
- **Strive for consistency with pricing**
  - Each risk class is (likely) priced separately
  - Is there a separate pricing cell for accelerated policies?

# Mortality Slippage

## Main drivers

- Impacts of new data sources
  - Observe conservation of deaths
  - Consider exclusivity
  - Any segmentation within risk classes?
- Misclassification
  - Unintentional and anti-selective misrepresentation
  - Severity vs prevalence
    - Misclassification of standard and better risks can be more costly than forgetful smokers

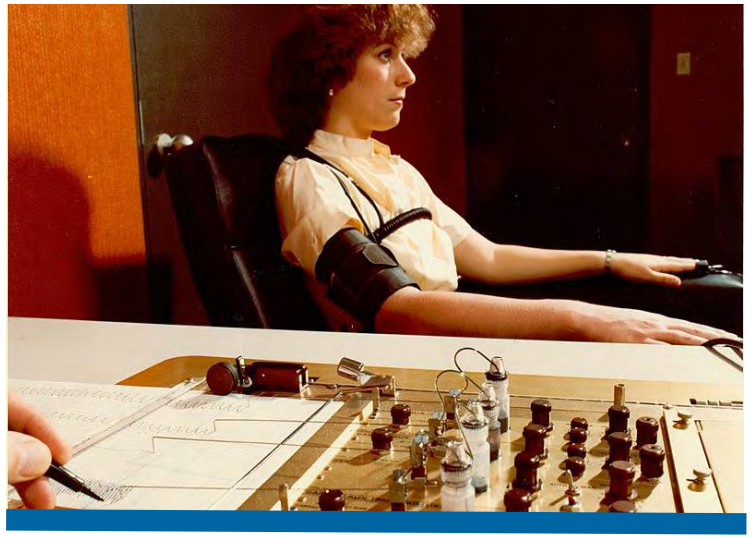
# Mortality Slippage

## Mitigation

- Common reasons for misclassification
  - Preferred knock-out criteria (e.g. build, cholesterol, blood pressure)
  - Undisclosed tobacco use
  - Previously verifiable information that is now unknown
- How do we close the gap? **Understanding the drivers points us to solutions**

# Mortality Slippage

## Mitigation (cont.)



- Behavioral Science

- New data sources

- Optimized evidence framework

# Mortality Slippage

## Mitigation – Behavioral Science

- **How much can we decrease non-disclosure?**
  - **How much will that impact mortality results?**
- **Focus on impairments with fewer surprise findings**

# Mortality Slippage

## Mitigation – new data sources

- **What information is most helpful?**
  - **Focus on most common causes of misclassification**
  - **How much would mortality improve with no misclassification because of X?**
- **Prioritize investment in evidence that moves the needle on mortality**

# Mortality Slippage

## Mitigation – optimized evidence framework

- **Should our use of existing data/evidence change if new tools are added?**
  - **Consider exclusivity to avoid double counting**
  - **Which evidences cause the most path changes or decision impacts?**
- **"Fail fast" framework**
  - **Reduce evidence costs**
  - **Improve cycle times**

# Monitoring - Reprise

## Effective monitoring lets us:

- Estimate mortality impacts

- Create feedback loop

- Use data to answer “What if…?” questions

# Monitoring - Reprise

## Will monitoring become unnecessary?

- Random holdouts can reach credibility quickly.
- Is the existing sample still relevant if…
  - new evidence is added?
  - previously used evidence is removed?
  - new distribution channels are added?
  - underwriting guidelines change?
- What if applicant or agent behavior changes in the future?
  - Already some evidence of change from FUW to AU
  - What will happen as agents learn the AU program?

# In Closing



Image from https://commons.wikimedia.org/wiki/File:Wayne_Gretzky_statue_2.jpg and has been altered from its original form.