

#### 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
<ul> <li>Electronic requirements (Rx, Medical Data, MIB, MVR, Credit)</li> <li>Decision engines driven by data</li> <li>Predictive Models</li> <li>Automation</li> </ul>	<ul> <li>Attending Physician Statements</li> <li>Labs</li> <li>Cycle times</li> <li>Costs</li> </ul>

#### **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**



## 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 ...)



#### **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

#### UW Guidance

- Conditions
- Severity
- Decisions
- Risk Score (optional)

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

	Opy Oidiac 469 Fills Doctors Pharm	<u>acies</u> <u>Han</u>	k's RxGuide	<u>Medical</u>	Show Rx Details
	SSN 990-11-1525 DOB 12/31/1968 Age	49 Male 2	Zip Code 5301	L	
÷	😷 🕑 🌖 AP 🔟 🖄 Rule Results				Clear Highlights
Prior	2015 2016	5	20	17	2018
+	++3//0+0/0++/400+0/	003+3	++ 3 7 8 4	01+3310	
2014	GABAPENTIN (Gabapentin)		HIGH	<u>1 Fill</u>	
	PROCHLORPERAZINE MALEATE	<u>RxGuide</u>	HIGH	<u>3 Fills</u>	
	(Prochlorperazine Maleate)		1		
	+ ALPRAZOLAM (Alprazolam)	<u>RxGuide</u>	MEDIUM	<u>37 Fills</u>	<b>i</b>
	+ BUDEPRION SR (Bupropion HCl)		MEDIUM	<u>10 Fills</u>	
	<b>BUPROPION HCL SR</b> (Bupropion HCl)		MEDIUM	<u>7 Fills</u>	
	CITALOPRAM HYDROBROMIDE (Citalopra	am <b>RxGuide</b>	MEDIUM	<u>1 Fill</u>	
	Hydrobromide)		1		
	+ FLUCONAZOLE (Fluconazole)	<u>RxGuide</u>	MEDIUM	<u>34 Fills</u>	
	+ HYDROCODONE/ ACETAMINOPHEN	<u>RxGuide</u>	MEDIUM	45 Fills	
	(Hydrocodone-Acetaminophen)		<b>.</b>		
	+ HYDROMORPHONE HCL (Hydromorphone	<u>RxGuide</u>	MEDIUM	<u>3 Fills</u>	
	HCI)		1		
	+ HYOSCYAMINE SULFATE (Hyoscyamine	<b>RxGuide</b>	MEDIUM	<u>3 Fills</u>	
2014	Sulfate)		1		
	+ LORAZEPAM (Lorazepam)	<b>RxGuide</b>	MEDIUM	<u>1 Fill</u>	
	METHOCARBAMOL (Methocarbamol)		MEDIUM	<u>1 Fill</u>	
	METOCLOPRAMIDE HCL (Metoclopramide	HCI)	MEDIUM	<u>1 Fill</u>	
	+ OXYCODONE/ ACETAMINOPHEN	<u>RxGuide</u>	MEDIUM	<u>2 Fills</u>	
	(Oxycodone w/ Acetaminophen)				



## Sample Case: Page 2

	OXYCONTIN (Oxycodone HCl)	<u>RxGuide</u>	MEDIUM	<u>3 Fills</u>
2013	PROVENTIL HFA (Albuterol Sulfate)		MEDIUM	<u>1 Fill</u>
	<b>TESTIM</b> (Testosterone)	<u>RxGuide</u>	MEDIUM	<u>1 Fill</u>
	TRAMADOL HCL (Tramadol HCl)		MEDIUM	<u>2 Fills</u>
	TRIAMTERENE/     HYDROCHLOPOTHIAZIDE	<u>RxGuide</u>	MEDIUM	<u>39 Fills</u>
	(Triamterene & Hydrochlorothiazide)			
	+ TRIAZOLAM (Triazolam)	<u>RxGuide</u>	MEDIUM	<u>1 Fill</u>
	VALACYCLOVIR HCL (Valacyclovir HCl)	<u>RxGuide</u>	MEDIUM	<u>40 Fills</u>
	+ VALTREX (Valacyclovir HCl)	RxGuide	MEDIUM	<u>61 Fills</u>
	+ AMOXICILLIN (Amoxicillin)		LOW	<u>3 Fills</u>
2013	+ AZITHROMYCIN (Azithromycin)	<b>i</b>	LOW	<u>2 Fills</u>
	+ CEPHALEXIN (Cephalexin)		LOW	<u>4 Fills</u>
2013	• CHERATUSSIN AC (Guaifenesin-Codeine)	<u>RxGuide</u>	LOW	<u>1 Fill</u>
	CHLORHEXIDINE GLUCONATE (Chlorhexid Gluconate (Mouth-Throat))	dine	LOW	1 Fill
	CLINDAMYCIN HCL (Clindamycin HCl)		LOW	<u>1 Fill</u>
2014	CLINDAMYCIN PHOSPHATE (Clindamycin (Topical))	Phosphate	LOW	1_Fill
	CLOTRIMAZOLE (Clotrimazole (Topical))		LOW	<u>1 Fill</u>
2013	<b>DELSYM</b> (Dextromethorphan Polistirex)		LOW	<u>1 Fill</u>
	DENAVIR (Penciclovir)		LOW	<u>8 Fills</u>
	ERYTHROCIN STEARATE (Erythromycin St	tearate)	LOW	<u>26 Fills</u>
	<b>ERYTHROMYCIN BASE</b> (Erythromycin Base	e)	LOW	<u>1 Fill</u>



## Sample Case: Page 3

2014	<b>ESTRADERM</b> (Estradiol)	LOW	<u>34 Fills</u>
	ESTRADIOL (Estradiol)	LOW	<u>1 Fill</u>
	+ ESTRASORB (Estradiol)	LOW	<u>16 Fills</u>
2014	ESTROGEL (Estradiol)	LOW	<u>1 Fill</u>
	+ IBUPROFEN (Ibuprofen)	LOW	<u>5 Fills</u>
	+ LIDOCAINE (Lidocaine) RxGuide	LOW	<u>1 Fill</u>
	METROGEL (Metronidazole (Topical))     RxGuide	LOW	<u>4 Fills</u>
	MINOCYCLINE HCL (Minocycline HCl)     RxGuide	LOW	<u>26 Fills</u>
	NYSTATIN (Nystatin (Topical))	LOW	<u>6 Fills</u>
	• NYSTATIN (Nystatin (Topical))             • OMEPRAZOLE (Omeprazole)		<u>6 Fills</u>
	• NYSTATIN (Nystatin (Topical))             • OMEPRAZOLE (Omeprazole)             • PRASCION (Sulfacetamide Sodium w/ Sulfur)		<u>6 Fills</u> <u>2 Fills</u> <u>12 Fills</u>
2014	<ul> <li>NYSTATIN (Nystatin (Topical))</li> <li>OMEPRAZOLE (Omeprazole)</li> <li>PRASCION (Sulfacetamide Sodium w/ Sulfur)</li> <li>SULFAMETHOXAZOLE/ TRIMETHOPRIM DS (Sulfamethoxazole-Trimethoprim)</li> </ul>		6 Fills 2 Fills 12 Fills 12 Fills 12 Fills 14 Fill
2014	<ul> <li>NYSTATIN (Nystatin (Topical))</li> <li>OMEPRAZOLE (Omeprazole)</li> <li>PRASCION (Sulfacetamide Sodium w/ Sulfur)</li> <li>SULFAMETHOXAZOLE/ TRIMETHOPRIM DS (Sulfamethoxazole-Trimethoprim)</li> <li>TRI-LUMA (Fluocinolone-Hydroquinone- Tretinoin)</li> </ul>		6 Fills 2 Fills 12 Fills 13 Fill 14 Fill 14 Fill 14 Fill 14 Fill 15 Fi

**Ci** Milliman

## Sample Case: Using Rules Engine

	<u>Opy Oidiac</u>	469 Fills	Doctors Pl	harmacies <u>Han</u>	k's RxGuide	Medical		Show Rx Details
	SSN 990-11-1	1525 DOB	12/31/1968	Age 49 Male	Zip Code 53011	L		_
	🕈 🕒 🌖 АР	TI 🗄 Ru	ule Results					Clear Highlights
	🕐 🅐 🌖 AP	TI 🗄 Na	rcotic Analgesic	- Agonist Rx - #147	6			
	🕐 🅐 🌖 AP	TI 🗄 Pot	tentially Abusive	Narcotic Analgesic	- #1478			
	🕐 🅐 🌖 AP	TI 🗄 Ant	ti-Convulsant wi	th multiple uses - Pri	ior3 - #354			
	🥐 🕐 🌖 AP	TI 🗄 De	pression / Psych	niatric Second Line F	Rx use - #80			
	🕐 🕐 🌖 AP	TI 🛨 Hy	pertension First	Line multiple medica	ations - #175			
	🥐 🕐 🌖 AP	🔟 🗄 Irrit	table Bowel Syn	drome or Constipation	on Rx - Prior3 - #2	220		
	P+ P S AP	TI 🗄 Mu	Iltiple narcotic dr	ugs indicating abuse	e or significant co	ndition - #302		
	P+ P S AP	TI 🗄 Na	rcotic Rx by mul	t MD's indicating ab	use or significant	condition - #71	1	
	🕐 🕐 🌑 AP	TI 🛨 No	tes					
Prior	2	2015		2016	20:	17	20	018
+	+ + 9 7 7 6	6 + 8 7 5	+ + 7 4 5 6	+ 8 7 6 6 9 + 9	+ + 5 7 9 4	87+997	6	
014		<b>TIN</b> (Gabap	entin)		HIGH		<u>1 Fill</u>	
	+ PROCHLO	RPERAZIN	E MALEATE	<u>RxGuide</u>	HIGH		<u>3 Fills</u>	
	(Prochlorpe	erazine Male	ate)					
	+ ALPRAZO	LAM (Alpraz	olam)	<u>RxGuide</u>	MEDIUM	I	<u>37 Fills</u>	ı ı
		ON SR (Bup)	ropion HCl)		MEDIUM		<u>10 Fills</u>	
						I	7 Fille	
	+ BOPROPI	UN HEL SK		) 	MEDIOM			
		RAM HYDRO	OBROMIDE (Cit	talopram <b>RxGuide</b>	MEDIUM		<u>1 Fill</u>	
	Hydrobrom	nide)	1 .		1		1 .	
	FLUCONA	ZOLE (Fluco	nazole)	<u>RxGuide</u>	MEDIUM		<u>34 Fills</u>	
	+ HYDROCO	DONE/ AC	ETAMINOPHE	N <u>RxGuide</u>	MEDIUM		45 Fills	
	(Hydrocodo	one-Acetami	inophen)					
			HCL (Hydromori	abone <b>BxGuide</b>	MEDTUM		3 Fills	



## **Applying Mortality Facts**

#### 2009

Milliman / RGA study Milliman study

1M exposure years

2,500 deaths

- 21M exposure years
- 45,000 deaths

2012

#### 2015

Milliman study

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

#### 2017

Milliman study

500K deaths

200M+ exposure years

Milliman Risk Score

#### 2019

In process

Milliman study

More data



#### **C** Milliman

## **Mortality – Context Matters**



\* CINV = Chemotherapy Induced Nausea and Vomiting



## **Mortality – Drug Combinations Matter**





## **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?

Query data sources in real time

FCRA compliant – 7 years of data

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.

#### **C** Milliman

## Case 1 – Irix identifies opioid concerns.

- Age: 26
- Male
- Rx Fills: 11

	Joe Applicant	<u>11 Fills</u> D	octors Ph	armacie	<u>s</u> <u>Hank's RxGu</u>	<u>iide</u> <u>Medical</u>		Show Rx	Details
	SSN 992-60-600	60 DOB 5/7	/1992 Age	26 Male	e Zip Code 0210	1			
Ŧ	P P S AP T	ı 🗄 Irix Res	sults				(	Clear Hig	hlights
Prior	2010	6	2	2017		2018	20	19	
7			1 3						
	+ OXYCODONE	/ ACETAMIN	OPHEN	<u>RxGuide</u>	MEDIUM	<u>3 Fills</u>			
2015	(Oxycodone w	/ Acetaminopl	nen)		I .				I
		NAIL LACQU	JER (Ciclopiro	×)	LOW	<u>1 Fill</u>			I
2013		IN HCL (Clinda	amycin HCl)		LOW	<u>1 Fill</u>			I
	+ DICLOFENAC	SODIUM DR	t (Diclofenac	<u>RxGuide</u>	LOW	<u>1 Fill</u>			
2013	Sodium)	. 1			I .				1
2015		NE HYCLATE (	Doxycycline H	lyclate)	LOW	<u>1 Fill</u>			
		(Meloxicam)		<u>RxGuide</u>	LOW	<u>1 Fill</u>	;		
		Naproxen)		<u>RxGuide</u>	LOW	<u>1 Fill</u>			
2015	+ PROMETHAZ	INE HCL (Pro	methazine HC	l)	LOW	<u>1 Fill</u>			
	+ TERBINAFIN	E HCL (Terbin	afine HCl)		LOW	<u>1 Fill</u>			
	• •								



## Case 1 – Irix identifies opioid concerns.

- Age: 26
- Male
- Rx Fills: 11

	Joe Applicant 11 Fills Doctors Pharmaci	es Hank's RxGuide	<u>Medical</u>	Show Rx Details
	SSN 992-60-6060 DOB 5/7/1992 Age 26 Ma	le Zip Code 02101		
	🤨 🕐 🌗 AP TI 🗄 Irix Results			Clear Highlights
	<ul> <li>AP TI</li> <li>Dx - Opioid Overdose Treatment</li> <li>Dx - Opioid overdose</li> <li>965.01 - 02/22/2015-02</li> <li>AP TI</li> <li>Dx - Tobacco/Nicotino Dopond</li> <li>AP TI</li> <li>Notes</li> </ul>	nt - Prior3 - #9941 /22/2015 - Poisoning by he once Status Fow #9455	eroin	
Prior 7	2016 2017	201	8	2019
2015	OXYCODONE/ ACETAMINOPHEN     RxGuid     (Oxycodone w/ Acetaminophen)	e MEDIUM	<u>3 Fills</u>	
	EICLOPIROX NAIL LACQUER (Ciclopirox)	LOW	<u>1 Fill</u>	
2013	ELINDAMYCIN HCL (Clindamycin HCl)	LOW	<u>1 Fill</u>	
2013	<b>DICLOFENAC SODIUM DR</b> (Diclofenac <b>RxGuid</b> Sodium)	e LOW	<u>1 Fill</u>	
2015	<b>DOXYCYCLINE HYCLATE</b> (Doxycycline Hyclate)	LOW	<u>1 Fill</u>	
	HELOXICAM (Meloxicam)	e LOW	<u>1 Fill</u>	
	NAPROXEN (Naproxen)     RxGuid	e LOW	<u>1 Fill</u>	
2015	PROMETHAZINE HCL (Promethazine HCl)	LOW	<u>1 Fill</u>	
	TERBINAFINE HCL (Terbinafine HCl)	LOW	<u>1 Fill</u>	

**C** Milliman

## **Case 1 – Irix identifies opioid concerns.**

- Age: 26
- Male
- Rx Fills: 11

	Joe Applicant         11 Fills         Doctors           SSN 992-60-6060         DOB 5/7/1992	Pharmacies Hank's RxGuide Medical Age 26 Male Zip Code 02101	Show Rx Details	
-	🔫 🕐 🌗 AP TI 🕙 Irix Results		Clear Highlights	
	<ul> <li>AP TI</li> <li>Dx - Opioid Over</li> <li>Dx - Opioid over</li> <li>Dx - Opioid over</li> <li>965.01 - 0</li> <li>965.01 - 0</li> <li>AP TI</li> <li>Dx - Tobacco/Nice</li> <li>AP TI</li> <li>Notes</li> </ul>	dose Treatment - Prior3 - #9941 verdose 2/22/2015-02/22/2015 - Poisoning by heroin otine Dependence Status - Few - #9455		
Prior 7	2016	2017 2018 20 3	19	
02/22/2015-	JOHNSON COUNTY MED ACT	Ground mileage, per statute mile	HCPCS A042	25
02/22/2015	OLATHE KS 66061 041 - Ambulance - land	Ambulance service, advanced life support, emergency transport, level 1 (ALS 1 - emergency)	HCPCS A04:	27
02/22/2015- 02/22/2015		Electrocardiogram routine ECG with at least 12 leads tracing only without interpretation and report	: CPT-4 9300	05
		Poisoning by heroin Emergency department visit for the evaluation and management of a	ICD-9 965.	.01
		patient, usually the presenting problem(s) are of moderate severity.	CF1-4 9920	03
02/22/2015-		Poisoning by heroin	ICD-9 965.	.01
02/22/2015	WILCHER JONATHAN	Electrocardiogram routine ECG with at least 12 leads interpretation and	CPT-4 930:	10
	KANSAS CITY KS 66160 022 - On Campus-Outpatient Hospital	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 9928	84



## 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.



**C** Milliman

## Predictive models can stratify risk within conditions.



#### **C** Milliman

## Predictive models can stratify risk within conditions.



#### **C** Milliman

## **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



Relative Mortality Cross Stratification by Rx-only decile and Credit-only deciles



16% 22% 28% 38% 45% 57% 76% 107% 165% 405% Total 10 395% 9 133% 8 94% 7 74% **Rx-only Decile** 6 62% 5 51% 40% 4 3 33% 2 25% 1 16% 3 2 5 6 7 8 9 10 Total 1 4 **Credit-only decile** 

Relative Mortality Cross Stratification by Rx-only decile and Credit-only deciles



Total 16% 22% 28% 38% 45% 57% 76% 107% 165% 405% 10 395% 9 133% 8 94% 7 74% **Rx-only Decile** 6 62% 5 51% 40% 4 3 33% 2 25% 1 16% 3 10 2 5 6 7 8 9 1 4 Total **Credit-only decile** 

Relative Mortality Cross Stratification by Rx-only decile and Credit-only deciles

Proprietary and Confidential

16% 22% 28% 38% 45% 57% 76% 107% 165% 405% Total 10 119% 162% 166% 180% 207% 207% 247% 297% 394% 802% 395% 9 42% 40% 46% 60% 63% 86% 89% 119% 168% 341% 133% 96% 8 27% 28% 31% 49% 44% 55% 69% 127% 288% 94% 7 17% 24% 24% 29% 37% 48% 64% 74% 109% 260% 74% **Rx-only Decile** 6 17% 20% 26% 34% 36% 38% 60% 68% 94% 210% 62% 5 16% 19% 19% 28% 25% 38% 43% 65% 92% 191% 51% 10% 14% 18% 23% 27% 33% 38% 56% 76% 156% 40% 4 3 9% 12% 20% 19% 24% 30% 37% 47% 59% 136% 33% 2 10% 11% 15% 20% 22% 21% 32% 36% 49% 95% 25% 8% 8% 9% 14% 17% 20% 25% 26% 41% 16% 1 63% 2 3 5 6 7 8 1 4 9 10 Total

Relative Mortality Cross Stratification by Rx-only decile and Credit-only deciles

Credit-only decile



## 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





## Thank you!

Eric Carlson, Principal and Life Actuary Eric.Carlson@Milliman.com 262-641-3537

## RGA

## Accelerated Underwriting

Front-end and back-end best practices

Taylor Pickett FSA, MAAA10.30.2019





## **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	<ul> <li>Preserve sentinel effect</li> <li>Compare to prior paradigm "apples to apples"</li> <li>Guarantee results (except dropouts)</li> </ul>	<ul> <li>Less seamless applicant experience</li> <li>Increased time to policy issue</li> </ul>
Post-issue Audit	Add'l evidence (e.g. APS) ordered after policy is issued	<ul> <li>More seamless applicant experience</li> <li>No delay to policy issue</li> </ul>	<ul> <li>Less consistency from case to case</li> <li>No guarantee of results</li> <li>More challenging to address discrepancies</li> </ul>



uncovered

## **Mortality Results**

How long until we reach credibility? A simple example





\*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.)





#### 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	77540	0	0
Preferred NT	150	8700	0
Standard NT	රර්	145	9600
Rated NT	120	230	540
Preferred Tobacco	3	8	12
Standard Tobacco	\$	2	g.
Rated T	ß	5	10
Decline	100	15	20



#### **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%

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%

7

Why the difference?



Wtd Avg MS:

122%

#### 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?





#### 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
    - o Misclassification of standard and better risks can be more costly than forgetful smokers



### 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



#### Mitigation – Behavioral Science





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



#### Mitigation – new data sources





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



