Rethinking and Reshaping Underwriting

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Presenters:
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Carmela Tedesco
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Rethinking and Reshaping Underwriting

June 25, 2015

Presented by: Carmela Tedesco
VP Underwriting & Claims
WHAT IS YOUR BACKGROUND?

1. Actuary
2. Chief Underwriter
3. Underwriter
4. Other Insurance Professional
RETHINK

Target Market

Risk Assessment

Incentivize Great Behavior
Who needs it?

Target Market
SIMPLE PRODUCT

It has to be an easy product!

Get them through the door!

Upsell later!  *(Wisdom comes with age)*
## CAUSES OF DEATH
### U.S. & CANADA

### Leading Cause of Death (USA)
#### Both Genders (2010)

<table>
<thead>
<tr>
<th>Rank</th>
<th>Age 25-44</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Accident</td>
<td>25%</td>
</tr>
<tr>
<td>2</td>
<td>Cancer</td>
<td>14%</td>
</tr>
<tr>
<td>3</td>
<td>Heart Disease</td>
<td>12%</td>
</tr>
<tr>
<td>4</td>
<td>Suicide</td>
<td>11%</td>
</tr>
<tr>
<td>5</td>
<td>Homicide</td>
<td>6%</td>
</tr>
<tr>
<td>6</td>
<td>All Other</td>
<td>32%</td>
</tr>
</tbody>
</table>

### Leading Cause of Death (Canada)
#### Both Genders (2011)

<table>
<thead>
<tr>
<th>Rank</th>
<th>Age 25-44</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Accident</td>
<td>22%</td>
</tr>
<tr>
<td>2</td>
<td>Cancer</td>
<td>21%</td>
</tr>
<tr>
<td>3</td>
<td>Suicide</td>
<td>16%</td>
</tr>
<tr>
<td>4</td>
<td>Heart Disease</td>
<td>8%</td>
</tr>
<tr>
<td>5</td>
<td>Homicide</td>
<td>3%</td>
</tr>
<tr>
<td>6</td>
<td>All Other</td>
<td>30%</td>
</tr>
</tbody>
</table>
## TOP 4 LEADING INSURERS’ UNDERWRITING EVIDENCE IN CANADA & U.S.

<table>
<thead>
<tr>
<th>Up to age 40</th>
<th>Canada</th>
<th>U.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>$250,000 - $500,000</td>
<td>Vitals ✔✔✔</td>
<td>E/P/NM ✔✔✔</td>
</tr>
<tr>
<td></td>
<td>Blood  ✔✔✔</td>
<td>Blood ✔✔✔</td>
</tr>
<tr>
<td></td>
<td>Urine  ✔✔✔</td>
<td>Urine ✔✔✔</td>
</tr>
<tr>
<td></td>
<td>NM     ✔</td>
<td>MVR   ✔</td>
</tr>
</tbody>
</table>

### Vitals
- Blood
- Urine
- NM

### E/P/NM
- Blood
- Urine
- MVR

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LOGIQ³

FREEDOM TO THINK

info@logiq3.com  416.340.7435  www.logiq3.com
105 King Street East, Toronto, ON M5C 1G6
What info is provided?

Screens for the following:

- Hypertension
- Irregular heart rhythms
- Obesity
What info is provided?

Blood Pressure

Pulse

Build

Screens for the following:

Hypertension

Irregular heart rhythms

Obesity
What is the BCP?

• BCP = Blood Chemistry Profile
• Insurance specific blood tests
• Part of routine age and amount requirements
What is tested?

- Glucose
- Kidney function
- Liver function
- Lipid levels
- HIV
- Nicotine
- Cocaine
BLOOD PROFILE

What do results tell us?

• **Glucose** ➔ Diabetes or Pre-diabetes
• **Kidney function** ➔ Kidney disease/failure
• **Liver function** ➔ Liver diseases/Alcohol/Hepatitis
• **Lipid levels** ➔ Risk factor for heart disease
• **HIV** ➔ AIDS
• **Nicotine** ➔ Tobacco users
• **Cocaine** ➔ Cocaine users
URINALYSIS

Screens for the following:

• Glucose
• Kidney disease
• HIV
• Nicotine
• Cocaine
• Diuretics
• Additional drug screening
URINALYSIS

What do results tell us:

- **Glucose** ➔ Diabetes or Pre-diabetes
- **Kidney disease** ➔ Signs of kidney disease/complications of diabetes
- **HIV** ➔ AIDS
- **Nicotine** ➔ Tobacco users
- **Cocaine** ➔ Cocaine users
- **Diuretics** ➔ Undeclared hypertension
- **Additional drug screening** ➔ Marijuana/others
ARE WE TESTING FOR THE RIGHT THINGS?

• Up to age 44 “Accident”, “Cancer”, and “Heart Disease” and Suicide are the top leading causes of death in Canada and U.S.

• Risks – driving, alcohol, drugs, sports, hobbies and poor judgment, cancer, cardiac, mental nervous disorder

How do vitals, blood and urine provide “protective value” for these risks?
Risk Assessment
<table>
<thead>
<tr>
<th>Risk</th>
<th>MVR</th>
<th>MIB</th>
<th>Credit Check</th>
<th>Script Check</th>
<th>Saliva</th>
<th>Risk Profile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accident</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>Multiple Violations, Drugs, Alcohol, Reckless Behavior, Depression, Poor Judgement, Character/Responsibility, Lifestyle</td>
</tr>
<tr>
<td>Cancer</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>Nicotine, Hepatitis, HIV, Previous Health History</td>
</tr>
<tr>
<td>Heart Disease</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>Nicotine, Previous Health History, Medications</td>
</tr>
<tr>
<td>Suicide</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>Multiple Violations, Drugs, Alcohol, Reckless Behavior, Depression, Poor Judgement, Medications, Poor Credit/Financial Difficulties, Character/Responsibility, Lifestyle</td>
</tr>
</tbody>
</table>
WHICH DATA WOULD YOU NEVER ELIMINATE ON A 40 YEAR OLD MALE FOR $1 MILLION?

1. MIB
2. Script Check
3. MVR
4. Blood
5. Urine
6. Tele-underwriting
Incentivize Great Behavior
VitalityHealth

Health and Life insurance that rewards you for being healthy

LOGIQ³
FREEDOM TO THINK

info@logiq3.com  416.340.7435  www.logiq3.com
105 King Street East, Toronto, ON M5C 1G6
Vitality works in three easy steps

1. Understanding Health
2. Getting Healthier
3. Motivating Rewards

Click on a section to find out more.
REWARD GOOD RESULTS

• Cholesterol testing often is not enough
• 50% of heart attacks occur in individuals with normal low-density lipoprotein (LDL)¹
• The PLAC Test for Lp-PLA₂ Activity is an FDA-cleared test that aids in predicting risk for CHD²


ARE YOU CONSIDERING A REWARD PROGRAM?

1. YES  2. NO
RETHINKING & RESHAPING

“Serve MY Needs”

“Be Consistent”

“Make it Easy”

“Give me VALUE”

“Reward Me”

“Be Transparent”
CONTACT US!

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Re-Thinking and Re-Shaping Underwriting

Society of Actuaries Webcast
June 25, 2015

Alan J. Hobbs
RGA Reinsurance Company
Underwriting Goals

- Accurately assess risk profile
- Uncover existence and severity of impairments and other factors impacting life expectancy
- Make decisions as quickly as possible
- Minimize underwriting costs
Underwriting Techniques

1. Change the way underwriting data is viewed
2. Change the way underwriting data is obtained
3. Change how the underwriting data is reviewed
4. Change the underwriting data
5. Change the applicant pool before obtaining the underwriting data
6. Change the use of underwriting data as it changes
1. Change the way underwriting data is viewed
Motor Vehicle Records (MVR) – The Way It Has It Has Been

- Has been used for decades in life insurance underwriting
- Characteristics
  - Low cost
  - Readily accessible
- General philosophy and approach pretty much unchanged for years and years
  - Scored by points
  - Flat extra premiums assigned to cover additional risk
- Some decline in use over the years
### MVR – Current Use

**Figure 1** Proportion of Companies Ordering MVR by Age and Amount\(^3\)

<table>
<thead>
<tr>
<th>Age</th>
<th>$25,000</th>
<th>$50,000</th>
<th>$100,000</th>
<th>$250,000</th>
<th>$500,000</th>
<th>$1,000,000</th>
<th>$2,000,000</th>
<th>$5,000,000</th>
<th>$10,000,000</th>
<th>&gt;$10,000,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age 15</td>
<td>5%</td>
<td>4%</td>
<td>7%</td>
<td>10%</td>
<td>11%</td>
<td>18%</td>
<td>22%</td>
<td>23%</td>
<td>24%</td>
<td>24%</td>
</tr>
<tr>
<td>Age 25</td>
<td>33%</td>
<td>37%</td>
<td>64%</td>
<td>74%</td>
<td>81%</td>
<td>92%</td>
<td>98%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Age 35</td>
<td>24%</td>
<td>29%</td>
<td>53%</td>
<td>64%</td>
<td>75%</td>
<td>87%</td>
<td>96%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Age 45</td>
<td>11%</td>
<td>12%</td>
<td>32%</td>
<td>45%</td>
<td>60%</td>
<td>68%</td>
<td>92%</td>
<td>98%</td>
<td>98%</td>
<td>98%</td>
</tr>
<tr>
<td>Age 55</td>
<td>9%</td>
<td>10%</td>
<td>28%</td>
<td>38%</td>
<td>57%</td>
<td>62%</td>
<td>91%</td>
<td>96%</td>
<td>98%</td>
<td>98%</td>
</tr>
<tr>
<td>Age 65</td>
<td>18%</td>
<td>20%</td>
<td>36%</td>
<td>49%</td>
<td>66%</td>
<td>74%</td>
<td>94%</td>
<td>96%</td>
<td>98%</td>
<td>98%</td>
</tr>
<tr>
<td>Age 75</td>
<td>34%</td>
<td>38%</td>
<td>54%</td>
<td>66%</td>
<td>78%</td>
<td>88%</td>
<td>94%</td>
<td>98%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Age 85</td>
<td>38%</td>
<td>43%</td>
<td>62%</td>
<td>74%</td>
<td>79%</td>
<td>88%</td>
<td>98%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Legend:**
- 0%-15%: Yellow
- 15%-30%: Orange
- 30%-45%: Red
- 45%-60%: Dark Red
- 60%-75%: Maroon
- 75%-99%: Black
- 100%: Dark Brown

Source. [www.rgare.com](http://www.rgare.com) “Motor Vehicle Records and All Cause Mortality”
2012 Mortality Study of MVR Records

- Study completed jointly by LexisNexis and RGA
- Over 7 million applicants
- Approximately 73,000 deaths
Significant all-cause mortality differentials are observed between applicants with clean or modest motor vehicle records and those with major motor vehicle violations.

The extra mortality risk presented by individuals with adverse motor vehicle histories is probably better represented by a mortality multiple (i.e., table rating) rather than a flat extra mortality load.

MVRs likely provide positive protective value across a wide spectrum of ages at relatively low face amounts.
### Figure 2: Exposure Distribution and Relative Mortality by MVR Severity

<table>
<thead>
<tr>
<th>MVR Severity</th>
<th>Exposure</th>
<th></th>
<th>Deaths</th>
<th></th>
<th>Average Age</th>
<th>Relative Mortality Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Applicant-Years</td>
<td>Proportion</td>
<td>Number</td>
<td>Proportion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clean Record</td>
<td>10,780,110</td>
<td>60.9%</td>
<td>50,945</td>
<td>69.7%</td>
<td>43.4</td>
<td>95.4%</td>
</tr>
<tr>
<td>Minor Violations</td>
<td>4,671,746</td>
<td>26.4%</td>
<td>13,977</td>
<td>19.1%</td>
<td>38.7</td>
<td>93.7%</td>
</tr>
<tr>
<td>Major Violations</td>
<td>2,258,776</td>
<td>12.8%</td>
<td>8,189</td>
<td>11%</td>
<td>35.4</td>
<td>170.7%</td>
</tr>
<tr>
<td>Total</td>
<td>17,710,632</td>
<td>100.0%</td>
<td>73,111</td>
<td>100%</td>
<td>41.2</td>
<td>100.0%</td>
</tr>
<tr>
<td>Relative Mortality Ratio</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>95.4%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>93.7%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>170.7%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100.0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
“Major” violations include the following types of infractions:

- Alcohol or substance related infractions
- Speeding in excess of 30 mph above the speed limit
- Suspended, withdrawn, revoked, surrendered or cancelled drivers license
- Failure to provide proof of financial responsibility
- Failure to appear in court
- Reckless or negligent driving
## MVR – Protective Value

### Figure 9: Protective Value Model Framework

<table>
<thead>
<tr>
<th>Issue Age</th>
<th>Actuarial PV (*$1000 DB)</th>
<th>Relative Mort</th>
<th>PV of Mortality Differential</th>
<th>Major Violation Prevalence</th>
<th>MVR Cost (Estimate)</th>
<th>Break-Even Face Amt (**)</th>
<th>Savings/Cost Ratio at $250,000 (**)</th>
<th>Required Exclusivity at $250,000</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Male</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>2.74</td>
<td>82%</td>
<td>158%</td>
<td>24.0%</td>
<td>$9.00</td>
<td>72,427</td>
<td>3.5</td>
<td>7.2%</td>
</tr>
<tr>
<td>35</td>
<td>3.22</td>
<td>87%</td>
<td>155%</td>
<td>20.0%</td>
<td>$9.00</td>
<td>81,563</td>
<td>3.1</td>
<td>8.2%</td>
</tr>
<tr>
<td>45</td>
<td>7.52</td>
<td>88%</td>
<td>170%</td>
<td>14.7%</td>
<td>$9.00</td>
<td>39,651</td>
<td>6.3</td>
<td>4.0%</td>
</tr>
<tr>
<td>55</td>
<td>18.91</td>
<td>92%</td>
<td>175%</td>
<td>10.0%</td>
<td>$9.00</td>
<td>22,883</td>
<td>10.9</td>
<td>2.3%</td>
</tr>
<tr>
<td>65</td>
<td>50.71</td>
<td>96%</td>
<td>163%</td>
<td>5.9%</td>
<td>$9.00</td>
<td>17,929</td>
<td>13.9</td>
<td>1.8%</td>
</tr>
<tr>
<td>75</td>
<td>135.69</td>
<td>99%</td>
<td>140%</td>
<td>3.8%</td>
<td>$9.00</td>
<td>17,080</td>
<td>14.6</td>
<td>1.7%</td>
</tr>
<tr>
<td>85</td>
<td>414.99</td>
<td>99%</td>
<td>131%</td>
<td>2.9%</td>
<td>$9.00</td>
<td>9,386</td>
<td>26.6</td>
<td>0.9%</td>
</tr>
<tr>
<td><strong>Female</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>1.37</td>
<td>88%</td>
<td>175%</td>
<td>14.0%</td>
<td>$9.00</td>
<td>214,631</td>
<td>1.2</td>
<td>21.5%</td>
</tr>
<tr>
<td>35</td>
<td>2.34</td>
<td>89%</td>
<td>182%</td>
<td>12.0%</td>
<td>$9.00</td>
<td>137,527</td>
<td>1.8</td>
<td>13.8%</td>
</tr>
<tr>
<td>45</td>
<td>5.58</td>
<td>92%</td>
<td>189%</td>
<td>8.5%</td>
<td>$9.00</td>
<td>77,715</td>
<td>3.2</td>
<td>7.8%</td>
</tr>
<tr>
<td>55</td>
<td>13.22</td>
<td>94%</td>
<td>215%</td>
<td>5.1%</td>
<td>$9.00</td>
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<td>5.6</td>
<td>4.4%</td>
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<td>98%</td>
<td>185%</td>
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<td>$9.00</td>
<td>45,638</td>
<td>5.5</td>
<td>4.6%</td>
</tr>
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<td>75</td>
<td>95.32</td>
<td>99%</td>
<td>177%</td>
<td>1.5%</td>
<td>$9.00</td>
<td>32,322</td>
<td>7.7</td>
<td>3.2%</td>
</tr>
<tr>
<td>85</td>
<td>332.36</td>
<td>99%</td>
<td>156%</td>
<td>1.7%</td>
<td>$9.00</td>
<td>11,438</td>
<td>21.9</td>
<td>1.1%</td>
</tr>
</tbody>
</table>

*100% of 2008 VBT

**Assumes MVR evidence is 25% exclusive from other underwriting evidence
<table>
<thead>
<tr>
<th>Break-Even Face Amt (**)</th>
<th>Savings/ Cost Ratio at $250,000 (**)</th>
<th>Required Exclusivity at $250,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>72,427</td>
<td>3.5</td>
<td>7.2%</td>
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<tr>
<td>81,563</td>
<td>3.1</td>
<td>8.2%</td>
</tr>
<tr>
<td>39,651</td>
<td>6.3</td>
<td>4.0%</td>
</tr>
<tr>
<td>22,883</td>
<td>10.9</td>
<td>2.3%</td>
</tr>
<tr>
<td>17,929</td>
<td>13.9</td>
<td>1.8%</td>
</tr>
<tr>
<td>17,080</td>
<td>14.6</td>
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</tr>
<tr>
<td>9,386</td>
<td>26.6</td>
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<tr>
<td>214,631</td>
<td>1.2</td>
<td>21.5%</td>
</tr>
<tr>
<td>137,527</td>
<td>1.8</td>
<td>13.8%</td>
</tr>
<tr>
<td>77,715</td>
<td>3.2</td>
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</tr>
<tr>
<td>44,382</td>
<td>5.6</td>
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</tr>
<tr>
<td>45,638</td>
<td>5.5</td>
<td>4.6%</td>
</tr>
<tr>
<td>32,322</td>
<td>7.7</td>
<td>3.2%</td>
</tr>
<tr>
<td>11,438</td>
<td>21.9</td>
<td>1.1%</td>
</tr>
</tbody>
</table>
### MVR – Mortality by Severity and Age

#### Figure 3: Exposure Distribution and Relative Mortality by MVR Severity and Age

<table>
<thead>
<tr>
<th>Attained Age</th>
<th>Applicant-Years</th>
<th>Proportion</th>
<th>Exposure</th>
<th>MVR History</th>
<th>Number</th>
<th>Proportion</th>
<th>Deaths</th>
<th>MVR History</th>
<th>Relative Mort Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-19</td>
<td>651,626</td>
<td>3.7%</td>
<td>Clean</td>
<td>71%</td>
<td>407</td>
<td>0.6%</td>
<td></td>
<td>Clean</td>
<td>62%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Minor</td>
<td>22%</td>
<td></td>
<td></td>
<td></td>
<td>Minor</td>
<td>23%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Major</td>
<td>7%</td>
<td></td>
<td></td>
<td></td>
<td>Major</td>
<td>15%</td>
</tr>
<tr>
<td>20-29</td>
<td>4,395,560</td>
<td>24.8%</td>
<td>Clean</td>
<td>48%</td>
<td>3,271</td>
<td>4.5%</td>
<td></td>
<td>Clean</td>
<td>34%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Minor</td>
<td>32%</td>
<td></td>
<td></td>
<td></td>
<td>Minor</td>
<td>31%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Major</td>
<td>19%</td>
<td></td>
<td></td>
<td></td>
<td>Major</td>
<td>34%</td>
</tr>
<tr>
<td>30-39</td>
<td>3,806,821</td>
<td>21.5%</td>
<td>Clean</td>
<td>55%</td>
<td>3,683</td>
<td>5.0%</td>
<td></td>
<td>Clean</td>
<td>45%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Minor</td>
<td>28%</td>
<td></td>
<td></td>
<td></td>
<td>Minor</td>
<td>28%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Major</td>
<td>16%</td>
<td></td>
<td></td>
<td></td>
<td>Major</td>
<td>28%</td>
</tr>
<tr>
<td>40-49</td>
<td>3,652,192</td>
<td>20.6%</td>
<td>Clean</td>
<td>62%</td>
<td>7,644</td>
<td>10.5%</td>
<td></td>
<td>Clean</td>
<td>54%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Minor</td>
<td>26%</td>
<td></td>
<td></td>
<td></td>
<td>Minor</td>
<td>25%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Major</td>
<td>12%</td>
<td></td>
<td></td>
<td></td>
<td>Major</td>
<td>21%</td>
</tr>
<tr>
<td>50-59</td>
<td>2,823,600</td>
<td>15.9%</td>
<td>Clean</td>
<td>69%</td>
<td>13,645</td>
<td>18.7%</td>
<td></td>
<td>Clean</td>
<td>63%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Minor</td>
<td>23%</td>
<td></td>
<td></td>
<td></td>
<td>Minor</td>
<td>22%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Major</td>
<td>8%</td>
<td></td>
<td></td>
<td></td>
<td>Major</td>
<td>15%</td>
</tr>
<tr>
<td>60-69</td>
<td>1,501,099</td>
<td>8.5%</td>
<td>Clean</td>
<td>76%</td>
<td>15,952</td>
<td>21.8%</td>
<td></td>
<td>Clean</td>
<td>74%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Minor</td>
<td>20%</td>
<td></td>
<td></td>
<td></td>
<td>Minor</td>
<td>18%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Major</td>
<td>4%</td>
<td></td>
<td></td>
<td></td>
<td>Major</td>
<td>8%</td>
</tr>
<tr>
<td>70-79</td>
<td>652,790</td>
<td>3.7%</td>
<td>Clean</td>
<td>82%</td>
<td>15,859</td>
<td>21.7%</td>
<td></td>
<td>Clean</td>
<td>81%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Minor</td>
<td>16%</td>
<td></td>
<td></td>
<td></td>
<td>Minor</td>
<td>15%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Major</td>
<td>3%</td>
<td></td>
<td></td>
<td></td>
<td>Major</td>
<td>4%</td>
</tr>
<tr>
<td>80+</td>
<td>226,944</td>
<td>1.3%</td>
<td>Clean</td>
<td>84%</td>
<td>12,650</td>
<td>17.3%</td>
<td></td>
<td>Clean</td>
<td>83%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Minor</td>
<td>14%</td>
<td></td>
<td></td>
<td></td>
<td>Minor</td>
<td>14%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Major</td>
<td>2%</td>
<td></td>
<td></td>
<td></td>
<td>Major</td>
<td>3%</td>
</tr>
<tr>
<td>Total</td>
<td>17,710,632</td>
<td>100.0%</td>
<td>Clean</td>
<td>61%</td>
<td>73,111</td>
<td>100.0%</td>
<td></td>
<td>Clean</td>
<td>70%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Minor</td>
<td>26%</td>
<td></td>
<td></td>
<td></td>
<td>Minor</td>
<td>19%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Major</td>
<td>13%</td>
<td></td>
<td></td>
<td></td>
<td>Major</td>
<td>11%</td>
</tr>
</tbody>
</table>

174% | 99% | 91%
160% | 95% | 75%
161% | 96% | 83%
174% | 92% | 88%
183% | 92% | 93%
168% | 89% | 99%
149% | 94% | 99%
141% | 95% | 100%
<table>
<thead>
<tr>
<th>Relative Mort Ratio</th>
<th>Clean</th>
<th>Minor</th>
<th>Major</th>
</tr>
</thead>
<tbody>
<tr>
<td>91%</td>
<td>99%</td>
<td>174%</td>
<td></td>
</tr>
<tr>
<td>75%</td>
<td>95%</td>
<td>160%</td>
<td></td>
</tr>
<tr>
<td>83%</td>
<td>96%</td>
<td>161%</td>
<td></td>
</tr>
<tr>
<td>88%</td>
<td>92%</td>
<td>174%</td>
<td></td>
</tr>
<tr>
<td>93%</td>
<td>92%</td>
<td>183%</td>
<td></td>
</tr>
<tr>
<td>99%</td>
<td>89%</td>
<td>168%</td>
<td></td>
</tr>
<tr>
<td>99%</td>
<td>94%</td>
<td>149%</td>
<td></td>
</tr>
<tr>
<td>100%</td>
<td>95%</td>
<td>141%</td>
<td></td>
</tr>
<tr>
<td>95%</td>
<td>94%</td>
<td>171%</td>
<td></td>
</tr>
</tbody>
</table>
MVR – Comparing Extra Mortality vs Flat Extra Premiums

<table>
<thead>
<tr>
<th>Issue Age</th>
<th>Flat Extra Premium Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>$0.70/1000 for 3 years</td>
</tr>
<tr>
<td>70</td>
<td>$21.00/1000 for all years</td>
</tr>
</tbody>
</table>

- Extra Mortality - Assumptions
  - % Extra for Major Violations – 170%
  - Mortality Table - 2008 Valuation Basic Select and Ultimate (VBT)
  - Male nonsmoker
  - 10 years, 6% interest, 6% lapse rates
Motor Vehicle Records – A New Paradigm?

- Use more often because of protective value
- Rate for the codes that are actually indicative of extra mortality
- Charge applicants % increases in premium, not flat extra premiums
2. Change the way underwriting data is obtained
Obtaining of Lab Data – The Way It Has Been

- Agent makes the sale
- Paramed
  - Comes to applicant’s home and obtains vial of fluid
  - Mails the vial to Kansas City
- Lab runs tests on fluid and provide results after several days to insurance company
Obtaining of Lab Data – Where
Walgreens

- Nation's largest drugstore chain
- 8,200 drugstores in all 50 states...
- “… believes its pharmacists and nurse practitioners can help fill the gap in primary care, expand health and wellness and lower overall health care costs …”
- “… vision …be the first choice in health and daily living for everyone in America, and beyond”

Source: Walgreens Outlines Growth Opportunities and Strategy at 2014 Annual Shareholders Meeting
Walgreens - Healthcare Clinic

- Options … 7 days a week and weeknights, too.
- Services
  - Prevention and Wellness
    - Vaccines
    - Physicals & Wellness Visits
    - Health Screenings & Testing
  - Treatments
    - Illness, Aches & Pains
    - Minor Injuries
    - Skin Conditions
  - Monitoring & Management
    - Ongoing Health Conditions
    - Medications & Treatments
CVS - MinuteClinic

- 800 clinics nationwide as of 2014
- Expects to
  - Add 150 more in next year
  - Have 1,500 clinics by 2017

- Services – Similar to Walgreens Healthcare Clinic

Obtaining of Lab Data – How Quickly

- Force Diagnostics
  - FDA-approved rapid diagnostic tests
  - Administered at the point-of-presence
  - Identify
    - Underlying disease states
    - Presence of Drugs of Abuse

Source: http://www.forcediagnostics.com/
Obtaining of Lab Data – How Much Fluid

- Theranos
  - “one tiny drop changes everything”
  - “Our mission is to make actionable information accessible to everyone at the time it matters.”
- Laboratory can precisely analyze tiny samples
  - Blood, urine, fluids, and more
  - Done quickly, easily, and accurately

Source: https://www.theranos.com/
Obtaining of Lab Data – Bringing It All Together?

- Theranos™ Wellness Centers

- At Walgreens in Arizona and California

Source: http://www.walgreens.com/pharmacy/lab-testing/home.jsp
Obtaining of Lab Data – A New Paradigm?

- Obtained in new ways/locations
- Analyzed using new tools
- Analyzed more quickly
3. Change how the underwriting data is reviewed
Reviewing Underwriting Data - The Way It Has Been

- Human underwriters
  - Obtains paper copies/pdf’s of underwriting information from all the sources
  - “Leading edge” sometimes still defined as using imaging in the underwriting process
  - Use years of experience to
    - Spot areas of concern or
    - Correlate data obtained from multiple sources
- Similar process followed
  - On most every life insurance application
  - As the amount of data has increased
As of 2015

Life insurance industry
- Underwriting data
  - Most all underwriting data is available in data form
  - More underwriting data available - Types, amount, …
- Underwriters
  - Average age of underwriters increasing yearly
  - Limited number of underwriters being trained
- Industry
  - Searching for new markets, distribution, …

Society
- Technology explosion
- Instant results and answers in most every area of our lives
Automated Underwriting – Components to Deal with These Issues

Some of the benefits

- Decrease underwriting time
- Reduce underwriting cost
- Ensure consistency of underwriting
- Reducing the workload of underwriters
- Enter new channel/market
Current use of underwriting engines

Source: Underwriting engines: the new strategic imperative in life and disability business by Select X and by Hank George Inc 2011
Companies that have not considered an engine as yet: considering in the future?

- No
- Yes – but probably not within the next 5 years
- Yes – probably within the next 3-5 years
- Yes – probably within the next 2 years

Global

North America
Figure 15: Decisions Made if Given Second Opportunity

Choose a different system? 50%
Select the same system? 50%

Source: Automated Life Underwriting survey; Society of Actuaries 2009
Human underwriters and automated underwriting partnering

- All underwriting data
  - Received electronically
  - Reviewed electronically
- Much data
  - Evaluated by technology alone
- Human underwriters only review
  - Applications that for which a human brain is needed to process
  - Relevant underwriting data
Question – Is the decision to embrace automated underwriting a choice

- To be leading edge?
- Or
- To remain relevant?
4. Change the underwriting data
The Underwriting Data - The Way It Has It Has Been

The data
- Application Questions
- MIB
- MVR
- Labs
- APS

- Somewhat recently – Rx
TransUnion / RGA Mortality Study
Credit based solutions for Life Insurance

Scott Rushing FSA, MAAA
Vice President and Actuary, Global R&D
RGA Reinsurance

Glenn Hofmann Ph.D., MBA
Senior Vice President, Analytic Services
TransUnion

SOA 2014 Life & Annuity Symposium
Atlanta, GA
May 19, 2014
Introduction / Motivation

Introduction

• TransUnion / RGA joint research to better understand the predictive nature of credit data for life insurance
• TransUnion built the Life Mortality Index (predictive model based on credit data)
• TransUnion shared the mortality index and about 85 other credit and demographic variables with RGA for a more traditional actuarial analysis

Motivation for the Study

• Deeper understanding of credit data and the many credit scores available
• Desire to work with partners having data
• Insurance solutions for underinsured using data-driven analytics
• General R&D Predictive & Protective Value Studies to benefit the industry
  • Rx
  • MIB
  • MVR Protective
  • Term Tail Studies
TransUnion is a trusted partner for businesses and consumers around the globe.

**Insurance**
- Leading provider of credit and many other data types to the Insurance industry for over 20 years
- All of the top 10 P&C Insurance carriers are customers of TransUnion
- Full data/analytics product suite, e.g. Generic and Customized Insurance Scores, Vehicle History Score, A-Plus Risk Alerts, Risk Verification Platform (fraud solution)
- Comprehensive offering for Life Insurance

**Financial Services**
- Insights and services to manage risk and grow profitability
- Eighteen of the top twenty U.S. banks and all major card issuers

**Healthcare**
- Systems and solutions for the provider (hospitals) and payer (health insurers) markets
- Entered market in 2004

**Consumer**
- Consumer credit reports and scores
- Identity monitoring and fraud prevention

**Other Industries**
- Tenant screening services for property management firms and landlords
- Mortgage, auto, and employment screening
- Collections prioritization and recovery solutions for 15 of the top 20 collections companies
Credit Regulations and Insurance Adoption

**Federal Statute**

Fair Credit Reporting Act (FCRA) Section 604 specifies permissible purposes for use of consumer reports to a person which it has reason to believe intends to use the information in connection with the underwriting of insurance involving the consumer…” Thus, consumer reports may be available to be used in connection with the underwriting of life insurance underwriting.

<table>
<thead>
<tr>
<th>State Laws and Regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NCOIL Model Act</strong></td>
</tr>
<tr>
<td>• ~ 50% of states adopt Model Act for P&amp;C: Sensible restrictions on credit variables</td>
</tr>
<tr>
<td>• Most other states propose own rules for credit use in rating/underwriting</td>
</tr>
<tr>
<td>• 3 states (CA, MA, HI) do not allow credit</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>P&amp;C Insurers</th>
</tr>
</thead>
<tbody>
<tr>
<td>99% of insurers use credit in connection with underwriting</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Life Insurers</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Early adopters are using in connection with underwriting</td>
</tr>
<tr>
<td>• Used in direct marketing by several life insurers</td>
</tr>
</tbody>
</table>
Modeling Methodology - Modeling Process

Data: Sample depersonalized dataset from the credit-active population in 1998 (90% of adult U.S. population). Non-overlapping samples from 4 quarterly credit archives (3/26/98, 6/26/98, 9/26/98, 12/26/98) to avoid seasonality.

Exclusions: People with Age <20 and >=70, Missing/invalid SSNs, People w/o credit history

Mortality Definition: Policyholders who died during the 12-year observation period (98-10). Merged deaths from Social Security Master Death File from October, 2011 using SSN

Most credit features
- Started with ~800 variables, all indicating features of credit history

Variable Selection
- Variables with highest predictive power for mortality
- Low correlation among variables
- Stable variables (over time)
- Non-gameable variables

Modeling
- Binary Logistic Regression
- Age at Issue, Implied Gender and Region used as control variables
- Score card development in multivariate context

TransUnion Mortality Index
- 0 (low risk) to 100 (high risk)
- Single number to express mortality risk on continuous scale
- Used for subsequent AE analyses
Study Background

• Studied a random sample of nearly 18 million individuals from the 1998 credit archives. TransUnion Mortality Index was calculated for each individual.
• RGA built a 12-year mortality study (1999-2010) on the 18 million lives.
• Study resulted in 194 million exposure years and 1.1 million deaths (using the Social Security Master Death File from October, 2011)

• Gender Variable: Derived based on the individual’s name (one gender required > 90% of the time). Those names with < 90% (unknown gender) were excluded.

• Expected Basis:
  • Started with 1999-2010 historical US Population mortality tables (by gender & attained age, includes improvement)
  • Adjusted the “Expected” for:
    • Gender mixing in the data
    • Missing SSMDF deaths by age and calendar year
Overall Results

- Exposure distribution is nearly uniform across the index
- Smooth increasing AE curve
The Underwriting Data - The New Paradigm?

The data
- Application Questions
- MIB
- MVR
- Labs
- APS

- Somewhat recently – Rx

- New data such as
  - Transunion TrueRisk Life (renamed in 2015)
5. Change the applicant pool before obtaining the underwriting data
Underwriting – The Way It Has It Has Been

- Underwriters review all applications sent to the carrier
- Applicants chosen entirely by distribution
- Any target marketing is done based on likelihood to buy
An Actuarial/Underwriting Question #1

Assume

- 10 applicants
- All same age, gender
- All rated in the same underwriting class
- Expected mortality for the class – $1.45/1000

Question

- What is the expected mortality of each individual applicant?
<table>
<thead>
<tr>
<th>Applicant</th>
<th>Expected Mortality/1000 per Each Applicant</th>
<th>Average Expected Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1.45</td>
</tr>
<tr>
<td>2</td>
<td>1.1</td>
<td>1.45</td>
</tr>
<tr>
<td>3</td>
<td>1.2</td>
<td>1.45</td>
</tr>
<tr>
<td>4</td>
<td>1.3</td>
<td>1.45</td>
</tr>
<tr>
<td>5</td>
<td>1.4</td>
<td>1.45</td>
</tr>
<tr>
<td>6</td>
<td>1.5</td>
<td>1.45</td>
</tr>
<tr>
<td>7</td>
<td>1.6</td>
<td>1.45</td>
</tr>
<tr>
<td>8</td>
<td>1.7</td>
<td>1.45</td>
</tr>
<tr>
<td>9</td>
<td>1.8</td>
<td>1.45</td>
</tr>
<tr>
<td>10</td>
<td>1.9</td>
<td>1.45</td>
</tr>
</tbody>
</table>
An Actuarial/Underwriting Question #2

- Question: What happens if applicant 10 never applies?
<table>
<thead>
<tr>
<th>Applicant</th>
<th>Expected Mortality/1000 for Each Applicant</th>
<th>Average Expected Mortality</th>
<th>Expected Mortality/1000 for Each Applicant</th>
<th>Average Expected Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1.45</td>
<td>1</td>
<td>1.4</td>
</tr>
<tr>
<td>2</td>
<td>1.1</td>
<td>1.45</td>
<td>1.1</td>
<td>1.4</td>
</tr>
<tr>
<td>3</td>
<td>1.2</td>
<td>1.45</td>
<td>1.2</td>
<td>1.4</td>
</tr>
<tr>
<td>4</td>
<td>1.3</td>
<td>1.45</td>
<td>1.3</td>
<td>1.4</td>
</tr>
<tr>
<td>5</td>
<td>1.4</td>
<td>1.45</td>
<td>1.4</td>
<td>1.4</td>
</tr>
<tr>
<td>6</td>
<td>1.5</td>
<td>1.45</td>
<td>1.5</td>
<td>1.4</td>
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<tr>
<td>7</td>
<td>1.6</td>
<td>1.45</td>
<td>1.6</td>
<td>1.4</td>
</tr>
<tr>
<td>8</td>
<td>1.7</td>
<td>1.45</td>
<td>1.7</td>
<td>1.4</td>
</tr>
<tr>
<td>9</td>
<td>1.8</td>
<td>1.45</td>
<td>1.8</td>
<td>1.4</td>
</tr>
<tr>
<td>10</td>
<td>1.9</td>
<td>1.45</td>
<td></td>
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</tr>
</tbody>
</table>
Question: What happens if applicant 10 never applies?

Answer: Expected mortality for the group is 1.40/1000

Potential Choices:
- Decrease the charge for all to 1.40/1000
  OR
- Increase your margin on every applicant by 0.05/1000
Overall Results

- Exposure distribution is nearly uniform across the index
- Smooth increasing AE curve
Potential Applications

- **Target Marketing**
  - Can be used to assist in the market segmentation process
  - Among other things, focus on the best risks for new customers or upsell / cross-sell campaigns

- **Conversion near the end of the level-term period**
  - Assist in the selection of policies for conversion near end of term
  - Offer favorable conversion terms to less risky policy holders

- **Simplified issue programs**
  - Use in conjunction with other real-time data (violations, Rx, MIB)

- **Additional segmentation** in full underwriting

- **Lapse prediction** and related underwriting actions (premium, face, payment terms, etc.)
Underwriting – The New Paradigm?

- Carriers, whenever possible, work to influence the pool of applicants before each person submits application data.
6. Change the use of underwriting data as it changes
Attending Physician Statements (APS) – The Way It Has Been

- Has been used for decades in life insurance underwriting
- Characteristics
  - Hated
    - Obtaining - Time Consuming
    - Reviewing - Time Consuming
    - Cost – Expensive
- Results
  - Declining as an age/amount requirement
  - New tools/techniques frequently include discussion about how to reduce APS usage
In 2004, President W. Bush
- 10-year EHR adoption plan.
- Created Office of the National Coordinator (ONC) for Health Information Technology (HIT):
  - Oversee development of policies and standards
  - Responsible for development and adoption of a national health IT infrastructure
  - Certification of standards and technology required for exchange.
- Goal: All Americans have an EHR by 2014
Adoption Rates

1. **Percent of physicians**

   - **Any EMR/EHR system**
     - 2001: 18.2%
     - 2002: 17.3%
     - 2003: 17.3%
     - 2004: 20.8%
     - 2005: 23.9%
     - 2006: 29.2%
     - 2007: 34.8%
     - 2008: 42.0%
     - 2009: 48.3%
     - 2010: 51.0%
     - 2011: 57.0%
     - 2012: 71.8%

   - **Basic system**
     - 2001: 10.5%
     - 2002: 11.8%
     - 2003: 16.9%
     - 2004: 21.8%
     - 2005: 27.9%
     - 2006: 33.9%
     - 2007: 39.6%

**NOTES:**
EMR/EHR is electronic medical record/electronic health record. “Any EMR/EHR system” is a medical or health record system that is all or partially electronic (excluding systems solely for billing). Data for 2001–2007 are from in-person National Ambulatory Medical Care Survey (NAMCS) interviews. Data for 2008–2010 are from combined files (in-person NAMCS and mail survey). Data for 2011–2012 are preliminary estimates (dashed lines) based on the mail survey only. Estimates of basic systems prior to 2006 could not be computed because some items were not collected in the survey. Data include nonfederal office-based physicians and exclude radiologists, anesthesiologists, and pathologists.

**SOURCE:** CDC/NCHS, National Ambulatory Medical Care Survey, 2001–2012.
Electronic Health Records (EHR)

In 2009, President Obama

- American Recovery and Reinvestment Act of 2009 (ARRA); enacted to promote the “meaningful use” of electronic health records (EHRs) and related technologies.
  - Health Information Technology for Economic and Clinical Health Act (HITECH): Provides funding to promote adoption of Health Information Technology (HIT).
- Key points:
  - Not just EHR adoption, but the meaningful use.
  - ARRA/HITECH requires EHR to be certified.
  - Incentives – followed by penalties.
    - 2015+ - penalties for providers who do not successfully demonstrate meaningful use
EHRs: Good News / Bad News

Good news: More Data
- Lifetime medical history
- Multiple sources
- Discrete data
- Records on demand

Bad news: More Data
- Volume of data (1,000’s of pages)
- Disparate formats, hybrid records
- New standards, vocabularies, etc.
- Access, sharing, matching
Solving the Many Challenges

- Large number of companies and lots of money committed
  - Example: IBM, Apple, Johnson and Johnson, and Medtronic

- IBM
  - “Some 2,000 employees … in a new Watson-in-medicine business unit. “

- Two acquisitions
  - Explorys
  - Phytel

Source: IBM Announces Deals With Apple, Johnson And Johnson, And Medtronic In Bid To Transform Health Care (4/13/2015)
Solving the Many Challenges

- Apple:
  - Integrate Watson-based apps into its HealthKit and ResearchKit tool systems
- Johnson and Johnson
  - Use Watson to create a personal concierge service
- Medtronic
  - Use Watson to create an “internet of things” around its medical gadgets, collecting data both for patients’ personal use
Attending Physician Statements (APS)/ Electronic Health Records – The New Paradigm?

- Continue/begin to be used in life insurance underwriting
- Characteristics
  - Loved - The Gold Standard
  - Loved
    - Obtaining - Immediate
    - Reviewing – Immediate using electronic tools
    - Cost – Much less expensive than a 2015 APS?
- Results
  - Increasing use as an age/amount requirement
  - May enable direct-to-consumer sales to be offered at near fully underwritten prices
1. Change the way underwriting data is viewed
2. Change the way underwriting data is obtained
3. Change how the underwriting data is reviewed
4. Change the underwriting data
5. Change the applicant pool before obtaining the underwriting data
6. Change the use of underwriting data as it changes
Questions?
Please remember to complete the webcast evaluation:

http://soa.qualtrics.com/SE/?SID=SV_5vdXxD8NvVB5tDD

Thank You