

**The Actuarial Profession**  
making financial sense of the future

Emerging Trends in Mortality and Longevity Symposium 2011  
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## Life Insurance Underwriting in the United States: Yesterday, Today and Tomorrow

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### Agenda

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- Basic types of underwriting in the US
- More recent developments in types of underwriting
- Underwriting Tools used in US
- What is new in underwriting?
- How to quantify the impact of underwriting on mortality experience

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## Detailed Agenda

- **Basic types of underwriting in the US**
  - Fully underwritten
  - Medical / Paramedical
  - Nonmedical
  - Simplified Issue
  - Guaranteed Issue
  - Guaranteed-to-issue
- **More recent developments in types of underwriting in the US**
  - Smoker/Nonsmoker and Preferred underwriting
  - Older age underwriting
  - Simplified issue underwriting
  - Other underwriting types

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## Detailed Agenda (cont'd)

- **Underwriting Tools used in US**
  - Application
  - Blood testing
  - Urine testing
  - Oral fluid
  - Tele-underwriting
  - Pharmaceutical database
  - Inspection report
  - EKG, treadmill
  - Chest x-ray
  - MIB (Medical Information Bureau)
  - MVR (Motor Vehicle Record)
  - APS (Attending Physician Statement)

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## Detailed Agenda (cont'd)

- What is new in underwriting?
  - Laboratories
  - Other vendors
  - New medical markers
  - Predictive analytics
  - Other considerations
- How to quantify the impact of underwriting on mortality
  - New underwriting
  - Existing underwriting

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## Underwriting Basics in US

- “Yesterday, all my troubles seemed so far away.” Beatles
- Fully underwritten
  - Full application with general (Part 1) and medical (Part 2) questions
  - Paramedical or Medical Exam
    - Typically height/weight measurements, blood pressure, pulse rate, blood draw and urine sample, medical questions
    - For medical, add brief additional exam (e.g., listening to heart)
  - Blood test
    - HIV, diabetes, kidney and liver disorders, cholesterol and other lipids, immune disorders, PSA (Prostate Specific Antigen) for males
  - Urine test
    - Cotinine (smoking), cocaine and other drugs, medications

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## Underwriting Basics (cont'd)

- Non-medical
  - Also considered fully underwritten because same application used
  - However, medical / paramedical, blood and urine testing not done
- Simplified issue
  - Less than a full set of medical questions
  - No medical / paramedical, blood or urine
  - However, other tools may be used
  - Practices vary widely

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## Underwriting Basics (cont'd)

- Guaranteed issue
  - No or a few medical questions
  - No medical / paramedical, blood or urine
  - Cannot be turned down for coverage, with a few exceptions
    - May depend on age and possibly if live in a nursing home or LTC facility
  - Small face amounts and return of premium for death in first two years
- Guaranteed to issue / Guaranteed acceptance
  - Similar to guaranteed issue coverage is guaranteed, however, can be rated
  - Benefits usually limited (e.g., return of premium)

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## More Recent Developments in Underwriting Types

- “Today is the greatest day I have ever known.” Smashing Pumpkins
- Smoker/nonsmoker underwriting
- Preferred underwriting
- Older age underwriting
- Simplified issue underwriting
- Other underwriting types

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## Smoker/Nonsmoker Underwriting

- Began about 1980
- Was first type of preferred underwriting
- Definition of smoker varied and evolved
  - No cigarettes; occasional pipe, cigar, chewing tobacco ok
  - No nicotine in last year, 2 years, 3 years
  - Never smoked

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## Preferred Underwriting

- Began in late 1980s with AIDS scare
- Common elements of preferred underwriting
  - Alcohol and drug abuse
  - Blood pressure
  - Build
  - Cholesterol
  - Family history
  - Motor Vehicle Record (MVR)
  - Personal medical history
  - Tobacco use
  - Other – Aviation, avocations, citizenship, foreign travel, hazardous activities, residence

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## Preferred Underwriting (cont'd)

- Evolution over the years
  - More risk classes
  - Move by some companies from the original knockout approach to a debit/credit approach
  - Exceptions vs. business decisions
  - Scoring of criteria for Principles Based Reserves

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## Older Age Underwriting

- Still developing
- Four components:
  - Cognitive testing
  - Functional testing
  - Older age supplemental questionnaire
  - Changes to traditional underwriting

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## Simplified Issue (SI) Underwriting

- SI has become more popular, primarily to:
  - Be able to issue the business more quickly
  - Become less intrusive to the applicant
  - Enter new markets
- Information still gathered may include one or more of:
  - MIB (Medical Information Bureau)
  - MVR
  - Rx Database
  - Oral fluid
  - Tele-underwriting
- Idea of SI is to still collect enough information to be able to underwrite the applicant reasonably well

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## Other Underwriting Types

- Financial
  - Income, net worth
- Policy Ownership
  - Stranger owned life insurance becoming more popular (again) and typically produces different results
  - Lapse rates lower than traditionally expected
  - Mortality may be above traditionally expected
    - Life settlement underwriters may have additional health information withheld from company underwriters
- Remote underwriting
- Outsourced underwriting
- Straight-through processing

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## Recent Developments in Underwriting Tools

- Oral fluid
- Tele-underwriting
- Pharmaceutical (Rx) database
- Other tools
  - MIB (Medical Information Bureau)
  - MVR (Motor Vehicle Record)
  - APS (Attending Physician Statement)
  - Inspection report
  - EKG, treadmill
  - Chest x-ray

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## Oral Fluid Test

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- Less invasive than blood and urine testing
- Can be done by agent so paramed not needed
- Can determine HIV, cocaine, cotinine and hepatitis (the latter available in Canada, but not US)

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## Tele-underwriting

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- This is where someone calls the applicant to ask them questions
- Person who calls can be from home office or third party vendor
- Person is usually knowledgeable in both health related issues and how to deal with customers
- Questions asked can be verification of information received on the application and/or include drill down questions to find out more about health conditions (or other activities) identified on the application

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## Pharmaceutical (Rx) Database

- Database information collected from Pharmacy Benefit Managers
- Company using database sends request for information on applicant (can also be used at time of claim)
  - Company provides name, social security number, date of birth
- Rx database company provides:
  - Prescription history if there is one,
  - That applicant in the database but no prescriptions found,
  - Or that the person was not found
  - First two considered “hits” and company charged. Not charged in third instance where there wasn’t a hit.
- If drug history, importance of drug listed as red, yellow, green.

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## Other Underwriting Tools

- MIB (Medical Information Bureau)
- MVR (Motor Vehicle Record)
- APS (Attending Physician Statement)
- Inspection report
- EKG, Treadmill
- Chest x-ray

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## What is new in underwriting?

- “Tomorrow, tomorrow, I love ya tomorrow. You’re always a day away!” Annie
- Considerations
- Laboratories
- Other vendors
- New medical markers
- Predictive analytics
- Other items

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## What are some of the considerations driving changes in underwriting?

- Need for speed
  - Looking at new forms of SI
- Age based underwriting
  - There are differences by age, but these just being considered
- Holistic approach
  - Laboratories and others looking at this
- Technology
  - Allows remote underwriting, predictive modeling
- Regulatory
- Is there a better way?

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## Laboratories

- Have been collecting data for many years and now using it to score individual applicants
- Information on applicants rather than insureds
- Collected death information from Social Security Death Master file
- Performed statistical analytics to determine score, considered correlations

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## Other Vendors

- Re-evaluate same information but in different ways
  - Research provides different values, weightings
  - Utilize individual company data for research
  - Preliminary results show better accuracy in predicting mortality
- Automated underwriting
  - Can be simple use of company parameters or more sophisticated analysis of data

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## New Medical Markers

- SOA research project
  - Surveyed labs for tests not used or not used by many yet
  - Studied 11 potential tests
    - Apolipoprotein A and B – Lipid test that can be used instead of cholesterol
    - CBC (Red Cell Distribution width) – Wider variation in widths implies higher mortality
    - Cystatin C – Renal (kidney) function
    - Hemoglobin – Anemia and other physiological diseases
    - Hemoglobin A1c – Metabolism of glucose
    - Microalbumin - Diabetes
    - NT-proBNP – Congestive heart failure
    - Oxidized LDL – Heart disease
    - Phospholipase A2 – Used to predict cardiac event or stroke
    - TNF alpha - Cancer
    - Troponin I and T – Determines if damage to heart
  - Report quantifies mortality savings and cost of test
    - Available on SOA website

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## New Medical Markers (cont'd)

- Marker to predict life expectancy
  - Blood test to measure telomere length
- Markers to predict Alzheimer's disease
  - Protein in spinal fluid (1)
  - Measure of increase in DHEA (dehydroepiandrosterone) when blood oxidized (no increase in DHEA in Alzheimer's patients) (2)

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## Life Style Based Analytics

- Used more in health insurance, but some beginning to use in life insurance
- Uses consumer data to evaluate applicant, example of two individuals:
  - First just bought new running shoes and subscribes to several healthy living magazines
  - Second just bought new television and couch
- Currently can only use positive information
- Potential privacy issues

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## Other New Underwriting Considerations

- Recent studies listed generally, but not always from US
- Environment
  - Pollutants linked to diabetes (3)
  - Age of onset of puberty predicts adult osteoporosis (4)
- Geographical location
  - Wide difference in life expectancy by region in US (5)
- Poverty, low levels of education and other social factors (6)
  - US study showed following extra deaths in 2000
    - 245,000 due to lower education
    - 162,000 due to low social support
    - 133,000 due to individual-level poverty

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## Other New Underwriting Considerations (cont'd)

- Obesity
  - Overweight more harmful to liver than alcohol in middle-aged men (7)
  - Obesity is a killer in its own right, irrespective of other risk factors (8)
  - Dementia link to middle-age obesity (9)
- Diet
  - Diets for elderly after hospitalization decreased mortality rates (10)
  - Eating purple fruit could fend off Alzheimer's Disease and Multiple Sclerosis (11)
- Exercise

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## How to quantify the impact of underwriting on mortality experience

- New underwriting tools
  - Testing and validation
  - Protective Value Study
- Established underwriting tools
  - Actual to Expected Study

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## Testing and Validation

- Process for testing new medical marker
- Gather mortality data
  - Clinical
  - Own
- Review relationships between readings and mortality
  - Example: If higher scores are indicative of higher mortality, must determine reason for lower mortality at higher scores
    - Could be due to lack of data in that portion of study or could be indicative that marker is not a good one
  - Check for J and U shapes in data

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## Testing and Validation (cont'd)

- Must also validate test
  - Divide mortality data into at least two segments
  - Save second segment for validation
  - Does result of second segment validate results of first (usually larger) segment?

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## Protective Value Study

- Cost / Benefit analysis done
  - Not as simple as it might sound
- Costs include:
  - Cost of the test itself
  - Time spent by underwriter and other personnel on evaluating applicant for this underwriting, training, etc.
  - Cost for ordering an APS or another test to verify information from this test
  - Time spent analyzing APS or other test
  - Time spent explaining to applicant why they were declined due to this new test
  - If this replaces another test, the mortality savings from the other test is a cost here

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## Protective Value Study (cont'd)

- Benefit (savings):
  - Mortality savings due to this test / technique
    - Not always easy to assess
    - Primary difficulty is determining how much savings is due to this type of underwriting alone
    - For example, how much savings did the pharmaceutical database provide if the applicant already mentioned the drug or if it was found in the APS – possibly very little or none!
  - Mortality savings due to needing to order an APS or other test and discovering something else, completely different, that wasn't caught before
  - If new test replaces existing test, cost of eliminated test
  - Sentinel effect reduces savings
  - Results often vary by age, gender, other factors

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## Actual to Expected Study

- This study is done after experience emerges
- “Actual” is the actual mortality experience
- “Expected” is the expected mortality experience, usually either the pricing assumption or based on a standard industry table
- Actual to Expected (A/E) ratios equal to 100% are at expected while ratios below 100% are better than expected and ratios above 100% are worse than expected
- Can split analysis by issue year, age, duration, gender, risk class, smoking status, policy size, and other categories as desired.

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## Actual to Expected Study (cont'd)

- This is not a perfect comparison as other factors beyond underwriting come into play, but it is a relatively easy approach to determine the effectiveness of the underwriting that has already been done

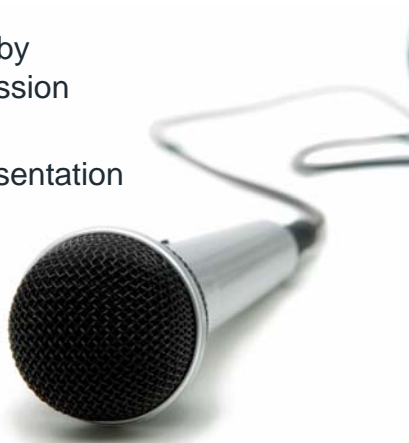
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## Questions or comments?

Expressions of individual views by members of The Actuarial Profession and its staff are encouraged.

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