Session 61 IF, Critical Illness Insurance Here and Abroad

Moderator:
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Presenters:
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Critical Illness Insurance
Here and Abroad

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Vice President, R&D
Optimum Re Insurance

Sara Goldberg, FSA, MAAA
Chief Actuary of Northeast Asia
Gen Re
Agenda

- Market
- Conditions
- Trends
- Antiselection
- Controls
  - Definitions
  - Rates
- Lessons learned
- Questions
To Each Its Own

- Successful market is different in each country…
  - UK: mortgage
  - Canada: Di substitute, buy-sell
  - US: worksite
  - Asia: individual bank, agent
Who owns a CI policy (personally)?

Increasing new business premium in the US:
- Sales totaled $380.7 million in 2014, doubling from 2009
- ~ 1.2 million policies sold in 2014

<table>
<thead>
<tr>
<th>Year</th>
<th>U.S.</th>
<th>China</th>
<th>Hong Kong</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td></td>
<td>319 mil</td>
<td>7.2 mil</td>
</tr>
<tr>
<td>2005</td>
<td></td>
<td>1360 mil</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td></td>
<td>~11mil</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td></td>
<td>~1.2mil</td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2010</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Population

New Policies Sold Annually
Why are existing CI products so popular?

There is a large need for coverage against the risk of cancer diagnosis

- The lifetime cancer risk is high
- The risk to die after a cancer diagnosis is high
- A CI diagnosis triggers significant financial cost
- High awareness for the financial needs after a CI diagnosis

Cumulative risk of suffering a cancer

<table>
<thead>
<tr>
<th>Country</th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>Korea</td>
<td>27%</td>
<td>36%</td>
</tr>
<tr>
<td>Japan</td>
<td>31%</td>
<td>37%</td>
</tr>
</tbody>
</table>

Source:
- Ministry of Health & Welfare, The Korea Central Cancer Registry, 2010
- Inoue et al, Probabilities of Developing Cancer over the Life Span of a Japanese
Why are existing cancer & CI products so popular?
Financial insecurity

Probability of job loss among cancer patients:

- 47% experience job loss in Korea
- Only 31% of these regained employment over 5-yr period
- Among those who did regain employment...

Basic Product Design

- Pays a lump sum upon occurrence of a covered condition
- Three basic type of products:
  - Individual
  - Group/worksite with issue age premium
  - Group/worksite with attained age premium
- Each company has their own definitions and own list of covered conditions
Basic Product Design

- Generally extend for the life of the insured
- Issues ages 18-65 or 70 but up to 85+

- Benefit reduction at age 65/70/75
- Stand alone more common than rider especially in the worksite market
Basic Product Design

- Guaranteed issue amounts available in worksite market
- Individual rates guaranteed one year
- Worksite rates guaranteed mostly for 2-3 years but some more
Advanced Product Features

- Possibility to carve out a disease (generally cancer) in worksite market
- Multiple payments generally by conditions category but some now without categories
- Recurrence benefits
- Push to cover:
  - More surgeries
  - More infectious diseases
- Shorter waiting or definition period
Market Standard

• Benefit trigger
  - Typically a lump sum payout upon first diagnosis of a “critical illness”
  - Coverage of up to 100 diseases, usually definitions-based

• Duration
  - Depends by market but frequently whole life in East Asia
  - YRT or limited PPP level; often guaranteed premium throughout

• Standalone or added to / accelerated by death benefit
  - “Accelerated”: Pays out on either death or on dread disease, i.e. the dread disease benefit accelerates the death benefit.
  - Standalone increasingly popular in low-interest rate environment
Common Variations and Innovations

• Complex CI payout structure
  - Tiered (higher payouts for more severe ailments)
  - Part of lump sum turned into reimbursement for treatment
  - Multiple pay CI, with limitations by groupings

• Targeted audiences
  - Female products, juvenile CI, diabetes complication & compliance benefits

• Stripped down or packaged
  - From cancer-only to all-in-one products (combined with some combination of LTC, accident, disability, and medical reimbursement)

• Underwriting alternatives
  - Preferred CI, simplified issue
The Conditions War - US

- Once upon a time: cancer, heart attack, stroke, bypass
- Quickly added: kidney failure, organ transplant, blindness, coma, deafness, paralysis, burns
- Now also covered are: Alzheimer’s, angioplasty, aorta surgery, benign brain tumors, heart valve, loss of speech, MS, occupational HIV, organ failure, Parkinson’s, traumatic head injury
The Conditions War - Canada

- More explosive condition competition
- Now standardized definitions are available (but not mandatory) for 26 conditions

- Include:
  - Loss of independent existence, motor neuron disease (starting to be seen in the US)
  - Aplastic anemia, bacterial meningitis, loss of limbs
Spread of Conditions

• Initially,
  - Cancer, Stroke, Heart Attack, CABG

• Then,
  - Kidney Failure, Major Organ Transplant, Multiple Sclerosis, Paralysis, Blindness

• And then......
  - Aortic Surgery, Balloon Angioplasty, Loss of Speech, Loss of Hearing, Alzheimer’s Disease, Parkinsons’s Diseases, Severe Burns, Coma, Benign Brain Tumour, Chronic Liver Failure, Chronic Lung Disease, Loss of Limbs, Aplastic Anaemia, Ulcerative Colitis, Motor Neuron Disease, Heart Valve Surgery, Poliomyelitis, Muscular Dystrophy, Primary Pulmonary Hypertension, Fulminant Hepatitis, Systemic Lupus Erythematosus, Encephalitis, Occupationally acquired HIV, Creutzfeld – Jacob Disease
## Leading Causes of Claim – Male
**Gen Re Dread Disease Survey 2008-2012**

<table>
<thead>
<tr>
<th>Cause of Claim</th>
<th>China</th>
<th>HongKong</th>
<th>Malaysia</th>
<th>Singapore</th>
<th>Indonesia</th>
<th>Australia</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rank</td>
<td>%</td>
<td>Rank</td>
<td>%</td>
<td>Rank</td>
<td>%</td>
</tr>
<tr>
<td>Cancer</td>
<td>1</td>
<td>57.3%</td>
<td>1</td>
<td>66.1%</td>
<td>1</td>
<td>51.7%</td>
</tr>
<tr>
<td>Ischemic Heart Disease</td>
<td>2</td>
<td>19.4%</td>
<td>2</td>
<td>16.3%</td>
<td>2</td>
<td>34.7%</td>
</tr>
<tr>
<td>Stroke</td>
<td>3</td>
<td>11.9%</td>
<td>3</td>
<td>7.9%</td>
<td>3</td>
<td>7.0%</td>
</tr>
<tr>
<td>Kidney Failure</td>
<td>4</td>
<td>4.7%</td>
<td>4</td>
<td>2.4%</td>
<td>4</td>
<td>1.8%</td>
</tr>
<tr>
<td>Heart Surgery</td>
<td>5</td>
<td>1.8%</td>
<td>5</td>
<td>1.5%</td>
<td>5</td>
<td>1.0%</td>
</tr>
<tr>
<td>Paralysis</td>
<td>6</td>
<td>1.5%</td>
<td>9</td>
<td>0.4%</td>
<td>10</td>
<td>0.5%</td>
</tr>
<tr>
<td>Chronic Liver Failure</td>
<td>7</td>
<td>0.6%</td>
<td>9</td>
<td>0.2%</td>
<td>10</td>
<td>0.7%</td>
</tr>
<tr>
<td>Benign Brain Tumour</td>
<td>10</td>
<td>0.3%</td>
<td>6</td>
<td>1.4%</td>
<td>7</td>
<td>1.0%</td>
</tr>
<tr>
<td>Total of top 10</td>
<td>98.4%</td>
<td>98.1%</td>
<td>97.2%</td>
<td>98.8%</td>
<td>99.1%</td>
<td>97.5%</td>
</tr>
<tr>
<td>Other than top 10</td>
<td>1.6%</td>
<td>1.9%</td>
<td>2.8%</td>
<td>1.2%</td>
<td>0.9%</td>
<td>2.5%</td>
</tr>
<tr>
<td>Unknown</td>
<td>1.7%</td>
<td>1.2%</td>
<td>22.7%</td>
<td>39.3%</td>
<td>8.6%</td>
<td>21.7%</td>
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<tr>
<td>Total number of claims</td>
<td>293,122</td>
<td>5,941</td>
<td>7,712</td>
<td>7,251</td>
<td>1,501</td>
<td>2,203</td>
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</table>
Leading Causes of Claim - Female

<table>
<thead>
<tr>
<th>Cause of Claim</th>
<th>China</th>
<th>HongKong</th>
<th>Malaysia</th>
<th>Singapore</th>
<th>Indonesia</th>
<th>Australia</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rank</td>
<td>%</td>
<td>Rank</td>
<td>%</td>
<td>Rank</td>
<td>%</td>
</tr>
<tr>
<td>Cancer</td>
<td>1</td>
<td>80.3%</td>
<td>1</td>
<td>89.1%</td>
<td>1</td>
<td>85.8%</td>
</tr>
<tr>
<td>Stroke</td>
<td>2</td>
<td>7.3%</td>
<td>2</td>
<td>3.1%</td>
<td>2</td>
<td>3.6%</td>
</tr>
<tr>
<td>Ischemic Heart Disease</td>
<td>3</td>
<td>4.1%</td>
<td>4</td>
<td>1.6%</td>
<td>3</td>
<td>2.7%</td>
</tr>
<tr>
<td>Kidney Failure</td>
<td>4</td>
<td>3.1%</td>
<td>5</td>
<td>1.3%</td>
<td>4</td>
<td>2.5%</td>
</tr>
<tr>
<td>Heart Surgery</td>
<td>5</td>
<td>1.4%</td>
<td>6</td>
<td>0.5%</td>
<td>7</td>
<td>0.6%</td>
</tr>
<tr>
<td>Benign Brain Tumour</td>
<td>6</td>
<td>1.1%</td>
<td>3</td>
<td>1.7%</td>
<td>5</td>
<td>1.4%</td>
</tr>
<tr>
<td>Multiple Sclerosis</td>
<td>0.1%</td>
<td>0.2%</td>
<td>8</td>
<td>0.3%</td>
<td>0.2%</td>
<td>0.2%</td>
</tr>
<tr>
<td>Total of top 10</td>
<td>98.9%</td>
<td>98.5%</td>
<td>98.1%</td>
<td>99.4%</td>
<td>98.2%</td>
<td>97.6%</td>
</tr>
<tr>
<td>Other than top 10</td>
<td>1.1%</td>
<td>1.5%</td>
<td>1.9%</td>
<td>0.6%</td>
<td>1.8%</td>
<td>2.4%</td>
</tr>
<tr>
<td>Unknown</td>
<td>1.6%</td>
<td>1.5%</td>
<td>18.2%</td>
<td>32.9%</td>
<td>7.2%</td>
<td>14.5%</td>
</tr>
<tr>
<td>Total number of claims</td>
<td>322,891</td>
<td>9,290</td>
<td>8,312</td>
<td>10,824</td>
<td>1,194</td>
<td>1,631</td>
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</tbody>
</table>
Claims By Diagnosis
U.S. Critical Illness Survey, 2014

Critical Illness Developments Abroad | Goldberg | June 2016

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Emerging Diseases

- Focus of CI in the US (and Canada) has been chronic diseases in the US
- But
  - Infectious diseases travel fast
  - Degree of infectivity can be very high
  - They have unexpected consequences

<table>
<thead>
<tr>
<th>Threat</th>
<th>Consequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIV</td>
<td>Cancer, heart</td>
</tr>
<tr>
<td>Hepatitis C</td>
<td>Transplant</td>
</tr>
<tr>
<td>Zika</td>
<td>Birth defect</td>
</tr>
<tr>
<td>Japanese encephalitis</td>
<td>Coma, ADL</td>
</tr>
<tr>
<td>Annual % change</td>
<td>1987-1996</td>
</tr>
<tr>
<td>----------------</td>
<td>-----------</td>
</tr>
<tr>
<td></td>
<td>White Men</td>
</tr>
<tr>
<td>First MI</td>
<td>-1.4</td>
</tr>
<tr>
<td>First MI adj</td>
<td>-3.6</td>
</tr>
<tr>
<td>White Women</td>
<td></td>
</tr>
<tr>
<td>First MI</td>
<td>-0.9</td>
</tr>
<tr>
<td>First MI adj</td>
<td>-3.0</td>
</tr>
</tbody>
</table>

Not homogenous, due to decrease in ischemic stroke. Explanations are better control of facilitating conditions especially uses of hypertensive medication and statins.
# Impact of Diabetes

<table>
<thead>
<tr>
<th>Event per 10,000</th>
<th>1990</th>
<th>2000</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Heart attack</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetic</td>
<td>141.1</td>
<td>105.7</td>
<td>45.5</td>
</tr>
<tr>
<td>Non diabetic</td>
<td>37.5</td>
<td>37.1</td>
<td>25.8</td>
</tr>
<tr>
<td><strong>Stroke</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetic</td>
<td>111.8</td>
<td>86.2</td>
<td>52.9</td>
</tr>
<tr>
<td>Non diabetic</td>
<td>36.3</td>
<td>35.0</td>
<td>34.3</td>
</tr>
</tbody>
</table>

Source: Table 3, Changes in diabetes-related complications in the United States, 1990-2010, EW Gregg et al, NEJM 4/17/2014
Alzheimer

Figure 1. CFAS I (1990-1993) and CFAS II (2008-2011) age-specific dementia prevalence
CFAS=Cognitive Function and Ageing Study.

Cancer

Delay and Age Adjusted SEER-9 Incidence Rates

Table 2.4 SEER Cancer Statistics Review 1975-2013
Top Cancer Males

SEER Incidence 2004-2013
Males by Race/Ethnicity

Prostate
Lung and Bronchus
Colon and Rectum

Rate per 100,000

2004 2007 2010 2013
Year of Diagnosis

2004 2007 2010 2013
Year of Diagnosis

2004 2007 2010 2013
Year of Diagnosis

Source: SEER 18 areas (San Francisco, Connecticut, Detroit, Hawaii, Iowa, New Mexico, Seattle, Utah, Atlanta, San Jose-Monterey, Los Angeles, Alaska Native Registry, Rural Georgia, California excluding SF/SJM/LA, Kentucky, Louisiana, New Jersey and Georgia excluding ATL/RG).
Rates are age-adjusted to the 2000 US Std Population (19 age groups - Census P25-1103).

SEER Cancer Statistics Review 1975-2013
Top Cancer Females

SEER Incidence 2004-2013
Females by Race/Ethnicity

Source: SEER 18 areas (San Francisco, Connecticut, Detroit, Hawaii, Iowa, New Mexico, Seattle, Utah, Atlanta, San Jose-Monterey, Los Angeles, Alaska Native Registry, Rural Georgia, California excluding SF/SJM/LA, Kentucky, Louisiana, New Jersey and Georgia excluding ATL/RC).
Rates are age-adjusted to the 2000 US Std Population (19 age groups - Census P25-1103).
Regression lines are calculated using the Joinpoint Regression Program Version 4.3.0.0, April 2016, National Cancer Institute.

SEER Cancer Statistics Review 1975-2013
Prostate cancer
Trend in diagnosis rates

Age-adjusted prostate cancer diagnosis rates per 100,000

Reducing PSA testing in population
US PLCO Cancer Screening Trial found no statistically significant effect of PSA-based screening on prostate cancer mortality after 10 years.

64.6% of eligible males in the US reported getting a PSA test in the previous 12 months in 1999. Average annual decline of -3.6% since then.
Prostate cancer
Trend in diagnosis rates

Age-adjusted prostate cancer diagnosis rates per 100,000

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64.6% of eligible males in the US reported getting a PSA test in the previous 12 months in 1999. Average annual decline of -3.6% since then.

"Westernization?"
Prostate cancer
Trend in insured incidence rates

- China
- Hong Kong

23.8% p.a.
13.4% p.a.
Trends – what about cancer in aggregate?
Korea

Age-standardised cancer incidence rate
(Korean population)

Annual report of cancer statistics in Korea in 2013, age standardized to Korea
Why other countries may follow this development:
1. Screening “epidemic” is imaginable in any country
2. Autopsy studies all over the world show high thyroid cancer prevalence
3. We see signs in China

*Incidence rate with Korean standard population
Thyroid cancer incidence in China (per 1,000)

Source: Gen Re 2008-2012 DD Survey

2003 Korea Pop
2006 Korea Pop
2012 Korea Pop

18.6% p.a.
21.3% p.a.

Male  Female  Projected-M  Projected-F
Long-term guaranteed cancer products in Korea sold around the year 2000

Actual experience

Loss ratios of cancer diagnosis products

Source: FSS, 2006

Pricing
Based on historic company experience
Limited consideration for future trends
Safety loading

Advancement in diagnostic techniques

Causes of losses

Screening campaigns

Guarantees

Critical Illness Developments Abroad | Goldberg | June 2016
Forefronts of medical progress in cancer detection

- New techniques like liquid biopsy, ctDNA, CTC, Micro RNA, and other acronyms

- Simpler: Dogs sniffing prostate cancer with >95% accuracy

New technologies may make histopathology evidence obsolete

More information:
Antiselection

- Insurance contract presupposes both parties have equal access to information on the risk to cover
- When information is dissymmetrical, the applicant has an opportunity for financial leverage
- More prevalent in CI because the applicant is often the beneficiary
Antiselection Mitigation

- Product design
  - Carefully consider embedded options
  - Definitions
  - Payout structure
- Product pricing
- Underwriting
- Marketing
- Early detection/claim monitoring
  - By duration
  - By causes
Selection effect (accelerated CI example)

Source: Gen Re 2008-2012 DD Survey
### Selection effect by product – dive into China

Experience ratios between:
- CIS claims / Cancer claims in Traditional product
- CIS claims / Cancer claims in Female product

<table>
<thead>
<tr>
<th></th>
<th>Traditional Product</th>
<th>Female Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breast CIS / Breast Cancer</td>
<td>1%</td>
<td>8%</td>
</tr>
<tr>
<td>Cervix CIS / Cervix Cancer</td>
<td>51%</td>
<td>115%</td>
</tr>
</tbody>
</table>
What can go wrong in pricing CI?

1. Initial best estimate of incidence rates is wrong
   • Level and shape (especially at older ages)
   • Company specific experience

2. Worsening trends in experience
   • Anti-selection
   • Improving diagnostic technology
   • Changing diagnostic criteria
   • Screening programs
   • Increased policyholder awareness of how to claim
   • Legal environment more favourable to policyholders
Variation in company experience – Hong Kong

A/E Ratio by Company

Source: Gen Re 2008-2012 DD Survey

Male  Female
Controls

- Definitions
- Regulatory frameworks
- Product design
- Rates
Definitions

- Standardized
- Clear/unambiguous
- Consistently applied
- Clear picture for your Claims department
- Future proof
Regulators

- Often misunderstood product
- Educate your regulators
  - Why is it needed?
  - What does it do for the people the regulators protect?
  - How does it do it?
  - How can regulation be enhanced without weakening consumer protection?
- Challenge: rarely a key product
Product Design

- Product type
- Actionable application
- Tiered approaches to triggers
- Do not complicate your Claims department’s job needlessly
Rates

- Price for anti-selection
- Reduce (or avoid) guarantees
- Review your rates regularly as part of your product management process
Definitions & Product Design are Key to Success
Fine-tuning Product Design and Definitions

• Offer term products
• In WL, use CI to accelerate the death benefit rather than as standalone, or with reducing sum insured pattern (common in the US to reduce to 50% by age 70)
• Don’t lose sight of what provides true value to consumer
• Consider alternate benefit trigger ideas:
  - Tiered definitions for major & minor
  - Triggered by time off work; life vs non-life threatening; surgery/treatment reimbursement
• Exclude certain minor diseases and/or minimize benefits, set age limit
• Price for anti-selection / discourage anti-selection
• Reduce extent of guarantees
• Price for deterioration
QUESTIONS?

Henri Julien Felix Rousseau known as Le Douanier
5/21/1844-9/2/1910