Extending the Critical Path
Summary Paper

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SCOR Global Life

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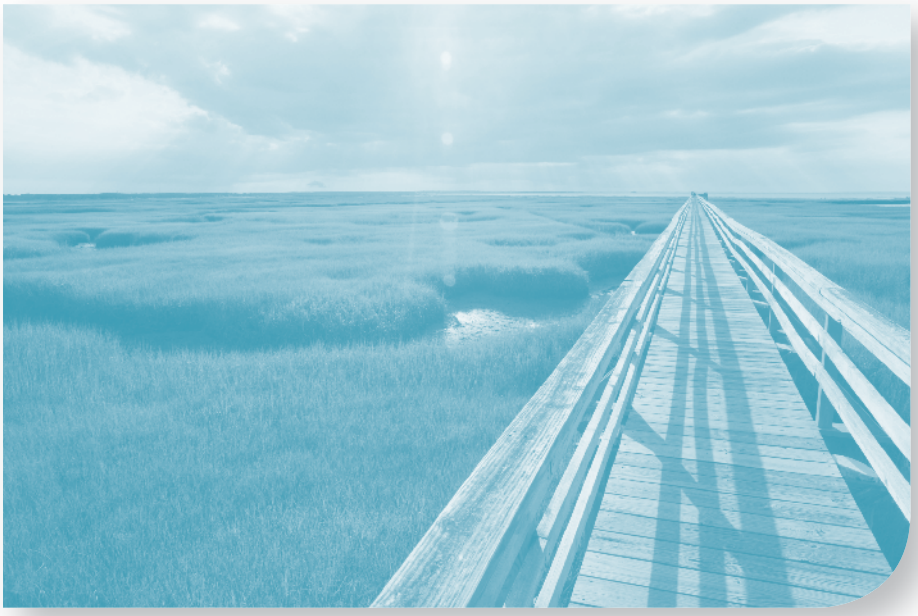
Background

In December 2013 the Critical Illness Definitions and Geographical Variations Working Party presented their paper, 'Extending the Critical Path' to the Staple Inn Actuarial Society. This paper is of significant interest to anyone involved with Critical Illness products and SCOR welcomes both the work that went into it and also the finished paper. SCOR Global Life UK was represented on this Working Party by our Chief Underwriter, Phil Cleverley and we thought a summary paper may be useful for readers.

Extending the Critical Path is a follow up to two previous papers that were published by working parties:

- A Critical Review: presented in 2000 from which the CIBT93 decrement rate tables were derived
- Exploring the Critical Path: presented in 2006 from which the CIBT02 tables were derived.



Overview

As the title of the paper suggests, it extends the work of the previous working parties. This extension covers both an update to use more recent data but also increased sophistication/ analysis as a result of using a broader dataset. The data used is Hospital Episode Statistics (HES) and covers in-patient admissions in English hospitals between 1997 and 2010.

The data has been used to:

- create CIBT08, an updated decrement rate table,
- explore geo-demographic factors as a predictor of morbidity risk.

The paper also considers the critical illness (CI) conditions at an individual condition level in order to give a very useful granular insight into each, covering an explanation of the condition, its risk factors and insurance definitions.

CIBT08

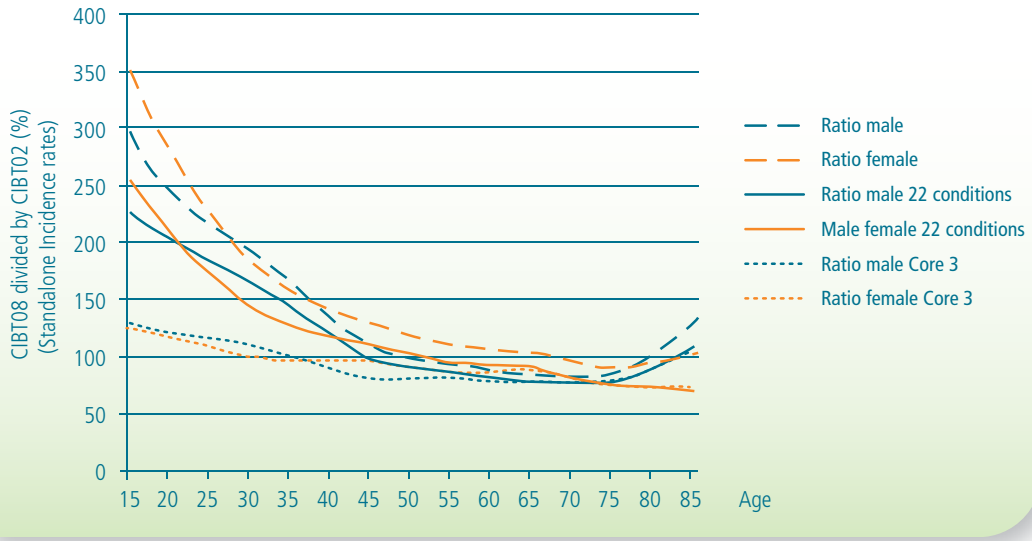
The CIBT08 table

- covers 36 commonly covered CI conditions (there is also an explicit additional allowance for 3 conditions which are often covered on a partial payment basis). This is a significant extension to the conditions within CIBT02,
- has rates for Stand Alone CI, Accelerated CI and the individual conditions,
- is based on general population rather than insured lives
- uses condition definitions based on HES coding (CIBT02 attempted to adjust to replicate insured definitions),
- includes gender differentiated rates,
- includes rates based on aggregate smoker status,
- does not allow for any select effect.

The table in Appendix A outlines the conditions covered by CIBT08 and CIBT02.

A comparison against the CIBT02 table is provided in the paper covering; all illness except TPD, the 22 illness that are covered in both tables and the core 3 (cancer, heart attack and stroke).

Comparison of CIBT08 and CIBT02



Source: Extending the Critical Path, page 10.

This shows significantly higher rates for young lives, which appears to be driven by non-core conditions such as benign brain tumour, deafness, loss of limb, paralysis and loss of speech. The rates remain higher than CIBT02 until age 45 for males and 53 for females.

Beyond age 45-50 the consistent comparison shows that rates are increasingly lower in CIBT08 until age 70 where there is a steeper progression by age relative to CIBT02.

It appears that a number of the differences are related to differences in methodology with regard to:

- adjusting for insured definitions (particular impact at young ages),
- overlaps (particularly at older ages),
- calculation of exposure (particularly at very old ages).

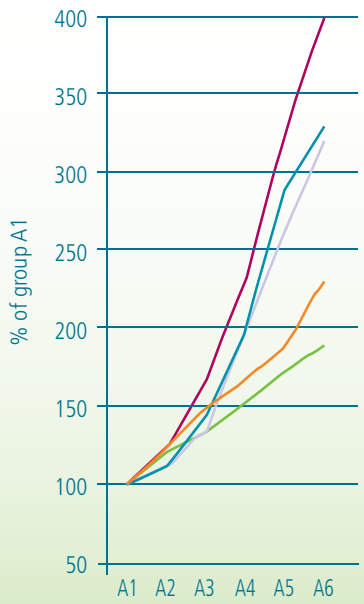
These methodology changes make a like for like comparison difficult, however, the different perspectives provided by 'exploring the path' and 'extending the path' generate a deeper understanding of the conditions that is not brought out by reading either paper in isolation.

Geo-Demographic Factors

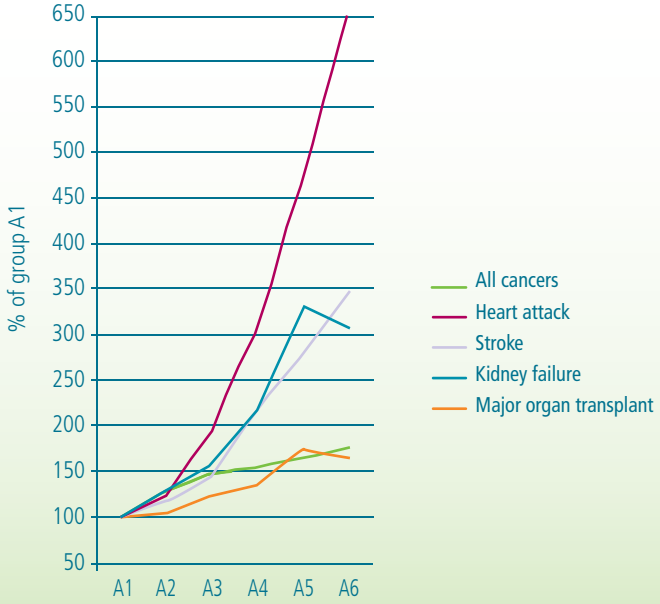
Analysis of incidence rates was undertaken using different groupings to reflect socio-economic groupings: Index of Multiple Deprivation (IMD), ACORN and Mosaic profiling.

Each of these suggested a positive socio-economic correlation – lower incidence rates for wealthier socio-economic groups – at an overall level. Note that group A1 represent the most affluent classes within ACORN profiling.

Male socio-economic gradients (ACORN)



Female socio-economic gradients (ACORN)



Source: SCOR calculations using information in Extending the Critical Path, page 12.

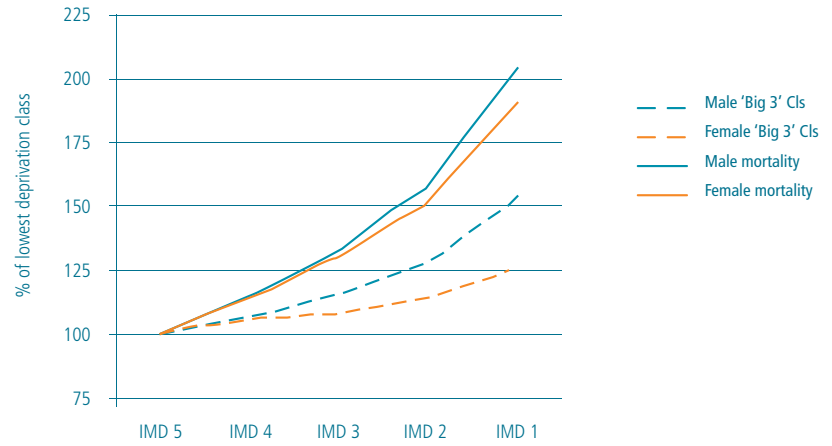
However, there was some variation amongst this by disease or source. For example, within the cancers:

- Malignant Melanoma (skin cancer) did not appear to demonstrate any strong socio-economic factors.
- Lung Cancer most strongly demonstrated a socio-economic impact.

Although there is a socio-economic element highlighted within the paper it is noted that this effect is less obvious (for cancer, heart attack and stroke) than in mortality data. This impact is shown below:

Within this graph IMD relates to a deprivation index – lives within IMD5 are the least deprived quintile of the population.

Mortality/morbidity by deprivation class



Source: SCOR calculations using information in Extending the Critical Path, page 36.

CI Conditions

One of the most significant developments within Extending the Critical Path is that the HES data has been collected at individual episode level. This allows a medical history of patients to be built and addresses the issue of whether an 'incident' is a first incident which is relevant to avoid double-counting and make the statistics more pertinent for an insured portfolio.

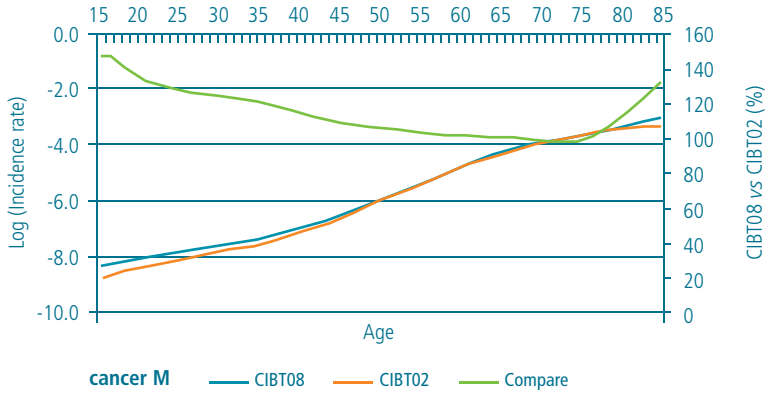
A few observations on individual conditions is made below, however, we would recommend a full read of the paper to get a deeper understanding.

Cancer

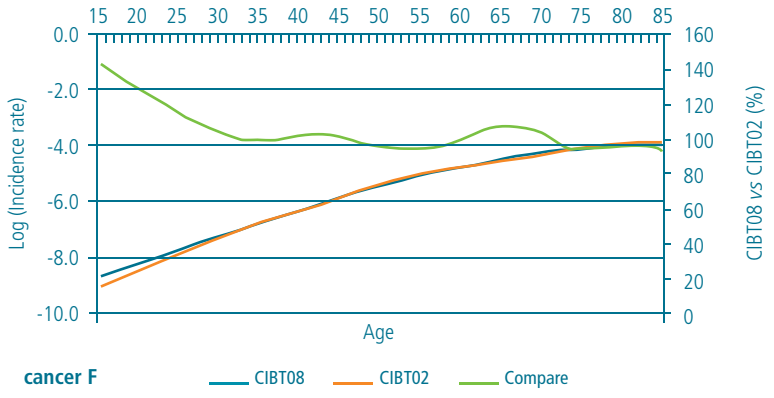
As the most significant condition it is worth looking at CIBT08 cancer rates compared to CIBT02. The graphs show that CIBT08 rates are generally higher but falling with age for males and reasonably consistent from age 30 for females.

The shape of the cancer rates is broadly consistent with the condition specific rates produced by CMI in working paper 52. The working party have also compared against crude rates from the Office for National Statistics Cancer Registrations and found a consistency.

Comparison of CIBT08 and CIBT02: Male Cancer



Comparison of CIBT08 and CIBT02: Female Cancer



Source: Extending the Critical Path, pages 47,49.

Heart Attack

The comparison between the CIBT08 rates and CIBT02 rates are very consistent between males and females. Each shows the rates to be significantly lower for CIBT08 with the reduction being greatest as age increases in the key age ranges. The largest difference between the two sets of rates is attributed to a more accurate methodology to allow for 'first-ever incidences' to be identified within HES in the more recent analysis.

Argument for a socio-economic variation appears much larger (and consistent by data source) for Heart Attack (and Strokes unsurprisingly given a number of the same risk factors) than it did for Cancers.

Total and Permanent Disability

This condition was included within CIBT02 and made a significant contribution to those rates. It has not been included within CIBT08 as there is no appropriate definition within HES codes from which to determine an incidence rate. In addition the incidence of TPD claims relative to all claims within the insured population is significantly lower than indicated by using the alternative data sources behind CIBT02.

Angioplasty

It is interesting to note that both single vessel and multi-vessel angioplasties are considered. The paper determines a very low incidence for multi-vessel – approximately 7% of single vessel.

The incidence rates derived are based on a single vessel procedure with a full payout (ie no adjustment for the partial pay-out status: this is also true of rates for lower grade prostate cancer and ductal carcinoma in situ).

Loss of Limb(s)

CIBT02 focused on a definition of loss of two limbs, while CIBT08 looks at loss of only one limb as this has become more significant in the market. The analysis confirms that the loss of two limbs is very rare.

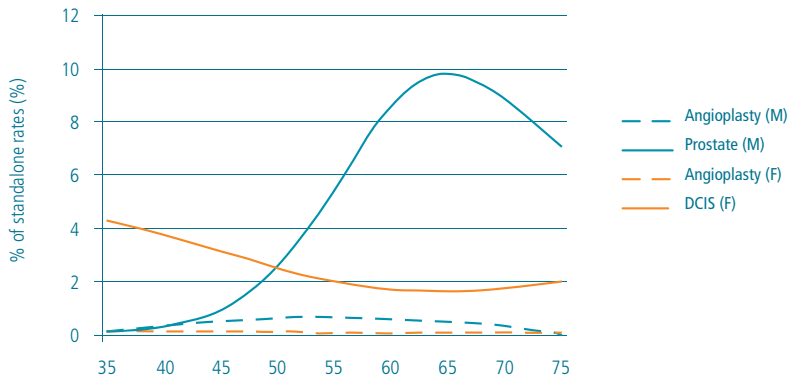
Paralysis of Limb(s)

Incident rates are shown for two limbs, as per the ABI definition, however there has also been work completed looking at a definition using only one limb as this is an extension often made to the ABI wording. The analysis shows an uplift in cost of around 20% for one limb at key insurance ages.

Additional conditions (Single Vessel Angioplasty, Ductal Carcinoma in Situ and Prostate Cancer)

The graph below shows an analysis of how these conditions increase the overall CI incidence relative to a stand-alone CI cost:

Cost of add-ons by age (treated as 100% payouts)



Source: SCOR calculations using information in Extending the Critical Path, appendix 6.

Other conditions of note

Condition	CIBT08 *vs* CIBT02	Comment
Alzheimer's Disease	Significantly lower	Working Party comment that they are not comfortable with the Alzheimer's rates
Benign Brain Tumour	Significantly higher	Results from change in HES conditions included
Coronary Artery Bypass Graft	Significantly lower	Genuine reduction in crude rates
Deafness	Significantly higher	Caused as a result of different source used in CIBT02 and adjustment for insured criteria
Kidney Failure	Significantly lower	Caused by significant increase in the overlap factor (primarily cardiovascular conditions)
Major Organ Transplant	Significantly lower	There is also a very different shape by age relative to CIBT02
Multiple Sclerosis	Significantly higher at older ages	Different treatment of multiple admissions which are significant for MS

Other

The paper also highlights a number of other areas of interest for readers, including:

- Description and explanation of HES data: helpful for anybody looking to do independent work with this data source
- More detail behind the geo-demographic data sources and how they group lives
- A comparison of the CIBT08 rates to the cause specific rates produced by the CMI in Working Paper 52

Beyond the information contained in the paper it is worth noting that the paper has caused considerable debate in political circles. The media have picked up on this story on the basis that the NHS have provided data to the industry cheaply (at cost price) which will help insurers justify increasing prices.

While data was anonymised and no personal information was disclosed, there seems to have been some confusion over this point and the episode has led to the Department of Health stating that they were wrong to provide the data. This has led to MPs suggesting that it may be appropriate to legally prevent insurers being able to purchase such data in the future. This would likely have an impact on any insurers using the HES or other datasets going forward.

We are hopeful that the misunderstanding about how such data is used can be clarified and a good outcome achieved – ultimately access to such data allows more accurate pricing and the removal of margins for uncertainty within the customer premium.

SCOR view/conclusion

SCOR welcomes this research work as a useful resource for those involved with critical illness products. Our thanks go out to all those involved and hope that this summary paper generates additional interest in reading the full paper.

As with previous working party analysis based on HES data it is difficult to extrapolate this work to an insured portfolio where the conditions are significantly different, underwriting has been applied, the pricing is smoker differentiated and the underlying socio-economic profile of the lives will not be consistent.

However, we feel that the paper does cover a number of interesting aspects and it is particularly pleasing to see the work extended to cover additional conditions, to use the HES data to an additional level of granularity than previous papers and to see the results of the geo-demographic profiling work.

We note that work that SCOR has conducted does not suggest that there is a strong socio-economic element within an insured portfolio. This may be the result of anti-selection and/or the impact of private healthcare.

The potential political fallout from this is certainly a concern as it does not put our industry in a good light but also because it raises concerns that our access to useful data for risk analysis purposes could be limited in the future. This would have an impact beyond protection with areas such as enhanced annuities also likely to suffer. We hope that the position and confusion is resolved in a manner that works for all parties.

Hopefully this summary and the paper itself provides a lot of food for thought and we would be happy to work with providers who would like to explore or discuss any aspect of this further.

Appendix A

Condition	Covered in CIBT02	Covered in CIBT08	Additional in CIBT08
Aorta Graft Surgery	✓	✓	
Alzheimer's Disease	✓	✓	
Angioplasty	✓		✓
Aplastic Anaemia		✓	
Bacterial Meningitis		✓	
Benign Brain Tumour	✓	✓	
Blindness	✓	✓	
Cancer	✓	✓	
Cardiomyopathy		✓	
Coma	✓	✓	
Coronary Artery Bypass Graft (CABG)	✓	✓	
Creutzfeldt-Jakob Disease		✓	
Deafness	✓	✓	
Dementia		✓	
Ductal Carcinoma in Situ (DCIS)			✓
Encephalitis		✓	
Heart Attack	✓	✓	
Heart Valve Replacement or Repair	✓	✓	
HIV infection	✓	✓	
Kidney Failure	✓	✓	
Liver Failure		✓	
Loss of Limb(s)	>1 limb	1 limb	
Loss of Speech	✓	✓	
Major Organ Transplant	✓	✓	
Motor Neurone Disease	✓	✓	
Multiple Sclerosis	✓	✓	
Multiple System Atrophy		✓	
Open Heart Surgery		✓	
Paralysis of Two Limbs	✓	✓	
Parkinson's Disease	✓	✓	
Primary Pulmonary Hypertension		✓	
Progressive Supranuclear Palsy		✓	
Prostate Cancer			✓
Respiratory Failure		✓	
Stroke	✓	✓	
Systemic Lupus Erythematous		✓	
Third Degree Burns	✓	✓	
Total and Permanent Disability	✓		
Traumatic Head Injury	✓	✓	

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