

The 10<sup>th</sup> Annual Healthcare Conference 2006  
7 - 9 May  
Edinburgh

Critical Illness Trends Research Group

## Workshop A1

### Critical Illness Trends Research Group

Working Party / Research Group Update

Neil Robjohns  
Munich Re UK Life Branch  
Scott Reid  
Revios Reinsurance UK Ltd

### Critical Illness Trends Research Group

#### Our Aims :

To examine underlying trends in the factors  
influencing UK Insured Critical Illness claim rates,  
and from these, to assess :

- The historic trend in incidence and death rates for the major CI's
- Any pointers for future trends in Standalone CI, Mortality and hence Accelerated CI.

Formed in March 2001

**Research Group Background :  
Current Group Members and our Specialised Focus**

<u>Cancer</u>	<u>Heart Attack &amp; Stroke</u>	<u>Non-CI Mort<sup>y</sup> &amp; MS</u>
Actuaries		
Richard Morris Neil Robjohns	Scott Reid Joanne Wells	Hamish Galloway
Medical Experts		
Professor Rubens Consultant Oncologist	Richard Croxson Consultant Cardiologist	
Links :		
CMIB CI experience investigation UK Actuarial Profession WP investigating risk based capital for CI ABI CI definitions group Actuaries Panel on Medical Advances		

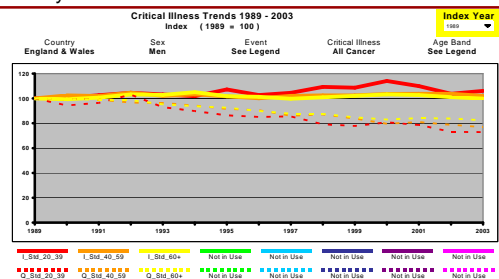
**Workshop Presentation Outline**

Update on CI Trends  
Major Trends in Population Incidence and Mortality  
New Population Critical Illness Base Table  
Why Update CIBT93 ?  
Development of CIBT02  
CIBT02 Compared to CIBT93 – High Level Overview  
CIBT02 Compared to CIBT93 – Heart and Stroke in detail  
CIBT02 Compared to CIBT93 – Other conditions  
CMI CI Claims Experience 1999 – 2002  
Compared to CIBT93 and Updated Population Table CIBT02  
Next Steps

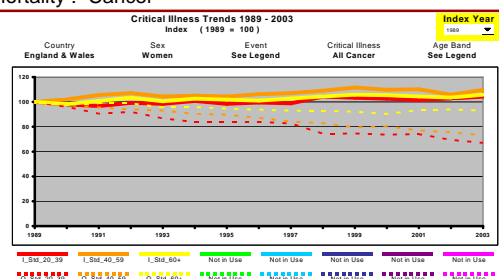
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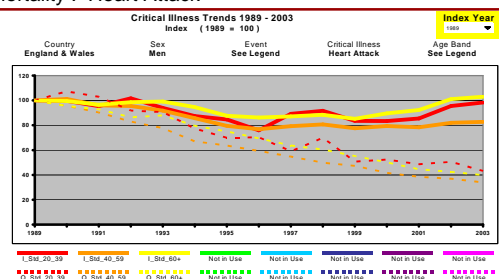
## Update on Major Trends in Population Incidence and Mortality : Cancer



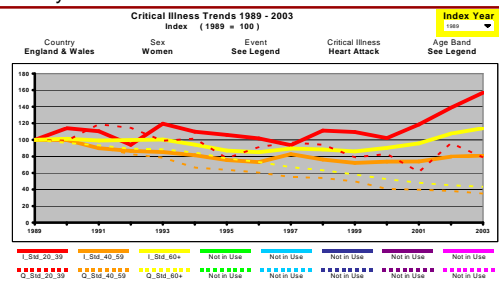
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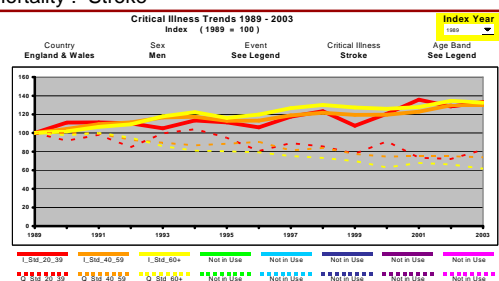
## Update on Major Trends in Population Incidence and Mortality : Heart Attack



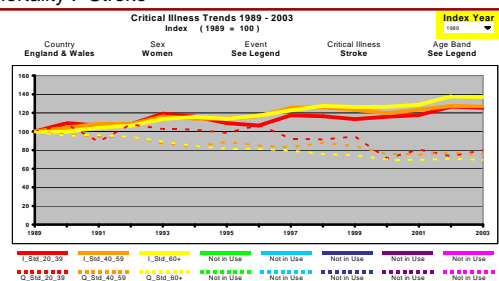
## Update on Major Trends in Population Incidence and Mortality : Heart Attack



## Update on Major Trends in Population Incidence and Mortality : Stroke



## Update on Major Trends in Population Incidence and Mortality : Stroke



Legend:

I_Std_20_39	I_Std_40_59	I_Std_60+	Not in Use	Not in Use	Not in Use	Not in Use	Not in Use
Q_Std_20_39	Q_Std_40_59	Q_Std_60+	Not in Use	Not in Use	Not in Use	Not in Use	Not in Use



## Next Steps

### An update to CIBT93 : Why ? / Our Aims

Absence of an insured lives table

CIBT93 is yet to be superseded

Insured lives data remains highly select, subject to significant IBNS adjustments, and is very limited in viable age range

Emergence of new and better data for producing a population CI table

CIBT93 was produced in 1999/00, largely from 1993/94 data

Crude CI rate data for 2002/03 is now available and is generally better quality

New data sources are available for many of the adjustments required

A new table will allow

An update on the shape of the population table by age (beyond range of CMI)

An update / better estimate of the breakdown of the total incidence by cause

Comparing CIBT02 to CIBT93 should summarise historic trends

### An update to CIBT93 : The Steps in Producing a CI Base Table

Derive crude rates from incidence count and population data

Adjust to 'first ever' incidence

Gross-up for missing 'sudden deaths'

Remove overlap with other CIs

Adjust for prevalence to 'healthy population' rate

Graduate resulting pure CI incidence rate,  $I$

Remove deaths in survival period to calculate Standalone CI rate,  $I'$

Calculate mortality rate for CI,  $kq$  ( $q = \text{pop}^n \text{ mort}^i$ ,  $k = \text{prop}^n \text{ death from CI}$ )

Derive Accelerated CI rate as  $I + (1-k)q$

### An update to CIBT93 : Development of CIBT02

Incidence rates updated to year 2002

Other assumptions revised / updated

First ever, sudden death, overlap, prevalence, 28 day survival, population mortality ( $q_x$ ), proportion critical illness deaths ( $k_x$ )

Successes

Generally better quality data and time series for crude CI rates

New and better quality information for many of the adjustments

For example, good data for first ever adjustment for heart attack and stroke

Some problems along the way

CIBT93 crude CI incidence rates inconsistent with current data sources

No new data sources for 'sudden deaths' but falling mortality clearly indicated need to reduce the assumed factors

Anomalies to resolve in final rates (as ever)

Still a 'Work in Progress'

Uncertainty remains in the adjustments and resulting incidence rates

Difficult to reconcile population rates to emerging insured experience

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### Update on CI Trends

Major Trends in Population Incidence and Mortality

### New Population Critical Illness Base Table

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CIBT02 Compared to CIBT93 – High Level Overview

CIBT02 Compared to CIBT93 – Heart and Stroke in detail

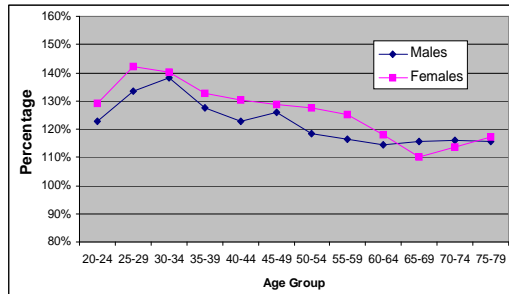
CIBT02 Compared to CIBT93 – Other conditions

### CMI CI Claims Experience 1999 – 2002

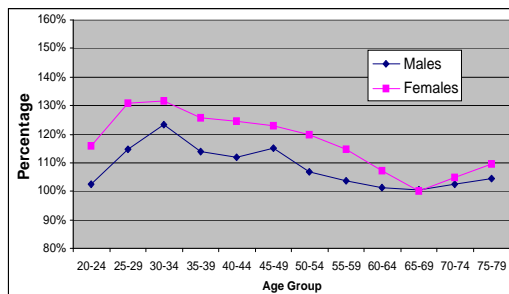
Compared to CIBT93 and Updated Population Table CIBT02

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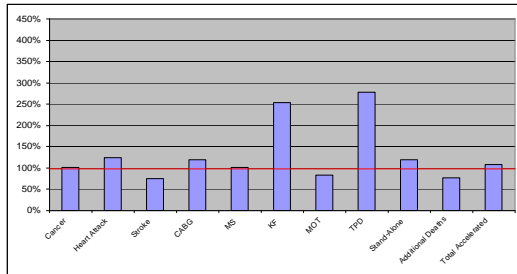
## CIBT02 Compared to CIBT93 : Stand-Alone



## CIBT02 Compared to CIBT93 : Total Accelerated



**CIBT02 Compared to CIBT93 :  
Males, 30 to 60, Percentage change by cause**




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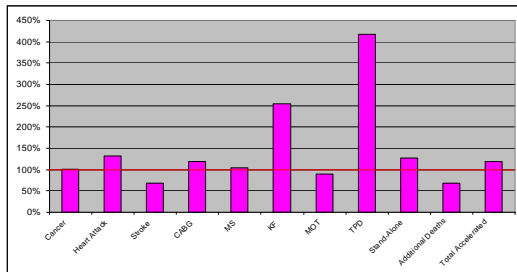
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**CIBT02 Compared to CIBT93 :  
Females, 30 to 60, Percentage change by cause**




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**CIBT02 Compared to CIBT93 :  
Summary of High Level Overview**

Little change for cancer - reflecting gentle upwards trends  
 Heart Attack has increased significantly  
 e.g. +24% males and + 33% females  
 Stroke has reduced significantly  
 e.g. -25% males and - 32% female  
 CABG has increased significantly  
 e.g. about +20% for males and females  
 TPD has increased significantly  
 e.g. about +180% males and +320% for females  
 Other conditions have a small impact on overall cost BUT there are some big % changes, e.g. in KF

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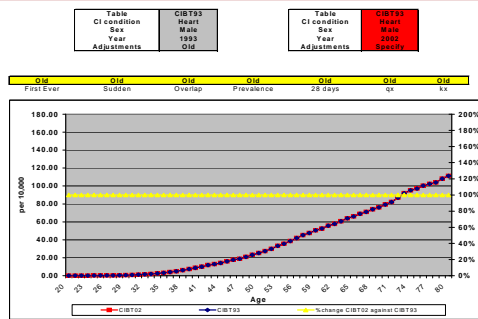
CIBT02 Compared to CIBT93 – Other conditions

### CMI CI Claims Experience 1999 – 2002

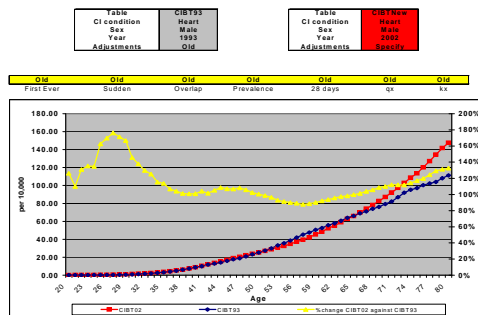
Compared to CIBT93 and Updated Population Table CIBT02

### Next Steps

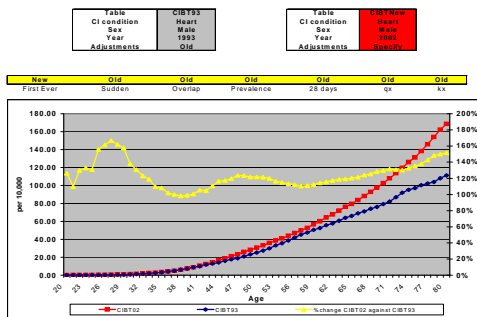
## CIBT02 Compared to CIBT93 : Heart Attack Stand-Alone incidence rates



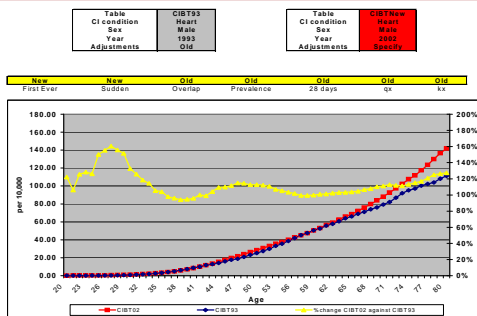
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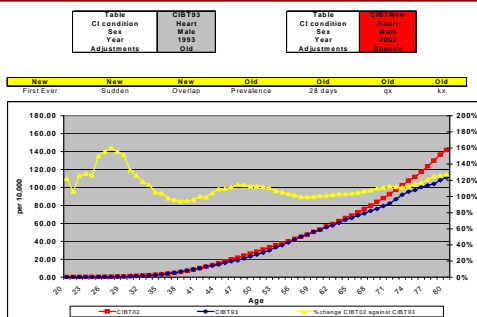
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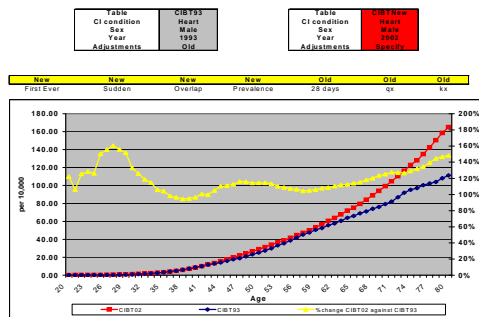
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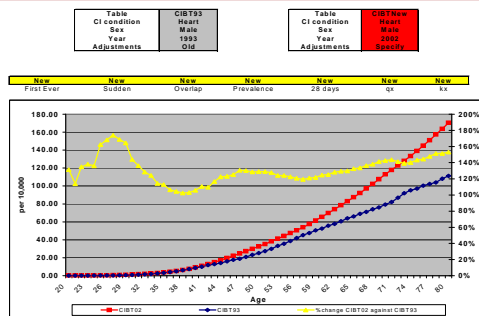
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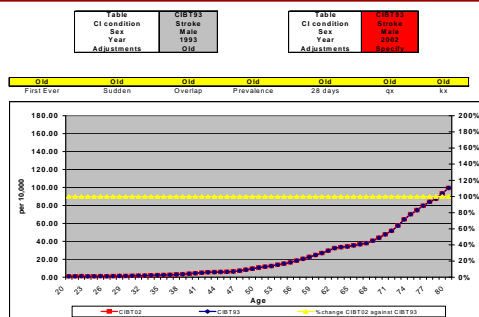
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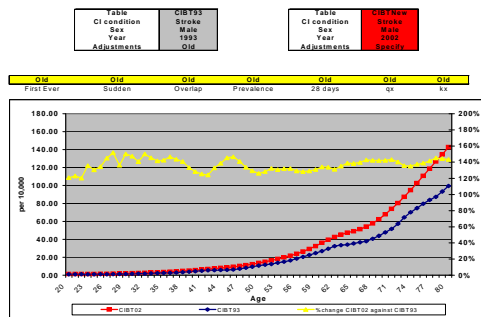
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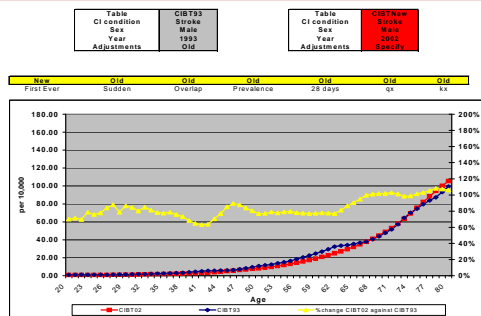
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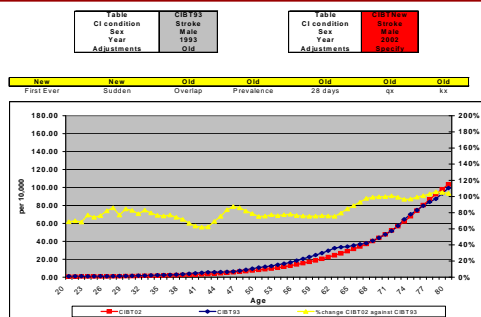
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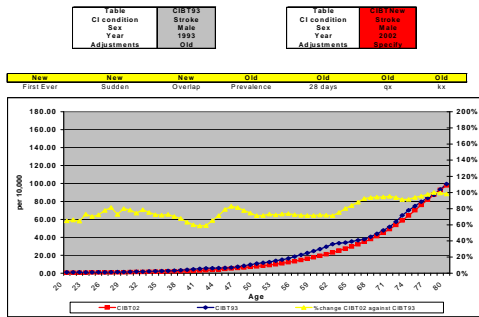
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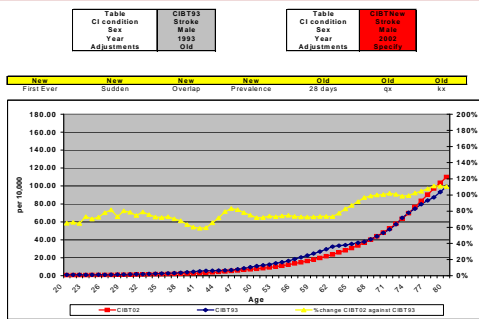
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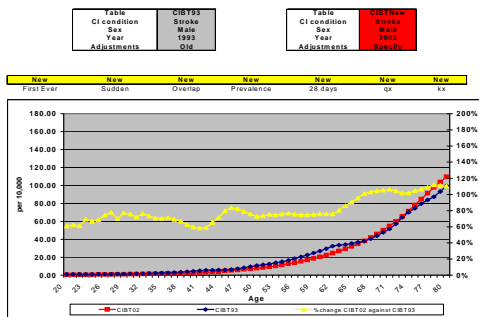
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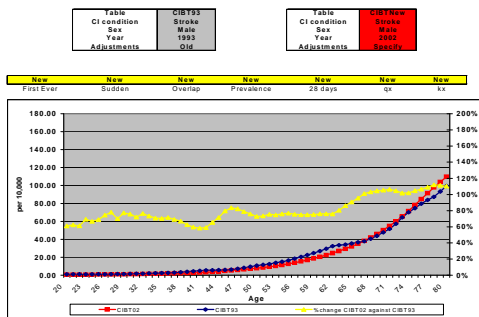
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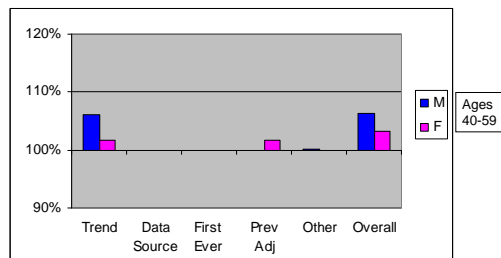
CIBT02 Compared to CIBT93 – Other conditions

#### CMI CI Claims Experience 1999 – 2002

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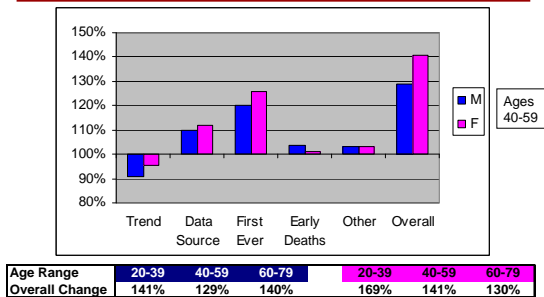
Next Steps

### CIBT02 Compared to CIBT93 Key Components of Change - Cancer



Age Range	20-39	40-59	60-79	20-39	40-59	60-79
Overall Change	111%	106%	102%	111%	103%	104%

**CIBT02 Compared to CIBT93**  
**Key Components of Change - Heart Attack**




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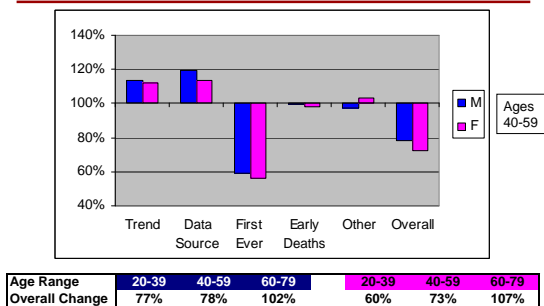
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**CIBT02 Compared to CIBT93**  
**Key Components of Change - Stroke**




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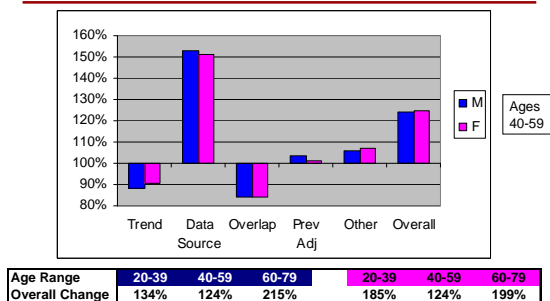
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**CIBT02 Compared to CIBT93**  
**Key Components of Change - CABG**




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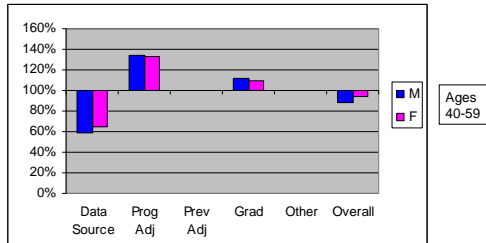
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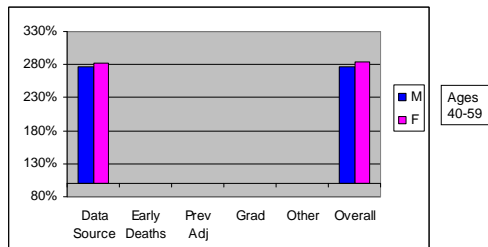
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**CIBT02 Compared to CIBT93**  
**Key Components of Change - Multiple Sclerosis**



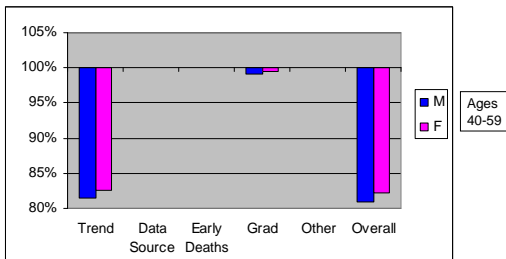
Age Range	20-39	40-59	60-79	20-39	40-59	60-79
Overall Change	145%	89%	30%	146%	94%	32%

**CIBT02 Compared to CIBT93**  
**Key Components of Change - Kidney Failure**



Age Range	20-39	40-59	60-79	20-39	40-59	60-79
Overall Change	182%	276%	2083%	171%	284%	3585%

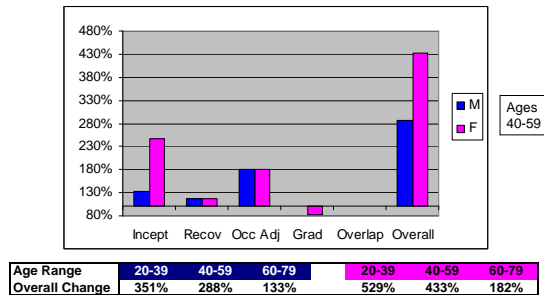
**CIBT02 Compared to CIBT93**  
**Key Components of Change - Major Organ Transplant**



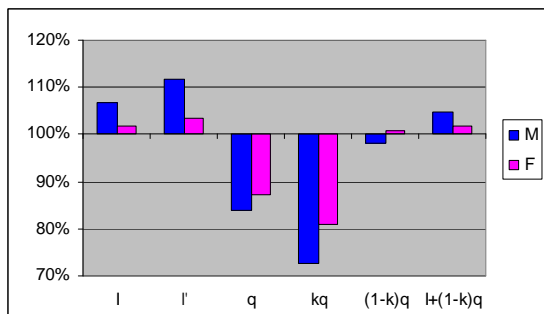
Age Range	20-39	40-59	60-79	20-39	40-59	60-79
Overall Change	118%	81%	109%	121%	82%	141%



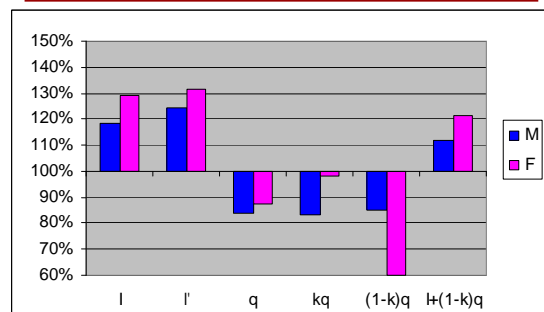
**CIBT02 Compared to CIBT93**  
**Key Components of Change - TPD**



**CIBT02 Compared to CIBT93**  
**Key Components of Change - Overview**  
**7 CIs (excl TPD), Ages 40-59**



**CIBT02 Compared to CIBT93**  
**Key Components of Change - Overview**  
**Total CIBT (incl TPD), Ages 40-59**



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#### CMI CI Claims Experience 1999 – 2002

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Next Steps

### CMI CI Claims Experience 1999-2002 Compared to CIBT93 and CIBT02

All office CMI CI experience data for 1999-2002

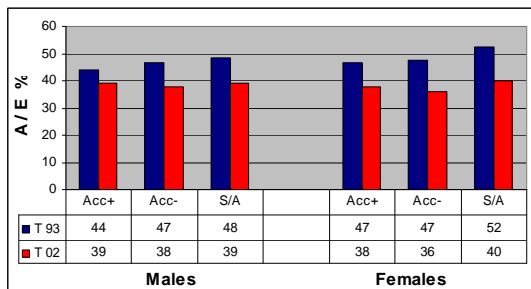
Thanks to the CMI for producing A/E's against CIBT02 and allowing our use of this dataset

#### Key Caveats

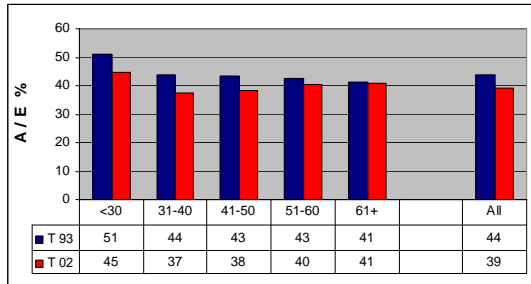
The A/E's shown are crude results, BEFORE any allowance for grossing-up factors / IBNS (so broadly multiply by 115%)

The CMI data remains highly select by duration and reflects a changing mix of business by office over time

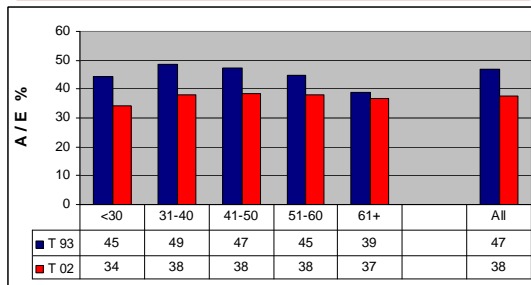
### CMI CI Claims Experience 1999-2002 Compared to CIBT93 and CIBT02 By Type of Cover



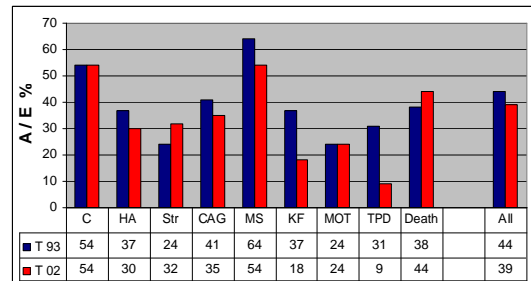
**CMI CI Claims Experience 1999-2002  
Compared to CIBT93 and CIBT02  
By Age, for Males, for Accelerated Cover (incl deaths)**



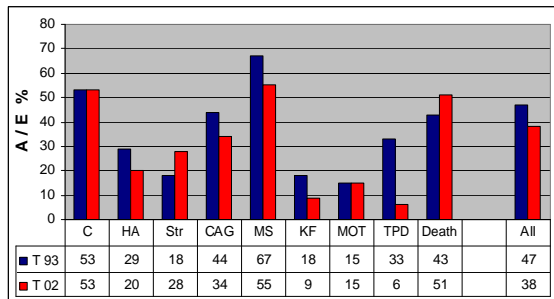
**CMI CI Claims Experience 1999-2002  
Compared to CIBT93 and CIBT02  
By Age, for Females, for Accelerated Cover (incl deaths)**



**CMI CI Claims Experience 1999-2002  
Compared to CIBT93 and CIBT02  
By Critical Illness, for Males, for Acc Cover (incl deaths)**



**CMI CI Claims Experience 1999-2002  
Compared to CIBT93 and CIBT02  
By Critical Illness, for Females , for Acc Cover (incl deaths)**



**New Population Critical Illness Base Table, CIBT02  
Conclusions**

We believe it will prove to be a useful exercise  
 It reflects the position almost a decade on from CIBT93  
 It reflects better quality data and estimates than were available for CIBT93  
 We believe it shows a better estimate of rate 'shape' by age and CI  
 In many ways it appears to give more level A/Es against CMI CI experience  
 But some aspects not as envisaged  
 Change from CIBT93 to CIBT02 reflects trends ...  
 But ... these are swamped by revisions to other factors  
 Some CIs clearly need further refinement (notably KF, TPD)  
 Observed features of CMI CI experience depend critically on the CIBT  
 There are many key assumptions and estimates embedded in such CIBT  
 Interpret features of CMI CI experience with care !

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### CI Trends Research Group : Our Future Aims

Finalise CIBT02 (further refinement and review)

Finalise the update to our CI trends database

England & Wales, Scotland, 1970 / 80 to 2003

Write up and publish our work

Document our analysis of CI trends at population level

Notes on features, interpretation and modelling of CI trends

Aim to provide access to database and tools

Provide analysis of trends by deprivation category

Document the derivation of CIBT02 and the movement from CIBT93

### Workshop A1

#### Critical Illness Trends Research Group

We welcome your

Ideas

Comments

Questions

Neil Robjohns, Munich Re UK Life Branch

Scott Reid, Revios Reinsurance UK Ltd