



The Actuarial Profession

making financial sense of the future

CMI Critical Illness Update

“Current Issues in Critical Illness”

7 December 2005

Dave Grimshaw

Chairman, CMI Critical Illness Committee

CMI CI Investigation

- Investigation started with 1998 data
 - Published results to members for 1998, 1999 & 2000 in 2003
 - Problems in collecting and analysing data for 2001-02:
 - Delays in some offices submitting data
 - A significant number of data re-submissions
 - Data issues forced us to exclude some offices whose data was used until 2000
 - Draft results for 2001, 2002 & quad included in talk last year
-

Agenda

- **Progress in 2005**
- **Claim Dates / Claims Delays**
- **Overview of the 1999-2003 data**
- **Draft 2003 results**
- **Further work**
- **1999-2002 results revisited**
- **Conclusions**

CMI CI – Progress in 2005

- **Full results for 2001, 2002 & quad released in May 2005**
- **Working Paper 14:**
 - Detailed methodology underlying 1999-2002 results
 - Estimate of overall grossing-up factor
- **2003 / 4 Data Collection**
- **Working Paper 18:**
 - Responses to feedback on WP14
 - Reasons for not graduating (yet)

Decision not to graduate (yet)

- **Very immature experience**
 - Normal approach is to graduate the ultimate experience and blend in select but much of our data is select!
 - We don't yet know the ultimate experience
- **Experience differs significantly by gender and smoking**
 - We would need to graduate a surface varying by age and duration for each sex/smoker status category
- **Limited age range**
 - Distinct lack of data below age 30 & above age 60
- **Do we graduate by cause separately or for all causes combined?**

CMI CI – Progress in 2005

- **Full results for 2001, 2002 & quad released in May 2005**
- **Working Paper 14:**
 - Detailed methodology underlying 1999-2002 results
 - Estimate of overall grossing-up factor
- **2003 / 4 Data Collection**
- **Working Paper 18:**
 - Responses to feedback on WP14
 - Reasons for not graduating (yet)
- **1999-2002 data available to CMI members**
- **Further work on grossing-up factors**
- **Discussions with Health Claims Forum re dates of claim**

Claim Dates

- CMI request 4 dates for each claim: Date of Diagnosis, Date of Notification, Date of Admittance & Date of Settlement
- Date of diagnosis matches exposure and matches the risk incurred by the office

- But:

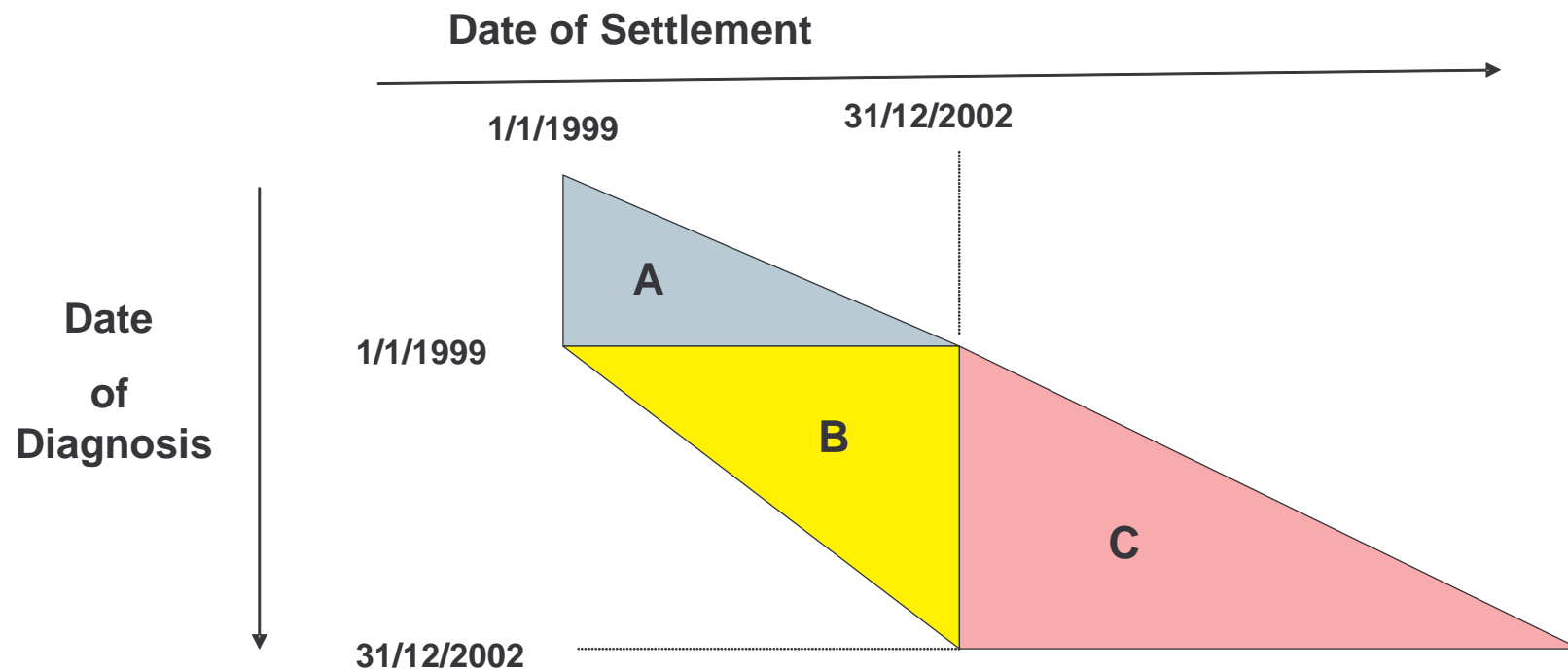
- Offices only supply date of diagnosis for some claims. In other cases we estimate it from the dates we are given:

Actual Date of Diagnosis	64.2% (56.3%)
Estimated from Date of Settlement	35.4% (42.3%)
Estimated from Date of Admittance	0% (1.2%)
Estimated from Date of Notification	0.4% (0.2%)

2003 data (1999-2002 in brackets)

- The claims we are analysing are those settled in the quad

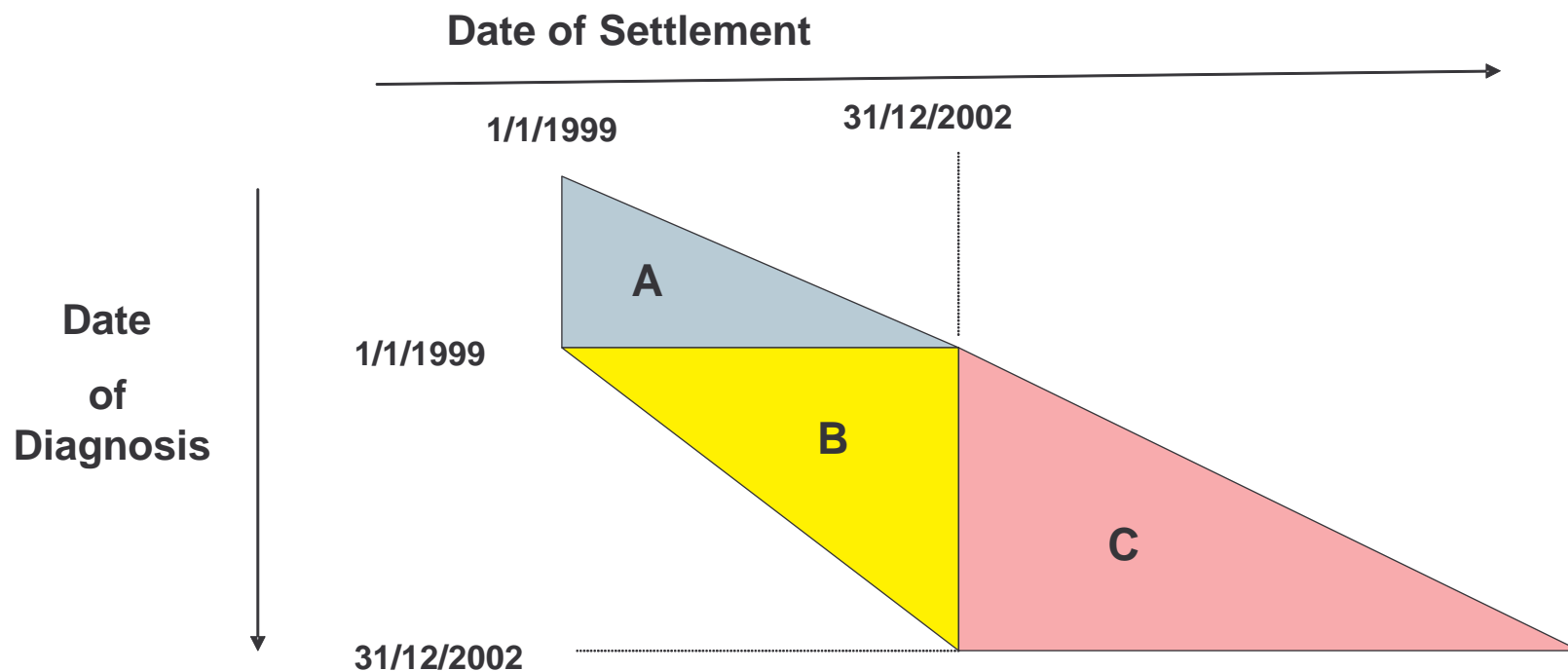
Date of Diagnosis v Date of Settlement



Importance of Claim Dates

- The date of diagnosis is used to correctly calculate the age and duration but not to re-allocate claims in or out of the analysis
- This would not be an issue with a stable portfolio
- **BUT VOLUMES HAVE INCREASED RAPIDLY**
- The effect of this is that CMI results are understated by a factor of the order of 15%
- This factor will vary between offices according to the growth rate in their claims portfolio

Date of Diagnosis v Date of Settlement



$$(A + B) \times (1 + \text{grossing-up factor}) = (B + C)$$

Claims Delays

- Approx. observed delays between claim dates:

- Date of Diagnosis

114 days

- Date of Notification

55 days

- Date of Admittance

7 days

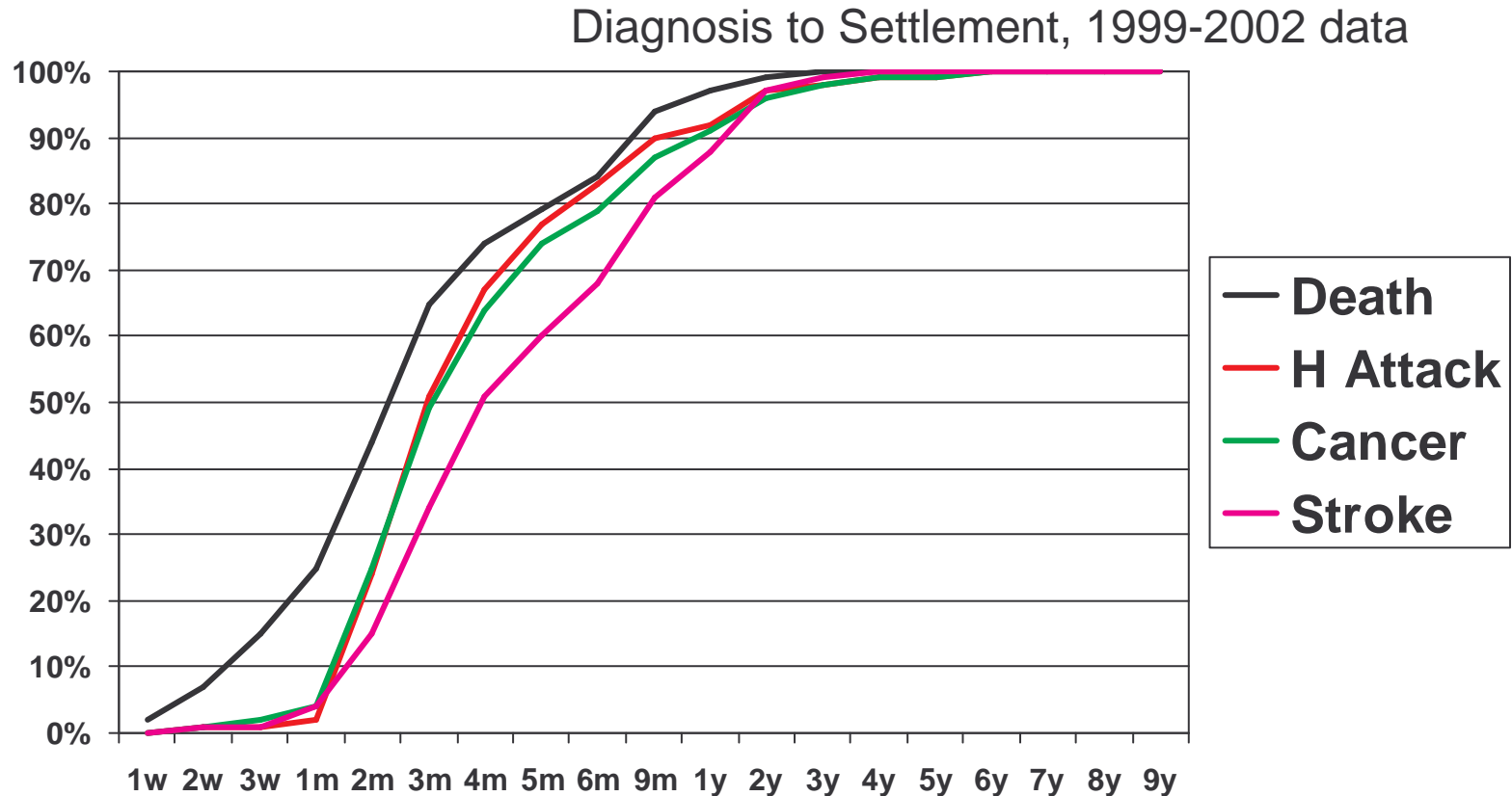
- Date of Settlement

Claims Delays

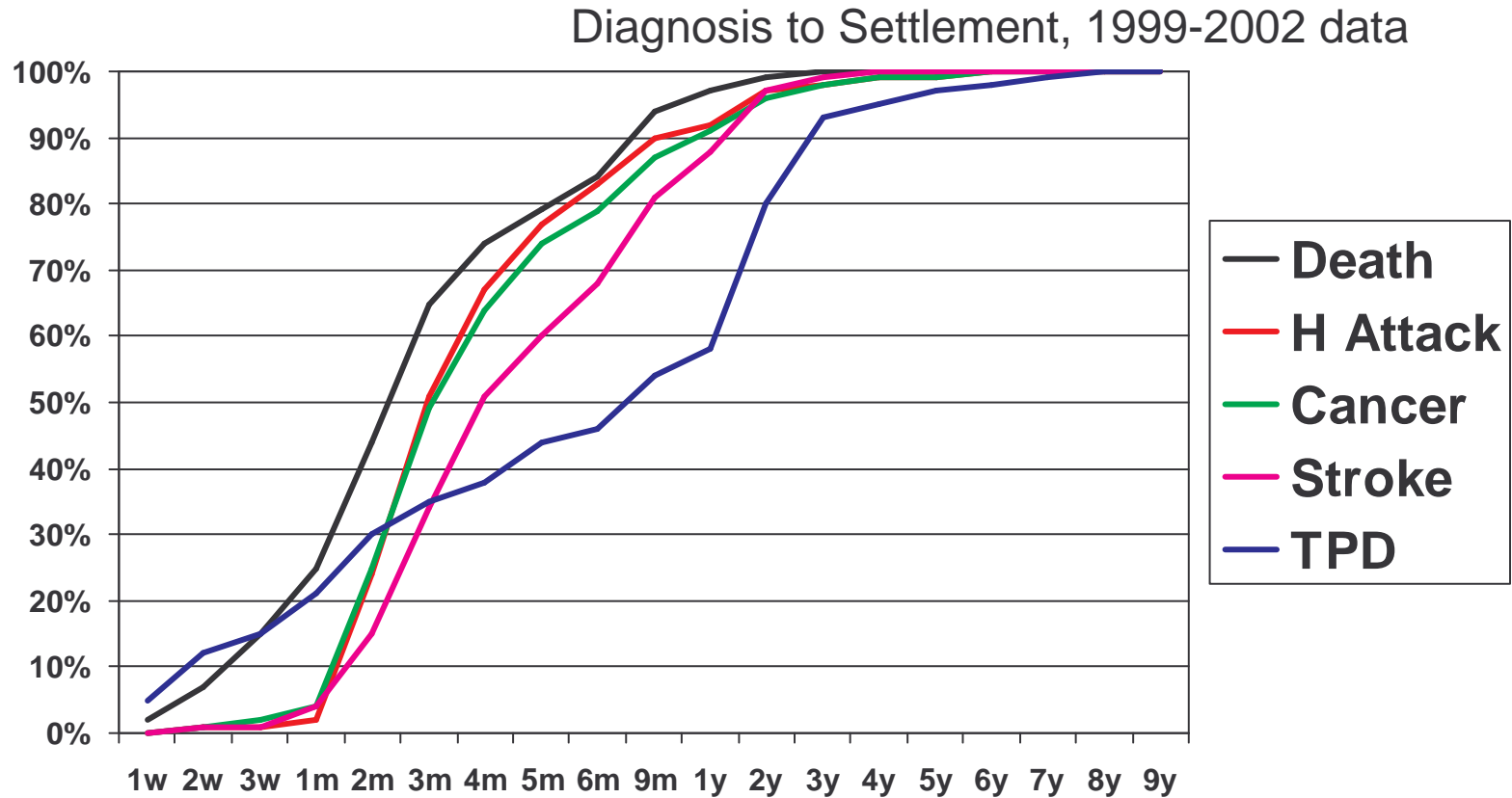
- Approx. observed delays between claim dates:

	Death	CI
• Date of Diagnosis	12 days	127 days
• Date of Notification	78 days	48 days
• Date of Admittance	10 days	5 days
• Date of Settlement		

Observed claim delays by cause



Observed claim delays by cause



What do we mean by Date of Diagnosis?

- **For some events it has a clear intuitive meaning, e.g. :**
 - Heart Attack
 - Surgery events
 - Death
- **For Cancer, is it the date symptoms are detected by the GP, or when a diagnosis is confirmed by the consultant?**
- **ABI definition of MS:**

A definite diagnosis by a Consultant Neurologist of Multiple Sclerosis which satisfies all of the following criteria:

 - § There must be current impairment of motor or sensory function, which must have persisted for a continuous period of at least six months.
 - § The diagnosis must be confirmed by diagnostic techniques current at the time of the claim.

So is it when diagnosis obtained or after the 6 months?
- **Definition may vary between offices or even between assessors within an office**

Discussions with the Health Claims Forum

- **Can we record Date of Diagnosis more often?**
- **Can we record Date of Diagnosis consistently?**

Claim Delays

- 1998-2000 analyses used an average delay of 155 days between diagnosis and settlement
- Average delay in 1999-2002 had lengthened to 176 days
- We expect it to continue to lengthen until number of claims stabilises. Our model suggests an underlying average delay of around 260 days
- A straight average over-simplifies these effects:
 - We are now differentiating between Death and CI
 - We apply an average based on duration of policy
- 2003 results use 1999-2002 adjustments

Observed Claim Delays

(diagnosis to settlement, in days)

Duration of policy at date of settlement	CI	Death
Up to 3 months	53	41
3 – 6 months	82	44
6 – 12 months	104	102
1 – 2 years	125	
2 – 3 years	154	
3 – 4 years	195	
4 – 5 years	234	
5 – 6 years	237	
6 – 7 years	261	
7 years +	298	

Contributing Offices

- Data from 15 offices for 2003 (so far!):

AEGON

AXA

Bupa

Halifax Life

Legal & General

Nationwide Life

Scottish Provident

Swiss Life (UK)

Allied Dunbar

Barclays Life

CIS

HSBC

Liverpool Victoria

Royal Sun Alliance

Standard Life

Data volumes

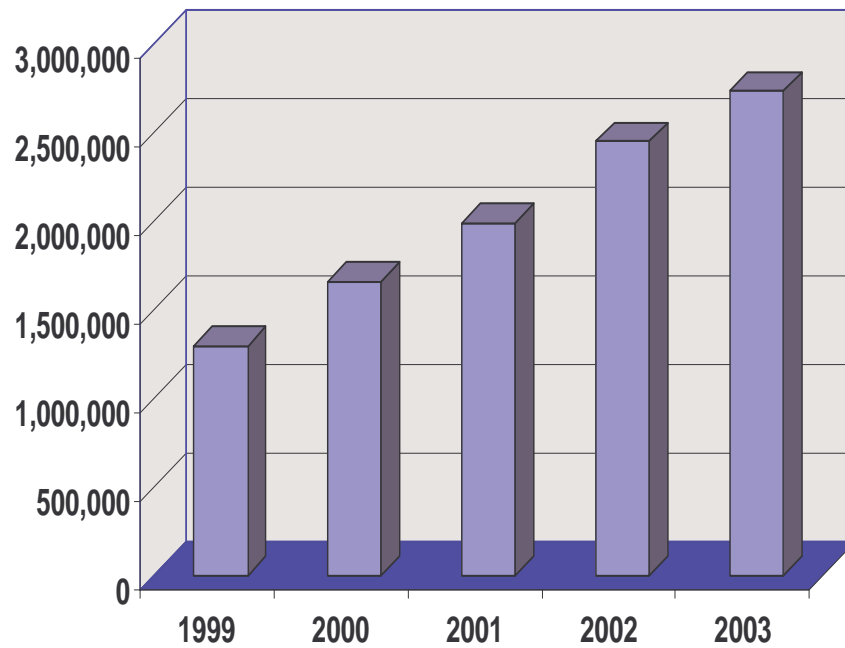
	1999-2002	2003
Data from:	16 offices	15 offices
Life-years exposure	7.4m	2.7m
Accelerated cover	6.4m	2.3m
Stand-Alone cover	1.0m	0.4m
Claims	11,803	4,048
Accelerated cover	10,310	3,416
	(7,978 CI; 2,332 death)	(2,691 CI; 725 death)
Stand-Alone cover	1,493	632

Split of the 1999-2003 data

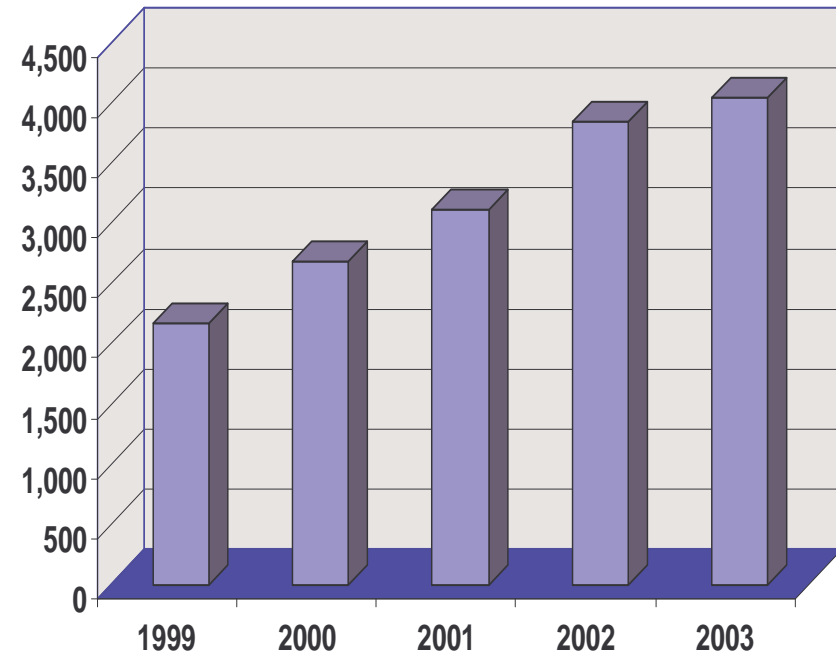
Split of exposure data (on lives basis):	1999-2002	2003
Accelerated cover	86%	87%
Stand-Alone cover	14%	13%
Single Life / Joint Life	45% / 55%	45% / 55%
Male / Female	53% / 47%	52% / 48%
Non-smoker / Smoker	80% / 19%	81% / 19%
Sales Channel		
Bancassurer	30%	31%
IFA	33%	36%
DSF	28%	22%
Other	6%	8%

1999-2003: Distribution of Exposure and Claims by year

Exposure

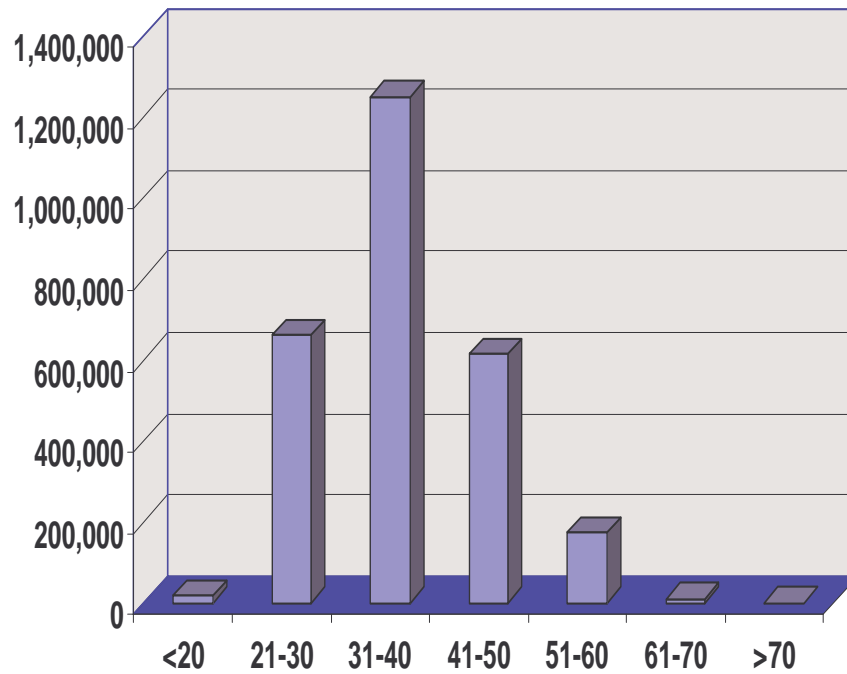


Settled Claims

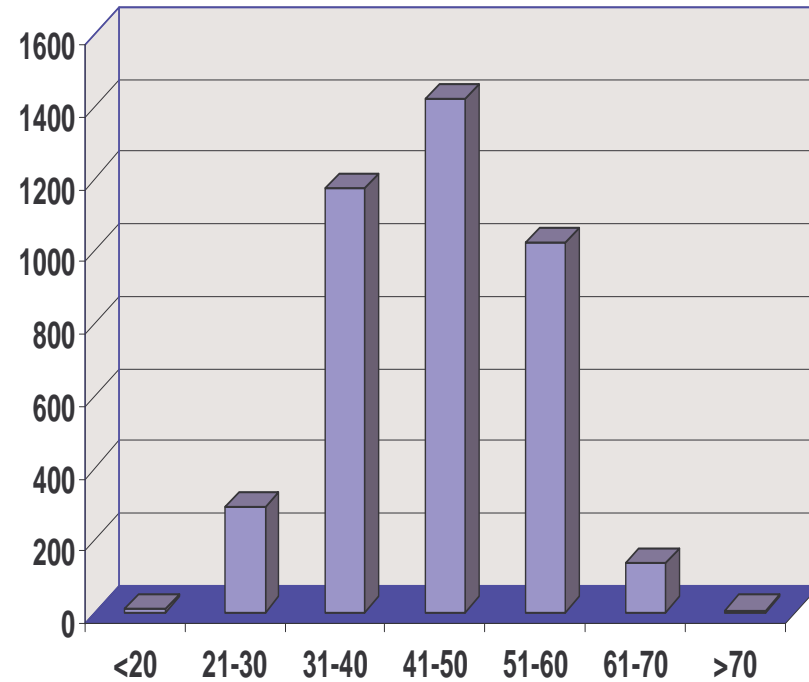


2003: Distribution of Exposure and Claims by age band

Exposure

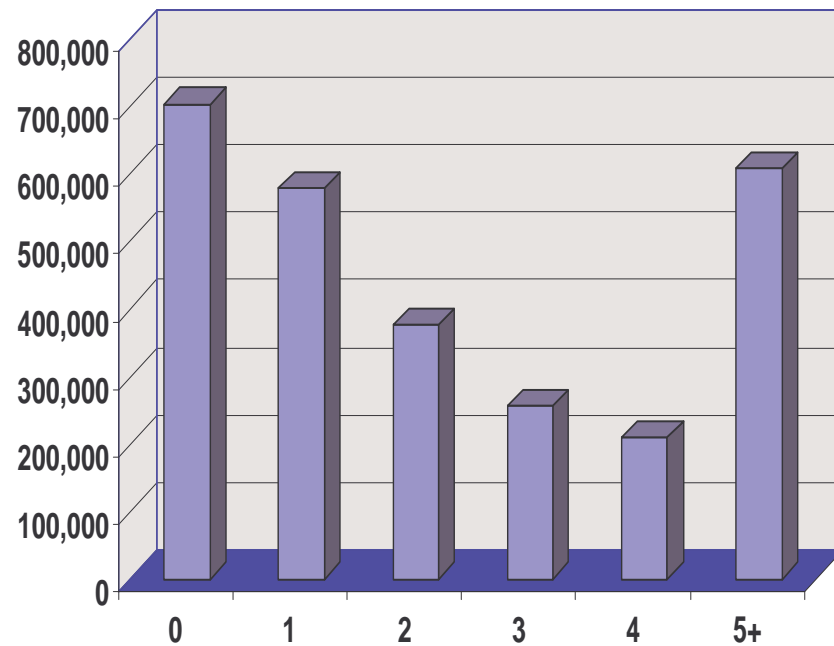


Claims

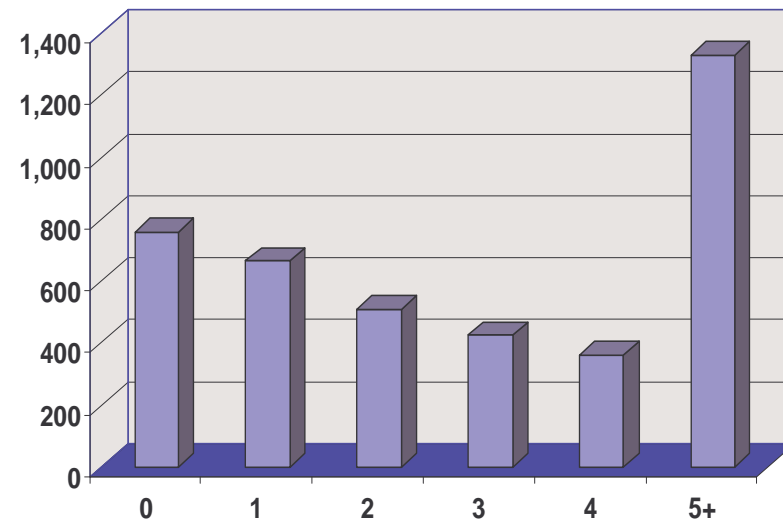


2003: Distribution of Exposure and Claims by duration

Exposure



Claims



Draft 2003 Aggregate results

Accelerated v Stand-Alone, all ages, all durations, Lives v Amounts

		Accelerated	Stand-Alone
Male	Lives	36 (44)	48 (48)
	Amounts	35 (41)	51 (49)
Female	Lives	42 (47)	59 (52)
	Amounts	43 (45)	63 (56)

(100 A/E's, Expected based on CIBT93, 1999-2002 results in brackets)

Results by Calendar Year

Accelerated business, all ages, all durations, Lives

		1999	2000	2001	2002	Quad	2003 (DRAFT)
Male	NS	40	39	39	35	38	31
	Sm	77	73	68	62	69	54
Female	NS	52	46	42	43	45	40
	Sm	58	55	57	56	57	53

(100 A/E's, Expected based on CIBT93)

Draft 2003 Results by Duration

Accelerated business, all ages, all years, Lives

		Dn 0	Dn 1	Dn 2+	All
Male	NS	27 (31)	25 (37)	35 (41)	31 (38)
	Sm	48 (64)	44 (68)	60 (71)	54 (69)
Female	NS	34 (41)	37 (46)	43 (46)	40 (45)
	Sm	51 (45)	51 (60)	55 (61)	53 (57)

(100 A/E's, Expected based on CIBT93, 1999-2002 results in brackets)

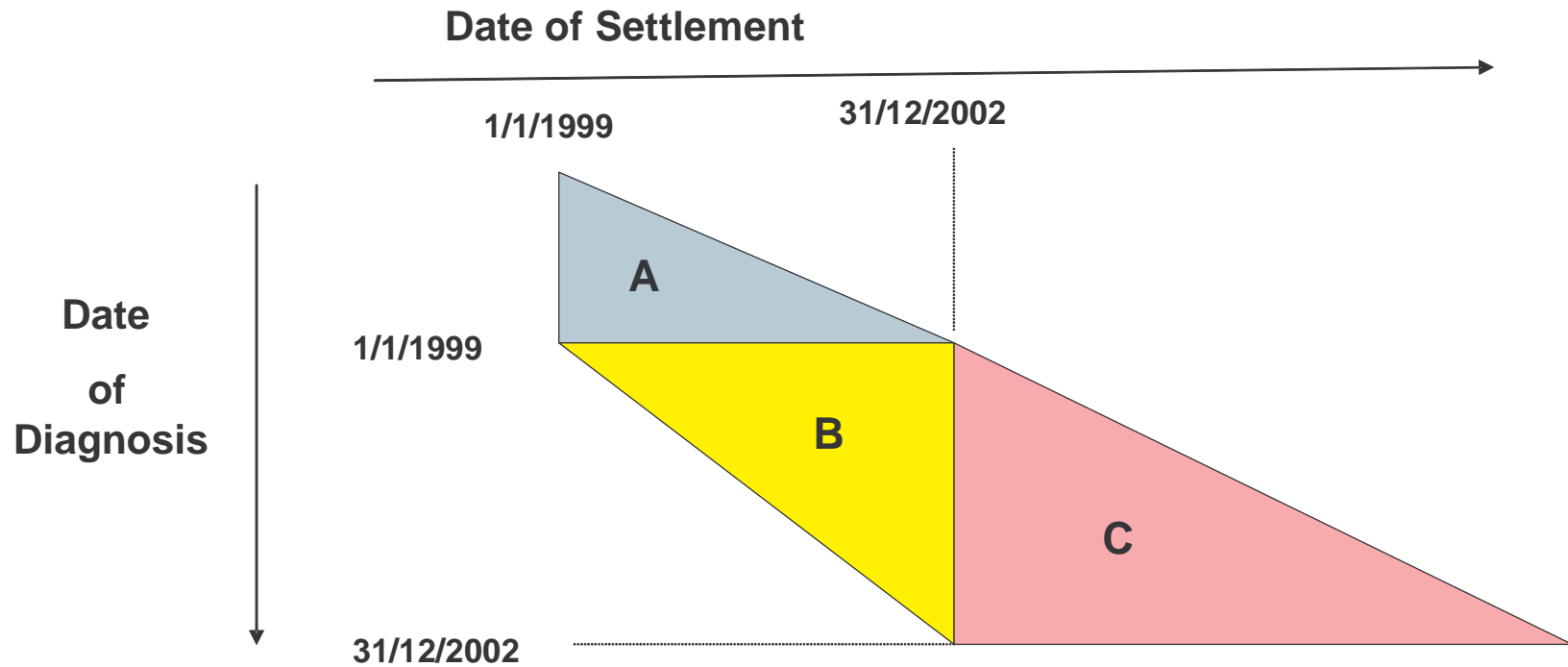
Draft 2003 Results by Age

Accelerated business, all durations, all years, Lives

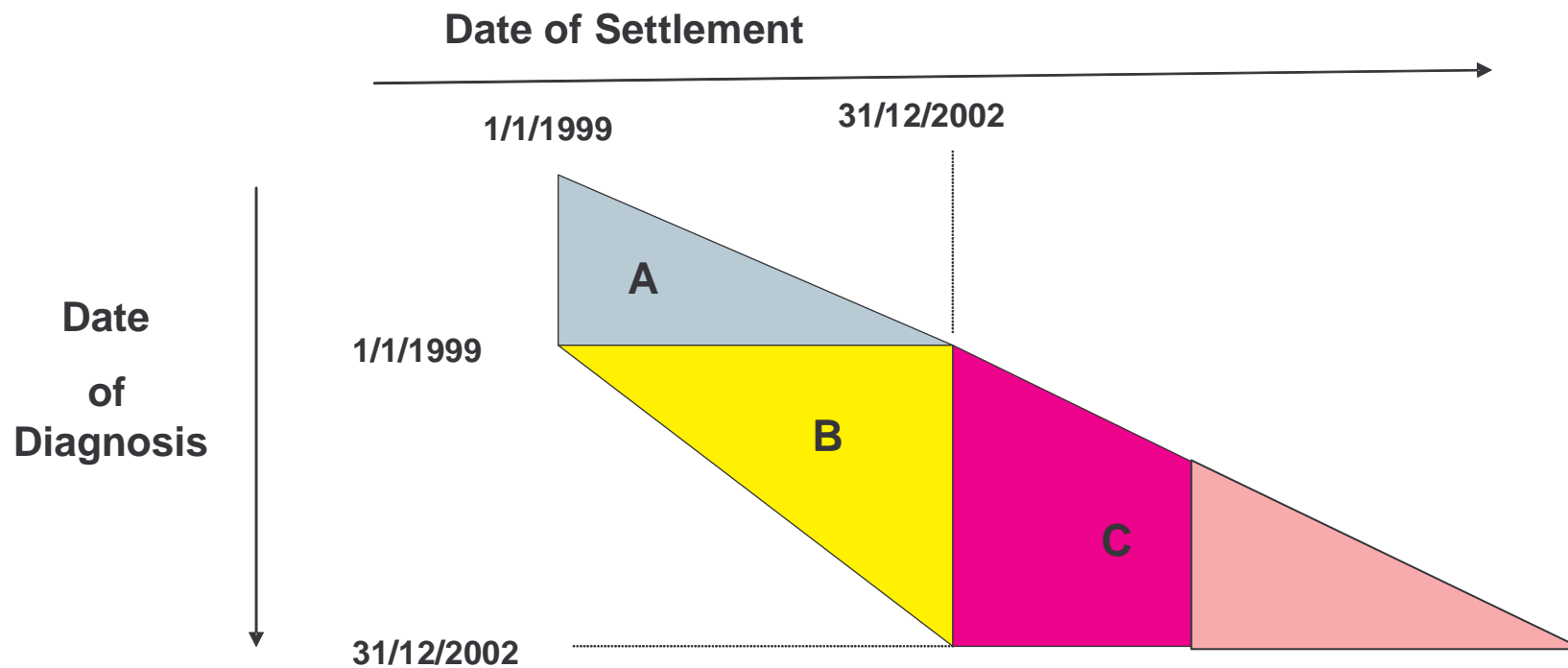
		<30	31-40	41-50	51-60	61+	All
Male	NS	36 (50)	30 (40)	32 (36)	32 (35)	32 (39)	31 (38)
	Sm	47 (55)	53 (60)	56 (76)	57 (77)	38 (56)	54 (69)
Female	NS	38 (44)	43 (48)	39 (45)	39 (41)	32 (31)	40 (45)
	Sm	31 (49)	44 (52)	59 (59)	68 (63)	68 (91)	40 (57)

(100 A/E's, Expected based on CIBT93, 1999-2002 results in brackets)

Date of Diagnosis v Date of Settlement



Date of Diagnosis v Date of Settlement



Use of 2003 settled claims

- Considerably reduces tail to be estimated
- Plus 2003 claims gives extra year's data from which to estimate development pattern
- Attempting to use only consistent data submissions
- And only claims where we know:
 - date of diagnosis, and
 - year of settlement
- Also allows us to consider subsets of the data

Date of Diagnosis v Date of Settlement

	Year of Settlement				
	1999	2000	2001	2002	2003
1993	0	0	0	0	
1994	1	1	2	1	
1995	0	1	4	2	
1996	5	1	4	4	
1997	16	13	7	4	
1998	131	27	24	16	
1999	651	245	37	17	
2000		1081	445	66	
2001			1465	583	
2002				1905	
2003					

Date of Diagnosis v Date of Settlement

	Year of Settlement				
	1999	2000	2001	2002	2003
1993	0	0	0	0	1
1994	1	1	2	1	0
1995	0	1	4	2	0
1996	5	1	4	4	1
1997	16	13	7	4	4
1998	131	27	24	16	7
1999	651	245	37	17	9
2000		1081	445	66	22
2001			1465	583	70
2002				1905	744
2003					1694

Year of Diagnosis

Date of Diagnosis v Date of Settlement

	Year of Settlement				
	1999	2000	2001	2002	2003
1993	0	0	0	0	1
1994	1	1	2	1	0
1995	0	1	4	2	0
1996	5	1	4	4	1
1997	16	13	7	4	4
1998	131	27	24	16	7
1999	651	245	37	17	9
2000		1081	445	66	22
2001			1465	583	70
2002				1905	744
2003					1694

Year of Diagnosis

Year 2 ratio=

$$\frac{27+37+66+70}{131+245+445+583} = 14.2\%$$

Date of Diagnosis v Date of Settlement

	Year of Settlement				
	1999	2000	2001	2002	2003
1993	0	0	0	0	1
1994	1	1	2	1	0
1995	0	1	4	2	0
1996	5	1	4	4	1
1997	16	13	7	4	4
1998	131	27	24	16	7
1999	651	245	37	17	9
2000		1081	445	66	22
2001			1465	583	70
2002				1905	744
2003					1694

Year of Diagnosis

Year 2 ratio=

$$\frac{27+37+66+70}{131+245+445+583} = 14.2\%$$

Estimate of claims diagnosed in 2002, settled in 2004=

$$14.2\% \times 744 = 106 \text{ claims}$$

Use of 2003 settled claims

- **Considerably reduces tail to be estimated**
 - 6495 claims diagnosed in 1999-2002 and settled in 1999-2002
 - 845 claims diagnosed in 1999-2002 and settled in 2003
 - 188 claims diagnosed in 1999-2002 estimated to be settled in 2004
 - 266 claims diagnosed in 1999-2002 estimated to be settled in 2005+
- **Overall grossing-up factor estimated at 15.3%**
- **Also allows us to consider subsets of the data**

Grossing-up factors for subsets of data

- **Methodology can be applied to data subsets**
- **But do we vary the development pattern for the sub-groups?**
- **Still uncertainty arising from estimating date of diagnosis on 40% of claims**
- **Work in Progress – not yet reviewed by CI Committee**

Grossing-up factors for subsets of data

- Overall grossing-up factor estimated at **15.3%**
- Using the same development pattern across data subsets gives:

- Males 14.9% Females 15.8%
- Non-smoker 15.6% Smoker 14.4%
- Accelerated 14.1% Stand-Alone 25.1%

- Age:

	<30	31-40	41-50	51-60	61+
	10.8%	16.9%	15.4%	15.9%	15.9%

- Duration

	0	1	2	3	4	5+
	12.7%	11.7%	13.9%	16.2%	18.3%	23.5%

- Calendar Year

	1999	2000	2001	2002
	20.7%	21.9%	12.4%	12.2%

Grossing-up factors for subsets of data

- Overall grossing-up factor estimated at **15.3%**
- Using the same development pattern across data subsets gives:

- Males 14.9% Females 15.8%
- Age:

<30	31-40	41-50	51-60	61+
10.8%	16.9%	15.4%	15.9%	15.9%

- Using the development pattern calculated for that sub-group:

- Males 14.5% Females 16.3%
- Age:

<30	31-40	41-50	51-60	61+
8.1%	23.1%	14.1%	14.0%	15.4%

- Work in Progress – not yet reviewed by CI Committee

Draft Adjusted 1999-2002 results

Accelerated v Stand-Alone, all ages, all durations, Lives v Amounts

		Accelerated	Stand-Alone
Male	Lives	50 (44)	60 (48)
	Amounts	Not analysed yet	
Female	Lives	54 (47)	67 (52)
	Amounts	Not analysed yet	

(100 A/E's, Expected based on CIBT93, Raw 1999-2002 results in brackets)

Draft Adjusted 1999-2002 results by Calendar Year

Accelerated business, all ages, all durations, Lives

		1999	2000	2001	2002	Quad
Male	NS	47 (40)	47 (39)	44 (39)	40 (35)	44 (38)
	Sm	95 (77)	84 (73)	78 (68)	66 (62)	78 (69)
Female	NS	61 (52)	59 (46)	45 (42)	49 (43)	52 (45)
	Sm	89 (58)	69 (55)	62 (57)	62 (56)	66 (57)

(100 A/E's, Expected based on CIBT93, Raw 1999-2002 results in brackets)

Draft Adjusted 1999-2002 results by Duration

Accelerated business, all ages, all years, Lives

		Dn 0	Dn 1	Dn 2+	All
Male	NS	34 (31)	41 (37)	49 (41)	44 (38)
	Sm	72 (64)	75 (68)	82 (71)	78 (69)
Female	NS	46 (41)	52 (46)	55 (46)	52 (45)
	Sm	54 (45)	70 (60)	71 (61)	66 (57)

(100 A/E's, Expected based on CIBT93, Raw 1999-2002 results in brackets)

Draft Adjusted 1999-2002 results by Age

Accelerated business, all durations, all years, Lives

		<30	31-40	41-50	51-60	61+	All
Male	NS	55 (50)	46 (40)	42 (36)	41 (35)	44 (39)	44 (38)
	Sm	62 (55)	69 (60)	85 (76)	88 (77)	65 (56)	78 (69)
Female	NS	50 (44)	56 (48)	51 (45)	48 (41)	39 (31)	52 (45)
	Sm	53 (49)	64 (52)	69 (59)	73 (63)	102 (91)	66 (57)

(100 A/E's, Expected based on CIBT93, Raw 1999-2002 results in brackets)

Further Work

- **Analysis of 1999-2002**
 - Ongoing work into grossing-up factors to adjust raw results
 - Attempting to track maturing 1999-2002 experience using claims settled in 2004
 - Hope to produce individual age rates relative to CIBT93
 - “Blue Book” report will provide more detailed analysis
 - Seeking consistency of claim recording
- **2003 Final Results – coming soon!**
- **Graduation**
 - Aim to produce a standard table for use in pricing and reserving
 - But when?

Conclusions

- **Draft 2003 results show improvement over 1999-2002**
- **Need to collect date of diagnosis, and seek consistency on recording**
- **Claims are subject to considerable delays**
- **Offices must make allowance for IBNS**
- **Grossing-up factor is of the order of 15%**
 - **But depends on offices' growth in claims**
 - **Also varies for subsets of the data**



The Actuarial Profession

making financial sense of the future

CMI Critical Illness Update

“Current Issues in Critical Illness”

7 December 2005

Dave Grimshaw

Chairman, CMI Critical Illness Committee