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A review of suicide statistics in Australia

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Contents

Acknowledgments.....	vi
Abbreviations.....	vii
Executive summary	viii
1 Introduction.....	1
1.1 Overview	1
1.2 Background.....	1
1.3 Note on terms	2
1.4 Structure of the report	3
Part A – Background	4
2 Suicide statistics in Australia.....	4
2.1 Number of suicide deaths recorded by year	4
2.2 Trends in suicide rates.....	7
2.3 Methods of suicide.....	8
2.4 Summary	9
3 Production of suicide statistics	10
3.1 Overview	10
3.2 Coronial processes	12
3.2.1 Reportable deaths.....	12
3.2.2 Opening a case.....	12
3.2.3 Case closure and certification.....	13
3.3 NCIS processes	13
3.3.1 Overview	13
3.3.2 Coding and classification	14
3.4 ABS processes.....	17
4 Potential sources of error	19
4.1 Before the coroner system.....	19
4.2 Coroner system.....	20
4.2.1 Time taken to reach decisions.....	20
4.2.2 The way decisions are recorded	20
4.2.3 Criteria for deciding ‘suicide’	21
4.3 NCIS.....	21
4.3.1 Existence of an NCIS record	21
4.3.2 Extent of information in an ‘open’ NCIS record	21
4.3.3 Extent of information in a ‘closed’ NCIS record	22
4.3.4 Quality assurance and documentation	22

4.4	Use of the NCIS	22
4.4.1	Timing of use of NCIS to obtain suicide statistics	23
4.4.2	Criteria used to assign a case in NCIS as 'suicide'	23
4.5	ABS processes	23
4.5.1	Timing of use of the NCIS by the ABS	24
4.5.2	Criteria used by the ABS to assign a case in NCIS as 'suicide'	24
4.6	The impact of timing	25
Part B – Investigation.....		26
5	Methods and data.....	26
5.1	Overview	26
5.2	Methods.....	26
5.2.1	Case extract from the NCIS.....	26
5.2.2	Overview of methods	27
5.2.3	Compare ISH according to two criteria based on the NCIS.....	28
5.2.4	ISH deaths according to NCIS and ABS mortality data	29
5.2.5	Checking and processing of the NCIS extract to support later analysis	29
5.2.6	NCIS records without Underlying Cause of Death codes.....	30
5.2.7	Assignment of ISH status using all information in NCIS.....	30
5.2.8	Feasibility test of manual recoding.....	31
5.2.9	Factors contributing to differences in assignment as ISH	34
5.2.10	Revised estimates of ISH deaths	34
6	Findings: describing the NCIS data.....	36
6.1	Introduction and overview	36
6.2	ISH according to two criteria based on the NCIS.....	36
6.2.1	Introduction	36
6.2.2	Overview of groups	36
6.2.3	Assessment of six groups	38
6.2.4	Summary of analysis of groups.....	48
6.3	Comparison of ISH deaths according to NCIS data and ABS mortality data	49
6.3.1	Use of logically equivalent criteria to identify ISH cases in the ABS mortality data and the NCIS extract.....	49
6.4	NCIS records without Underlying Cause of Death codes	52
6.4.1	Open cases.....	52
6.4.2	Month of death	54
6.4.3	Timing of NCIS record creation	55
6.4.4	Timing of NCIS case closure by coroner.....	55
6.4.5	Jurisdiction	55

7	Findings: explaining differences and improving estimates	56
7.1	Introduction and overview	56
7.2	Assignment of ISH status using all information in the NCIS	57
7.2.1	Staged case identification	57
7.2.2	Feasibility test of manual recoding	63
7.3	Explaining differences	67
7.3.1	Duration from death to closure of case by coroner	67
7.3.2	Duration from closure of case by coroner to publication	69
7.3.3	Jurisdiction	71
7.3.4	Is misclassification of ISH related to annual data processing?	73
7.3.5	Characteristics of cases assigned Underlying Cause of Death codes for ISH	79
7.3.6	Summary	81
7.4	Revised estimates of ISH	82
8	Discussion	88
8.1	Revised estimates of ISH in Australia	88
8.2	Misclassification of ISH	89
8.3	Sources of error in estimates of ISH	90
8.3.1	Time-related misclassification	90
8.3.2	Ambiguity in identification of deaths as 'suicide'	91
8.3.3	State-specific differences in the content of NCIS records	93
8.4	Impediments and solutions	94
8.4.1	Missing values of Underlying Cause of Death in the NCIS	94
8.4.2	Record linkage	95
8.5	Changes to ABS process	95
8.6	Conclusions	96
8.6.1	Completeness	97
8.6.2	Reliability of trends	97
8.6.3	Timeliness	97
	Appendix	100
	References	102
	List of tables	104
	List of figures	106

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Abbreviations

ABS	Australian Bureau of Statistics
AIHW	Australian Institute of Health and Welfare
COAG	Council of Australian Governments
ICD-10	International Classification of Diseases 10th Revision
ICECI	International Classification of External Causes of Injury
ISH	Intentional Self-harm
LCMS	Local Case Management System
MMDS	Mortality Medical Data System
NCIS	National Coroners Information System
NDI	National Death Index
NHDD	National Health Data Dictionary
NISU	National Injury Surveillance Unit
QA	Quality Assurance
SPSS	Statistical Package for the Social Sciences
UCoD	Underlying Cause of Death
WHO	World Health Organization

Executive summary

Suicide, or intentional self-harm (ISH), is an important public interest and policy issue. The rate of suicide in Australia is widely used as a progress measure or indicator, so it is vital that reliable statistical information on suicide is available.

Australian Bureau of Statistics (ABS) mortality data are the main source of suicide statistics in Australia. The ABS is part of a complex process that generates these statistics. The two other main parts of the system are coroners and the National Coroners Information System (NCIS). Coding rules that form part of the International Classification of Diseases (ICD), which the ABS is required to apply, also affect the statistics.

In recent years, the ABS has cautioned that suicide data may be underestimated and 'observed changes over time are likely to have been affected by delays in [coroners] finalising a cause.'

Investigation of recent suicide data

This report investigated deaths occurring in 2004 mainly using cases extracted from the NCIS as at early 2008. Comparisons were made using ABS data added to the NCIS, including Underlying Cause of Death codes, and with aggregate data from the ABS mortality data files.

The comparisons indicated that, at the time that ABS coders assigned ICD-10 codes to deaths, the lack of information from coroners concerning intent impeded their assignment of codes such as those for ISH. The main effect of this is that some deaths that were later finalised by coroners and recorded in the NCIS as being due to ISH were not classified as ISH in the ABS mortality data. Aside from the effects of incomplete information, the quality of ABS coding appears to have been good.

Taking the misclassified cases into account results in larger numbers of deaths due to ISH than the numbers published in ABS mortality data for the same period. Revised estimates are 3% higher than the ABS value when using similar criteria to the ABS, 11% higher when using these criteria and adding cases closed between the publication of *Causes of death, Australia, 2004* (ABS 2006a) in March 2006 and the extraction date of the data used in this project, and 16% higher when including all deaths in NCIS identified as ISH when using a standard definition applied early in 2008.

Future statistics on suicide

The ABS has introduced changes to its cause of death processes, which can be expected to improve the completeness of ISH data for deaths registered from 1 January 2007. The most important change is the introduction of a revision process for causes of death. Data on deaths registered before 2007 were finalised by the ABS before the annual release of the report of the causes of deaths (e.g. by March 2008 for deaths registered in 2006). Under the new system, causes of death can be reviewed for at least 2 years after this (i.e. to early 2011 for deaths registered in 2007), allowing longer for the ABS to receive final information from coroners.

Although it is not possible to provide an exact prediction of the effect that this change will have on the completeness of the data, this study suggests that it is likely that more than half of ISH deaths previously misclassified will be correctly classified in the future.

The inclusion of NCIS deaths meeting certain criteria as being due to ISH (even though a coroner's finding is not available) and statistical modelling could improve estimates for deaths registered before 2007. For deaths registered after that, methods to improve the timeliness of data and the value of a standard definition of ISH for statistical purposes should be explored with coroners and other stakeholders.

1 Introduction

1.1 Overview

Suicide is a matter of considerable public interest and policy significance. The rate of suicide in Australia is widely used as a progress measure or indicator (e.g. AIHW 2008; COAG 2006). For this and other reasons it is important that reliable statistical information on suicide is available.

Currently, the main source of suicide data in Australia is the Australian Bureau of Statistics (ABS). Cautionary notes in recent editions of ABS reports on causes of death, and other information, have prompted concern that official statistics on suicide in Australia might be underestimated. The ABS has indicated that care needs to be taken in the interpretation of the suicide statistics it releases as there are indications that the reported downward trend in suicide deaths in recent years may be, at least in part, due to an increase in the number of open coroners' cases when the ABS finalises its annual suicide statistics (ABS 2006b).

This report meets the concern by (a) reviewing current official data and the methods by which they are obtained, and (b) examining information from the National Coroners Information System (NCIS) in addition to data from the ABS mortality collection to assess the extent to which the concerns are well founded, and to determine reasons for under-enumeration, if it has occurred. Though limited by data constraints, revised estimates are provided. The final part of the report provides advice for the future statistical monitoring of suicide and self-harm in Australia.

1.2 Background

The ABS provides suicide case counts (and similar information on all other deaths) based on information provided to it by state and territory Registrars of Births, Deaths and Marriages.

This information is supplemented by data from other sources, notably coroners. This is because data supplied to the ABS by Registrars generally do not include certain information needed by the ABS to identify and code suicide deaths: the role of human intent, and the mechanism of self-harm (e.g. hanging, shooting). In recent years, information from coroners' records has normally been obtained by ABS from the NCIS. This system is designed to include data on all deaths referred to coroners in Australia.

Since all deaths suspected to have been due to suicide (or intentional self-harm) are required to be referred to a coroner (as are deaths for any other reason except 'natural causes'), the NCIS should provide a good basis for ISH statistics. However, it is a relatively new system (operating in all jurisdictions since 2001); it was developed with the information needs of coroners, not the ABS and ISH statistics, as the primary consideration, and the shift to reliance by the ABS on the NCIS is quite recent. Furthermore, the NCIS is only one component of the information system on which Australia's ISH statistics depend. Hence, there are reasons to look closely at the information system as a whole, paying particular attention to the operation of the NCIS, and its use by the ABS.

ABS officers compile the information received from the Registrars and other sources, and code the information according to the 10th revision of the International Classification of Diseases (ICD-10). This is the basis of Australia's official statistics on deaths. The ABS provides summary statistics in its own publications (e.g. the *Causes of death* series) and releases unit record data files that are analysed by others (in this report the ABS Causes of Death data are referred to as ABS mortality data). The ABS publications and data files normally report deaths that were registered in a calendar year. Until the early 2000s, the publication covering deaths registered in a particular year was normally released late in the following calendar year. In recent years, however, publication has been several months later.

1.3 Note on terms

Terminology concerning suicide and self-harm is notoriously diverse and variable (O'Carroll et al. 1996; Silverman et al. 2007a, 2007b). The title of this project refers to 'suicide'. In practice, that term is often not used, or is used as a synonym for other terms, in the data sources on which 'suicide' statistics are based. This is so in both the ABS mortality data and the NCIS.

The ABS mortality data are coded according to the ICD-10 (WHO 2004). The ICD-10 code range usually reported as 'suicide' is X60-X84 (and sometimes also Y87.0). The title given to that code range in the ICD-10 is 'Intentional self-harm'. This is defined in a way that includes all suicide deaths, but has somewhat wider logical scope. A person might die as a result of an act that was intentional and self-inflicted, but was not done with intent to die. For example, a person could die as a result of self-inflicted overdose of medication, undertaken with the intention of influencing another person's behaviour, and not with the intention of dying. Similarly a person could die from self-inflicted suffocation undertaken with the aim of erotic pleasure.

The NCIS data items most directly relevant to assignment of cases as 'suicide' are *Intent – Notification (Presumed)* and *Intent – Case Completion*. Both of these are coded according to a classification that is based on the International Classification of External Causes of Injury (ICECI) (ICECI Coordination and Maintenance Group 2004). Like the relevant section of ICD-10, the NCIS classification uses the term 'intentional self-harm'. The ICECI defines ISH in the same way as the ICD.

The wording of coroners' findings is diverse (Freckelton & Ranson 2006). The word 'suicide' is used rarely, if ever, in some jurisdictions, and frequently in others.

Hence, when considered in terms of the classifications used for ABS mortality data and for the NCIS:

- the codes conventionally used to identify 'suicide' cases are formally named 'intentional self-harm' (ISH)
- the scope of the concept 'intentional self-harm' is wider than that of 'suicide'
- the practical effect on statistics of this difference in conceptual scope has not been shown.

In this report, we have:

- used the terms 'intentional self-harm' and 'suicide' more or less interchangeably when referring to data coded to ICD-10 X60-X84
- generally preferred 'intentional self-harm' for cases defined by the presence of the NCIS *Intent – Case Completion* code meaning 'intentional self-harm'
- used 'suicide' where the context implies a focus on this rather than ISH.

1.4 Structure of the report

This report has seven chapters after this introduction, and is divided into two main parts.

Part A provides background material. This comprises a review of ISH statistics based on ABS mortality data (Chapter 2), a description of the information processes that underlie ISH statistics in Australia (Chapter 3), and an appraisal of the potential sources of error in ISH statistics (Chapter 4).

Part B presents an investigation of ISH data undertaken for this project, based mainly on analysis of data from the NCIS, and ABS mortality data in the NCIS. The methods and data sources are described in Chapter 5. The next two chapters present findings, the first focusing on describing the data (Chapter 6), and the second on explanations for the differences found and methods for obtaining new estimates of ISH (Chapter 7).

The final chapter presents a discussion and conclusions.

Part A—Background

2 Suicide statistics in Australia

Official statistics on suicide (or deaths as a result of intentional self-harm, ISH) are produced and published by the ABS annually. A report on causes of death, which is published every year, includes some data on suicides (ABS 2008b). A report specifically on suicide mortality is published in some years (ABS 2003, 2004, 2006b, 2007c). Each report normally focuses on deaths registered in a particular calendar year, and is released about a year after the end of the reference year (longer in recent years).

The latest publication of summary statistics on deaths registered in Australia where the underlying cause of death was recorded as ISH was published by the ABS in March 2008 and covers the years 1997–2006 (ABS 2008b). The notes section of the previous edition, *Causes of death, Australia, 2005* (ABS 2007a), cautions readers about the quality of the data in the report:

The quality of cause of death coding is affected by a range of factors including delays in finalising coronial processes. The level of recorded deaths attributed to suicide, and observed changes over time are likely to have been affected by delays in finalising a cause (p. 2).

This caution, or a similar one, has appeared in all recent ABS publications in which suicide statistics are presented. The issue of the potential under-enumeration of suicide deaths was also a focus of an information paper released by the ABS in 2007 on the quality of external cause coding of deaths in Australia (ABS 2007b).

This section of the report presents information from the ABS causes of death reports for the period 1997–2006. The aim is to present the data which are the subject of the rest of the report.

The contents of this section are largely limited to the information contained in the ABS publication *Causes of death, Australia, 2006* (ABS 2008b) and available data cubes. Some use has also been made of the unit record mortality data file. Note that the ABS can provide a more detailed breakdown of suicide data on request.

2.1 Number of suicide deaths recorded by year

According to the ABS, the annual number of suicide deaths registered in Australia decreased from 2,722 in 1997 to 1,799 in 2006. A decline was evident for both males and females (Table 2.1).

Table 2.1: Number of suicide deaths in Australia according to ABS causes of death data by sex and year of death registration, 1997–2006

Year	Males	Females	Persons
1997	2,145	577	2,722
1998	2,150	533	2,683
1999	2,002	490	2,492
2000	1,864	503	2,367
2001	1,936	521	2,457
2002	1,817	503	2,320
2003	1,737	477	2,214
2004	1,661	437	2,098
2005	1,658	444	2,102
2006	1,398	401	1,799

Note: The suicide data published in the 2006 causes of death report (ABS 2008b) differ slightly from the data published in the 2005 suicide report (ABS 2007c). The differences are a small increase in the total number of suicide cases for 5 of the 10 years described. The differences are small; for example, the causes of death publication reports 2,722 suicide deaths occurring in 1997 whereas the 2005 suicide publication reports 2,720 suicide deaths occurring in 1997.

Source: ABS 2008b:Table 4.1.

The median age at death for suicide in 2006 was 43.7 years for males and 45.1 years for females. Age-specific annual counts of deaths registered as suicide are shown in Table 2.2. Large decreases can be seen in the age categories younger than 45 years and (though less markedly) older than 64 years. Suicide counts more than halved in the 10-year period for 15–24 year olds and 25–34 year olds.

Table 2.2: Number of suicide deaths registered in Australia by selected age groups and year of death registration, 1997–2006

Year	15–24	25–34	35–44	45–54	55–64	65+	Total
1997	510	655	553	390	234	365	2,722
1998	446	700	614	386	216	313	2,683
1999	380	623	531	409	218	313	2,492
2000	339	582	576	359	197	305	2,367
2001	339	594	567	417	224	305	2,457
2002	317	546	553	396	214	286	2,320
2003	300	518	484	392	213	293	2,214
2004	265	471	473	346	208	326	2,098
2005	290	442	465	400	211	283	2,102
2006	244	292	393	363	236	263	1,799

Source: ABS 2008b:Table 4.1.

Trends in the annual number of suicide deaths registered have differed across the Australian jurisdictions (Table 2.3). The annual count for New South Wales declined greatly, from more than 900 to about 500, whereas that for Tasmania tended to increase (with fluctuations), and other patterns are seen for the remaining jurisdictions.

Table 2.3: Deaths coded as suicide by jurisdiction and year of registration, 1997–2006

Year	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Australia
1997	935	670	535	196	255	51	38	42	2,722
1998	862	579	579	244	287	59	42	31	2,683
1999	869	552	480	200	236	78	32	45	2,492
2000	733	512	541	199	261	50	42	29	2,367
2001	785	541	500	208	270	64	43	46	2,457
2002	692	528	537	170	242	70	55	26	2,320
2003	640	540	466	193	227	69	44	35	2,214
2004	587	521	453	178	194	88	51	26	2,098
2005	549	506	459	231	203	74	45	35	2,102
2006	504	444	340	170	207	73	29	32	1,799

Source: ABS 2008B:Table 4.5.

In the same period, the number of deaths coded to ill-defined and unspecified causes of mortality (R99) rose substantially, especially after 2002 (Table 2.4), when the number more than doubled. The ABS has attributed this to its increased reliance on the NCIS (ABS 2008b, Explanatory note 68). Cases coded as unattended deaths (R98) also rose until 2005. As noted by the ABS (ABS 2008b, Explanatory note 67), the decline of R98 cases in 2006 and the further increase of R99 cases reflect correction of an error in coding software that had assigned 'natural causes' deaths with no further information to R98 until 2006. A dip in the number of injury and poisoning deaths coded to undetermined intent was noticeable in the middle of the period, but by 2006 the number registered was similar to that in 1997. The number of deaths coded as accidental threats to breathing (W75–W84) also rose after 2002. These are categories to which ISH deaths by hanging are likely to be coded if information available to the coder is incomplete.

Table 2.4: Accidental threats to breathing, undetermined intent, unattended and ill-defined deaths by year of death registration, Australia, 1997–2006

Year	Unattended death (R98)	Other ill-defined and unspecified causes of mortality (R99)	Other accidental threats to breathing (W75–W84)	Events of undetermined intent (Y10–Y34)
1997	79	87	171	131
1998	4	329	231	135
1999	72	221	210	86
2000	140	221	212	51
2001	128	120	217	72
2002	177	206	222	65
2003	150	456	275	67
2004	277	430	342	81
2005	231	495	260	105
2006	57	1,131	409	135

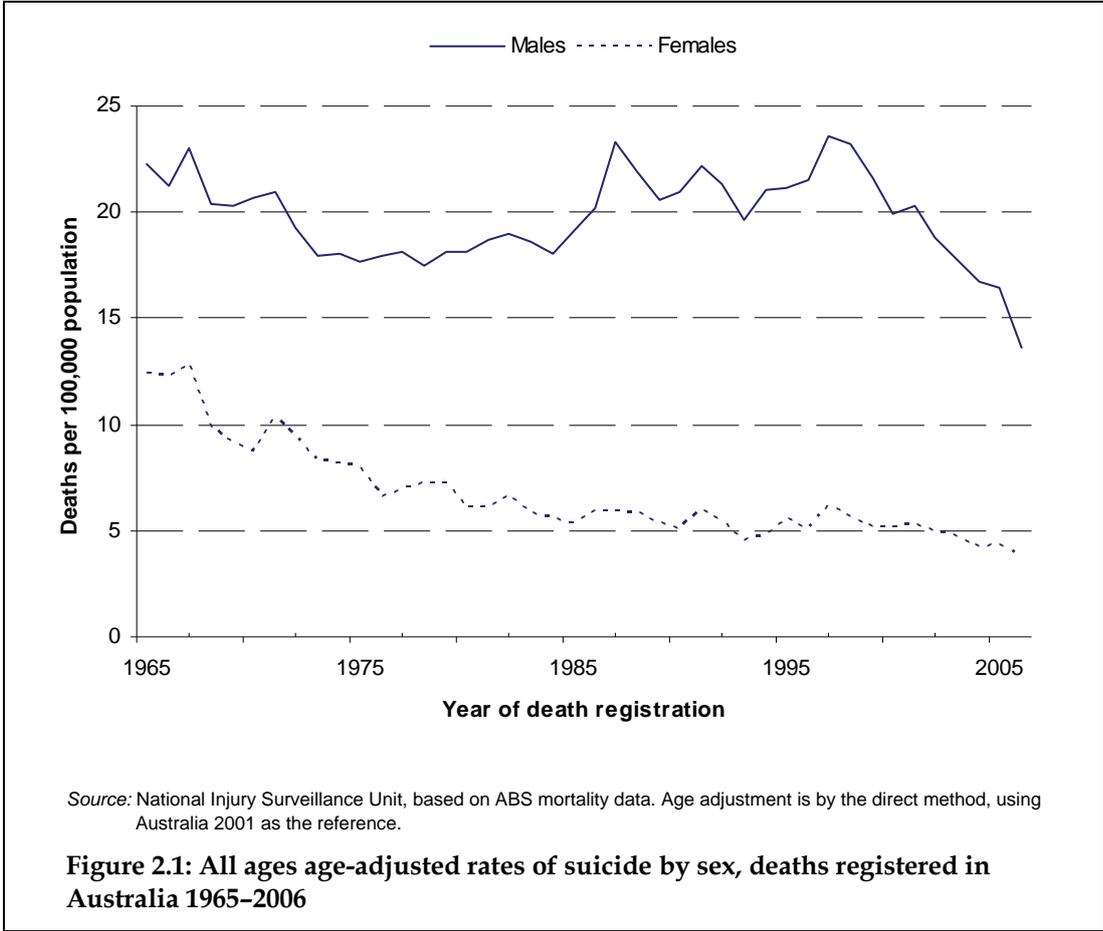
Source: National Injury Surveillance Unit, using ABS mortality data.

2.2 Trends in suicide rates

During most of the 20th century, age-adjusted suicide rates in Australia, calculated on the basis of mortality data, fluctuated around 20 deaths per 100,000 population for males, and 5 deaths per 100,000 population for females (Steenkamp & Harrison 2000).

Age-adjusted rates based on ABS data for the period since the mid-1960s are shown in Figure 2.1, and the charted rates are presented in Table A.1 (in the Appendix). Male and female suicide rates peaked in the mid-1960s because of an epidemic of barbiturate poisoning, which declined during the next decade (Steenkamp & Harrison 2000). Rates for males rose again in the late 1980s (largely due to a rise in rates among young men) then remained at a higher but fluctuating level until a peak in 1997 and 1998, since when rates have fallen (Kreisfeld et al. 2004). Male and female rates have declined by about the same proportion since the peak in the late 1990s.

If these data are reliable, then the rates in the most recent 2 or 3 years charted were at historically low levels. The rate of suicide in males in 1997 was 29.8 per 100,000 and 17.0 per 100,000 in 2006. Equivalent rates for females were 7.8 and 4.8 per 100,000.



2.3 Methods of suicide

The most frequently used method of suicide in all years since 1997 was hanging (Table 2.5). Poisoning by other methods (which includes carbon monoxide poisoning) was the next most frequent, followed by poisoning by drugs, and firearms. The largest decreases over the period were seen in suicide by firearms (329 cases in 1997 down to 155 cases in 2006), poisoning by other methods (671 cases in 1997 down to 249 cases in 2006) and drowning (73 cases in 1997 down to 41 cases in 2006). Suicide by hanging, the most frequently used method, has shown large fluctuations from year to year, being highest in 1998 and lowest in 2006.

Table 2.5: Number of suicide deaths by selected external cause groups and year of death registration, Australia, 1997–2006

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Poisoning by drugs	309	310	278	273	285	287	278	229	247	185
Poisoning by other ^(a)	671	586	595	574	513	439	415	402	337	249
Hanging ^(b)	987	1,217	1,028	989	1,050	1,045	996	998	1,068	940
Drowning and submersion	73	50	36	47	52	40	46	55	40	41
Firearms	329	235	269	222	261	217	193	167	147	155
Contact with sharp object	53	48	43	36	49	55	47	51	45	38
Falls	116	97	99	72	99	106	82	95	92	73
Other ^(c)	184	140	144	154	148	131	157	101	126	118

(a) Includes poisoning by other gases and vapours (including motor vehicle exhaust).

(b) Includes strangulation and suffocation.

(c) Includes explosives, smoke/fire/flames, blunt object, jumping or lying before moving object, crashing of motor vehicle, other and unspecified means. Also includes sequelae of intentional self-harm.

Source: ABS 2008b:Table 4.4.

Changes over time in the number of recorded suicide deaths by method might reflect changes in suicidal behaviour in the Australian population, perhaps because of specific influences. For example, it has been suggested that decreases in suicide using firearms could be the result of the stricter gun laws introduced in 1996 (Ozanne-Smith et al. 2004). However, part of the observed change could be due to changes in case ascertainment or coding of the data.

Under-enumeration of suicide cases could have more effect in some external cause groups than in others; for example, suicide deaths from drowning can be difficult to distinguish from unintentional deaths by the same mechanism.

2.4 Summary

In conclusion, there has been a downward trend in deaths registered as being due to suicide since about 1998. How much of this trend is due to a real decline in the number of suicide deaths and how much can be attributed to under-enumeration or misclassification is not obvious. Trends in the opposite direction for certain other ICD-10 code ranges raise the possibility of increased misclassification, especially after 2002.

The data presented in this chapter are broadly consistent with the occurrence of a recent increase in under-enumeration of ISH deaths. If a change occurred in national information systems at a specific time, with the effect that suicide deaths were, after that time, less likely to be recorded as such, then one would expect to see a consistent pattern of reducing counts overall and for subsets of cases (e.g. by sex, age or state). However, although national counts have certainly declined, examination of the patterns by age group, jurisdiction and mechanism of ISH reveals continued complexity, with some categories showing decline and others not. It is possible that a change has occurred but that its effects differ, for example, by jurisdiction.

3 Production of suicide statistics

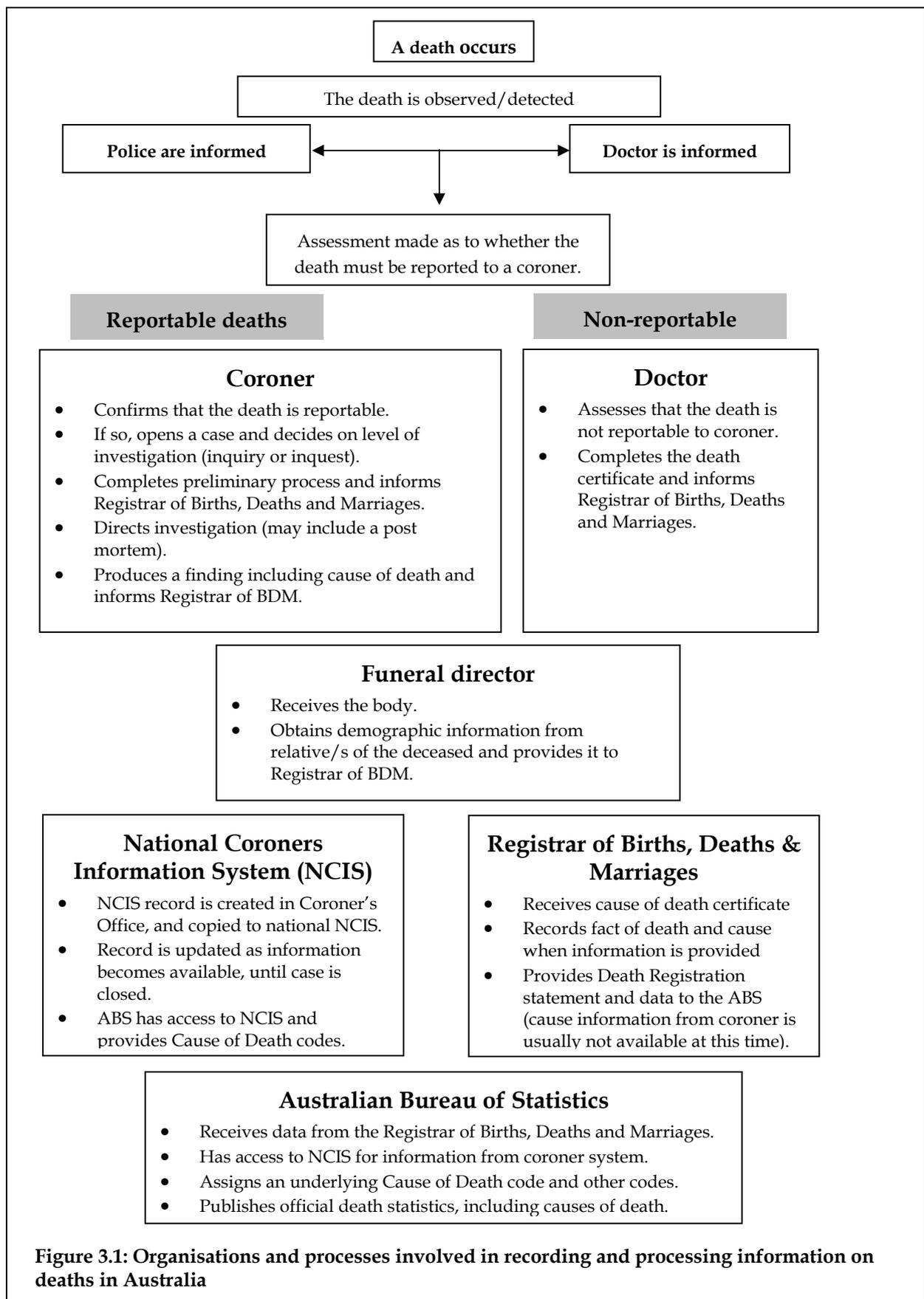
3.1 Overview

National mortality statistics, including suicide statistics, depend on a complex process of information capture, distribution and processing, involving numerous organisations and individuals. This section provides an overview of the main agencies and their roles and responsibilities for recording, investigating and coding potential cases of suicide.

When a death occurs a doctor is often called or police are notified (Figure 3.1). Most deaths are due to 'natural causes' and meet the criteria that permit a medical practitioner to certify the cause. The practitioner completes a medical certificate of death, and provides this to the Registrar of Births, Deaths and Marriages in the jurisdiction. Further information is obtained about the deceased person (not the cause of death) from a relative or other person with relevant knowledge, usually through a funeral director, and this is also sent to the Registrar. The information is entered and stored electronically at the Registrar's office. Periodically, copies of the registration data are sent from each Registrar's office to the central ABS Brisbane office, where further checking and processing are done.

In a minority of cases (about 12%), a different process takes place after a death occurs. If a doctor is unable or unwilling to certify a death, then it must be referred to a coroner. Sudden and unexpected deaths are likely to be brought to the attention of police, and these too are referred to a coroner, as are instances in which a person goes missing in circumstances that suggest that death has occurred, and instances in which human remains are discovered. This is the process that should apply to deaths where suicide is known or suspected to have occurred.

The main purpose of this chapter is to describe the process that occurs between referral of deaths to coroners and the production by the ABS of mortality data. Three agencies – Coroners' Offices, the NCIS and the ABS – are involved in acquiring and processing information about these deaths, and so their processes and practices have potential to influence the ways a death is recorded in national mortality data, and consequently whether it is recorded as suicide in national statistics.



3.2 Coronial processes

3.2.1 Reportable deaths

Coronial processes begin once a reportable death occurs in any of the states or territories in Australia and a coroner is notified. Each jurisdiction in Australia has different, though similar, laws governing the reporting of deaths and coronial processes (Freckelton & Ranson 2006). Generally speaking, a death must be reported to a coroner in the following circumstances:

- where the person died unexpectedly and the cause of death is unknown
- where the person died in a violent or unnatural manner
- where the person died during or as a result of an anaesthetic
- where the person was 'held in care' or in custody immediately before death
- where a doctor has been unable to sign a death certificate giving the cause or death
- where the identity of the person who has died is not known.

Typically a police officer or a medical practitioner will notify the coroner of a death which may be considered reportable. It is the role of the coroner to investigate the circumstances surrounding all reportable deaths. In undertaking an investigation a coroner may seek information from any interested party, including the police, medical practitioners, family and friends. A post mortem examination may also form part of the coronial investigation. In certain circumstances a coroner may also hold an inquest into the death.

Coronial systems in Australia have been reformed during the past 20 years or so. Before the reforms, numerous magistrates, solicitors and others acted as coroners on a part-time or occasional basis, often without formal training or support services. The reforms differ in detail between jurisdictions, but generally have introduced the office of State Coroner, added prevention to the roles of coroners, and resulted in a more coordinated system.

The civil death registration process is worth a brief explanation here, even though this is not considered further in this report. The process is administered by the Registrar of Births, Deaths and Marriages in each jurisdiction. Registrars receive information supplied to them by funeral directors and relatives of the deceased along with death certificates produced by doctors and coroners. Some of this information may be incorrect or missing. A Registrar has the power to make further enquiries if he or she is not satisfied or needs to find out certain particulars which were not given in a Death Registration statement. This occasionally results in referral to a coroner of a death initially certified by a doctor.

3.2.2 Opening a case

Once a reportable death has been received by the coroner an investigation is established and the case is considered to be open. A case will not be closed until the coroner completes the investigation and returns a finding. Once a case has been opened, preliminary details are recorded at the local level normally using a local case management system (LCMS). Certain information is later provided to the NCIS, under a licence agreement between NCIS and all states and territories. Clerical staff in each coronial office are responsible for maintaining records. A number of different electronic LCMS are used by the jurisdictions, one of which has been developed by the NCIS. Eventually, all coronial cases are uploaded to the NCIS.

(More information on the NCIS is presented later in this section.) The timing of the completion of the uploading of cases to the NCIS varies from jurisdiction to jurisdiction and between cases.

As mentioned, recording of data relevant to a reportable death starts at the beginning of the coronial investigation, with information, including the preliminary cause of death, entered from information in the case file as received and supplemented over time as more information becomes available with the progression of the investigation. This normally includes a report from a forensic pathologist, based on post mortem examination of the body. Final determination about whether a death was by suicide occurs only when the coroner makes a finding.

3.2.3 Case closure and certification

Once the investigation is complete, the coroner makes a finding, normally including the identity of the deceased; the date and place of death; the cause of death; circumstances surrounding the death; and sometimes other information needed to register the death (Freckelton & Ranson 2006).

A death certificate is then completed and provided to the Registrar of Births, Deaths and Marriages. In common with certificates of other deaths in Australia, this adheres to an international standard promulgated by the World Health Organization (WHO). This has two parts. Part 1 should list all the conditions that made up the causal chain of events leading to the death. Part 2 should list any other conditions which may have been significant, but were not part of the causal chain. Guidelines issued by the ABS for medical practitioners in completing death certificates are prescriptive with respect to the sequencing of conditions listed on Part 1 of the certificate (the UCoD should be listed last) and in differentiating between the uses made of Parts 1 and 2 (ABS 2005).

3.3 NCIS processes

3.3.1 Overview

The NCIS is a national internet-based data storage and retrieval system for Australian coronial cases. The NCIS contains both free text and coded data as well as a number of full text reports. The Victorian Institute for Forensic Medicine has a licence agreement with each state and territory in Australia permitting the transfer of coronial information for storage and dissemination.

Data entry is performed by staff at each of the Coroners' Offices, using local case management systems or a case management system supplied by NCIS. Data are uploaded to the NCIS on a nightly basis (for the majority of Coroners' Offices). The progressive addition of material to an individual case file on the LCMS and ultimately to the NCIS can vary between jurisdictions and individual coronial offices. Information may be added continuously as the coronial investigation progresses (i.e. while the case is open) or only at the completion of the investigation (i.e. when the case is closed). As a result, the information contained in the files of open cases may vary considerably, and this may or may not reflect what is known about the case at a point in time.

Access to case information on the NCIS is controlled and the level of access differs between users. For example, most licensed users have limited access to open cases, but the ABS has full access to all cases, open or closed.

The clerical officers in Coroners' Offices who are responsible for entering NCIS data are provided with training and comprehensive manuals, namely the National Coroners Information System Coding Manual and User Guide (NCIS 2007b). The manual is revised periodically and ongoing support for these personnel is provided by the NCIS team.

The NCIS has an ongoing and active quality assurance (QA) program which identifies inconsistencies and other anomalies in the data in closed cases and recommends data cleaning activities to improve the quality of the data maintained in the NCIS. The QA program covers the following:

- Completeness – verification that all mandatory data fields are complete
- Comprehensiveness – for deaths due to external causes, verification that the coding gives a complete representation of how, when, where and why the deceased was injured and died
- Relevance – for deaths due to external causes, verification that only contributing mechanism, objects, modes of transport, etc. are coded
- Reliability – verification of consistency in national coding, ensuring that all jurisdictions are comparable
- Validity – verification that coding is a true reflection of the case file, reports and coroners' findings
- Contemporary – verification that the status of each case is appropriate (all completed cases reported as closed).

3.3.2 Coding and classification

Coding of data in the NCIS is guided by two publications, the NCIS Data Dictionary (NCIS 2007a) and the NCIS Coding Manual and User Guide (NCIS 2007b). NCIS also provides training for coroners' clerks. Many items in the coding system used by NCIS are based on the definitions in the AIHW *National health data dictionary* (NHDD)¹. This ensures that fields such as *Date of birth*, *Sex*, *Indigenous origin* and *Marital status* are consistent with other Australian data collections.

The NCIS Data Dictionary also includes classifications based on the International Classification of External Causes of Injury (ICECI), which are used to code variables including the *Incident Activity Details*, *Location*, and *Mechanism of Injury*. Although cause of death coding according to the ICD-10 is not undertaken as part of the NCIS, ICD-10 codes assigned by the ABS (see below) are provided to the NCIS for addition to the database. This information is provided in batches, at some time after the release by the ABS of an annual cause of death data report and file.

1 The current edition of the NCIS Data Dictionary (version 2, July 2007) is based on the *National health data dictionary*, Version 13 (cat. no. HWI 88), published by the AIHW in 2006.

At the preliminary stage of a coronial case, clerks are required to enter information about the *Case type at the time of notification*. There are five possible codes available:

- Death due to natural cause(s)
- Death due to external cause(s)
- Body not recovered
- Still enquiring
- Unlikely to be known.

In the case of a suspected suicide, 'death due to external cause' is the most likely entry at notification, but any value could appear.

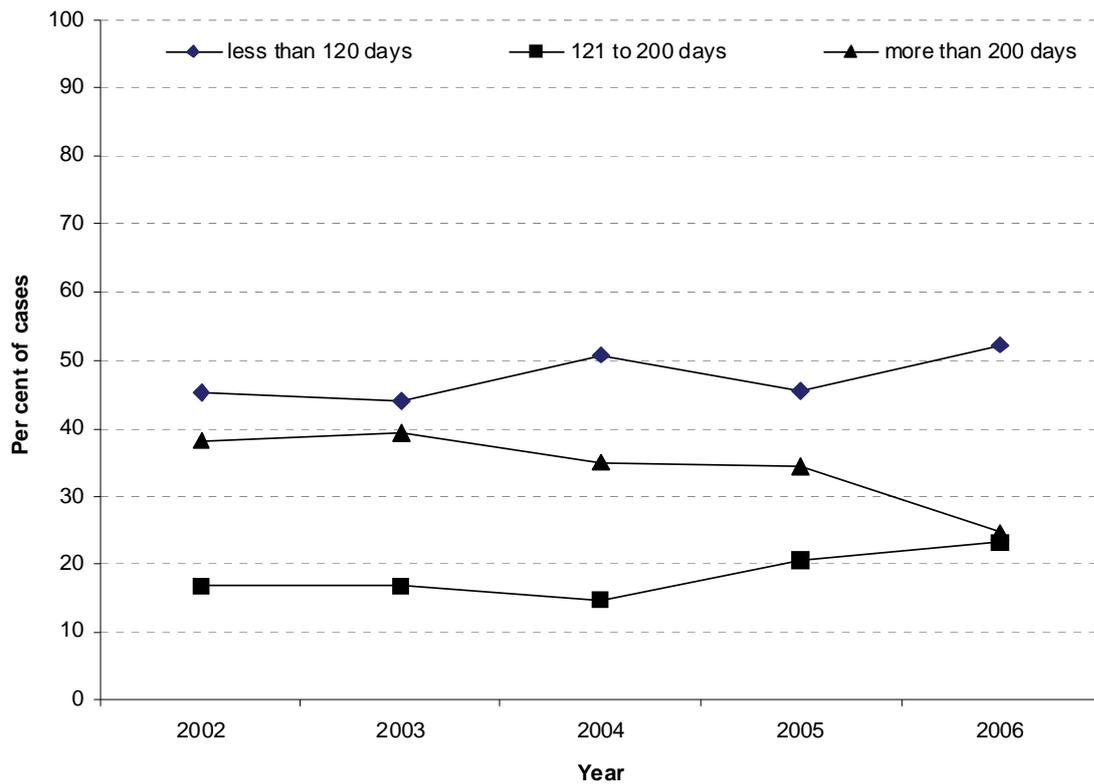
If the case type at notification is an external cause, coders are also required to code the intent at the time of notification. Intent at notification is defined in the NCIS Data Dictionary as 'The role of human purpose in the event resulting in death as known at the time of notification of death to the coronial office'. The code set provides for a range of responses:

- Unintentional
- Intentional self-harm
- Assault
- Legal intervention
- Operations of war, civil conflict and acts of terrorism
- Complications of medical or surgical care
- Undetermined intent
- Other specified intent
- Still enquiring
- Unlikely to be known.

Once entered, information at notification including the intent at notification does not change even when the case is finalised by the coroner.

The codes assigned to cases at notification are an important part of the enumeration of suicides in Australia as they are sometimes used by the ABS when cases remain open at the time of ABS processing (ABS 2008a). More detail on the coding rules, the effects of coding at notification and the use of this information by the ABS is given later in this report.

Information supplied by the NCIS on the length of time between the coroner closing a case and the date that the case appears as closed on the NCIS is shown in Figure 3.2. The data are based on all cases closed between 2002 and 2006. As can be seen, the majority of cases in the 5-year period are closed on the NCIS within 120 days of closure by a coroner. Many cases take more than 200 days to close on the NCIS, although this proportion has decreased gradually since 2003.



Note: Figure excludes 28 cases over the 5 year period with erroneous start and end dates.

Source: NCIS 2007.

Figure 3.2: Length of time from case completion in coroner-investigated deaths to registration in NCIS as closed in Australia, 2002-2006

The *Intent – Case Completion* field provides information on ‘the role of human purpose in the event resulting in death as determined at the completion of the coronial investigation’ (NCIS 2007a). Accordingly, the *Intent – Case Completion* field is reported when a case has been finalised by the coroner, and the coding should reflect the decision reached by the coroner. As with *Intent – Notification (Presumed)*, the code set provides for a range of responses:

- Unintentional
- Intentional self-harm
- Assault
- Legal intervention
- Operations of war, civil conflict and acts of terrorism
- Complications of medical or surgical care
- Undetermined intent
- Other specified intent
- Still enquiring
- Unlikely to be known.

3.4 ABS processes

The process by which the ABS collates information, analyses it, and codes and classifies deaths has been described in an information paper (ABS 2007b). Aspects relevant to the enumeration of suicide deaths in Australia are discussed below.

Elements in this process include the receipt of death records from the state and territory Registrars of Birth, Deaths and Marriages, supplemented by information from coronial investigations. ABS officers code cause of death according to the ICD-10 classification, using a software system called the Mortality Medical Data System (MMDS). Because of the complexity of assigning multiple and underlying causes for deaths due to external causes, including suicides, the use of the MMDS has been supplemented by manual investigation and coding by ABS coders.

Before 2002, the ABS actively sought information from coronial offices in order to determine causes of death. From 2003 the ABS progressively introduced the use of NCIS as the main source of information on coroner-certified deaths. The ABS states that from 2003 to 2006 ABS staff continued to seek additional information from coronial offices to supplement NCIS information in several jurisdictions. However, from 2006 the NCIS is the only source of data used by the ABS for coroner-certified deaths (ABS 2008b).

The ABS uses both the *Intent – Notification (Presumed)* and *Intent – Case Completion* fields in the NCIS when assigning intent (ABS 2008b). When a case is closed, the ABS codes the cause of death details using the *Intent – Case Completion* field. If a case is still open when the ABS stops processing, the *Intent – Notification (Presumed)* field is taken into account by the ABS in conjunction with other information available to ABS coders in the NCIS (e.g. autopsy, police reports).

The MMDS and ABS coders follow ICD-10 rules for coding deaths from external causes and classify cases according to the intent of death (e.g. suicide) and the mechanism of death (e.g. hanging), using codes from Chapter XX 'External causes of morbidity and mortality'. In addition, codes from Chapter XIX 'Injury, poisoning and certain other consequences of external causes' are used to code the fatal injury. In Chapter XX the most relevant block of codes is X60–X84, 'Intentional self-harm (suicide)'. Y87.0 ('Sequelae of intentional self-harm') is often included as well.

In an information paper on external causes of death, the ABS has outlined coding rules for cases with incomplete information (e.g. open coronial investigations) and for closed cases (i.e. closed by the coroner after investigation) (ABS 2007b). According to this source, in the absence of a coronial finding there must be conclusive evidence from a police or autopsy report to show the death was intentional. For example, if the NCIS record of a death contained evidence of a suicide note, then it could be coded as a suicide. If a case is closed there must be evidence in the finding that the injury was self-inflicted and the intent was suicide.

According to the information paper on external causes of death, the ABS aims to release data to the public within 12 months of the end of a given reference period. For example, the 2002 report was released at the beginning of December 2003. In recent years, the time between the end of a calendar year and publication by the ABS of the cause of death data on deaths registered during that year has increased to approximately 15 months. For example, the 2004 report was released in March 2006.

The fact that the ABS has a target date for release of its publications and data on deaths registered in a particular calendar year implies the existence of critical dates for processing.

For example, if a coronial case is closed after the ABS has released its annual report for the year in which that death was registered, then the coroner's finding and perhaps some other information from the NCIS cannot have been used by the ABS officer who assigned a cause of death code for the death. In contrast, if a coronial case is closed well before the ABS publication date, then the finding will normally have been available through the NCIS in time to be used. The process implies the existence of practical deadlines some time before the release date of ABS cause of death products, but cut-off dates have not been published by the ABS.

The process described here applies to deaths registered before 2007. During 2008, the ABS announced changes, partly intended to improve the identification of ISH deaths. These changes and their likely implications for suicide statistics in Australia are described in Chapter 8.

4 Potential sources of error

This chapter describes potential sources of error and undercounting in each of the agencies' processes discussed in the previous chapter.

As shown in Chapter 3, suicide statistics depend on a complex system, involving several stages and numerous agencies and individuals. No one agency or structure has authority and responsibility for all the elements of the system. The production of suicide statistics is only one of the duties in many parts of the system, and is not necessarily the main task.

This is also true for statistics on deaths from any other cause. In addition to this, production of suicide statistics is complicated by special characteristics of this cause of death.

Even after careful investigation it is sometimes not possible to decide confidently whether a death was by suicide (Freckelton & Ranson 2006). Doubt can remain about the state of mind of the deceased when he or she undertook a self-harming act. For example, a person takes a large dose of a medication. Did the person intend to die? A teenager with a cognitive deficit hangs himself. Was he capable of forming an intention to die? Sometimes the circumstances of a death leave doubt about whether the person intended self-harm at all (e.g. some cases of unobserved drowning or vehicle crashes might be unintentional or intentional).

Decision making on whether the cause of death is suicide is also complicated by the sensitive nature of suicide (Freckelton & Ranson 2006). Relatives may have strong wishes that a death not be found to be suicide.

Differences exist in the meaning given to the term 'suicide' by many people, and decisions on cause of death can be made by coroners, for example, without reference to a standard definition. There is, in particular, no explicit guide concerning the strength of evidence that is sufficient to warrant coming to the conclusion that a death should be regarded as resulting from suicide.

These characteristics present challenges to the production of useful and reliable suicide statistics. This section surveys a range of those aspects of the system that could be sources of unreliability.

4.1 Before the coroner system

Steps before the referral of a death to a coroner are not a major focus of this project. It is, of course, possible that some deaths due to suicide are not referred to a coroner, for a number of reasons:

- Suicide from some causes, such as poisoning by certain drugs, may appear similar to death due to natural causes. For example, the sudden death of an older person in a manner superficially consistent with a natural cause, such as myocardial infarction, might not prompt consideration of the possibility of suicide.
- A person might try to obscure the fact that his or her death is due to suicide, perhaps out of concern for insurance entitlements of the dependants. Surviving family members might want to do the same, to avoid the emotional trauma of an inquiry, or the perceived shame of having a family member take his own life.

- Deaths which involve assisted suicide may not be recognised or reported as such.
- Errors in judgment concerning whether or not a death is reportable can occur, when suicide is not necessarily obvious.

Formal evidence on the frequency and outcome of such events is lacking.

Administrative changes in Victoria have increased the number of doctor-certified deaths brought to the attention of forensic pathologists. This could, in principle, cause an increase in the identification of suicide deaths.

4.2 Coroner system

Most deaths ultimately recorded as suicides are recognised as such by the time that they are reported to a coroner. There are some exceptions, in which investigation ends with a finding that a death not originally suspected as being suicide is found to be due to this cause or, conversely, that a death that appeared to be due to suicide is found not to be. Usually such changes simply reflect better understanding of a case based on investigation. In a few cases, however, there may have been an attempt to obscure the true cause of death, for example by disguising a homicide as a suicide. Also, as with any endeavour, there is the potential for mistakes to occur.

Three other aspects of the coroner system are likely to have more impact on suicide statistics. These are:

- the time taken to reach decisions
- the way decisions are recorded
- the criteria used when deciding whether a death should be recorded as being due to suicide.

These issues are dealt with briefly here, and in more detail later (see timing in Chapter 7 and all three aspects in Chapter 8).

4.2.1 Time taken to reach decisions

The ABS depends heavily on information originating from coroners for its production of suicide statistics. The ABS production process is subject to time constraints, and this may have an effect on whether a particular case is recorded as suicide in official statistics. For example, a coroner may not have reached a decision in a case later found to be suicide in time for an ABS deadline. This case might not then be recorded as suicide in official statistics.

4.2.2 The way decisions are recorded

Coroners have latitude in the way they record findings, and are also subject to constraints, especially in some jurisdictions. A coroner who has concluded that a death was due to a suicidal jump from a height might write a finding that is more forthcoming (e.g. 'jumped from the XYZ building with the intention of taking his life') or less forthcoming (e.g. 'multiple injuries due to a fall from a height') on the matter of suicidal intent, for reasons of personal judgment and preference, or in response to regulatory requirements (Freckelton & Ranson 2006).

4.2.3 Criteria for deciding ‘suicide’

Similarly, coroners also exercise some discretion concerning the criteria for deciding whether a particular death is ‘suicide’, particularly concerning the extent of evidence they require to come to this conclusion. For example, one coroner might find that the death of an adult by unambiguous self-inflicted hanging, but without leaving a suicide note, to be of undetermined intent, whereas another coroner might find a similar case to be suicide.

Although an investigation into the impact of these influences on enumerating suicides in Australia is beyond the scope of the present study, it is noteworthy that a review and survey of the practices of coroners in different jurisdictions was undertaken in 1999 for the National Youth Suicide Prevention Strategy (DHAC 1999). The results showed considerable scope for suicide rates to be influenced by different practices and procedures. The survey of coroners found that formal suicide verdicts were used only in New South Wales and Western Australia. More recent work by Dodds confirms the complexity of the concept of intent and of the influences on how this concept is recorded in Australian coroners’ data (Dodds 2007).

4.3 NCIS

Four main aspects of the NCIS system are likely to have an impact on suicide statistics. These are:

- the existence of an NCIS record concerning a death
- the extent of information in an ‘open’ NCIS record
- the extent of information in a ‘closed’ NCIS record
- the quality assurance and documentation processes.

4.3.1 Existence of an NCIS record

Creation of a case record in the NCIS depends on action being taken in the contributing Coroner’s Office. Preferred practice is for an NCIS record to be created as soon as possible after a death has been reported to the coroner. Sometimes, however, record creation does not happen until much later. This is important, because not until an NCIS record has been created is there a straightforward way for the ABS to obtain any information from coroners about a death. A case could have been completed by the coroner but still be ‘invisible’ to the ABS because it has not been entered into the NCIS system.

4.3.2 Extent of information in an ‘open’ NCIS record

Pending completion of processing of a death by the coroner, its NCIS record has ‘open’ status. Since open records normally refer to incomplete cases, some information, such as the coroner’s finding, is usually missing. Other information in open cases is suppressed for nearly all users, for reasons to do with case confidentiality while the coroner is still working on the case. There are also jurisdiction-specific differences in the extent of information available in open cases.

The extent to which this affects the work of ABS coders is not clear, as they have an unusually high level of access to the NCIS. It might be argued that open cases should not be used as the basis for assigning deaths as suicide and, hence, that the extent of information

accessible in open NCIS records is not important for suicide statistics. Reasons stated later in the report provide the justification for making use of open cases, and the ABS has stated that open cases can be coded as ISH in some circumstances (ABS 2007b).

4.3.3 Extent of information in a 'closed' NCIS record

After finalisation of a case by the coroner, the NCIS record can be completed and given 'closed' status. For the purposes of this project, the most important data items that become available at this stage are the *Intent – Case Completion* code field (discussed later) and the text files that can be attached to records, namely the police report to the coroner, the autopsy report, the toxicology report and (especially) the coroner's finding. Although the *Intent – Case Completion* field is provided in nearly all closed cases, there is great variation in whether any text files are provided and which ones are provided, and in the extent of information contained in these files. For some states (e.g. Victoria) text files provide useful information on most suicide cases. The value of Queensland NCIS records has been constrained by the absence of coroners' findings. South Australian records often have police report and findings documents, but the content is usually so brief as to be of little use.

4.3.4 Quality assurance and documentation

A strength of the NCIS is that it includes data quality assurance processes. Fields in NCIS records provide information on whether a record has been subjected to quality assurance (QA) and some information on its stage and outcome. According to the Spring 2007 edition of *NCIS News*, critical errors were detected in approximately a quarter of all closed cases over the 2005 period. NCIS also reports that the percentage of critical errors found in closed cases has been steadily decreasing over time.

For the purposes of this project, the quality and documentation of the *Intent – Case Completion* item is particularly important, because it provides the most specific indication of intent for most cases in NCIS. There are many cases in the NCIS where this item is coded as 'Intentional self-harm', but nothing specific is stated about intent in the cause of death fields or in the coroner's finding (if provided).

The specific issues here are (1) whether the value of *Intent – Case Completion* can be taken as being the coroner's finding on intent, and (2) whether the value *Intentional self-harm* in this variable can be taken as being equivalent to the ICD-10 code range with the same name, which is what is reported as suicide in ABS statistics.

4.4 Use of the NCIS

In addition to the issues associated with the NCIS system just described, there are also two key issues affecting suicide statistics which relate to the ways in which NCIS data are used. These are:

- the timing of the use of NCIS to obtain suicide statistics
- the criteria used to assign a case in the NCIS as 'suicide'.

4.4.1 Timing of use of NCIS to obtain suicide statistics

For reasons described above, the date on which the NCIS is consulted for information about a death will determine what is found. Immediately after death, no cases have an NCIS record. For most deaths, a record is created fairly soon after death, but the record remains incomplete and access is restricted while the case is open. After the case has been closed, the record can be completed and finalised, and more of the information in it is made available to NCIS users.

Three factors determine the time-relationship of the usefulness of the NCIS for obtaining data on suicide: (i) the criteria used to decide whether a case is 'suicide'; (ii) the accessible information content of NCIS records, open and closed; and (iii) the time-course of NCIS cases ultimately satisfying criteria for designation as 'suicide' (in other words, what is the distribution of durations between deaths and NCIS case creation, and the assignment of closed status).

4.4.2 Criteria used to assign a case in NCIS as 'suicide'

The utility of the NCIS, and the suicide counts obtained by means of it, can differ greatly depending on the criteria used. For example, criteria used might require that a death may be assigned as 'suicide' only after a coroner has made a finding or, more restrictively, only when there is an unambiguously worded coroner's finding in the NCIS record. These criteria would result in lower counts than other criteria which, for example, also allow inclusion of other cases where information suggests ISH (e.g. a police report to the coroner which describes a death by self-hanging where a suicide note was also found).

Both of these issues are partly matters of standardisation of use of the NCIS, rather than relating to error. That is, any coroners' information system is likely to be imperfect for the purpose of suicide statistics. Best use of the system can be made if its information properties, including timing and the information content of the records, are well understood, and if it is used in a standardised manner that takes this knowledge into account.

4.5 ABS processes

The use of the NCIS by the ABS for the purpose of mortality coding is an instance of the more general use of the NCIS, and the comments in the previous section apply. However, some more specific comments can be added.

The ABS has adopted a policy of using the NCIS as the main source of information on the cause of death in coroner-certified deaths. This policy was progressively introduced from 2003, and from 2006 the NCIS is the only source of data used by the ABS for coroner-certified deaths (ABS 2008b). This replaced a process in which the ABS communicated directly with Coroners' Offices.

Since the ABS is at the end of an information chain, its work is affected by what is done at earlier stages. Thus, the ABS depends heavily on coroners and the NCIS for data completeness, reliability and timeliness.

4.5.1 Timing of use of the NCIS by the ABS

The process used by the ABS for producing mortality data on deaths registered before 2007 implies the existence of certain critical dates². The ABS process has been one in which each death is coded and reported only once; each death is processed according to the calendar year in which it was registered; and data are published in year-of-registration batches, 12 to 15 months after the end of a reference period.

Processing by the ABS of deaths that were registered in a particular calendar year ceases some time before the publication of data for that period, in order to allow checking and preparation for release. Many of the coroner-certified deaths relevant to an annual file will have been closed in the NCIS in time to be used by the ABS, but there is no reason to expect that all will have been. (Ideally, these coroner-certified deaths will also have been subjected to NCIS QA processes, which occur after case closure.) However, coroners have no obligation to work according to the ABS timetable.

A question flowing from this is whether there is a 'sweet spot' in timing of use of the NCIS for the purpose of reporting suicide statistics: late enough for all or most cases to be closed but early enough to provide sufficiently timely statistics.

4.5.2 Criteria used by the ABS to assign a case in NCIS as 'suicide'

The ABS codes deaths according to the 10th revision of the WHO International Classification of Diseases (ICD-10). The code range conventionally reported as 'suicide' is X60–X84 (although the ICD-10 descriptor for this range is 'Intentional self-harm'). The ICD-10 provides some indication of the criteria for inclusion in this range, and some guidance on how to deal with cases that do not quite satisfy the criteria (Walker et al. 2008). The ICD-10 coding rules specify that documentation underlying ICD-10 coding decisions on cause of death must come from a medical or legal authority (WHO 2004), but precisely what constitutes a medical or legal authority does not appear to have been defined by WHO.

ABS documents suggest some variation in interpretation of these criteria. In one recent publication (ABS 2007c), the ABS states:

To be classified as a suicide a death must be recognised as being due to other than natural causes and established by coronial enquiry that the death results from a deliberate act of the deceased with the intention of taking his or her own life (p. 20).

This strict interpretation suggests that only in the presence of a coronial finding to this effect can a death be coded as suicide.

However, somewhat broader criteria are described elsewhere. In an information paper (ABS 2007b) the following statement is made:

In order to classify a death as suicide (intentional self-harm) the ICD-10 requires that specific documentation from a medical or legal authority be available regarding both the self-inflicted nature and suicidal intent of the incident (p. 6).

2 A new ABS system was introduced for deaths registered after 2006. It is described in Section 8.5.

The report goes on to say:

The case generally needs to be closed by the coroner to code suicide as such, unless there is conclusive information in the police report or autopsy report to show that the death was intentional. For example, if the NCIS contains evidence of a suicide note the death would be coded as a suicide.

These two approaches would lead to different coding of some deaths. It is not clear which of these criteria has been used by the ABS, or whether they have been used in particular reporting periods.

4.6 The impact of timing

Throughout this chapter, the impact of timing has been a recurrent theme, in particular timing of the first appearance of a case in the NCIS after notification to the coroner, when the coroner closes a case, when the case is closed on the LCMS and when that information is uploaded to the NCIS and the case is given 'closed' status. Delays in any of these steps can impair the potential of the NCIS record to guide the ABS coder who is responsible for assigning a cause code to the case. The ABS has identified increases in the length of time to case closure by coroners as a reason for under-enumerating suicide cases.

Part B—Investigation

5 Methods and data

5.1 Overview

Part A of this report presents selected summary statistics on deaths resulting from ISH in Australia, describes the information system that generated them, and identifies potential sources of error. Part B presents investigations designed to detect, describe and explain certain potential deficiencies of the data, and to produce revised estimates.

The overall purpose of the study is to lead to more reliable estimates of the number of ISH deaths in Australia. This could be achieved by demonstrating that concerns about data quality are unfounded, or by confirming suspected problems and showing how they can be avoided or overcome.

This chapter describes the study methods, and the next two chapters present findings. The investigations are based mainly on an analysis of data from the NCIS.

The study method is provided below. Briefly, the study made use of data from the NCIS to:

- identify ISH cases in terms of ABS-sourced codes and in terms of NCIS data
- compare these sets, revealing cases where there is disagreement in ISH status according to these criteria
- examine these sets in detail, to describe their characteristics and attempt to explain the occurrence of cases where there is disagreement on ISH status
- undertake a coding exercise to investigate the potential of NCIS data to be used as the basis for reviewing and perhaps recoding cases (for example, after they are closed by a coroner)
- produce estimates of the number of cases that appear to be codable as ISH on the basis of NCIS data as they were at the time of this study.

5.2 Methods

5.2.1 Case extract from the NCIS

NCIS data can be accessed via a web-based interface (accessible at <www.ncis.org.au> with necessary permissions and password). This mode of access is sufficient for some purposes, but is not sufficiently flexible for the purposes of this project. For that reason, most of the analysis reported here is based on a large extract of NCIS data. The extract was made in January 2008 and is thus a snapshot of the state of information in the NCIS at that date. This extract contains all NCIS records where *Date of Death* is between 1 January 2004 and 31 December 2006 inclusive. The extract is therefore suitable for analysis of deaths that occurred in calendar year 2004, this having been chosen because it was recent enough to fall

within the period during which the data may have been affected by the problems that prompted this project, but also sufficiently long ago to have allowed time for most coroner cases to have closed.

The extract includes almost all NCIS data fields for closed cases, and a restricted range of fields (all that we were permitted to access) for cases that were open on the date of extraction.

In addition, and crucially for this project, the extract includes certain data provided by the ABS from its mortality data file for inclusion in the NCIS. The most important item is the UCoD code for each record.

The main limitation of using the NCIS in the form of an extract, compared with using it via the web interface, is that the documents attached to many closed records on the website are not provided with the extract. This is because of the way the NCIS is constructed, an effect of which is that providing copies of the attachments corresponding to the cases in an extract is very time-consuming and costly. Because we expected that we would need to refer to the attachments to only some of the records in the extract, we opted to do this via the web interface.

The extract was supplied as a flat table file. We loaded it into SPSS (version 14) and Stata (version 9.2). Most data manipulation was conducted in SPSS. Some summary analysis and preparation of certain tables and figures was done in MS Excel 2003.

5.2.2 Overview of methods

We used the NCIS extract in several ways, which can be divided into two groups.

In Phase 1, we used the NCIS data in a straightforward manner, using only a few key variables. In this we used the NCIS variable *Intent – Case Completion* as the sole basis for assigning cases as intentional self-harm (ISH). We compared this assignment with ABS UCoD codes that have been added to many NCIS records.

Two subprojects make up Phase 1. The first is comparison of cases according to whether they were flagged as ISH according to each of the two sources (see Section 5.2.3). The second is a comparison of the deaths in 2004 identified as ISH according to the NCIS with data from the ABS mortality data files for the same period (see Section 5.2.4).

These investigations turned out to be limited by several characteristics of the data. These are described in detail later, but the most important are:

- Most NCIS cases that remain open cannot be assessed or compared by the methods used in Phase 1.
- Comparisons cannot be made for the 13% of NCIS records that lack an ABS UCoD code.

In Phase 2 of analysis of the NCIS extract, we used all data in the records to minimise the restricting effects of the data characteristics evident in Phase 1. We did this in several steps. First, we checked and processed the NCIS extract to improve its utility for the project (Section 5.2.5). Second, we investigated one of the data omissions with potential to affect the analysis, namely the absence of the ABS UCoD code from a proportion of cases in the extract (Section 5.2.6). Third, we developed and applied a staged approach to assignment of ISH status based on all information in the NCIS (Section 5.2.7). This was the first of two methods to derive new estimates of ISH based on data in the NCIS. The second is to manually recode

UCoD based on NCIS records. A feasibility study for this approach is reported in Section 5.2.8.

We then analysed the data following these case assignments to gain a better understanding of reasons for misclassification of ISH cases (Section 5.2.9). Finally, we made revised estimates of ISH mortality in Australia in 2004 based on all information in the NCIS, and compared these with separate estimates of ISH in Australia based on ABS mortality data (Section 5.2.10).

5.2.3 Compare ISH according to two criteria based on the NCIS

We flagged two sets of records in the extract. These are records in which:

- there is an ABS UCoD code in the range usually reported as suicide (X60–X84)³
- the NCIS variable *Intent – Case Completion* = ‘intentional self-harm’ (which is represented in the data by code value 2).

This was done because preliminary investigations revealed that *Intent – Case Completion* = ‘intentional self-harm’ is the best way to identify ‘suicide’ cases in the NCIS. We expected that comparing this criterion with the conventional ICD-10 criterion for suicide, using ABS-coded data, would provide insights into the two sources.

We were aware that this approach would probably not be the only one required. For example, the fact that *Intent – Case Completion* is normally blank until an NCIS case is closed implied that another approach would be needed for open cases.

We applied flags to all records, marking whether they were in either or both of these sets. Each flag allows three values: ‘yes’, ‘no’ and ‘missing’ (used where the underlying fields in NCIS were blank). Cross-tabulation of the flags produced a three-by-three table. We limited attention to six of the nine cells, collapsing those meaning ‘no-no’, ‘missing-no’, ‘no-missing’ and ‘missing-missing’ into one group (Group D in Table 5.1).

We undertook analyses of the seven sets of records specified by this process. This is reported in Section 6.2.

Table 5.1: Flags applied to NCIS data

Group	ISH?	Records	Analysis	
	ABS	NCIS		
A	Yes	Yes	1,818	Searched for false positive assignment
B	Yes	No	28	Detailed examination of extract data and downloaded attachments.
C	No	Yes	236	Detailed examination of extract data and downloaded attachments.
D*	No or missing	No or missing	16,889	Searched for false negative assignment
E	Missing	Yes	258	Detailed examination of extract data and downloaded attachments.
F	Yes	Missing	50	Detailed examination of extract data and downloaded attachments.

* Includes cases that are ‘missing-no’, ‘no-missing’ and ‘missing-missing’.

3 ICD-10 code Y87.0, ‘Sequelae of intentional self-harm’, is sometimes included when reporting ‘suicide’ in terms of data coded according to ICD-10. Y87.0 did not appear among the UCoD codes in the NCIS extract used for this project. Range X60–X84 was used as the selection criterion. One record with this code and year of death 2004 is in the ABS mortality data file.

5.2.4 ISH deaths according to NCIS and ABS mortality data

We compared numbers of deaths recorded in the NCIS as having occurred in 2004 and with *Intent – Case Completion* = ‘intentional self-harm’ with those deaths recorded in the ABS mortality data files as ISH (or suicide) in the same period. These ABS cases were defined as cases with UCoD = X60–X84 or Y87.0 (see footnote 3). The ABS mortality data used for this purpose are the annual year-of-registration files for 2004 and 2005, held by the AIHW. As we did not have sufficient time to obtain necessary permission to undertake record linkage of these two sources, comparison was based on aggregate tables. The findings of this part are presented in Section 6.3.

5.2.5 Checking and processing of the NCIS extract to support later analysis

The NCIS extract was examined thoroughly and several items were identified that could be processed in a way that would improve the utility of the file for the purposes of this project.

Derived variables produced at this step were:

- Revised *Date of Death* and *Year of death*. Deaths that occurred during 2004 are in-scope for this study. A precise date of death is recorded in NCIS for most deaths. However, this is not so for some deaths, either because the body was found in circumstances that can only imply a period during which death occurred, rather than give a specific date, or because the case remained open when our data extract was made, in which case the *Date of Death* was usually not available. In these cases, information in several fields in the NCIS record was used to assess whether the death had occurred in 2004.

An estimate of the number of deaths in 2004 based on the NCIS variable *Death start date* is 19,289. A revised *Date of Death* value was derived, using (in this order of priority) the NCIS variables *Death finish date*, *Death start date*, *Incident start date*, and *Incident finish date*, then (for closed cases not assigned on the basis of one of these variables) all data in the NCIS extract and attachments were scrutinised. Deaths that could not be assigned a full *Date of Death* on this basis were assigned *Year of death* = *Case year*. Although this process generates an approximation, for cases with exact year of death it is the same as *Case year* in 98.9% of cases.

Following application of this method, the revised estimate of the number of deaths in the extract with *Year of death* 2004 is 19,593. Of this total, 19,245 cases are also in the initial estimate. The revised count omits 40 cases for which *Year of death* was after 2004, two records that refer to discovery of old Aboriginal remains and two that refer to animal remains. The revised count adds 348 cases, 91% of which were open cases. Queensland cases account for 71% of the additions, all open. Another 10% were open Western Australian cases, and 9% were closed cases from South Australia.

- Durations between dates of death, notification to the coroner, creation of NCIS record, and case closure by the coroner. These durations were calculated by subtracting one date from another, after allowing for missing values and converting to convenient units (days for most purposes).
- Estimated durations from date of publication of *Causes of death, Australia, 2004* (ABS 2006a). The report was published on 14 March 2006. The significance of this date is that information that was not available in the NCIS by this date (or, in practice, some time before it) cannot have been used by ABS officers when assigning UCoD codes to the

deaths included in the report. The durations calculated were dates of death, and case closure by coroners to the publication date. The durations were grouped into ranges for reporting.

Calculation of the durations involved an approximation, because the cases included in the ABS report are defined in terms of date of death registration, but the NCIS does not include this variable. The best substitute for year of death registration that is available in the NCIS is *Year of death*. Analysis of the ABS mortality data file for several registration years up to 2005 indicates that about 8% of ISH deaths occurring in a calendar year were registered in a later year. Hence, for about 8% of deaths that occurred in 2004, an assumption that they are included in the ABS report published on 14 March 2006 is incorrect. Most of these cases will have been included in the ABS report published a year later (ABS 2007a). Because of this, the times between an event recorded in NCIS (e.g. *Date Case Closed*) and publication will be underestimated by a year for about 8% of ISH cases.

- Revised age at death. Age at death in completed years was derived using the NCIS variable *Age at death* and an associated variable that specifies the unit of the age variable (i.e. years, months, days). Cases that were not assigned a *Year of death* on this basis were tested for the availability of plausible values of *Date of Death* and *Date of Birth*. Where found, age at death was calculated from these. The whole NCIS record was inspected for closed cases which still had not been assigned an age value by this stage of the process, and 11 were found with *Year of death* 2004. No further age values could be assigned.

5.2.6 NCIS records without Underlying Cause of Death codes

The initial analysis described in Section 5.2.3 and reported in Section 6.2 revealed that about 13% of records in the NCIS extract lacked data in the *ICD-10 Cause of Death* field (referred to in this report as Underlying Cause of Death or UCoD). Do these NCIS records lack an UCoD code because linkage with records in the ABS mortality data file is incomplete or because the records are not in the ABS mortality data file? The answer has important implications either way, which complicate the project. The comparison with ABS mortality data indicates that the cases are in the ABS mortality data file, but not matched (see Section 6.3).

In Section 6.4 we report the findings of an investigation of this set of cases, which was done with the aim of understanding whether they are a biased sample of all NCIS records and, if so, with what characteristics. We analysed NCIS cases for deaths that occurred during 2004 (based on the revised *Year of death* variable described in Section 5.2.5). The cases were analysed by comparing distributions of variable values for NCIS records with and without an UCoD code. Separate tables were produced for all cases and for those where NCIS *Intent – Case Completion* = ‘intentional self-harm’.

5.2.7 Assignment of ISH status using all information in NCIS

Earlier parts of analysis used only certain data from the NCIS to assign cases as ISH, namely *Intent – Case Completion* and unintentional cause of death. In this section we used all available data in NCIS records. The process was done in five stages, each using a particular range of NCIS variables and a particular method, as shown in Table 5.2.

Table 5.2: Process for assignment of ISH status

Stage	Criteria for inclusion	Criteria for exclusion
1. Intent—Case Completion	<i>Intent—Case Completion</i> = 2	<i>Intent—Case Completion</i> = 1, 3, 4, 5, 6 or 7
2. Other NCIS variables	<i>Incident Activity DetailsLevel2</i> = 98.1 or <i>Intent—Notification (Presumed)</i> = 2	<i>Incident Activity DetailsLevel2</i> = 98.3, or <i>Intent—Notification (Presumed)</i> = 3 (assault/homicide) <i>Incident Activity DetailsLevel2</i> = 1.1, 1.2, 2.1, 2.2, 8.1, 8.2 (transport) <i>Case Type—Completion</i> = 1 and <i>Mechanism of Injury</i> (Primary, Secondary1 or Secondary2) = 1.05 (unintentional fall) <i>Intent—Case Completion</i> = 999 and <i>Case Type—Completion</i> = 2 (unlikely to be known)
3. String searches (confirmed by manual review of records)	Presence in extract of text string 'suicid', relevance of which was confirmed by record review.	Presence in extract of certain text strings, including 'femur', 'fall', and for open cases 'assault', 'traffic', 'MVA', 'bicycle' and 'motorcycle', the relevance of which was confirmed by record review.
4. Manual review of all records assigned ISH by only one source (i.e. Groups B, C, E and F in Table 5.1). Included review of attachments for all closed records.	Net effect for 2004 deaths: +1 ISH	
5. UCoD code (used for records not assigned by any prior step – mostly open cases with sparse data)	<i>UCoD</i> code X60–X84	<i>UCoD</i> code any valid ICD-10 value except X60–X84

Note: In stage 4, other text strings were tested (e.g. 'self-harm', 'hang') but either selected no additional records or were not sufficiently specific.

Evidence at earlier stages was preferred over evidence at later stages. Assignment as 'ISH' or as 'not ISH' at a particular stage was not changed in later stages (with a limited exception, described below).

At each level, records in the pool which were eligible for processing were assessed in terms of two sets of criteria: The first are positive criteria, the presence of which favours assignment of the case as being ISH. The second are also positive criteria, the presence of which favours assignment of the case as being due to a cause of death other than ISH.

The exception mentioned above is at stage 4, in which records shown in Section 6.2 to have disagreement on ISH status between NCIS *Intent – Case Completion* and the *ICD-10 Cause of Death* code in NCIS were reviewed and assigned manually. At this stage, five cases were newly assigned as ISH and six others already assigned as ISH had this status removed.

5.2.8 Feasibility test of manual recoding

This describes the methods used to produce the findings presented in Section 7.2.2.

A pilot project involving the recoding of a selection of cases from several of the identified groups was carried out in order to finalise the selection of cases for the main recoding task and to review and define ICD-10 coding rules in order to assign alternative ICD-10 codes.

Three coding criteria were devised based on information from key ABS publications and our knowledge of ICD-10 coding criteria. Two of the criteria were based on ABS guidelines and

the third on our own somewhat looser interpretation of the ICD-10 coding rules. Two ABS criteria were needed because conflicting information was found in the ABS publications regarding what was the minimum necessary information required to code a death as a ISH (see Section 4.5.2). The criteria used were as follows.

ABS criterion 1

A strict interpretation of ABS coding rules for ISH based on ICD-10 rules suggests that the only information ABS coders may use in making a decision regarding intent is the coroner's finding. According to this criterion, without a coroner's finding an ICD-10 code from the ISH block cannot be used.

Where a coroner's finding is present, it must contain a definitive statement that indicates the injury was self-inflicted and that the intent was death. We recognise that many coroners may not use the term 'suicide' and accept that terms such as 'with the intent to die', 'took his own life' and 'by his own hand' are acceptable statements indicating suicidal intent.

With respect to Queensland cases we acknowledge that coroners may not provide any statement to the effect that a death was intentional self-harm. Advice to us suggests that intent information may be found in the coroner's finding, but that it will probably be present by omission (Walker et al. 2008). For example, in a case of suicide a Queensland coroner may rule out all 'other intent' categories, leaving intentional self-harm as the only remaining prospect without actually stating this in writing. Coders in the pilot study were asked to study Queensland findings carefully and note any instances where they found such examples.

ABS criterion 2

Elsewhere, the ABS has indicated that information from a medical or legal authority may be used in order to ascertain intent and assign an ICD-10 code. What constitutes a medical or legal authority is somewhat open to interpretation. In the paper on external causes of death, medical or legal authorities are defined as coroners, police officers and pathologists (ABS 2007b).

In contrast, Walker et al. (2008) suggest that permitting ABS coders to make decisions which include coroners' reports and/or police reports would be a significant departure from current practice.

For the purposes of the present exercise we decided to define medical or legal authorities as coroners, forensic pathologists and police officers.

The information from the medical or legal authority must contain a definite statement that the injury was self-inflicted *and* that the intent was to die. Evidence of a suicide note or a verbal statement to that effect is sufficient to determine suicide if the injury is proven to be self-inflicted.

National Injury Surveillance Unit (NISU) criterion

The NISU coding criterion allows coders to use any and all information contained in the NCIS record and any attached documentation. As with the ABS criteria described above, the information in the record must contain a definite statement and/or indication that the injury was self-inflicted. In addition, the following criteria were added based on our knowledge of patterns and methods of suicide in Australia:

- Evidence of a suicide note or a verbal statement to that effect is sufficient to determine suicide if the injury is proven to be self-inflicted.
- Self-inflicted gunshot to the head with no suspicious circumstances is sufficient to determine suicide.
- Carbon monoxide poisoning by car with no suspicious circumstances is sufficient to determine ISH.
- Hanging cases where there is evidence of past suicide attempts and verbalised suicidal ideation is sufficient to determine ISH if the injury is proven to be self-inflicted.
- Jumping and/or standing in front of trains and other vehicles where there is evidence of past suicide attempts and verbalised suicidal ideation is sufficient to determine ISH if the injury is proven to be self-inflicted.
- Jumping from a height where there is evidence of past suicide attempts and verbalised suicidal ideation is sufficient to determine ISH if the injury is proven to be self-inflicted.
- Poisoning with non-recreational drugs (i.e. prescription medications) where there is evidence of past suicide attempts and verbalised suicidal ideation and the amount taken was enough to overdose is sufficient to determine ISH if the injury is proven to be self-inflicted.
- Poisoning with recreational drugs where there is evidence of past suicide attempts and verbalised suicidal ideation and the amount taken was enough to overdose is sufficient to determine ISH if the injury is proven to be self-inflicted.

Pilot study

The study method was tested and refined by means of a pilot study, in which 20 cases were randomly chosen from Group C and all 25 closed cases were selected from Group B (these groups are specified in Section 6.2.2). Two staff members from NISU undertook the recoding of the 40 cases. Each case was coded according to the three criteria described above. Inter-rater reliability was measured.

Full feasibility study

The pilot confirmed the suitability of the method, for closed cases, and it was used without change for the full feasibility study. Cases from Groups B, C, E and F were included, as follows:

- Group B: All 25 closed cases of the total 28 cases.
- Group C: A random sample of 50 closed cases of the total 220 closed cases.
- Group E: A random sample of 50 closed cases of the total 243 closed cases.
- Group F: All 5 closed cases of the total 50 cases.

Random numbers were used to select cases in Groups B and C.

The main recoding exercise used two separate coders, both NISU project staff. All disputed coding decisions were adjudicated by the NISU Director. Both coders were experienced users of ICD-10 coded data and followed comprehensive written coding instructions. Coders were instructed to access the WHO ICD website in order to use the most recent version of ICD-10 in assigning codes. For cases coded using the ABS1 and ABS2 criteria, the instructions for assigning an ICD-10 code were taken directly from an ABS information paper (ABS 2007b).

Additional codes were assigned to record the sufficiency, for study purposes, of the information available in the NCIS record and our confidence concerning our assessment of intent. Samples of records were coded by two coders and inter-rater agreement was calculated.

Comparison of the ABS-assigned and the study-assigned ICD-10 codes was used to calculate misclassification proportions for each of the groups of records included in the test.

5.2.9 Factors contributing to differences in assignment as ISH

The part of the analysis presented in Section 7.3 is an attempt to provide explanations for the differences in assignment of cases as ISH between ABS-assigned UCoD codes and NCIS-based assignment.

Investigation focused on two factors, dates of events and jurisdiction. Derived variables (see Section 5.2.5) were used to present data in terms of several durations: date of death to date of case closure by coroner and by LCMS, and date of NCIS case closure to date of publication of *Causes of death, Australia, 2004* (14 March 2006). The difference-based durations were limited to records in which valid values were present for both of the variables compared.

Data were also presented in terms of date of coroner closure and of LCMS closure.

5.2.10 Revised estimates of ISH deaths

Three revised estimates were produced, and are presented in Section 7.4.

Estimate 1: Values from the ABS mortality data file

The revised estimates were compared with values from the ABS mortality data file, referred to as estimate 1. This includes cases where the UCoD code is in the range X60–X84, *Date of Death* is in calendar year 2004, and the death was registered by the end of calendar year 2005 (that is, it is in the 2004 or 2005 registration year-based data files).

Estimate 2: Estimate based on NCIS and using our best assessment of the criteria applied by the ABS to produce Estimate 1, as at the publication date of *Causes of death, Australia, 2004*

This was designed to apply similar criteria to those used by the ABS in producing the values above but is based on the NCIS. Two criteria were used.

First, we included all deaths that had LCMS closed dates and *Coroner Closed* dates before 14 March 2006 (the date of publication of *Causes of death, Australia, 2004*), provided they had been flagged as ISH by stage 5 of the method described in Section 5.2.7 and had *Year of death* = 2004.

Second, we also included a set of deaths that are included in the ABS mortality data file as ISH but which had not been closed by LCMS and/or coroner at 14 March 2006. These were defined as all deaths in the NCIS with ICD-10 *Cause of Death* code = X60–X84 and *Year of death* = 2004 (most were already included by the first criterion). This criterion probably results in a small underinclusion, because it cannot be applied to the 12% of ISH cases in the NCIS with missing UCoD.

Estimate 3: The same criteria as Estimate 2, applied to NCIS data as at January 2008

This estimate was designed to apply the same criteria as the previous one, but also includes cases for which LCMS and/or coroner closure dates are after 14 March 2006 but before January 2008, when the NCIS data extract used for this project was made.

Estimate 4: Estimate based on all cases identified as ISH according to the staged assignment process (Section 7.2.1)

This estimate includes all of the deaths flagged as ISH by stage 5 of the method described in Section 5.2.7 and with *Year of death* = 2004. This includes all of the cases in estimate 3, plus the subset of open cases not already included by the second criterion of Estimate 2.

6 Findings: describing the NCIS data

6.1 Introduction and overview

This chapter presents results from the analysis of the NCIS data extract, and makes some comparisons with contemporaneous ABS mortality data.

6.2 ISH according to two criteria based on the NCIS

6.2.1 Introduction

We began the analysis by studying records in the NCIS extract according to the values of the two variables that provide the most direct basis for assignment as ISH: the NCIS variable *Intent – Case Completion* and the ABS-sourced UCoD code, represented as an ICD-10 code.

We describe the pattern of numbers and proportions of records in the extract according to these two criteria. We then describe the findings of investigations into certain subsets of cases specified by applying these two criteria.

The methods and NCIS extract used for this substudy are described in Section 5.2. This section analyses deaths in the extract for which *Year of death* was 2004.

6.2.2 Overview of groups

The NCIS extract contained 19,289 cases with *Year of death* 2004. The cases were cross-tabulated according to values of *Intent – Case Completion* ('Intentional self-harm', any other non-missing value, missing) and values of ABS-sourced UCoD codes in the extract (X60–X84, any other ICD-10 code, or missing) (Figure 6.1). The four groups that were not ISH according to either source were collapsed into one group (Group D, below), to simplify reporting.

The cases were considered in six groups, as follows:

- Group A: Cases coded as ISH according to NCIS *Intent – Case Completion* and ABS-sourced UCoD code (that is, an ICD-10 code in the range X60–X84). Designated in this section as (NCIS+/ABS+).
- Group B: Cases with an ABS-sourced UCoD indicating ISH and an NCIS *Intent – Case Completion* code other than ISH (X60–X84). Designated in this section as (NCIS-/ABS+).
- Group C: Cases coded as ISH according to NCIS *Intent – Case Completion* with an ABS-sourced UCoD code which was not in the ISH range (i.e. any valid ICD-10 code except X60–X84). Designated in this section as (NCIS+/ABS-).

- Group D: Cases in the file that were not ISH according to NCIS *Intent – Case Completion* or ABS-sourced UCoD code. This group includes the cases that were other ICD-10 *Cause of Death* and other *Intent – Case Completion* ($n = 3,479$), other ICD-10 *Cause of Death* and missing *Intent – Case Completion*⁴ ($n = 11,390$), missing ICD-10 *Cause of Death* and other *Intent – Case Completion* ($n = 578$) and missing values for both ICD-10 *Cause of Death* and *Intent – Case Completion* ($n = 1,452$). Designated in this section as (NCIS-/ABS-).
- Group E: Cases coded as ISH according to NCIS *Intent – Case Completion* and which had a missing ABS-sourced UCoD code. Designated in this section as (NCIS+/ABS~).
- Group F: Cases with an ABS-sourced UCoD indicating ISH and a missing NCIS *Intent – Case Completion* value. Designated in this section as (NCIS~/ABS+).

The total number of cases in each of these groups is shown in Table 6.1, with the numbers that were open or closed when the extract was made in January 2008.

Several initial points about the values in the table are made here, before we proceed to more detailed assessment of each group.

Overall, according to the NCIS (i.e. *Intent – Case Completion* = ‘intentional self-harm’ or value ‘2’) there were 2,312 deaths due to ISH in 2004, compared with 1,896 according to the ABS-sourced UCoD codes in NCIS records, a difference of 417 cases.

The two criteria are in agreement for 1,818 cases (Group A).

Of cases that are ISH according to NCIS *Intent – Case Completion*, 236 (10%) had an ABS-assigned UCoD code indicating some other cause of death (Group C) and a further 258 (11%) had a missing value in the field expected to contain the ABS-assigned UCoD code (Group E).

Of the NCIS cases that had an ABS-sourced UCoD in the ISH range, 96% were also coded as ISH according to NCIS *Intent – Case Completion*. The exceptions were 28 cases with an *Intent – Case Completion* value other than ISH, and 50 without an *Intent – Case Completion* value, 90% of which were open cases.

4 *Intent – Case Completion* is normally blank for deaths not designated as being due to an external cause.

		Intent—Case Completion = ISH			
		+	-	~	Total
ICD-10 Cause of Death code = ISH	+	A 1,818 (1,665 C, 153 O)	B 28 (25 C, 3 O)	F 50 NCIS Intent Missing (5 C, 45 O)	1,896 (1,695 C, 201 O)
	-	C 236 (220 C, 16 O)	D 16,899 (14,776 C, 2,123 O)		17,135 (14,996 C, 139 O)
	~	E 258 ICD-10 Cause of Death Missing (not coded) (243 C, 15 O)			
Total		2,312 (2,128 C, 184 O)	16,927 (14,801 C, 2,126 O)		

Key:
+ coded as 'Intentional self-harm'.
- coded as any cause except 'Intentional self-harm'.
~ missing value.
C = closed NCIS.
O = open NCIS case.
ICD-10 Cause of Death, provided to NCIS by ABS (i.e. UCoD).
'Intentional self-harm' defined as: UCoD X60–X84; NCIS Intent—Case Completion = 2.

Figure 6.1: 'Intentional self-harm' according to Intent—Case Completion code and ICD-10 Cause of Death code, NCIS cases with Year of death = 2004

6.2.3 Assessment of six groups

The groups of cases distinguished in Figure 6.1 are described and assessed here, first in comparison with each other, then separately.

The groups were compared in terms of distribution by sex, age, jurisdiction and NCIS case status (i.e. open or closed).

Overall, nearly two-thirds (64%) of the cases were males, but the proportion of males was three-quarters or higher for the groups that are ISH according to both sources (Group A) and for the other two groups that are ISH according to the NCIS, Groups C and E (Table 6.1). In contrast, Group D, which neither criterion assigned as ISH, had a lower proportion of males (62%).

Table 6.1: Number of cases in each group by gender, Year of death = 2004

Group	Males	Females	Persons	Proportion male (per cent)
Group A (NCIS+/ABS+)	1,450	368	1,818	80
Group B (NCIS-/ABS+)	20	8	28	71
Group C (NCIS+/ABS-)	178	58	236	75
Group D (NCIS-/ABS-)*	10,455	6,419	16,888	62
Group E (NCIS+/ABS~)	198	60	258	77
Group F (NCIS~/ABS+)	40	10	50	80
Total	12,341	6,923	19,278	64

Note: There were 11 cases with missing gender information in Group D, and 14 cases in this group where gender was coded as 'unlikely to be known'. The latter cases have been included in the total count.

Similarly, age distribution was most alike for Groups A, C and E, and Group D differed markedly (Table 6.2).

Table 6.2: Age comparison of each group, Year of death = 2004

Group	Minimum	Maximum	Mean	Std. Dev.
Group A (NCIS+/ABS+)	11	96	44.19	17.68
Group B (NCIS-/ABS+)	14	76	36.11	14.68
Group C (NCIS+/ABS-)	13	92	43.16	17.67
Group D (NCIS-/ABS-)*	0	110	61.71	23.23
Group E (NCIS+/ABS~)	13	96	41.72	17.80
Group F (NCIS~/ABS+)	14	81	46.40	17.12
Total	0	110	59.49	23.37

Note: There were 9 cases with missing age information, 8 in Group D and 1 in Group E.

The distribution of cases by groups across Australian jurisdictions is presented in Table 6.3. For Australia as a whole, cases that are ISH according to the NCIS but not according to the *ICD-10 Cause of Death* code (i.e. Groups C and E; $n = 494$) make up 21% of all cases that are ISH according to NCIS (i.e. Groups A, C and E; $n = 2,312$). This proportion varied considerably between jurisdictions, ranging from 5% in Tasmania to 29% in Queensland, 31% in SA and 43% in the Australian Capital Territory. This indicates large differences between jurisdictions in the extent to which the NCIS-based criterion flagged cases as ISH that had not been flagged by the *ICD-10 Cause of Death* code.

Table 6.3: Case jurisdiction by group, Year of death = 2004

Group	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Total
Group A (NCIS+/ABS+)	493	466	398	139	179	78	45	20	1,818
Group B (NCIS-/ABS+)	9	3	5	1	5	1	3	1	28
Group C (NCIS+/ABS-)	55	27	94	9	39	0	0	12	236
Group D (NCIS-/ABS-)	5,161	3,803	2,181	3,682	1,121	415	257	279	16,899
Group E (NCIS+/ABS-)	48	59	70	54	12	4	8	3	258
Total	5,766	4,358	2,748	3,885	1,356	498	313	315	19,239
C+E as % of A+C+E	17%	16%	29%	31%	22%	5%	15%	43%	21%

The status of the cases reported here is as recorded in the NCIS at the time the extract was made, January 2008 (Table 6.4). Note that 12% of deaths recorded as occurring in 2004 remained open, according to NCIS, in early 2008, between 3 and 4 years after occurrence. This has considerable importance for timely measurement of ISH, particularly if the coroner's finding is required as a part of the case criteria used.

As for sex and age distribution, the proportion of cases that remained open was similar for the three groups of cases flagged as ISH according to the NCIS (A, C and E). The proportion of open cases for Groups B and D was a little higher, whereas that for the small Group F was much higher.

The most remarkable thing about these results is that there are any open cases which have been assigned as ISH according to either of the criteria. It is noteworthy that some open cases have been assigned as ISH according to NCIS *Intent – Case Completion* because, at face value, it appears contradictory for an open case to have an *Intent – Case Completion* value (because a value is normally only assigned to this variable 'on completion'). Similarly, it is noteworthy that some open cases have *ICD-10 Cause of Death* code values meaning ISH because this implies that the case is not complete, and the ABS (2007c) has stated:

To be classified as a suicide a death must be recognised as being due to other than natural causes and established by coronial enquiry that the death results from a deliberate act of the deceased with the intention of taking his or her own life.

Table 6.4: Number of cases in each group by cases status, Year of death = 2004

Group	Closed	Open	Total	Open per cent
Group A (NCIS+/ABS+)	1,665	153	1,818	8
Group B (NCIS-/ABS+)	25	3	28	11
Group C (NCIS+/ABS-)	220	16	236	7
Group D (NCIS-/ABS-)*	14,776	2,123	16,899	13
Group E (NCIS+/ABS-)	243	15	258	6
Group F (NCIS-/ABS+)	5	45	50	90
Total	16,934	2,355	19,289	12
C+E as % of A+C+E	22%	17%	21%	

Open cases were not distributed equally by jurisdiction. Although 30% of NCIS records for deaths in 2004 were from New South Wales, that state accounted for 80% of the cases

that remained open in January 2008, when the extract used for this project was made. Most of the remaining open cases were from Queensland (9%), Western Australia (5%) and Victoria (4%).

Information available for open cases

Closed cases are cases where a coroner's investigation has been completed. Open cases are cases where the coroner's investigation is still under way and a finding has yet to be delivered. Cases may also still be marked 'open' in the NCIS after a coroner has closed a case but before information in the record has been completed and uploaded to the national database. Researchers are generally allowed only limited access to NCIS records with open status. Variables including *Surname*, *Given Name*, *Date of Death* and documentary attachments such as autopsy and police reports are restricted under this arrangement. Open cases have also not undergone quality assurance processes by NCIS staff.

Group A contained 1,665 closed cases and 153 open cases and Group F contained 5 closed cases and 45 open cases.

Open cases in Group A had information present in key fields which would aid in coding intent and mechanism (Table 6.5). In contrast, open cases in Group F were missing information in the key fields of *Case Type*, *Intent*, *Mechanism of Injury* and *Object or Substance Producing Injury*.

Table 6.5: Information in the NCIS on open cases in Groups A and F, deaths occurring in 2004

Variable	Group A open cases (n = 153)	Group F open cases (n = 45)
State/territory	✓	✓
Date of Death	✓	✓
Date of Notification of Death	✓	✓
Gender	✓	✓
Age	✓	✓
Case Type—Notification	✓	✓
Case Type—Completion	✓	✗
Intent—Notification (Presumed)	✓	✗
Intent—Case Completion	✓	✗
Mechanism of Injury	✓	✗
Object or Substance Producing Injury	✓	✗
ICD-10 Cause of Death (ABS-sourced)	✓	✓

Nearly all of the open cases in Group A came from New South Wales (149/153), with the remainder from Western Australia.

Group A: ISH according to ABS-sourced ICD-10 Cause of Death code and NCIS Intent—Case Completion

Cases in Group A were coded as ISH according to NCIS *Intent – Case Completion* and had an *ICD-10 Cause of Death* code from the ABS indicating ISH. There were 1,818 cases in this group.

The proportion of male cases was 80%, higher than any other group except Group F, and the average age was 44 years.

The largest proportion of Group A cases came from New South Wales (27%) closely followed by Victoria (26%) and Queensland (22%). Of the 153 cases in Group A which were open at the time of extraction, the majority ($n = 149$) were from New South Wales.

Nearly all (98%) cases were coded as due to an external cause code at notification and all but two cases had this designation at case completion. Similarly, intent was coded as intentional self-harm for 98% of cases at notification, and for all at completion.

The most common *Primary Mechanism of Injury* was threat to breathing followed by exposure to chemical or other substance.

The great majority of Group A cases were notified in 2004, with 26 notified in 2005. Coroners had closed most of the cases in 2004 ($n = 678$) and 2005 ($n = 847$) with a small number closed in 2006 ($n = 125$) and 2007 ($n = 16$). The average length of time between the date of death and the date of coroner case closure was 248.4 days.

All cases in Group A were searched for indications of misclassification as ISH. No cases were assessed as likely to be misclassified as ISH. Given the high threshold of evidence required to code a death as a suicide, it was reassuring but not surprising to find no evidence of false positive cases in this group.

Group B: ISH according to ABS-sourced ICD-10 Cause of Death code but not according to NCIS Intent—Case Completion

Cases in Group B have a ICD-10 Cause of Death code from the ABS indicating ISH, but were assigned an NCIS Intent – Case Completion value other than ISH. There were 28 cases in this group. All attachments available for these cases via the NCIS web interface were downloaded and reviewed.

The male-to-female ratio was 2.5:1 and the average age was 36 years, the youngest average of all the groups. Only one death in this group occurred at an age less than 18 years.

The distribution of Group B cases by jurisdiction was unremarkable, the largest number ($n = 9$) being from New South Wales.

Most cases were coded at notification as being due to an external cause and all but one had this designation at case completion. With respect to intent, only five were coded as ISH at notification, 14 were coded as unintentional, seven as unlikely to be known and one each as assault and missing. At completion, 16 cases were coded as unintentional, 10 as unlikely to be known and 2 as assault.

The most common *Primary Mechanism of Injury* was exposure to chemical or other substance followed by threat to breathing. The most common primary *Object or Substance Producing Injury* was pharmaceutical substance for human use.

All cases in Group B were notified in 2004; the majority ($n = 17$) were closed by the coroner in 2005. The average length of time between the date of death and the date of coroner closure was 254 days.

Three of the 28 cases in Group B, all from New South Wales, were open at the date when the NCIS extract used in this study was made.

The UCoD codes assigned to cases in Group B are presented in Table 6.6. By definition, intent differs between the NCIS-based and ABS-based assignment of these cases. However, there was agreement on mechanism of injury (e.g. suffocation, poisoning) for most cases.

Detailed assessment of case information, including attachments, showed Group B to be a mixed bag. Some cases had ambiguous or complex intent. Several had scanty information on intent. Two appear to have erroneous *Intent – Case Completion* values.

Our assessment is that cases in this group, while not numerous, are noteworthy because they might be ‘false positive’ ISH cases in the ABS mortality data.

Table 6.6: ABS codes assigned in Group B cases, deaths registered in 2004

ABS code	Description	Number
X61	Intentional self-poisoning by and exposure to antiepileptic, sedative-hypnotic, antiparkinsonism and psychotropic drugs, not elsewhere classified	5
X64	Intentional self-poisoning by and exposure to other and unspecified drugs, medicaments and biological substances	4
X67	Intentional self-poisoning by and exposure to other gases and vapours	1
X70	Intentional self-harm by hanging, strangulation and suffocation	11
X71	Intentional self-harm by drowning and submersion	3
X74	Intentional self-harm by other and unspecified firearm discharge	1
X78	Intentional self-harm by sharp object	1
X80	Intentional self-harm by jumping from a high place	1
X82	Intentional self-harm by crashing of motor vehicle	1
Total		28

The fact that the two sources generally agreed on mechanism is evidence against simple errors in coding such as typographical errors. Five of these cases were flagged on notification to the NCIS as being ISH. This suggests that there were some grounds for assigning them to ISH, and raises the possibility that ABS assignment took this initial assessment in the NCIS into account, but not the assessment on completion. Perhaps the timing of case closure in relation to ABS deadlines contributed to this.

Group C: ISH according to NCIS *Intent—Case Completion*, but not according to ABS-sourced *ICD-10 Cause of Death* codes

Cases in Group C were coded as ISH by NCIS and had a *ICD-10 Cause of Death* code from the ABS which was not in the range for ISH. There were 236 cases in this group.

The male-to-female ratio was 3.1:1 and the average age was 43 years, including six aged under 18 years.

In contrast to Groups A and B, Group C cases came predominantly from Queensland (40%).

All of the 16 open cases in this group were from New South Wales.

All but four cases had been designated at notification as due to external causes, as were all but one case at completion. Similarly, all but four cases in this group were coded as ISH according to the variable *Intent – Notification (Presumed)*. By definition, all have *Intent – Case Completion* = ‘intentional self-harm’.

The most common *Primary Mechanism of Injury* was threat to breathing followed by exposure to chemical or other substance, and the most common *Primary Object or Substance Producing Injury* was other object/substance followed by pharmaceutical substance for human use.

All but 13 cases in Group C were notified in 2004, the remainder being notified in 2005. The majority of cases were closed by the coroner at least one year after the date of notification with at least a third being closed two or more years after notification. The average length of time between the date of death and the date of coroner closure was 424 days, the longest of any group.

A recent report suggests that Queensland coroners do not make explicit statements of suicidal intent in their findings (Walker et al. 2008):

In Queensland the State Coroner has indicated that if the death is believed to be accidental or undetermined, this will be specifically documented. In cases where there is no such documentation, coders have been advised that it may be assumed that the death is intentional.

This could contribute to the relatively large number of Group C cases that are from Queensland (94/236; 40%). Findings documents are not provided in NCIS for Queensland cases, so we were not able to check this.

Table 6.7 lists the ABS-assigned UCoD codes for Group C cases by ICD-10 category. Most of the cases were assigned ICD-10 codes from the 'Unintentional' section of the External Causes chapter of ICD-10 (Chapter XX), generally agreeing with NCIS codes on the *Mechanism of Injury*. Eight cases were assigned codes from the 'Assault' section of Chapter XX.

Of the cases in Group C, 7% have ICD-10 codes from the 'Undetermined intent' range. This is not surprising, since this range is mostly used for cases thought likely to be due to ISH or assault, but where the person making the assignment feels that the evidence is not sufficient to make this assignment.

Seventeen per cent of the cases were assigned ICD-10 codes that are applicable when the coder has little or no information about the cause of a death, not even sufficient to decide that the death was due to an external cause (R98, R99). The use of these codes suggests that the ABS coder had access to no information about the cause of these cases at the relevant time, although dates in the NCIS records do not indicate that records in this group were closed particularly slowly.

The nine remaining cases in Group C were assigned UCoD codes for conditions codable to other chapters of the ICD-10.

Forty per cent of Group C cases occurred in Queensland and another 24% in New South Wales (Table 6.8). The distribution of ICD-10 codes for Group C cases differs greatly between jurisdictions. Most of the Group C cases in New South Wales, Victoria and Queensland had non-ISH ICD-10 codes from the External Causes chapter.

Of the non-injury related deaths, 41 were coded to R98 *Unattended death* ($n = 7$) or R99 *Other ill-defined and unspecified causes of mortality* ($n = 34$). Those from the Australian Capital Territory were all residual codes (R99; $n = 12$), and those from Western Australia were a mixture of types. This suggests that the extent and nature of the information available to ABS coders at relevant times differed between jurisdictions.

Table 6.7: ISH according to NCIS and other cause according to ICD-10 Cause of Death, deaths in 2004

ABS ICD-10 coding	Number
Impaired glucose regulation and diabetes mellitus (E09–E14)	
E10.1 Type 1 diabetes mellitus	1
Mental and behavioural disorders due to psychoactive substance use (F10–F19)	
F19.1 Mental and behavioural disorders due to multiple drug use and use of other psychoactive substances (harmful use)	1
F19.2 Mental and behavioural disorders due to multiple drug use and use of other psychoactive substances (dependence syndrome)	1
Other disorders of the nervous system (G90–G99)	
G93.9 Disorder of brain unspecified	1
Ischaemic heart diseases (I20–I25)	
I25.1 Atherosclerotic heart disease	1
Symptoms and signs involving the circulatory and respiratory systems (R00–R09)	
R09.0 Asphyxia	4
Ill-defined and unknown causes of mortality (R95–R99)	
R98 Unattended death	7
R99 Other ill-defined and unspecified causes of mortality	34
Transport accidents (V01–V99)	
V01–V09 Pedestrian injured in transport accident	7
V40–V49 Car occupant injured in transport accident	4
Other external causes of accidental injury (W00–X59)	
W00–W19 Falls	11
W20–W49 Exposure to inanimate mechanical forces	13
W65–W74 Accidental drowning and submersion	4
W75–W84 Other accidental threats to breathing	81
W85–W99 Exposure to electric current, radiation and extreme ambient air temperature and pressure	1
X40–X49 Accidental poisoning by and exposure to noxious substances	35
X58–X59 Accidental exposure to other and unspecified factors	5
Assault (X85–Y09)	8
Event of undetermined intent Y10–Y34	17
Total	236

Table 6.8: Group C cases, ICD-10 Cause of Death by selected ICD-10 codes by jurisdiction, deaths registered in 2004

<i>ICD-10 Cause of Death</i>	NSW	Vic	Qld	SA	WA	ACT
Accidental	41	22	78	5	15	0
Assault	4	1	2	0	1	0
Undetermined	2	2	0	3	10	0
Not injury	8	2	14	1	13	12
Total	55	27	94	9	39	12

Note: There were no cases from Tasmania or the Northern Territory.

According to the ABS, use of codes from the undetermined event block Y10–Y34, X59 *Exposure to unspecified factor*, and R99 *Other ill-defined and unspecified causes of mortality* are confined to cases where information on intent and/or mechanism are unavailable or insufficient (ABS 2007b). According to the ABS, cases with information on mechanism but not intent must be coded to the accidental code block unless the coroner specifically states that the intent of the person was undetermined or the coroner returns an open finding. Cases with no information on mechanism or intent can be coded to X59, and if no information is available on external cause, intent or mechanism, then R99 (or R98) should be used.

In all but two cases in Group C, information on *Mechanism of Injury* was present at the time of extract.

Group D: ISH according to neither ABS-sourced ICD-10 Cause of Death code nor NCIS Intent—Case Completion

Cases in Group D included deaths in 2004 which were not recorded as ISH according to either NCIS *Intent – Case Completion* or ICD-10 *Cause of Death* codes. This group is of interest because of the possibility of false negative cases.

More than two-thirds of these deaths were coded as being due to natural causes (71% on notification and 69% on completion). Most of the rest were coded as due to external causes (23% at both notification and completion). A small number of these cases ($n = 14$) had been coded as ISH at notification.

Analysis of Group D cases was undertaken in order to establish the frequency of false negative cases, if any. Attention focused on Group D cases where *Intent – Notification (Presumed)* indicated intentional self-harm, or one of the following codes was present: W76, Y20, X47, X49, W34, X59, or R99.

These criteria led to the selection of 630 cases for review. All cases in this group which had ICD-10 codes indicating hanging or shooting ($n = 19$) as well as 12 cases which had *Intent – Notification (Presumed)* as ISH were examined in detail. A random sample was selected from the remaining cases for closer examination. Close scrutiny was restricted to closed cases, because of the limited information available for open cases.

The analysis of these cases revealed no definite false negatives. For cases with a finding present, the coroner’s remarks were examined closely. In all cases the coronial findings indicated either an accidental death or a clear finding of undetermined intent.

Group E: ISH according to NCIS *Intent—Case Completion* and missing value for ABS-sourced ICD-10 Cause of Death code

Cases in Group E have NCIS *Intent – Case Completion* = ‘intentional self-harm’ and a missing ABS-sourced ICD-10 *Cause of Death* code. There were 258 cases in Group E.

The proportion of males (77%) and the average age (42.7 years) were both similar to Group A, though slightly lower.

More cases in this group were from Queensland than any other jurisdiction ($n = 70/238$; 27%). All but one of the 15 open cases originated in New South Wales, and the others came from Queensland.

All but two were coded on notification as being due to an external cause, as were all on completion.

The most common *Primary Mechanism of Injury* was threat to breathing followed by exposure to chemical or other substance, and the most common *Primary Object or Substance Producing Injury* was other object/substance followed by other non-pharmaceutical chemical substance.

The majority of cases were notified in 2004, 2 were notified in 2003 and 30 were notified in 2005. A similar distribution was seen in the year in which the coroner closed the cases. The average length of time between the date of death and the date of coroner closure was 260 days.

This group was generally similar to Group A, apart from having missing values for ICD-10 *Cause of Death*. This issue is investigated further in Section 6.4.

Group F: ISH according to ABS-sourced ICD-10 Cause of Death code and missing value for NCIS *Intent—Case Completion*

Group F consists of cases with no NCIS *Intent – Case Completion* value (90% of cases in the group were still open) and an ICD-10 *Cause of Death* code indicating ISH (X60–X84). There were 50 such cases, of which only 5 were closed at the time of extraction. The cases are predominantly from New South Wales ($n = 44$) with 5 from Western Australia and 1 from Queensland.

Only 3 open cases out of 45 had information on mechanism present in the NCIS, 2 recording threat to breathing and 1 exposure to chemical or other substance. No information was available on intent at notification or completion for open cases. Males constituted 80% of cases in the group, and the average age was 46.4 years. In one case the person was younger than 18 years of age.

Cause of death information was present in the NCIS for all but 9 cases. The ICD-10 underlying cause of death codes covered the spectrum of ISH-related causes, including hangings, poisonings (pharmaceutical, illegal drugs, carbon monoxide) and gunshot wounds, more than half of the cases being assigned to X70 and X67 (Table 6.9).

Table 6.9: ICD-10 assigned codes for Group F cases, deaths during in 2004

ICD-10	Descriptions	Number of cases
X61	Intentional self-poisoning by and exposure to antiepileptic, sedative-hypnotic, antiparkinsonism and psychotropic drugs, not elsewhere classified	2
X62	Intentional self-poisoning by and exposure to narcotics and psychodysleptics [hallucinogens], not elsewhere classified	2
X64	Intentional self-poisoning by and exposure to other and unspecified drugs, medicaments and biological substances	3
X67	Intentional self-poisoning by and exposure to other gases and vapours	14
X70	Intentional self-harm by hanging, strangulation and suffocation	17
X71	Intentional self-harm by drowning and submersion	3
X73	Intentional self-harm by rifle, shotgun and larger firearm discharge	1
X74	Intentional self-harm by other and unspecified firearm discharge	4
X78	Intentional self-harm by sharp object	2
X80	Intentional self-harm by jumping from a high place	1
X81	Intentional self-harm by jumping or lying before moving object	1
Total		50

6.2.4 Summary of analysis of groups

The main findings of this review of cases according to agreement on two criteria for ISH were as follows.

NCIS *Intent – Case Completion* and ABS-sourced UCoD were generally in agreement as to whether (Group A) or not (Group D) a death was due to ISH.

In two of the other groups examined (C and E), NCIS *Intent – Case Completion* indicated ISH.

Group C comprises cases where the NCIS indicated the death was ISH but the ABS-sourced UCoD is not in the ICD-10 range for ISH. This group is important, because it includes most of the cases for which there is disagreement as to whether the death is due to ISH. Group C cases came predominantly from Queensland (40%) and had the longest average time between date of death and the coroner closure date (424 days). At the time of extraction, all but 13 of the 236 cases were closed, but cases in Group C were more likely to be closed by the coroner in the 2 years after notification with at least a third of the cases taking at least 2 years to close. Coding by ABS officers may have been complicated by this, with possible further factors being the scantiness of information in NCIS records of open cases from Queensland, and possible avoidance of clear mention of suicide in findings (Walker et al. 2008).

Group E contains the cases that are ISH according to *Intent – Case Completion*, but which have a missing ABS-sourced UCoD code. This group is important for this project, but probably less so more generally. Cases with missing UCoD are considered in Section 6.4.

Although few in number, Group B cases are also of interest because the ABS ICD-10 codes indicate ISH but other variables in the NCIS suggest that most of these deaths were not due to ISH, or that intent was doubtful.

6.3 Comparison of ISH deaths according to NCIS data and ABS mortality data

This section presents comparisons of case counts of ISH deaths in Australia in 2004 using two sources, the NCIS and the ABS mortality data file. The method for the work presented in this section is given in Section 5.2.4.

An important reason for this comparison is to resolve a question raised by the Group E cases described above. The comparison also provides an initial basis for understanding differences between estimates from the two sources.

Group E ($n = 258$) contains cases that are ISH according to *Intent – Case Completion*, but which lack a *ICD-10 Cause of Death* code. The question for this project is whether the cases in Group E lack a *ICD-10 Cause of Death* code because they are missing from the ABS mortality data file, or because matching of NCIS cases with that file is incomplete. The results presented in this section and in Section 6.4 are intended to provide an answer.

A direct approach to answering this question would be to link records from the ABS mortality data file and from the NCIS for this project. Because we did not seek permission to do this, we took the indirect approach of comparing logically similar tables of aggregate data.

6.3.1 Use of logically equivalent criteria to identify ISH cases in the ABS mortality data and the NCIS extract

Intentional self-harm cases identifiable in the ABS mortality data have an UCoD code in the ICD-10 range X60–X84. The code for sequelae (late effects) of ISH (Y87.0) is often also included, and that is done here, though for deaths in 2004 this added only one case to the records obtained from the ABS data. The same code ranges can be used to select cases from the NCIS, provided the cases do not have a missing value for *ICD-10 Cause of Death*.

ABS publications usually report ISH deaths in terms of year of registration. For example, the ABS reported 2,098 ISH deaths as having been registered in 2004 (ABS 2006b).

The NCIS data collection does not include year of death registration, so we cannot use it to make a comparison with the published counts of registered cases. However, both the NCIS and the ABS mortality data file include *Date of Death*, and the comparisons presented here are for deaths that occurred in 2004. The number of deaths in the ABS mortality data file with *Year of death* = 2004 and *ICD-10 Cause of Death* = ISH is 2,110⁵ (Table 6.10, column 1).

5 This is based on registration year files up to and including 2005. The values shown in the table include 20 ISH cases recorded in the ABS mortality file as being certified by a medical practitioner (Victoria $n = 12$, NSW $n = 7$, WA $n = 1$). The number of ISH deaths registered in 2004 was 2,098.

Table 6.10: ISH deaths according to the ABS mortality data file and ABS-coded data in NCIS, deaths occurring in 2004

State	1. ISH cases in the ABS mortality data file	2. ABS-coded ISH cases in NCIS (Groups A+B+F)	3. Difference: Col 1–Col 2 (%)	4. Group E Intent–Case Completion = ISH and no ICD-10 Cause of Death	5. Col 2 + Col 4	6. Difference: Col 1–Col 5 (%)
NSW	583	546	37 (6%)	48	594	–11 (–2%)
Vic	525	469	56 (11%)	59	528	–3 (–1%)
Qld	450	404	46 (10%)	70	474	–24 (–5%)
SA	180	140	40 (22%)	54	194	–14 (–8%)
WA	198	189	9 (5%)	12	201	–3 (–2%)
Tas	83	79	4 (5%)	4	83	0 (0%)
NT	57	48	9 (16%)	8	56	1 (2%)
ACT	34	21	13 (38%)	3	24	10 (29%)
Total	2,110	1,896	214 (10%)	258	2,154	–44 (–2%)

The number of deaths in the NCIS with *Year of death* = 2004 and an ABS-sourced *ICD-10 Cause of Death* for ISH (i.e. groups A+B+F) totals 1,896 (Column 2). This is smaller by 214 deaths (10%) than the count of ISH deaths in 2004 based on the ABS mortality data file (Column 1).

Group E (shown in Column 4) is the set of 258 deaths in 2004 coded as ISH in the NCIS, but with a missing value for the ABS-sourced *ICD-10 Cause of Death* code. If these NCIS cases are assumed not to have equivalents in the ABS mortality data file (i.e. are missing cases), then we would expect to find the same or similar values in Column 1 and Column 2, and the larger counts seen in the ABS mortality data file (Column 3) would require explanation. An alternative, and more likely, possibility is that the cases in Group E are present in the ABS mortality data file and were coded as ISH (i.e. they are included in the values in Column 1) but, for some reason, the UCoD codes for these cases were not put into the equivalent NCIS records. In this case, we would expect that Group E would account for the differences shown in Column 2. As shown (Column 5), the addition of Group E accounts for a little more than that difference overall and in all states except Tasmania (see below concerning the comparison for the Australian Capital Territory).

As shown below, there are reasons to expect that some of the Group E cases will not have been coded as ISH in the ABS mortality data file, which would further reduce the remaining unexplained difference (Column 6). Further investigation of Group E is described in Section 6.4.

The values for the Australian Capital Territory in Table 6.10 stand out as having much larger differences than any other jurisdiction between counts of ISH deaths from the ABS mortality data file and those based on ABS-sourced *ICD-10 Cause of Death* codes in NCIS. This is so with or without the assumption that Group E cases should be included when making this comparison. These large differences and other findings have led us to think that for at least some ACT cases, the ABS-sourced *ICD-10 Cause of Death* code in NCIS is not the same as the UCoD code in the mortality data file. As shown in the section on Group C above, *ICD-10 Cause of Death* code R99 is surprisingly frequent among ACT cases in the NCIS that are ISH according to *Intent – Case Completion*. If in fact the 12 ACT ISH cases with *ICD-10 Cause of Death* = R99 in NCIS have UCoD codes in the ABS mortality data file that are in the ISH

range (i.e. X60–X84), then the values for the Australian Capital Territory would be similar to those for other jurisdictions.

Not shown in Table 6.11 are the cases that are due to ISH according to NCIS *Intent – Case Completion* and which were assigned to another cause according to the ABS-sourced *ICD-10 Cause of Death* in NCIS (i.e. Group C, $n = 236$). If the NCIS coding is correct, then these deaths can be regarded as ‘hidden’ or misclassified ISH deaths in the ABS mortality data file.

Deaths coded to ISH in the ABS mortality data file are compared with NCIS cases with *Intent – Case Completion = ISH* in Table 6.11. As in the previous table, Column 1 provides jurisdiction-specific counts of relevant cases in the ABS mortality data file. Column 2 shows the total numbers of cases in NCIS with *Intent – Case Completion = ISH* (i.e. the sum of Groups A, C and E). The NCIS-based values are higher than those in Column 1 for all jurisdictions, though the difference varies substantially (Column 3).

Cases in Group F (Column 4) should be represented in Column 1 (because they have UCoD values in the ISH range) but they are not included in Column 2 (because NCIS *Intent – Case Completion* was not available for these cases, most of which were still open when the data extract was made for this study). If these cases are due to ISH then they should be assigned *Intent – Case Completion = ISH* at some time in the future. The final two columns in Table 6.11 show the enlargement of the difference between ISH estimates based on the ABS mortality data file and on NCIS that occurs if this assumption is made.

Table 6.11: ISH deaths according to the ABS mortality data file and NCIS *Intent – Case Completion*, deaths occurring in 2004

State	1. ISH cases in the ABS mortality data file	2. ISH cases according to NCIS (Groups A+C+E)	3. Difference: Col 1–Col 2 (%)	4. Group F	5. Col 2 + Col 4	6. Difference: Col 1–Col 5 (%)
NSW	583	596	-13 (-2%)	44	640	-57 (-10%)
Vic	525	552	-27 (-5%)	0	552	-27 (-5%)
Qld	450	562	-112 (-25%)	1	563	-113 (-25%)
SA	180	202	-22 (-12%)	0	202	-22 (-12%)
WA	198	230	-32 (-16%)	5	235	-37 (-19%)
Tas	83	82	1 (1%)	0	82	1 (1%)
NT	57	53	4 (7%)	0	53	4 (7%)
ACT	34	35	-1 (-3%)	0	35	-1 (-3%)
Total	2110	2,312	-202 (-10%)	50	2,362	-252 (-12%)

In summary, this aggregate comparison of estimates of ISH from ABS mortality data and from the NCIS suggests that:

- Group E cases are more likely to represent incomplete matching of ABS and NCIS records than to be cases that are missing from the ABS mortality data file.
- ISH according to *Intent – Case Completion* in NCIS cases is at least 10% more numerous than ISH according to ABS mortality data for deaths that occurred in 2004.

6.4 NCIS records without Underlying Cause of Death codes

The methods for this section are described in Section 5.2.6.

The NCIS cases with missing values of *ICD-10 Cause of Death* were an important constraint on analysis. Our examination of these cases in the NCIS showed that they included a substantial number of deaths due to ISH (Group E; $n = 258$ in 2004).

If, as we think likely, all or most of these cases are also coded as ISH in the ABS mortality data file, then simple direct comparisons between ISH according to the ABS mortality data file and ISH according to the ABS-originated cause data in the NCIS are valid, provided that Group E cases are taken into account (see Section 6.3).

This section examines the question: Are NCIS cases with missing UCoD similar to the rest? If NCIS cases missing an UCoD code are a random subset of all NCIS records, then it would be safe to analyse the cases with UCoD and extrapolate the findings to all NCIS cases. However, there was no *a priori* reason to expect this.

Absence of an UCoD code is expected for many NCIS records. When the NCIS data extract that was used for most of this project was made (early January 2008), the ABS had not yet supplied UCoD data to the NCIS for deaths registered after the end of 2005. Hence, as expected, all deaths with *Year of death* 2006 have missing UCoD in the data extract.

The focus of this section is deaths that occurred in 2004. Based on analysis of ABS mortality data, it is likely that all but a small proportion of these deaths had been registered by the end of 2005. Since the ABS had supplied data to the NCIS, including UCoD, for deaths registered in 2004 and 2005 before our extract was made, we expected to find UCoD values in the NCIS for almost all deaths that occurred in 2004. In fact, UCoD was missing from about 13% of these cases.

We found that NCIS cases with and without UCoD codes differ in terms of several characteristics (Table 6.12). Some of these differences are the same for cases identified as ISH and some are not (Table 6.13).

6.4.1 Open cases

Overall, 13.6% of NCIS cases of deaths in 2004 were recorded as having open status at the date on which the extract was made (January 2008) (Table 6.12). Open NCIS cases from Queensland were unlikely to have an UCoD code: only 5 of 243 did so. Open cases from other jurisdictions (except New South Wales) were more likely to have an UCoD code (189 of 283, 33%, did so). Open cases without an UCoD code were frequent among New South Wales cases ($n = 291$), but make up a relatively small proportion of all New South Wales open cases (13%). Open cases, mostly from Queensland, account for the cases with unassigned month of death.

Table 6.12: Selected variables in NCIS by whether an UCoD code is present in the record, deaths occurring in 2004

Variable	Descriptor	Is an UCoD code in the record?			Missing UCoD (per cent)
		Yes	No	Total	
NCIS case status at January 2008	Closed	14,985	1,942	16,927	11
	Open	2,033	633	2,666	24
Case state	NSW	5,196	627	5,823	11
	Vic	3,838	520	4,358	12
	Qld	2,342	644	2,986	22
	SA	3,385	528	3,913	13
	WA	1,250	140	1,390	10
	Tas	463	31	494	6
	NT	263	50	313	16
	ACT	281	35	316	11
Month of death	<i>Date of Death</i> not assigned (some open cases)	45	290	335	87
	December	729	781	1,510	52
	Other months	16,244	1,504	17,748	8
NCIS record creation date compared with ABS publication date	During calendar year of death	16,002	1,893	17,895	11
	Later, but 90 days or longer before publication	1,006	651	1,657	39
	Up to 90 days before publication	4	5	9	56
	Up to 1 year after publication	6	18	24	75
	More than 1 year after publication	0	8	8	100
Date case was closed by coroner compared with ABS publication date	Not assigned	20	1	21	5
	90 days or more before	13,483	1,458	14,941	10
	Up to 90 days before	569	154	723	21
	Up to 1 year after	771	240	1011	24
	More than 1 year after	142	89	231	39
	Still open at Jan 2008	2,033	633	2,666	24

Open case status was not strongly associated with missing UCoD code for ISH cases (Table 6.13). This might be because open cases lacking an UCoD code tend also to lack other data required for a case to be assigned as ISH.

Table 6.13: Selected variables in NCIS by whether an UCoD code is present in the record, deaths occurring in 2004 for which *Intent – Case Completion = ISH*

Variable	Descriptor	Is an UCoD code in the record?			Missing UCoD (per cent)
		Yes	No	Total	
NCIS case status at January 2008	Closed	1,880	244	2,124	11
	Open	169	15	184	8
Case state	NSW	547	48	595	8
	Vic	493	59	552	11
	Qld	492	70	562	12
	SA	148	55	203	27
	WA	215	12	227	5
	Tas	77	4	81	5
	NT	45	8	53	15
	ACT	32	3	35	9
Month of death	<i>Date of Death</i> not recorded	0	0	0	
	December	82	81	163	50
	Other months	1,967	178	2,145	8
NCIS record creation date compared with ABS publication date	During calendar year of death	1,851	191	2,042	9
	Later, but 90 days or longer before publication	198	67	265	25
	Up to 90 days before publication	0	1	1	100
	Up to 1 year after publication	0	0	0	
	More than 1 year after publication	0	0	0	
Date case was closed by coroner compared with ABS publication date	Not assigned	4	1	5	20
	90 days or more before	1,627	179	1,806	10
	Up to 90 days before	102	31	133	23
	Up to 1 year after	127	27	154	18
	More than 1 year after	20	6	26	23
	Still open at Jan 2008	169	15	184	8

6.4.2 Month of death

Month of death is a strong predictor of missing UCoD codes. Overall, deaths occurring during December were much more likely (52%) to have a missing UCoD code than deaths occurring in other months (8%). This excess for December deaths accounted for more than a quarter of NCIS records with missing UCoD codes where *Year of death* is 2004.

The excess of December deaths was similar for all cases and for ISH cases.

The pattern of missing UCoD code by month of death was similar for deaths in 2004 and in 2005.

6.4.3 Timing of NCIS record creation

NCIS records contain a variable that is described as holding the date on which the record was created. The value of this date is usually soon after the recorded date on which the death was reported to the coroner, but sometimes the date is much later.

This date has been subtracted from the publication date of *Causes of death, Australia, 2004* (ABS 2006a) for deaths registered in 2004. The difference provides an indication of whether the NCIS record is likely to have existed soon enough to have been available for use by the ABS officers responsible for coding the deaths (see Section 5.2.5).

In 91% of cases, the NCIS record was created during the calendar year in which death occurred, and 11% of these have a missing UCoD code. The proportion with a missing UCoD code is much higher for cases created later than that – 39% for records created earlier than 3 months before publication, and higher for the few cases created later than that.

6.4.4 Timing of NCIS case closure by coroner

Similarly, NCIS records contain a variable for the date on which the coroner closed the case. Cases closed by 3 months before publication include 10% that have no UCoD code. Cases closed later than that include 21% to 39% without an UCoD code.

6.4.5 Jurisdiction

The proportion of cases with missing UCoD code varied by jurisdiction, the highest in the all-cases Table 6.12 being for Queensland (22%) and for South Australia (27%) in the ISH cases Table 6.13.

In summary, cases with a missing UCoD code are not a random subset of all NCIS cases with a given year of death. They are cases that were probably handled late in the process leading to production of the 2004 causes of death report and data file. However, we did not find a simple explanation, or predictive property.

Although we considered handling this set of cases by multivariate adjustment, the complex nature of the set prompted us to deal with them mainly by stratification.

As stated elsewhere in this report, this problem could be overcome by undertaking record linkage as part of the project. An alternative that would have some weaknesses, but would be much better than the situation confronting this project, would be for the NCIS and ABS to ensure that the UCoD code that appears in the ABS unit record file is made available to the NCIS for every NCIS record that has a counterpart in a released ABS causes of death file.

7 Findings: explaining differences and improving estimates

7.1 Introduction and overview

The previous chapter described the findings of investigations of the NCIS data extract used for this project. In overview, these investigations revealed that:

- Simple comparison of cases identified as ISH on the basis of (i) ABS UCoD codes in NCIS records and (ii) the NCIS *Intent – Case Completion* variable revealed agreement in most cases, but disagreement in an important minority of cases.
- Disagreement was of two main types: (i) cases recorded as ISH according to NCIS and as some other cause of death according to ABS-sourced *ICD-10 Cause of Death* codes in NCIS (Group C: NCIS+/ABS-); and (ii) cases recorded as ISH according to NCIS and with a blank in the field expected to contain the ABS-sourced *ICD-10 Cause of Death* codes (Group E: NCIS+/ABS~). Small numbers of cases show other types of disagreement.
- Cases with both main types of disagreement have characteristics similar to cases agreed by both sources to be ISH (for example, age, proportion males, most frequent mechanisms).
- UCoD codes in the records with the first main type of disagreement are largely as expected for cases in which information on intent was lacking when ABS coders assessed the records.
- The cases with the second main type of disagreement could lack an UCoD code because of incomplete matching by the ABS and NCIS, or because they are not present in the ABS mortality data file. Analysis presented in Sections 6.3 and 6.4 favours the first of these explanations. We found that these cases are not randomly distributed, being most common among cases with date of death in December, records created and cases closed late in relation to ABS mortality data production, and records with scanty data. These findings suggest an explanation related to case processing.
- Despite the long period between death and the date of our NCIS data extract (3–4 years for deaths in 2004) a considerable proportion of cases remained open in the NCIS. Although some of these were assigned ISH according to one or both of the sources (itself a noteworthy finding), others were not. More generally, there is potential for other open cases, not flagged as ISH according to either of these criteria, to be due to ISH. Despite being open, there might be sufficient information in NCIS records available to us to identify them, though perhaps with less certainty than other ISH cases.

The initial investigations confirm the presence of under-enumeration of ISH deaths in ABS mortality data, but do not explain them or offer solutions. That is the purpose of the further investigations presented in this chapter.

In outline, the investigations presented in this chapter are:

- Assignment of ISH using all data available to us in NCIS records (Section 7.2). Two methods for doing this were investigated: (i) semi-automated assignment, based on a series of methods using all available information; and (ii) manual recoding of ISH based on NCIS records. We report a feasibility study of this approach.
- An investigation of factors that contribute to misclassification. These included timing of stages in coroner and NCIS processes and ABS publication, as predictors of NCIS processes being incomplete at a critical stage; differences in information available in NCIS records, especially between jurisdictions and between closed and open NCIS records (Section 7.3).
- Comparisons of ISH counts based on the assignment mentioned above with estimates from ABS mortality data files for the same period. This step was hindered by the 13% of NCIS records lacking UCoD values, so the comparisons must be regarded as approximate. Nevertheless, they provide an improved basis for interpreting the ABS-sourced data (Section 7.4).
- Production of revised estimates of ISH, based on this work.

7.2 Assignment of ISH status using all information in the NCIS

This section presents the results of two approaches to identifying ISH using data available in the NCIS.

The first is based on the presence of codes and certain text strings in the NCIS system, and uses computer code to assign cases on this basis, supplemented by some manual checking.

The second is a feasibility study of a manual process, in which cases were reviewed one by one, and coded according to explicit coding criteria.

7.2.1 Staged case identification

Identifying ISH among cases in the NCIS

In Chapter 6 we used one NCIS data item, *Intent – Case Completion*, to decide which cases would be regarded as ISH. The value of *Intent – Case Completion* meaning ‘ISH’ can be regarded as having similar meaning to the presence of an ‘UCoD’ ICD-10 code in the ISH range. In both instances, the code means ‘intentional self-harm’. Assignment of the ICD-10 codes in this range is commonly limited to circumstances in which a coroner or analogous public official has assessed the case and come to that conclusion. The presence of *Intent – Case Completion* = ‘Intentional self-harm’ means much the same thing: by definition, the cause of these deaths has been decided by a coroner.

However, *Intent – Case Completion* is not the only data item in the NCIS that can provide useful information to guide a decision about whether a death should be regarded as being due to ISH.

Other relevant items include the cause of death text strings, activity codes (value 98.1 means ‘self-inflicted harm’), other text in the extract file and the documents that are attached to many NCIS records after they are closed.

Use of these additional items is essential if assignment of deaths as being due to ISH is to be made for NCIS records that have a missing value for *Intent – Case Completion*, which is the usual situation for open NCIS records.

The method is described in Section 5.2.7. Cases were flagged as ISH if they met any of the following criteria:

1. if NCIS *Intent – Case Completion* = ‘intentional self-harm’ (value = 2),
2. if the case is not already assigned to ISH or to another external cause group, and if the case status is open and NCIS secondary *Incident Activity Details level 2* = 98.1 (self-inflicted harm)⁶ or NCIS *Intent – Notification (Presumed)* = ‘intentional self-harm’ (value = 2),
3. if the case is not already assigned to ISH or to another major external cause group, and the NCIS *Cause of death* text fields contain the string ‘suicid’ and manual checking confirmed its relevance,
4. case review of records likely to have dissimilar assignment as ISH (i.e. those in Groups B, C, E and F in Table 5.1), and
5. if the case is not already assigned to ISH or another major external cause group, and the case status is open and ABS-originated UCoD code = X60–X84.

This process assigned 2,458 deaths with *Year of death* = 2004 as being due to ISH. Case flows by processing stage are shown in Table 7.1. Flows after the first stage were small, and the whole process added only about 6% to the initial count. The largest addition occurred at stage 2, where 139 open cases were assigned on the basis of the presence of a special *Incident Activity Details* code meaning self-inflicted harm and/or *Intent – Notification (Presumed)* = ‘intentional self-harm’. Both of these values correlate strongly with eventual assignment as *Intent – Case Completion* = ‘intentional self-harm’.

Table 7.1: Assignment as ISH of NCIS records by stage of processing, deaths in 2004, Australia

	Added	Removed	Net change	Cumulative count
Stage 1	2,308			2,308
Stage 2	139	0	139	2,447
Stage 3	0	0	0	2,447
Stage 4	6	5	1	2,448
Stage 5	10	0	10	2,458

The results of this process differ from those presented in Section 6.2 as follows. The use of an improved *Year of death* variable for this part of the work (method described in Section 5.2.5) resulted in the omission of four deaths from Group A and one from Group C, and the addition of one each to Groups E and F, and 307 to Group D. This changes the estimate based on *Intent – Case Completion* = ISH from 2,312 to 2,308.

⁶ According to the NCIS Data Dictionary, *Incident Activity Details* Level 2 code 98.1 means self-inflicted harm. This code is highly sensitive and specific for *Intent – Case Completion* = Intentional self-harm (> 98% for each).

The staged assignment process added 150 ISH cases to the 2,308 based on *Intent – Case Completion* alone. In terms of the group designations, 8 of the 150 came from Group B, 47 from Group F and 95 from Group D.

Records of deaths in 2004 that were flagged as ISH by the five stages of this process are shown in Table 7.2 according to the value of the UCoD code in the NCIS record.

The findings are similar to those reported in Chapter 6, although the estimated number of ISH cases is a little larger, reflecting the use here of additional information in NCIS records as the basis for assignment. As before, the largest addition to the UCoD-based estimate of ISH is a group of 206 cases with UCoD code values in the range meaning *Unintentional injury*. The largest group of cases in this set had been assigned UCoD values meaning death due to unintentional hanging and asphyxia (W75-W84). The pattern of ICD-10 codes seen for the cases identified as ISH that were not assigned an UCoD code for ISH is consistent with expectations (Walker et al. 2008). That is, the great majority of the additional ISH cases had been assigned ICD-10 codes in the ranges to which ISH cases are likely to be coded in the absence of sufficient information on intent (i.e. Unintentional injury range, or X59), or in the absence of information on the intent or mechanism of death (i.e. R98 or R99).

The large group of cases with a missing value of UCoD ($n = 288$) is due to incomplete matching of ABS and NCIS data (see Section 6.4).

Table 7.2: NCIS records of deaths in 2004 by ISH assignment and ABS-originated UCoD codes, Australia

NCIS-based assignment (Year of death 2004)			
UCoD	ISH	Other	Total ISH
External causes			
Suicide (ISH)	1,869	24	1,893
Undetermined intent	24	53	
Homicide	9	111	
Complications	0	65	
Unintentional	206	3,045	
X59	10	266	
Other ICD-10 codes			
R99	35	263	
R98	8	213	
A00–R97	9	10,808	
Missing UCoD	288	2,291	
Total	2,458	17,139	

Extensive checking was undertaken in the course of developing and refining this assignment process. Cases in which both UCoD-based assignment and the initial NCIS-based assignment (i.e. *Intent – Case Completion* = ISH) agreed that the case was ISH were accepted as such. Cases that were assigned as ISH according to only one of the two sources were investigated further. These records were considered in eight groups, which previous assessments of the

data suggested were likely to have commonalities. The groups are defined in terms of UCoD-based and NCIS-based values, as shown in Table 7.3.

Table 7.3: Categories of cases that were checked for retention as ISH

Group	ABS UCoD	NCIS	2004
1	ISH	Not assigned	8
2	ISH	Other Ch 20	30
3	Other Ch 20	ISH	252
4	X59	ISH	10
5	R99	ISH	35
6	R98	ISH	9
7	Non-Ch 20	ISH	19
8	missing	ISH	290
Total			653

Note: Other Ch 20 refers to an ICD-10 UCoD code in Chapter XX 'External causes of mortality', whereas Non-Ch 20 refers to an ICD-10 UCoD code outside of Chapter XX.

Less information is available for open NCIS cases than for closed ones, so records were stratified by this characteristic within the eight groups. Previous investigations had shown differences in case information according to state/territory, so the records were also sorted by state/territory.

A case summary, including all text strings and other potentially relevant fields, was scrutinised for each case. The extent of information available for the cases varied considerably. Open cases generally provided less information than closed cases, although for some states and territories a substantial proportion of cases marked as open included useful information, notably the cause of death string, and NCIS codes for activity at the time of occurrence.

Closed cases generally provided more useful information than open ones, particularly the *Case type on completion* and *Intent – Case Completion* fields in the NCIS. Most closed cases from Victoria also include a short textual case summary, which was often the most useful part of the record.

Further checking was done after completing the staged assignment process, based on characteristics of the sets of records that had been assigned as ISH or as not ISH. This was based on the expectation that two sets of records that are both, in fact, due to ISH are likely to have a similar distribution of types of mechanism of injury, such as hanging or shooting. It is also likely that the distribution of mechanism for ISH deaths will differ from the distribution for other types of deaths.

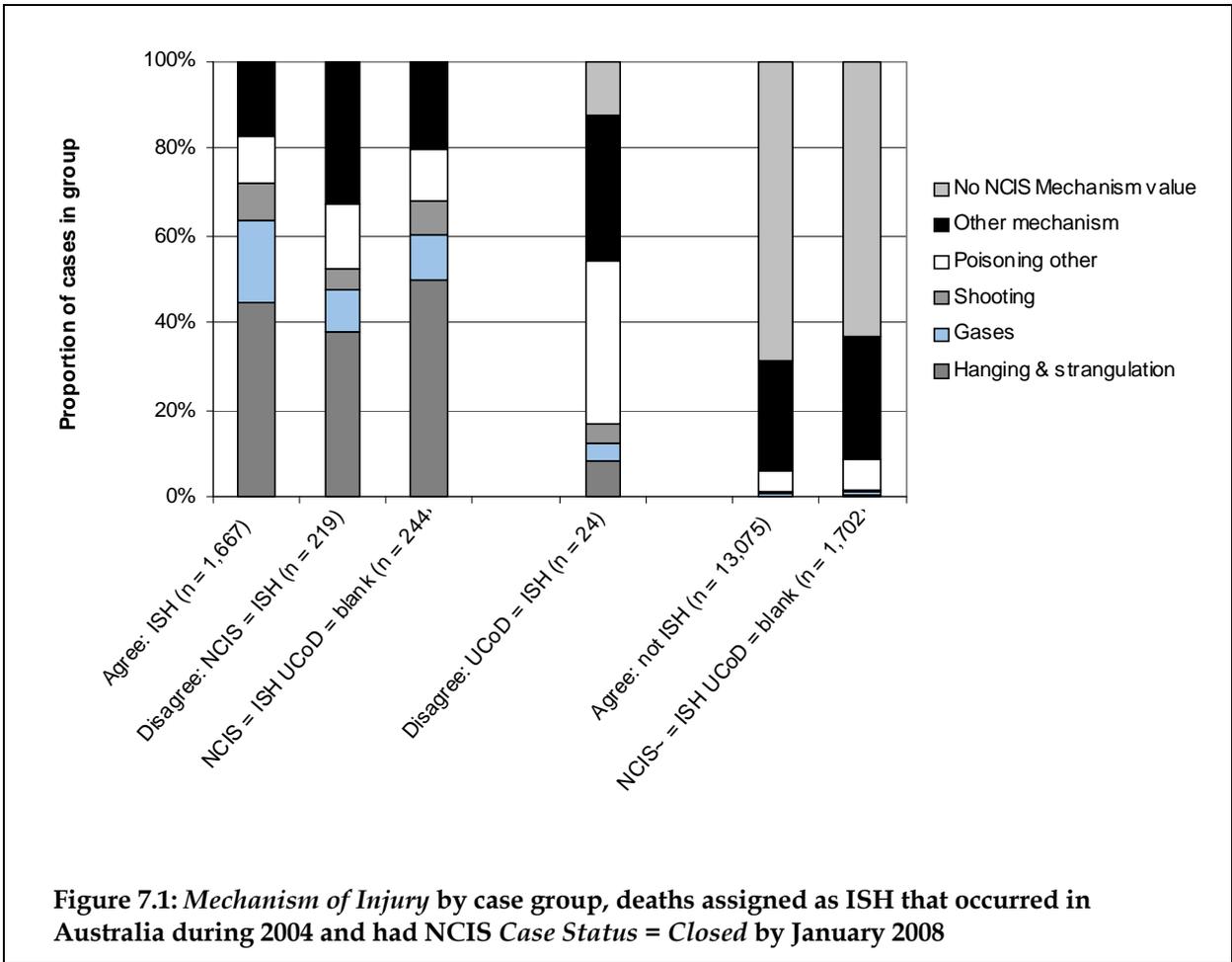
Data in NCIS records can be used to categorise cases according to the type of mechanism of injury, irrespective of intent. This can be done for cases that have NCIS *Case status = closed*, but only for some open cases. Figure 7.1 shows the distribution of mechanisms for deaths that occurred during 2004, that are recorded in the NCIS, and that had been closed by January 2008. Distributions of mechanism are shown for six sets of cases.

The first three sets are the cases assigned as ISH according to the method described in this section (stage 5). The distribution of mechanisms is similar for the subsets of these cases that are ISH according to that method and (i) UCoD codes in NCIS records concur with this

assessment (ii) UCoD codes in NCIS records assign the case to something other than ISH; and (iii) no UCoD is present in the record. This tends to support the validity of the assignment of these cases as ISH.

A very different distribution of mechanisms is seen for the set of cases where both criteria agree that the cases were not due to ISH (most cases in this group do not have a *Mechanism of Injury* code, as expected for deaths due to natural causes). A very similar distribution is seen for cases where NCIS assignment is that the deaths are not due to ISH, and no UCoD is available in the record.

Finally, an intermediate distribution is seen for a small group of cases ($n = 24$) which were coded as ISH according to UCoD, but the NCIS-based assignment does not agree. Many of these cases were borderline or doubtful (one-third were assigned in NCIS as *Intent – Case Completion = ‘unlikely to be known’*).



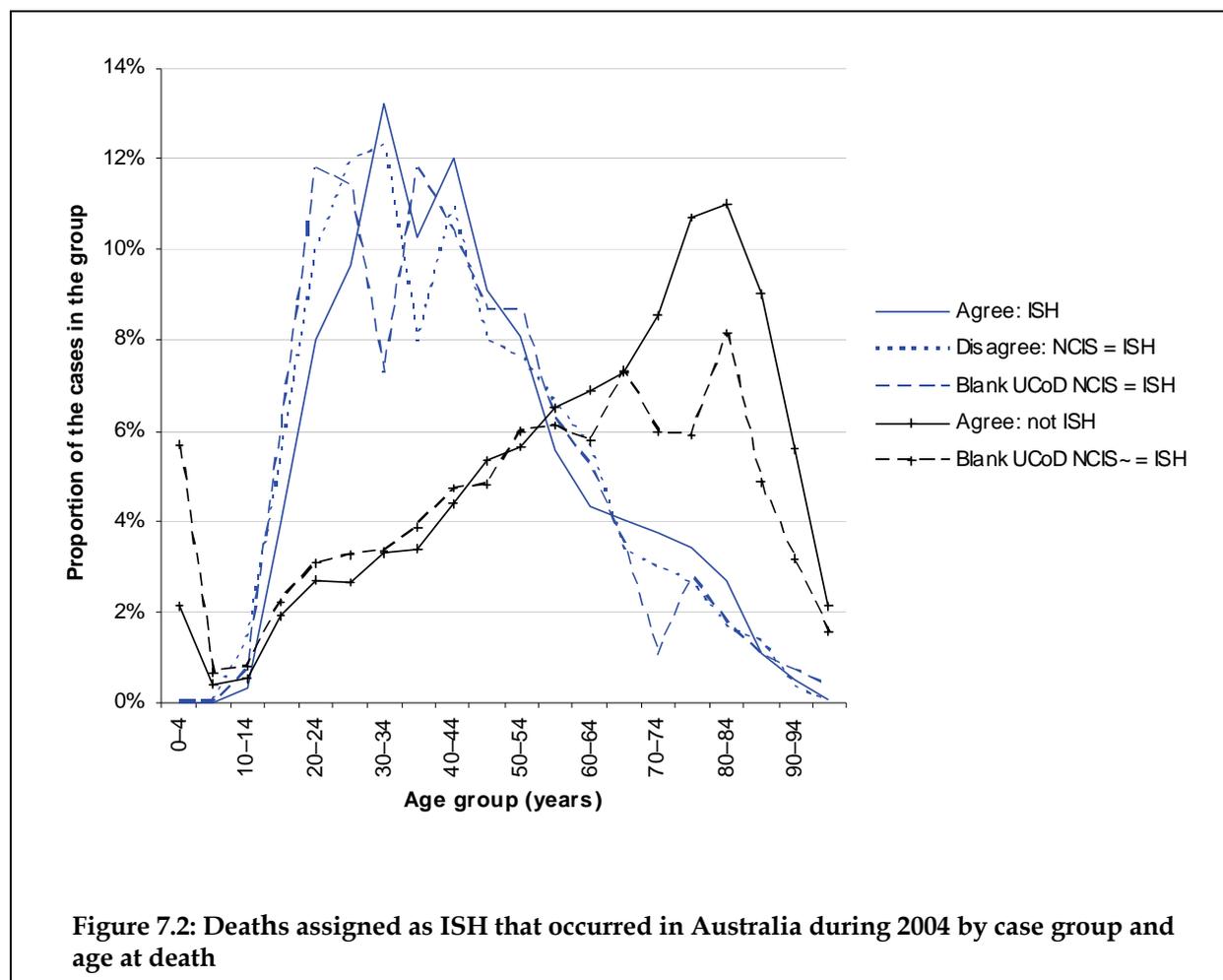
Similarity of the first three groups, and difference from the last two is also seen in terms of sex (Table 7.4) and age (Figure 7.2). (The group *Disagree: ICD-10 Cause of Death = ISH* was omitted from Figure 7.2 because of the small number of cases.)

These findings tend to confirm that the process used to identify ISH cases in the NCIS was robust, and that the groups *Disagree: NCIS = ISH* and *Missing ICD-10 Cause of Death NCIS = ISH* both comprise ISH deaths.

Table 7.4: Deaths assigned as ISH that occurred in Australia during 2004 by case group and sex

	Agree: ISH	Disagree: NCIS = ISH	Missing ICD-10 Cause of Death NCIS = ISH	Disagree: ICD-10 Cause of Death = ISH	Agree: not ISH	Missing ICD-10 Cause of Death NCIS- = ISH
<i>n</i> =	1,869	301	288	24	14,824	2,254
Male	80%	77%	77%	67%	62%	56%
Female	20%	23%	23%	33%	38%	33%

Note: Sex was missing or unspecified for *n* = 6 in Agree: not ISH and *n* = 6 in Missing ICD-10 Cause of Death NCIS- = ISH.



Section 6.3 presents comparisons of estimates of ISH based on NCIS *Intent – Case Completion*, ABS-sourced *ICD-10 Cause of Death* codes in NCIS and UCoD from the ABS mortality unit record file.

Table 7.5 presents a comparison that is similar to that in Table 6.11, except that the NCIS-based ISH counts are those produced by the staged process reported in this section. Both comparisons show a larger number of ISH deaths based on NCIS than on the ABS mortality data file, but the difference is larger (16%) when using estimates based on all data in NCIS than when based only on *Intent – Case Completion* (12%).

The use of all data in the NCIS to assign ISH status, rather than only *Intent – Case Completion*, has a small effect on counts for all jurisdictions except New South Wales, differences ranging from 0–5 cases. The effect was larger for New South Wales cases, adding 87 ISH cases. This reflects the large proportion of New South Wales records in NCIS that remained open in January 2008, when the extract of NCIS data used for this project was made. Although New South Wales cases made up 30% of all records in the extract where *Year of death* was 2004, they accounted for 80% ($n = 2,130$) of the 2,666 open records.

Table 7.5: Deaths assigned as ISH according to ABS mortality data and NCIS by jurisdiction, deaths during 2004

State	1. ISH cases in the ABS mortality data file	2. ISH cases according to NCIS ^(a)	3. Difference: Col 2 – Col 1 (%)
NSW	583	727	144 (25%)
Vic	525	555	30 (6%)
Qld	450	562	112 (25%)
SA	180	204	24 (13%)
WA	198	240	42 (21%)
Tas	83	81	-2 (-2%)
NT	57	53	-4 (-7%)
ACT	34	36	2 (6%)
Total	2,110	2,458	348 (16%)

(a) Based on staged assignment using all data in the NCIS.

7.2.2 Feasibility test of manual recoding

This section presents the results of a feasibility test of a manual method of recoding ISH cases based on all information in NCIS records, including attachments.

Initial descriptive analysis of NCIS data (Section 6.2) confirmed the presence of cases for which the NCIS *Intent – Case Completion* variable and ABS-sourced *ICD-10 Cause of Death* codes in NCIS disagreed about ISH status.

One potential response to the case misclassification that is implied by this finding is to review and recode cases using the data available in NCIS records at the date of investigation. Since the recoding would be done long after the initial coding by ABS officers, by which time data in NCIS should be more complete, such recoding might provide more complete and reliable data on ISH.

A full recoding project would be a large job, since it would require recoding of all coroner cases for a period of interest, and about 20,000 deaths per year are referred to a coroner in Australia. A recoding project could be designed in a way that requires the processing of fewer cases (for example, process a sample of deaths, or exclude types of case that are unlikely to include suicides, such as those coded by coroners as due to ‘natural causes’). Nevertheless, it would be a substantial exercise.

Is it practicable to do such a project? This section describes a feasibility study. The methods are described in Section 5.2.8. The case groups referred to in this project are those described in Section 6.2.

Recoding was done with reference to three criteria, which are described in Section 5.2.8:

Coding criteria	Valid information	Necessary criteria	Sufficient criteria
ABS1	Coroner's finding only	Self-inflicted nature	Coronial statement
ABS2	Police report Autopsy report Toxicology report Coroner's finding	Self-inflicted nature	Clear indication of intent (e.g. suicide note)
NISU	All available information	Self-inflicted nature	Clear indication of intent (e.g. suicide note)

Pilot of feasibility study

Group C (NCIS+/ABS-) recoding was undertaken first, the resulting codes were compared and high inter-rater reliability was found, with disagreement being identified in only 5 cases under NISU coding criteria. In these cases, one rater erred on the side of ISH and the other erred on the side of undetermined intent. For all cases, 14 out of 20 cases were found to be ISH when NISU criteria were used and 12 out of 20 when using ABS1 or ABS2 criteria. For Group B (NCIS-/ABS+) recoding inter-rater reliability was again extremely high with only 2 cases in dispute. The results of the pilot study confirmed the appropriateness of the planned method. The coding criteria were found to be easily understood and applied.

Full feasibility study

The recoding exercise produced flags for intent coded according to the ABS1, ABS2 and NISU criteria as well as ICD-10 codes for each. Of most interest to the present report are the recoded intent codes, and the rest of the results section focuses on this aspect of the exercise.

Inter-rater reliability

Inter-rater reliability on the ABS1 criterion was perfect for the sample set of records. Further analysis was restricted to ABS2 and NISU criteria. Inter-rater reliability was assessed using the Kappa statistic. The agreement on intent between coder 1 and coder 2 using the ABS2 criterion was 88.5% (Kappa = 0.811, $p = 0.000$) and the agreement on intent between the coders using NISU criterion was 96.9% (Kappa = 0.910, $p = 0.000$).

Estimates of the proportion of misclassified ISH cases

Simple proportions of cases found to be misclassified according to ABS2 and NISU criteria were calculated by case group and for the sample as a whole (Table 7.6). Only 10% of cases in Group B were coded as intentional self-harm according to the ABS2 criterion whereas all cases in this group had an ABS code present indicating ISH. A slightly higher proportion was coded as intentional self-harm according to the NISU criterion (16%).

Table 7.6: Resulting proportions of self-harm when coders use different coding standards – for Groups B, C, E and F, deaths in 2004

	Group B (NCIS-/ABS+)	Group C (NCIS+/ABS-)	Group E (NCIS+/ABS-)	Group F (NCIS~/ABS+)
Study sample (cases)	25/25 closed	50/220 closed	50/243 closed	5/5 closed
ABS2 criterion				
Coder 1	3	31	28	0
Coder 2	2	30	29	0
Average	2.5	30.5	28.5	0
Number of cases	25	50	50	5
Coded as ISH (%)	10%	61%	57%	–
NISU criterion				
Coder 1	4	50	50	0
Coder 2	4	50	50	1
Average	4	50	50	0.5
Number of cases	25	50	50	5
Coded as ISH (%)	16%	100%	100%	1%

For cases in Group C, more than half (61%) were coded as intentional self-harm according to the ABS2 criterion and all were coded as ISH according to the NISU criterion. All of these cases contained ABS-assigned UCoD codes that indicate a cause of death other than ISH.

A similar result was seen for cases in Group E where there was no ABS assigned UCoD code present in the NCIS.

Cases in Group F proved very difficult to code, primarily because of lack of information in the NCIS extract (90% of this group were open cases, for which little information is available) and the unusual nature of the cases present. Applying ABS2 criterion resulted in no cases coded as ISH despite all cases in the group having an ABS-sourced UCoD in the NCIS record.

Taken as a whole, of the 130 cases recoded according to the two criteria, 47.3% (mean $n = 61.5$ per coder) were coded as intentional self-harm using ABS2 criterion and 80.4% (mean $n = 104.5$ per coder) using NISU criterion.

Revised ISH case estimates based on feasibility test of manual recode method

Application of the misclassification proportions to the total number of cases in each of the groups is shown in Table 7.7. Group B contained a total of 28 cases, all of which had an ABS-assigned code indicating that the death was due to ISH. According to ABS2 criterion, only 2.8 of these cases were intentional self-harm, and according to NISU criterion, 4.5 of these were intentional self-harm. For Group C there was a total of 236 cases which had an ABS-assigned code other than ISH, and according to ABS2 criterion, 144 of these cases were intentional self-harm, and all were coded as ISH according to NISU criterion. Similarly, for cases in Group E, 147 were coded as intentional self-harm according to ABS2 criterion, and all were ISH according to NISU.

Table 7.7: Estimated cases^(a) of self-harm for Groups B, C, E and F based on two criteria tests in the recoding feasibility study, deaths in 2004

	Group B (NCIS-/ABS+)	Group C (NCIS+/ABS-)	Group E (NCIS+/ABS-)	Group F (NCIS-/ABS+)
Total number of cases	28	236	258	50
Number of self-harm cases according to ABS2 criterion	2.80	143.96	147.06	0
Number of self-harm cases according to NISU criterion	4.48	236.00	258.00	0.50

(a) Group- and criterion-specific proportions coded as ISH (from Table 7.6) multiplied by group-specific total number of cases.

The revised estimates of the number of cases of intentional self-harm according to the two recoding criteria and the number of cases of intentional self-harm according to NCIS and ABS-assigned codes are presented in Table 7.8.

Table 7.8: Estimated cases of intentional self-harm for all groups based on coding criteria and data in the NCIS, deaths in 2004

Group	Estimated ISH deaths in 2004 based on			
	NCIS Intent— Case Completion = 2	ABS UCoD in NCIS = X60–X84	ABS2 criterion^(a)	NISU criterion^(a)
Group A (NCIS+/ABS+)	1,818	1,818	1,818	1,818
Group B (NCIS-/ABS+) ^(b)	0	28	3	4
Group C (NCIS+/ABS-) ^(b)	236	0	144	236
Group D (NCIS-/ABS-)	0	0	0	0
Group E (NCIS+/ABS-)	258	0	147	258
Group F (NCIS-/ABS+) ^(b)	0	50	0	1
Total of ISH deaths	2,312	1,896	2,112	2,317

(a) Values for Groups B, C, E and F are the estimates given in Table 6.1. Groups A and D were not included in the feasibility study.

(b) Estimates have been rounded to whole numbers.

In this feasibility test, cases where there was agreement between NCIS *Intent – Case Completion* and ABS-sourced UCoD codes that a death was due to ISH (Group A) or was not due to ISH (Group D) were not studied. This was done so that the limited resources available for the feasibility study were applied to the subset of records where changed assignment was most likely. However, this should not be interpreted as implying that there is no possibility of false positive assignment in Group A and false negative assignment in Group D. There is, in particular, potential for some deaths due to ISH to be in Group D, as shown in Section 7.2.1.

The estimates for Groups B, C, E and F should be regarded as approximate, though indicative. Application of the relatively stringent ABS2 criterion resulted in a lower estimated count than the less stringent NISU criterion. It is possible that a similar difference would be seen if these two criteria were applied to cases in Group A. Note that the most stringent criterion considered (ABS1) would produce even lower estimates, because it requires a coroner’s finding to be present, which is not so for some cases in the extract studied, including some coded as ISH according to the ABS-sourced UCoD.

The ABS coding criterion used in this study was designed to mimic criteria implied by published information from the ABS describing the necessary and sufficient information required by ABS coders to code a case as intentional self-harm.

It is interesting to note that the estimate shown in Table 7.8 and based on the ABS2 criterion ($n = 2,112$) is similar to the number of ISH deaths reported by the ABS as occurring in 2004 (and registered by the end of 2005), $n = 2,110$. However, this similarity should not be taken as confirmation that either is a complete or reliable estimate.

Although the overall estimate of cases based on the feasibility study is similar to that published by the ABS, some cases included in each of these estimates are omitted from the other. In particular, the findings of the feasibility study indicate that most cases in Group B (ISH according to ABS-sourced UCoD codes) were found not to meet study criteria for ISH and that most of those in Group C (not ISH according to ABS-sourced UCoD codes) were found to meet study criteria for ISH.

The estimates of ISH based on both of the criteria assessed in this section are lower than the estimate based on code-based algorithms presented in the previous section ($n = 2,458$), although the difference between this and the point estimate based on the broader of the criteria is not very large ($n = 141$; -6%).

This investigation confirmed the technical feasibility of conducting a manual recode. Such a study would be constrained by the limited information available in many NCIS records, but so is the original coding. A complete recoding study would be very time-consuming.

7.3 Explaining differences

Previous sections of this report have shown that estimated numbers of ISH deaths differ according to the data source used (e.g. Tables 6.10 and 7.5). The focus of this section is on explaining these differences.

7.3.1 Duration from death to closure of case by coroner

The timing of processing of cases by coroners will determine what is available in the NCIS for use by ABS coders when they assign a cause of death code. Since much weight is placed on the final finding by the coroner, particularly concerning intent, it is useful to understand the relationship between date of death and coroner closed date of ISH cases. In this section we show relationships between time-based characteristics of NCIS cases and assignment as ISH.

Walker et al. (2008) have described the decision-making process that should be followed when assigning ICD-10 codes as underlying causes of death, and the effect on the code assigned of incomplete information being available at the relevant time. If the availability of information in NCIS records is related to time, then certain time-based characteristics should be associated with misclassification of ISH cases to particular non-ISH UCoD codes.

Figures 7.1 and 7.2 and Table 7.4 show similarities between the three groups of cases identified as ISH on the basis of all data in the NCIS. This left unanswered the question as to why the cases in one of these groups (*Agree: ISH*) should also have been identified as ISH according to ABS-supplied UCoD codes whereas those in another (*Disagree: NCIS = ISH*) were assigned non-ISH UCoD codes.

Timing of processing of coroner cases has been proposed as an explanation. Support for this is given by Figure 7.3. This shows the cumulative proportion of the cases in each of the groups presented in Figure 7.1 that had been closed by coroners in relation to the number of days elapsed since date of death⁷.

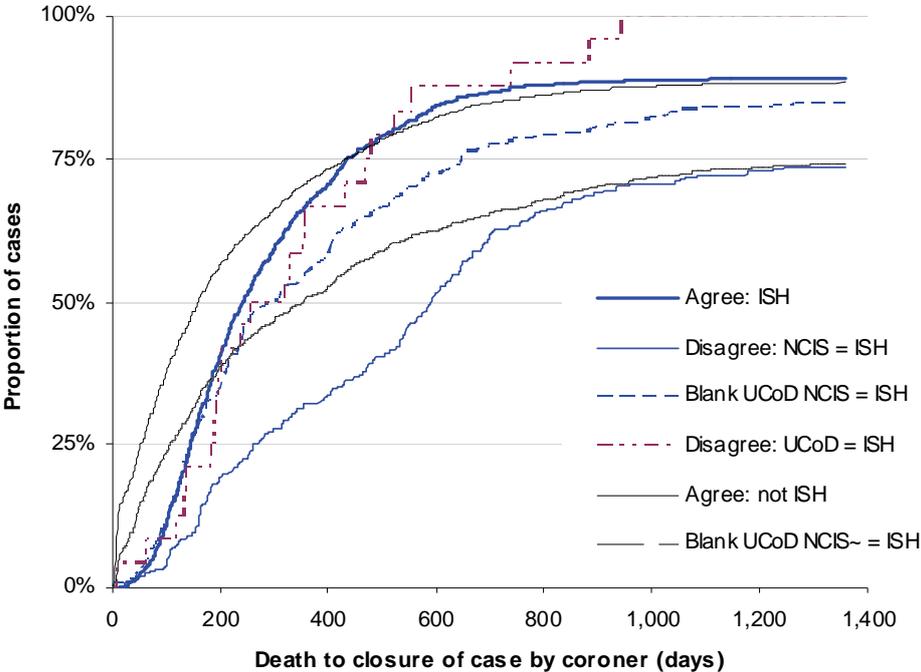


Figure 7.3: From Date of Death to Coroner Closed date by case type, deaths during 2004, Australia

Cases in the *Agree: not ISH* group tended to be closed quite soon after death. This is consistent with the nature of these cases, most being due to ‘natural causes’.

Deaths that are due to ISH according to both NCIS data and the UCoD codes (*Agree: ISH*) tended to take longer to be closed than deaths from natural causes, 50% being closed by 240 days and 75% by 433 days.

However, cases in the *Agree: ISH* group tended to be closed much more quickly than those in the *Disagree: NCIS = ISH* group: 50% were closed by 587 days and only 73% were closed by the end of the study period.

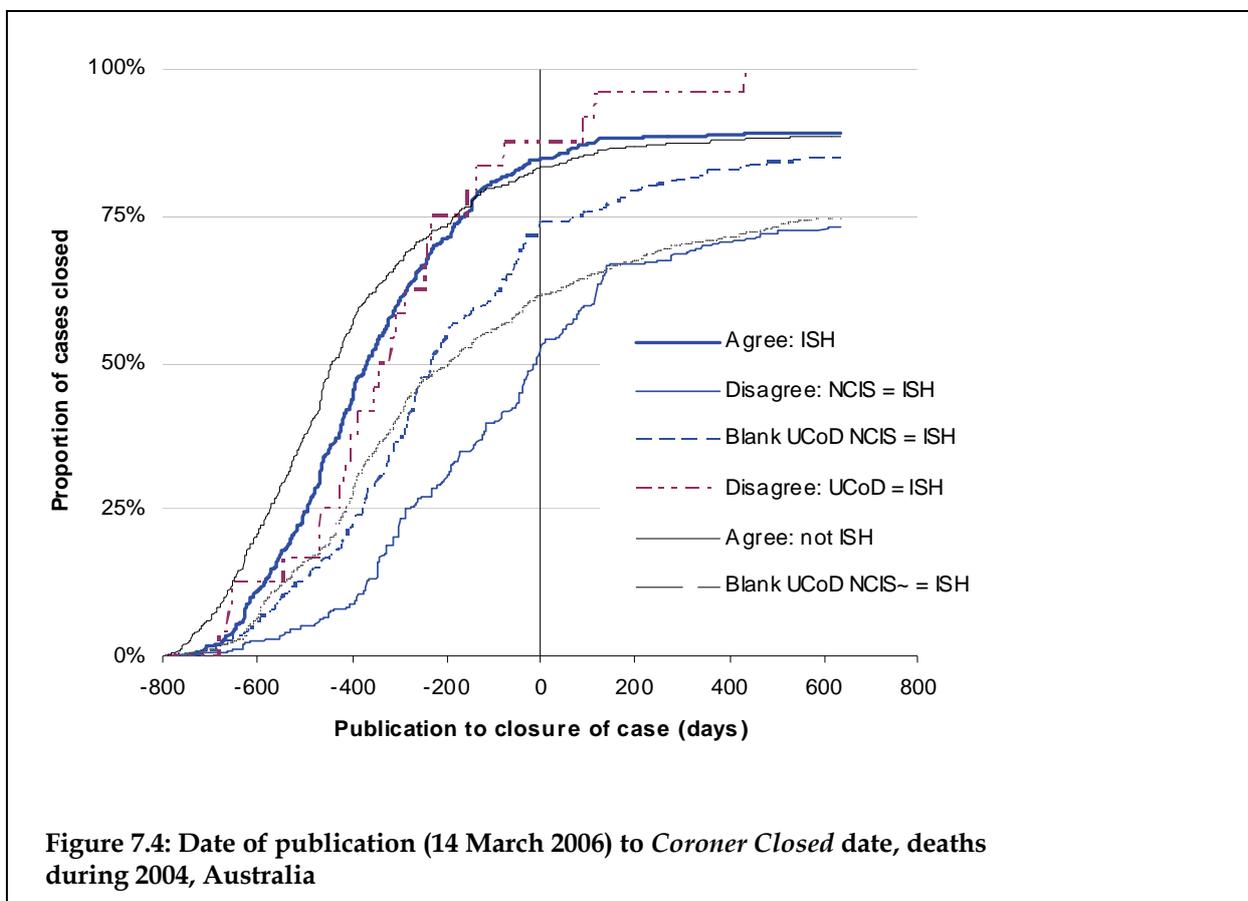
Most of the curves do not reach 100%. This is because some cases still had open status in the NCIS at the date of data extraction (January 2008). Note that the proportion that remained open was substantially higher for cases in the *Disagree NCIS = ISH* group than for the *Agree: ISH* group.

⁷ The data in this figure do not allow for the difference in follow-up period between deaths that occurred early in 2004 and those that occurred late in 2004, which could affect estimates after 1,095 days. However, rate of change is slow before this limit, so the effect is likely to be small.

7.3.2 Duration from closure of case by coroner to publication

Analysis of duration from death to case closure tends to confirm that timing contributes to the observed misclassification of some ISH cases. However, a more relevant period might be the time between NCIS case closure and the date of publication of the ABS report in which cause of death information for a case is included. This is because certain information is not available in NCIS before case closure, and information that becomes available in the NCIS only after the ABS has published data for the case is too late to be used as a basis for coding decisions. Figure 7.4 is equivalent to Figure 7.3 except that the horizontal axis shows days between *Coroner Closed* date and 14 March 2006, the date on which *Causes of death, Australia, 2004* (ABS 2006a) was published⁸.

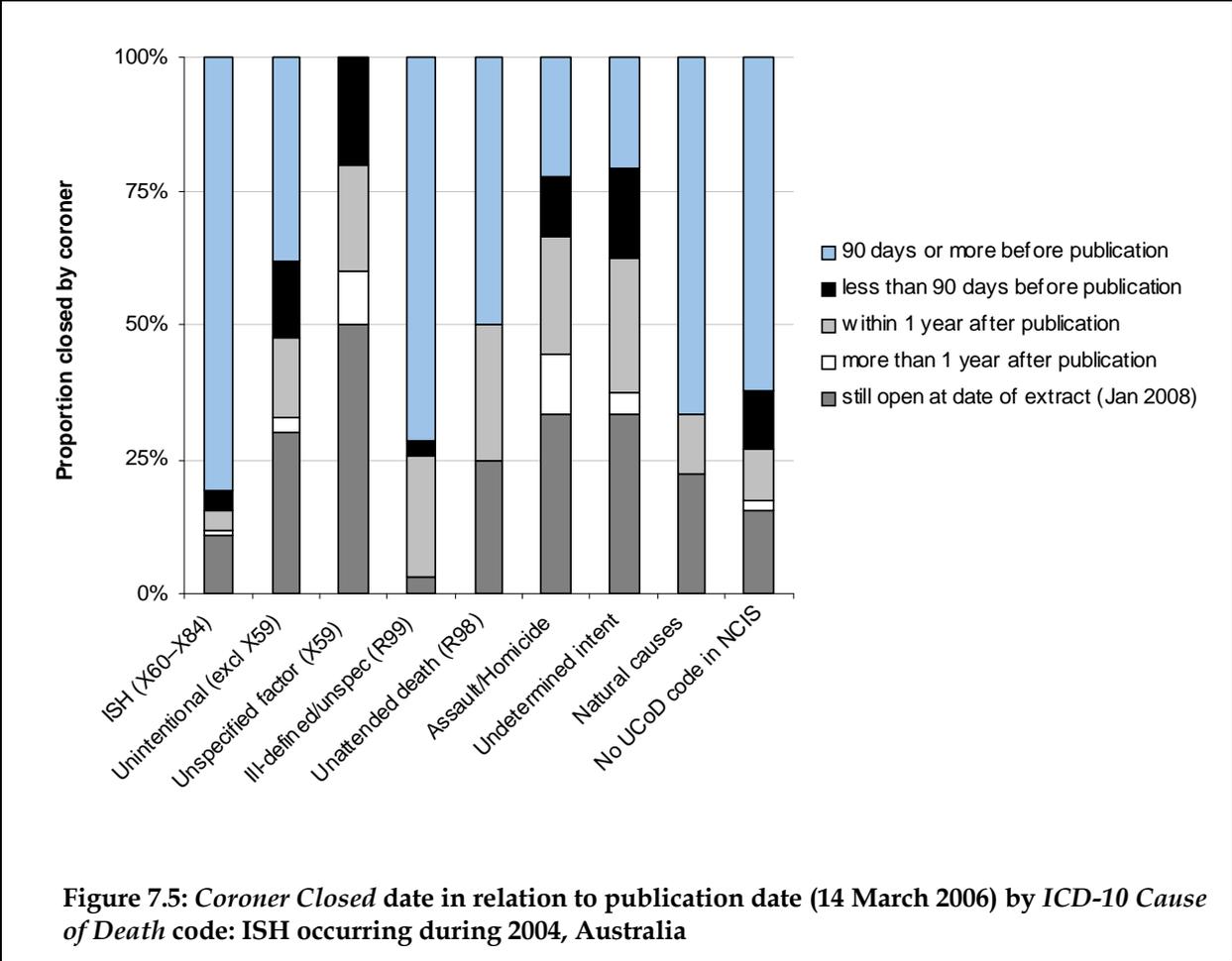
Considering the cases that are ISH according to both sources (*Agree: ISH*), 85% had been closed by the publication date, compared with 52% of the cases probably misclassified as to whether they were ISH (*Disagree: NCIS = ISH*).



Another way to look at the effect of timing is to examine time-based variables in relation to the types of UCoD codes assigned to cases by the ABS.

⁸ We cannot be certain in which year a case in the NCIS will have been reported by the ABS, because that depends on year of registration, which is not available in the NCIS. We have used year of death as a substitute, which is correct in most cases, but a small proportion of deaths are registered in a year later than the year of death. Checks indicate that this is unlikely to have much effect on the findings shown here.

Figure 7.5 shows the relationship between time of closure (according to the *Coroner Closed date/Finding date* item in NCIS) and the publication date of *Causes of death, Australia, 2004* in which that death is likely to have been reported (14 March 2006). The periods have been divided into five strata. If the timing of case closure by coroners influences coding, then we would expect to see that cases that were closed after the publication date or soon before will be more likely to show signs of having been processed with incomplete information than cases closed long before publication date (since the practical cut-off date for consulting the NCIS concerning cases that will appear in a given publication must be some time before publication).



The cases analysed in Figure 7.5 are all of those identified as ISH according to the staged assignment described in Section 7.2.1. The columns distinguish subsets of these cases according to their UCoD value (i.e. the ICD-10 code assigned by an ABS coder). The categories are the same as were used to produce Table 7.2.

The categories shown include several that are the likely ‘destinations’ for cases where little (e.g. X59) or nothing (R99) is known about the cause of a death when coding is done, as well as one for the ICD-10 range commonly used to specify ISH (X60-X84).

The column segments represent different relationships between the date on which the case was closed and the publication date. The top category is the one that should be associated with the best opportunity for the coder to have inspected the closed NCIS case in time for

this to be useful (case closed 90 days or more before publication). The second segment represents cases that closed before publication, but perhaps not long enough before, to have been useful to the coder (closed 0–89 days before publication). The remaining segments represent situations in which the case was closed after the ABS publication date.

The pattern shown in Figure 7.5 is in line with expectations. The cases that an ABS coder, working before 14 March 2006, was able to code as ISH are mainly (81%) cases that were closed more than 3 months before publication date. In contrast, cases in all the other categories were likely to have closed soon before, or after, the publication date, implying the availability of less complete information for coders at the necessary time. In the second category shown (Unintentional excl X59), which accounts for about two-thirds of misclassified ISH cases, only 38% of cases had been closed by coroners at least 90 days before publication, and 52% by the day of publication.

7.3.3 Jurisdiction

Since coronial processes are administered at state and territory level, there is no reason to expect that the timing of case processing is the same in each jurisdiction. Figure 7.6 is the same as Figure 7.4, but by jurisdiction. Only the three data series that refer to cases identified as ISH according to NCIS data have been included, for reasons of clarity. Negative values on the horizontal axis refer to cases closed before the 14 March 2006 publication date, and positive values refer to cases closed after that date. The vertical axis of each chart shows the proportion of the ISH cases identified by the staged process that had been closed by each date.

The time course differs noticeably between jurisdictions. In all jurisdictions, however, the cases assessed as misclassified (*Disagree: NCIS = ISH*) tend to have taken longer to close than those for which there is agreement on ISH status.

Noteworthy points are:

- The large proportion of New South Wales cases not yet closed by the NCIS at the end of the study period (January 2008)
- The relatively small difference between the three groups for Queensland cases. This pattern could occur if reliance by ABS coders on NCIS data was lower here than elsewhere.
- The absence of any of the *Disagree: NCIS = ISH* type among Tasmanian and Northern Territory cases has ambiguous implications. This observation could imply that all ISH deaths from these jurisdictions were reported at a time and in a manner that enabled correct coding by ABS officers. However, the same pattern would be seen if some misclassified ISH cases exist, and data in the relevant NCIS records are inadequate to allow their detection by the methods used in this study.

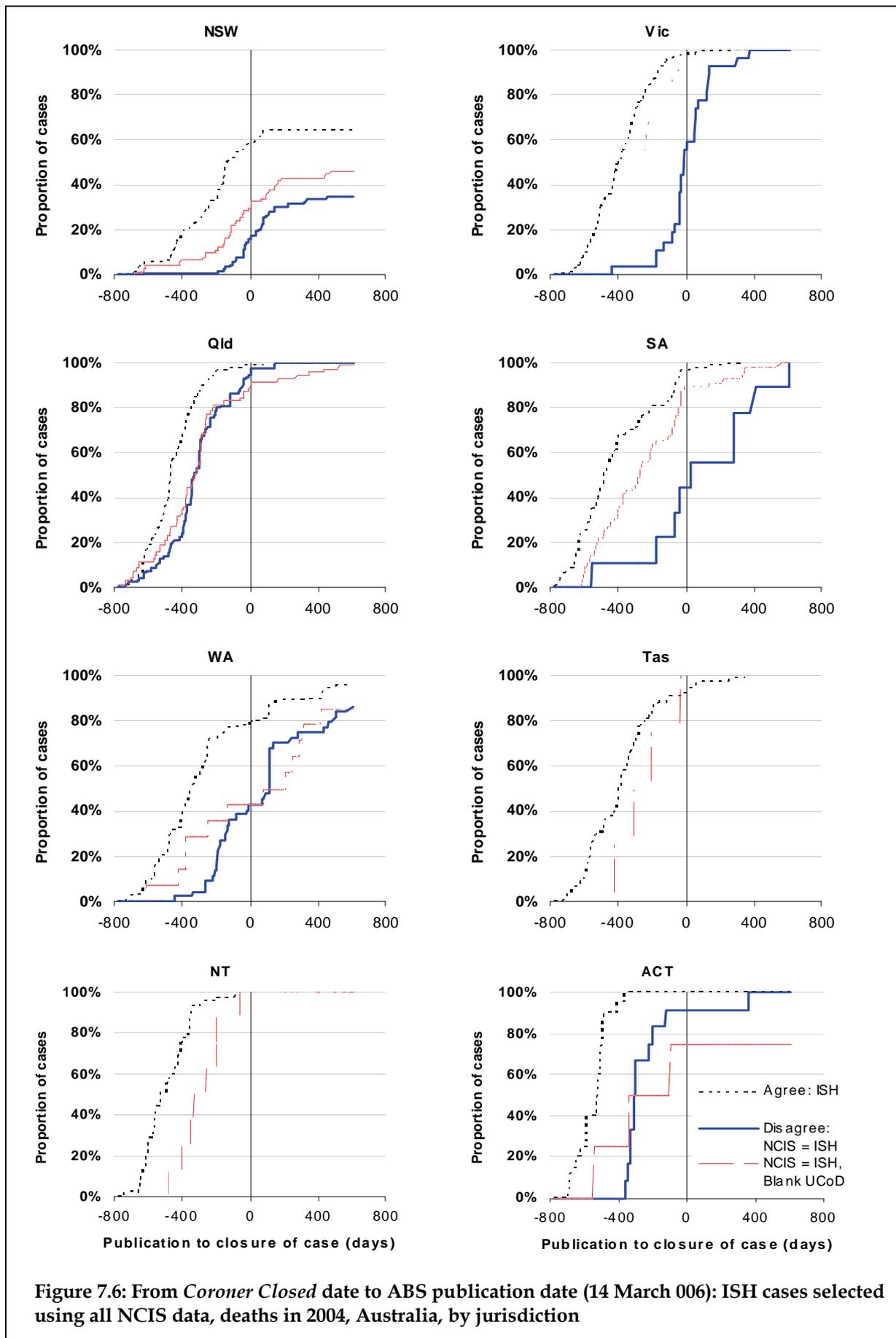


Figure 7.6: From *Coroner Closed* date to ABS publication date (14 March 006): ISH cases selected using all NCIS data, deaths in 2004, Australia, by jurisdiction

The important conclusion is that the timing of processing of ISH cases in the NCIS differs substantially between jurisdictions. Differences are large enough to have non-trivial effects on the relative ascertainment of ISH, the pattern of which would differ according to the cut-off date at which assessment is made.

7.3.4 Is misclassification of ISH related to annual data processing?

Since certain time characteristics are strongly associated with the likelihood that an ISH case will have been misclassified (i.e. assigned an UCoD other than ISH), changes in the ABS cut-off date for processing cases that will be reported in a particular annual data set might be expected to have an effect on the proportion of cases misclassified.

Inspection of Figure 7.6 suggests that for a change in cut-off date of a particular size (say, 3 months), the effect on misclassification would differ between jurisdictions, and that the effect would differ depending on its direction – that is, setting the cut-off 3 months earlier would have a larger (negative) effect than the (positive) effect of moving it 3 months later.

However, temporal association between rate of case closure and publication might reflect actions by or at the urging of the ABS, in which case moving the cut-off date might have less effect than if the pattern in Figure 7.6 was simply a reflection of coroner practice.

This section presents analyses of NCIS data intended to provide insight into the relationship between the timing of case closure, publication date and misclassification of ISH.

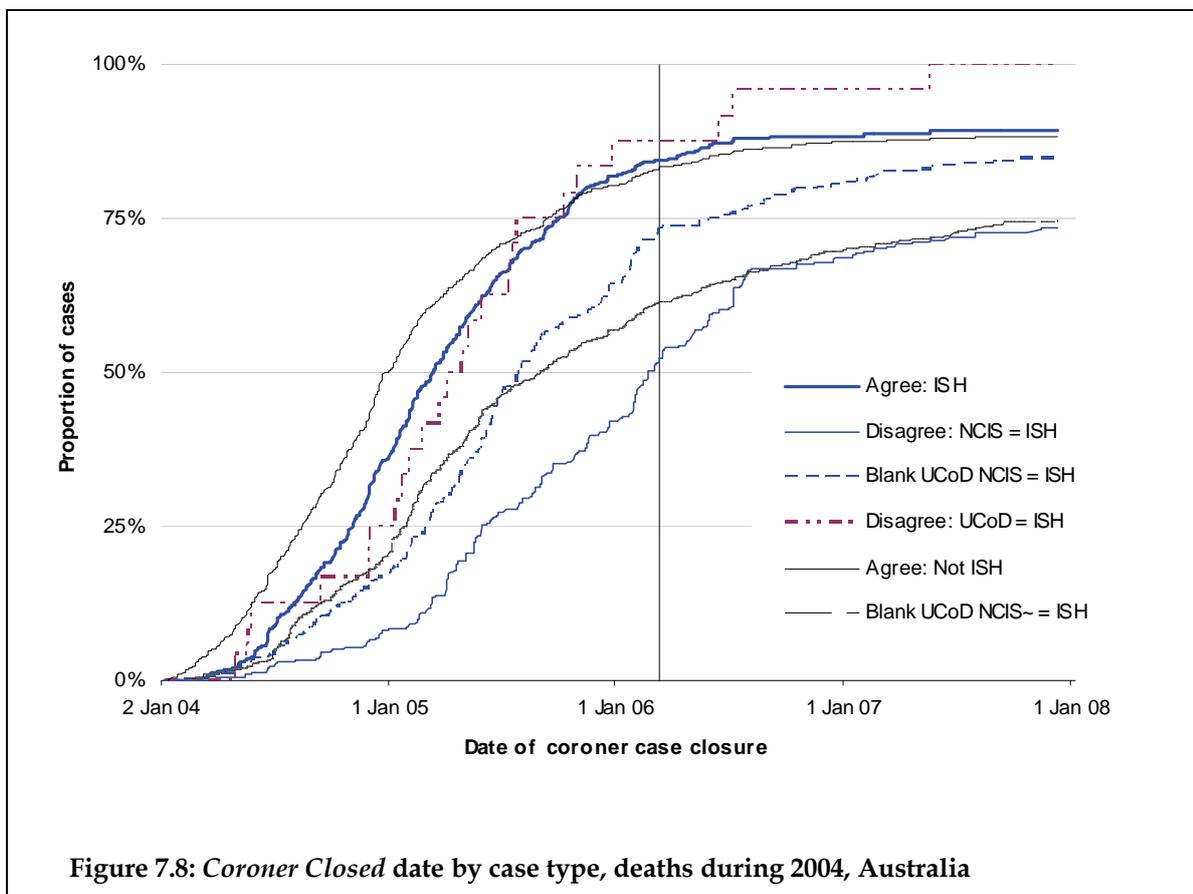
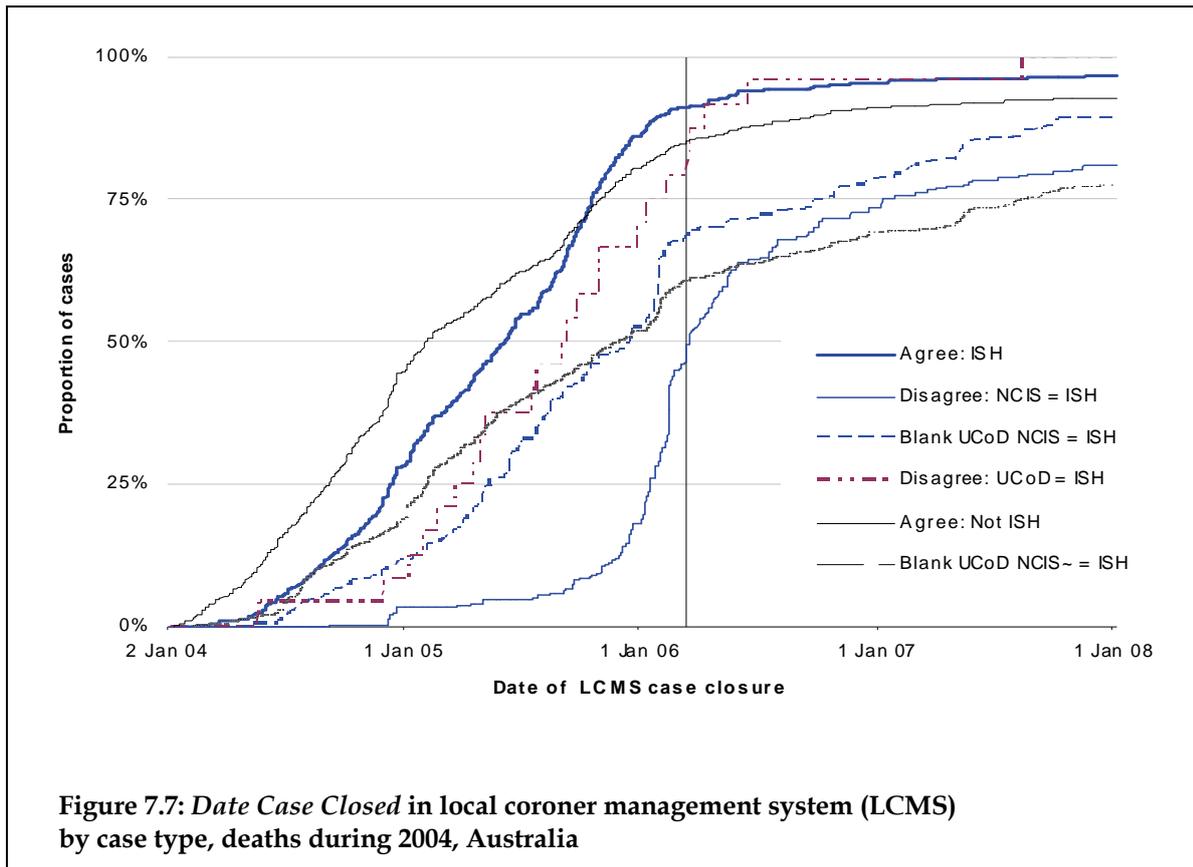
The NCIS contains two variables related to the date of case closure. *Coroner Closed* date, reported above, should mark the date by which the coronial process has ended, and the coroner will normally have made a finding by this date⁹. The other is local coroner management system (LCMS) closure date (*Date Case Closed*), which usually occurs after the Coroner has closed the case, and which generally marks the transition of the record from open to closed status in the NCIS, and entry of data into the ‘on completion’ fields of the NCIS¹⁰. Hence, *Date Case Closed* should provide a relatively accurate guide to when information on a case becomes available for use through the NCIS.

The date of publication of *Causes of death, Australia, 2004* (14 March 2006) followed soon after distinct changes in the cumulative proportion of cases closed according to NCIS *Date Case Closed* (Figure 7.7). The patterns differ markedly between groups of cases relevant to this analysis.

The deaths that are ISH according to both the ABS-assigned UCoD and the staged assignment based on all data in the NCIS (*Agree: ISH*) show a pattern of steady cumulation of closed cases during the latter part of 2004 and all of 2005, tailing off shortly before publication date, and rising only gradually and to a small degree after that date.

9 According to the NCIS Data Dictionary (July 2007 edition), *Coroner Closed* date is defined as ‘The date the case was closed by the Coroner’. The guide for use states ‘Manual entry of the exact date the coronial investigation was closed by the responsible coroner. Usually the date stipulated on the Coronial Finding or similar court documentation.’

10 Defined in the NCIS Data Dictionary (July 2007 edition) as ‘The date the case [was] closed in the LCMS, and/or NCIS’. The guide for use adds ‘The date is automatically generated when the Sign Off field is activated.’



In sharp contrast, the cases that appear to be misclassified as ISH (*Disagree: NCIS = ISH*) show a rapidly escalating number of LCMS case closures during the few months before publication, beginning to tail off after mid-February 2006, although the upward trend remained steep through much of 2006.

The pattern of coroner closure dates of the same cases shows little evidence of acceleration in the period soon before publication (Figure 7.8). The coincidence of the critical period for finalising the 2004 publication with acceleration of LCMS closure – but not acceleration of coroner closure – suggests that actions by or for the ABS undertaken in the run-up to publication had an effect of ‘speeding up’ the finalisation of NCIS records, but little or no effect on case finalisation by coroners.

Hence, it would be unwise to assume that the shape of the case closure curves is independent of the ABS publication schedule. The mid-March publication date of the data on deaths registered in 2004 was about 3 months later than for reports on deaths registered in 2002 and earlier years, which were published during the December following the registration year reported. This delay in publication was prompted by awareness by ABS officers that some coroner-certified deaths registered in the data year being processed were not represented by either NCIS records or incomplete NCIS records at the cut-off date necessary for the previous publication timetable. Efforts were made to reduce this problem, by communicating with Coroners’ Offices and the NCIS.

The ISH cases processed during this period of accelerated LCMS closure are particularly likely not to have been assigned as ISH according to the UCoD code (Figure 7.9). Half (50%) of the misclassified ISH cases were closed during the 4 months ending March 2006, compared with 9% of the cases agreed by both sources to be ISH.

The results shown here suggest that efforts late in 2005 and early in 2006 to finalise processing of deaths registered in 2004 were successful in the sense of producing an upward step in closed NCIS cases, but at the cost of contributing a large number of cases to the set identified in this report as misclassified as ISH.

If the ABS’s annual process had no effect on the pattern of closure of coroner cases, then an analysis like the one presented here could be used to assess the likely effects on ascertainment and misclassification of ISH cases. However, the findings indicate that the ABS process was influential, at least in terms of LCMS closure. An identical process, but with the cut-off date moved somewhat (i.e. up to a few months) earlier or later could be expected to lead to a corresponding shift in the peak of misclassified cases, and not necessarily to much change in ascertainment or misclassification of ISH cases.

A later cut-off could also be contemplated, preferably as part of a process in which deaths that occurred in a particular year are revisited periodically, to take into account additional information in the NCIS. This type of approach has been introduced by the ABS for deaths registered after 2006 (see Section 8.5).

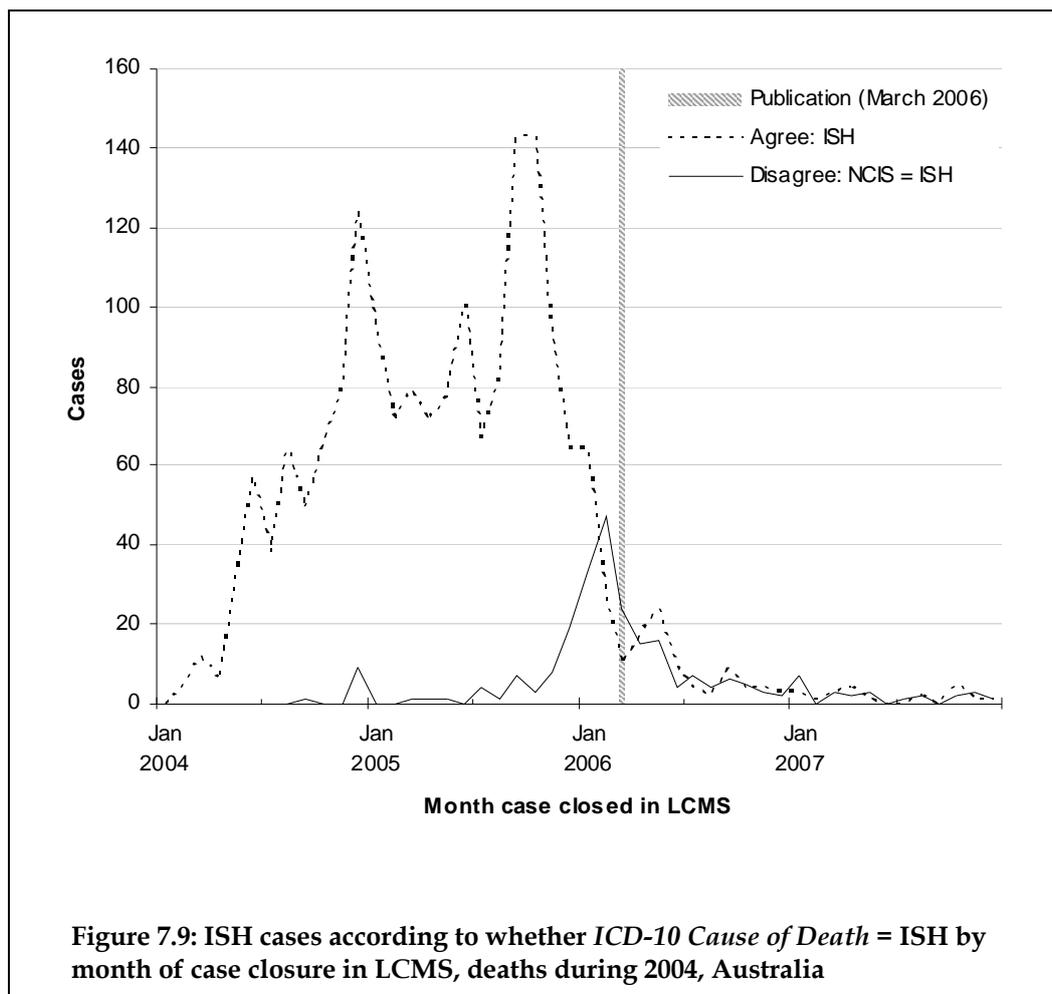


Figure 7.9: ISH cases according to whether ICD-10 Cause of Death = ISH by month of case closure in LCMS, deaths during 2004, Australia

Figure 7.10 presents a summary of the relationship between date of assessment of NCIS, the criteria applied and the number of deaths that can be identified as ISH. This assessment is based on the cases identified as ISH according to the staged assessment described in Section 7.2.1, using an extract of NCIS data made in January 2008. Two criteria have been used here: date of coroner closure (*Coroner Closed*) and date of LCMS closure (*Date Case Closed*). Assessment is in terms of the number of ISH cases closed according to each of those criteria at the end of each calendar year.

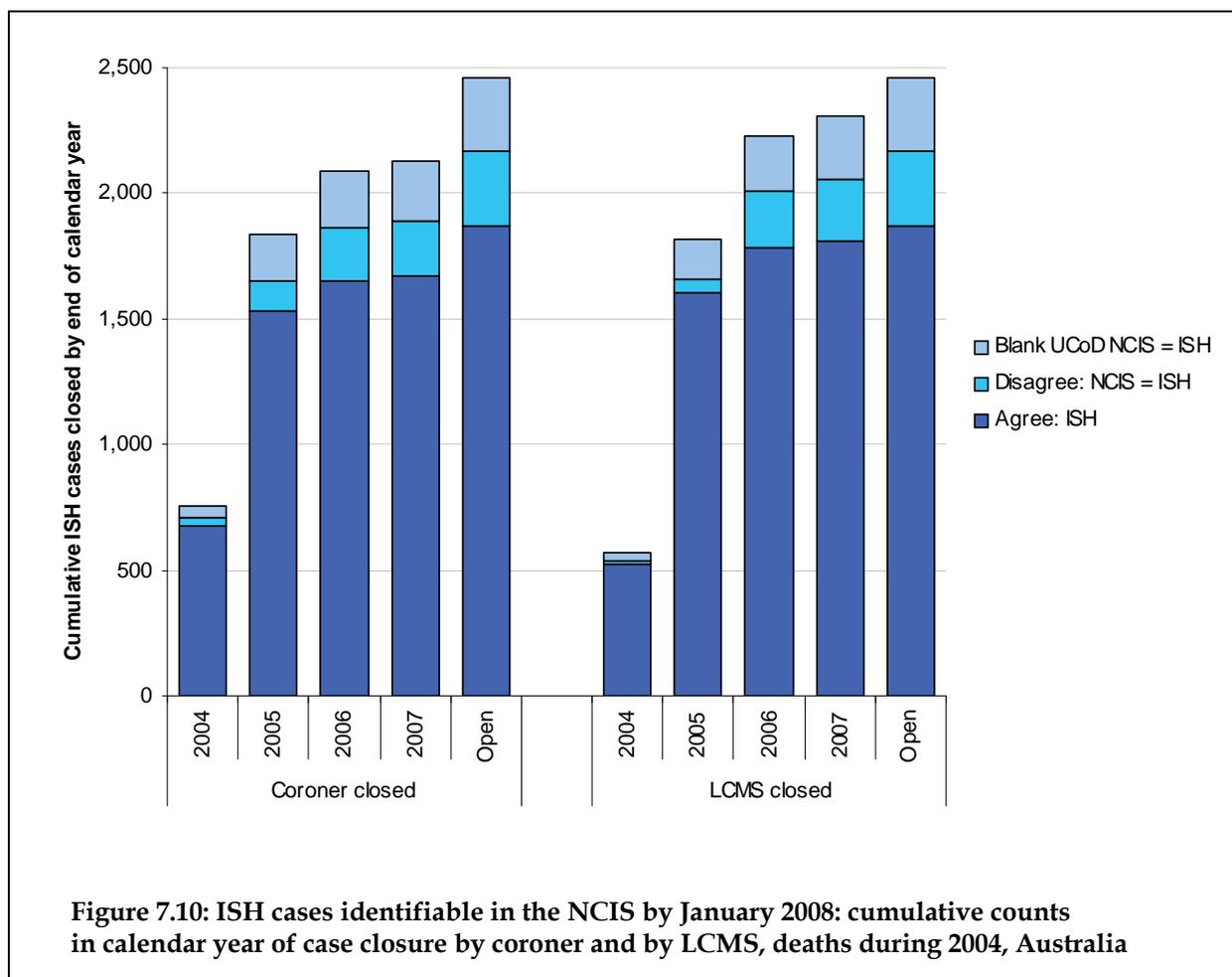


Figure 7.11 shows similar information, but focuses on the time-course of ISH case closure in the NCIS during the period after the publication of *Causes of death, Australia, 2004* on 14 March 2006 (marked by a vertical line in each chart). The left axis of each chart shows the charted values as a percentage of the number of cases recorded as being closed on 14 March 2006, and the right axes show cumulative numbers of closed ISH cases. The total number of deaths identified as ISH in this project ($n = 2,458$) is also shown on each chart. Note that the vertical and horizontal axes have been truncated to focus on the period after publication.

The following points are noteworthy:

- A substantial number (and proportion) of the ISH deaths that occurred during 2004 were closed after the publication date.
- The cumulation of closed cases proceeded at a gradually diminishing rate throughout the period studied.
- By the end of 2007, the time since date of death ranged from 3 to 4 years for these cases. Even at this date, a considerable number of deaths identified as ISH by the staged assignment process used in this report remained open according to each of NCIS date of closure variables.

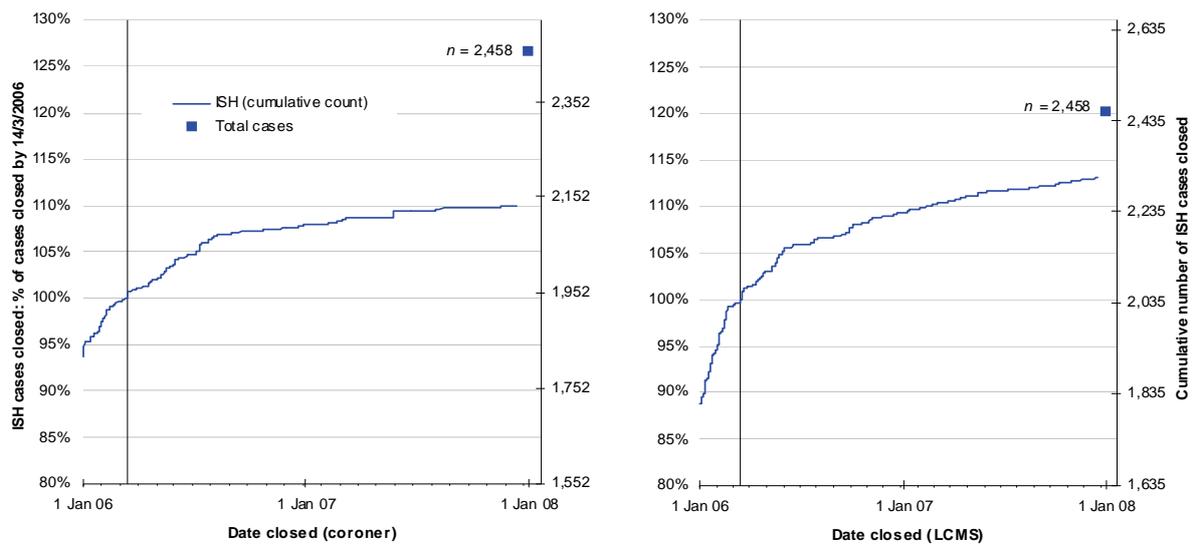


Figure 7.11: ISH cases identifiable in the NCIS by January 2008: cumulative counts and proportions of count as at 14 March 2006 according to date of case closure by coroner and by LCMS, deaths during 2004, Australia

The choice of a cut-off date, and the case selection criteria, can also affect the relative ascertainment of ISH cases by jurisdiction (Figure 7.12). Of the cases identified as ISH according to the staged assignment process (Section 7.2.1), the proportion closed at the date of publication of the causes of death in 2004 report differed by jurisdiction and depending on whether assessment is in terms of coroner closure (*Coroner Closed*) (often regarded as necessary for assigning a case as suicide) or in terms of LCMS closure (*Date Case Closed*) (more closely related to whether information is available in the NCIS).

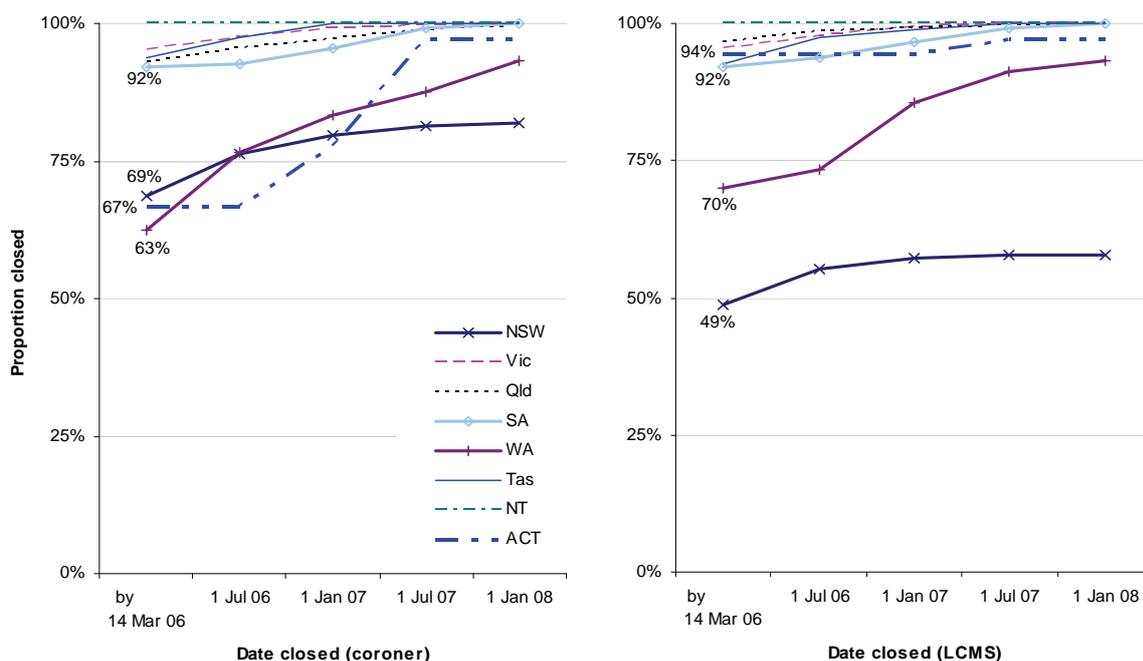


Figure 7.12: Closure of ISH cases in the NCIS during the period between publication (14 March 2006) and the end of 2007 by jurisdiction, deaths during 2004, Australia

If assessment was made according to one or other of these criteria at a date between the publication date and the end of 2007, then the estimate of ISH deaths would be higher, but the extent of the elevation differs by jurisdiction and the pattern of differences by state would differ according to the time point chosen.

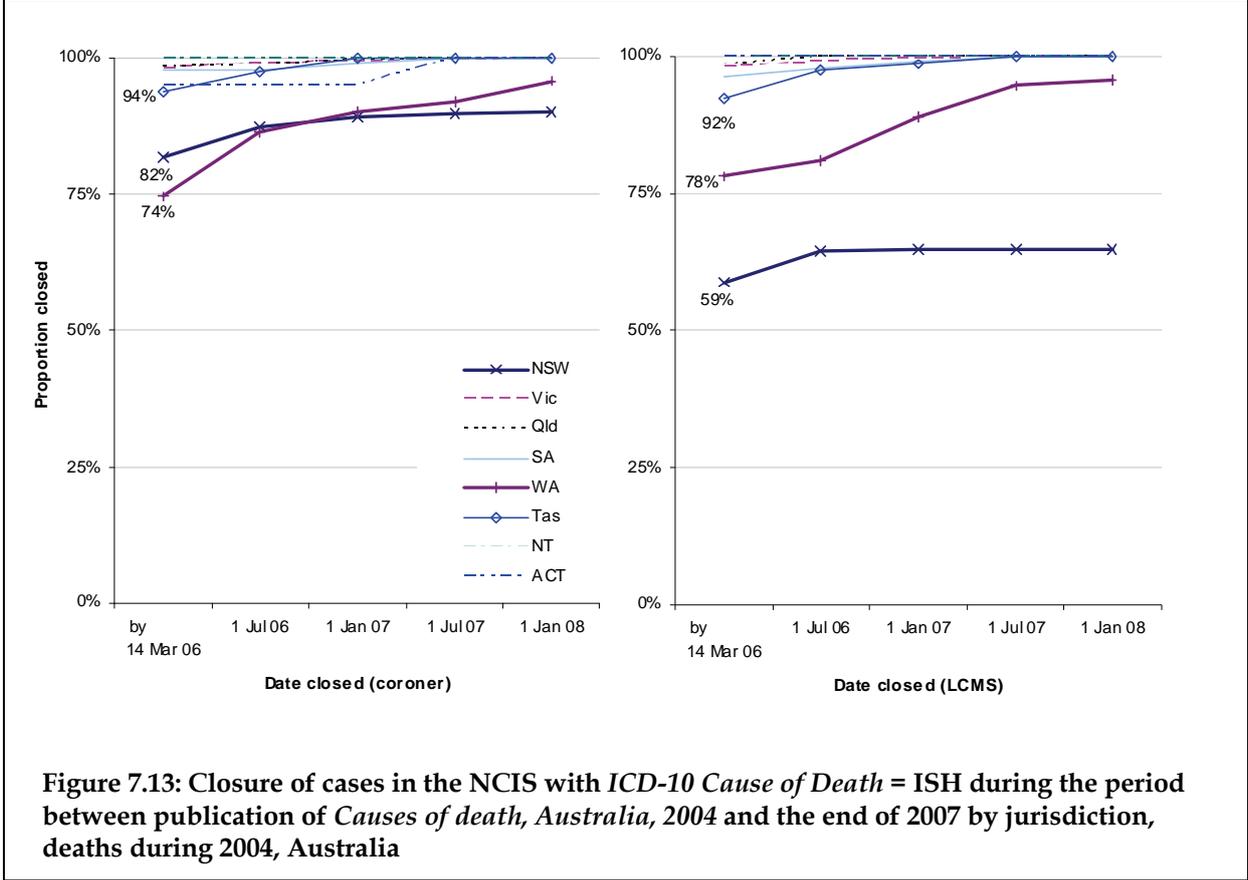
For deaths in 2004, estimates of ISH cases in two states (New South Wales and Western Australia) would be most susceptible to timing, along with cases from the Australian Capital Territory if coroner closure date is relied on. (These patterns are produced by factors that could change from year to year, so it should not be expected that the same jurisdictions would be most affected in another year.)

7.3.5 Characteristics of cases assigned Underlying Cause of Death codes for ISH

Assessment of the effects on the number of ISH cases among deaths in 2004 that would be included in national mortality data if alternative cut-off dates were to be used depends on replicating the case selection used by the ABS in terms of NCIS case characteristics. This section presents an investigation of this.

The proportions in Figure 7.12 are based on the jurisdiction-specific numbers of deaths identified in this project as ISH. Figure 7.13 is similar, but based on the deaths coded as ISH according to ABS-sourced UCoD codes in NCIS records. (Recall that the number of such records is lower than in the ABS mortality data file because of the cases in NCIS which are missing UCoD.)

Two points can be made from this figure. First, the general pattern of case closure according to the two NCIS variables is similar to that shown in the previous figure, although somewhat lower proportions were open at the date of publication. Second, since the great majority of the cases included in the figure had been coded as ISH by the ABS before publication, the figure provides an indication of the extent and pattern of cases coded as ISH by the ABS when still open according to the NCIS.



Analysis of the available data suggests that LCMS closure before the publication date was required for a case to be assigned an UCoD code indicating ISH. This condition was met for 91% of cases. This condition was not met for at least 3% of cases, these being the ones that had Case Status = Open and a missing value for date of Date Case Closed in January 2008. Most of the cases in this group were from New South Wales (87%, compared with 26% of the cases closed before publication date) and all of the rest were from Western Australia.

This issue could not be investigated definitively for the remaining 6% of cases with ICD-10 Cause of Death = ISH, which have an LCMS closure date in the period between the date of publication and January 2008 (i.e. some of these deaths are likely to have been registered after 2004, but the absence of year of registration data in the NCIS prevented certain identification of which ones). However, we note that most of the cases in this group were from New South Wales (41%) or from Western Australia (36%). One-third of these cases (nearly all being New South Wales and Western Australia cases) have a coroner closure date before publication.

This suggests that the cases assigned as *ICD-10 Cause of Death* = ISH by the cut-off date for publication had LCMS closed by that date, except for some additional cases from New South Wales and Western Australia, which appear to have been assigned *ICD-10 Cause of Death* = ISH on some other basis, perhaps enquiries to Coroners' Offices.

Considering only the cases that are ISH according to *ICD-10 Cause of Death* in the NCIS, 91% have an LCMS closure date before publication date. This implies that the coroner's finding could have been used as the basis for assignment of these as ISH. Another 1% had a coroner closure date after the date of publication and before January 2008. These are difficult to assess, for the reasons given above. The remaining 8% remained open in January 2008, and so have no coroner closure date.

The last of these groups was examined further. All but one of the cases in this group were from New South Wales ($n = 136/137$ when based on *ICD-10 Cause of Death* in the NCIS; the equivalent number is 163/164 when based on ISH according to the staged assignment, which includes the cases with missing *ICD-10 Cause of Death* in the NCIS). Almost all of these cases had been assigned as ISH according to *Intent – Notification (Presumed)*. Findings for this group are consistent with further special treatment of New South Wales cases. However, analysis of the NCIS data cannot determine whether this took the form of assignment as ISH on the basis of information available in NCIS records, despite the case being open when this was done, or on the basis of other enquiries, going beyond the information available in the NCIS.

In summary, this analysis indicates that the great majority of the cases coded as ISH according to *ICD-10 Cause of Death* codes in the NCIS had an LCMS closure date before the relevant deadline (this implies availability to coders of NCIS case information 'on completion') and a coroner closure date before the same deadline (this implies the availability of coroners' conclusions on the cases for use in coding decisions). The main exceptions to this finding are some cases from New South Wales and Western Australia, characteristics of which suggest that they were coded as ISH on the basis of special investigations by the ABS, though LCMS and/or coroner closure of these cases had not occurred by the relevant cut-off date.

7.3.6 Summary

In Section 7.2.1, we used all data available in the NCIS to search for and flag ISH cases, using a staged approach. Most of the cases meeting these criteria are also ISH according to the ABS-originated UCoD codes that are available in most NCIS records. However, about 300 of the cases flagged as ISH on the basis of NCIS data had been assigned an UCoD code for a cause other than ISH ('misclassified ISH'), and nearly as many lacked an UCoD code in the NCIS record ('ISH, missing *ICD-10 Cause of Death*'). This group of cases is the subject of Section 6.2, where we conclude that they are due to incomplete linkage between NCIS and ABS data). These two groups basically account for the larger estimate of ISH found here than has been reported by the ABS for deaths in 2004.

Further work in Section 7.2.1 showed that the cases in these two groups are similar to the cases that are ISH according to both the UCoD codes in the NCIS and our method.

In this section, we report investigations into reasons for this difference in classification of ISH cases, focusing on the cases in which there is disagreement (rather than the ones with missing UCoD in the NCIS).

In summary, we have found that

- The misclassified ISH cases differ sharply from the other ISH cases in terms of time-related variables.
- The misclassified ISH cases were much more likely than others to have acquired LCMS closed status soon before publication date. This relationship was not evident for coroner closure date.
- Patterns of closure date in relation to publication date differed substantially between jurisdictions.
- Some cases were closed, according to both NCIS case closure variables, during the 21 months after publication. Assessment of ISH according to these variables at points in this period would assign more cases as ISH, but the overall number and proportion by jurisdiction would differ, depending on the date used.
- Analysis of the NCIS data suggests that LCMS and coroner closure before publication date was a necessary factor for inclusion of deaths in 2004 as ISH according to UCoD codes. This makes sense because only limited (and sometimes very limited) information on the cases would have existed in the NCIS before this date.
- An exception is that some deaths from New South Wales and Western Australia were coded as ISH despite the absence of LCMS closure at the relevant date. This is consistent with enquires having been made with the coronial offices in these states to acquire information beyond that in the NCIS. Some of these cases have coroner closure dates before publication, suggesting that at least some of the cases found in this process had been completed by coroners, but that the 'on completion' information had not been entered into the NCIS.

Hence, if a method to adjust ISH case estimates is to be based on NCIS, and if the aim is to use criteria comparable to those used by the ABS, the approach should be one that, by default, requires LCMS and coroner closure by the chosen cut-off date. At least for deaths in 2004, the cases included by the exception described in the last dot point above must also be included if good comparability is to be achieved. This exception includes some cases that remained open long after the cut-off date for publication, some of which were still open in January 2008.

7.4 Revised estimates of ISH

This section presents the ISH cases identified by means of the staged assignment process (Section 7.2.1) in a way that focuses on estimates of ISH case counts.

These estimates are compared with case counts from the ABS mortality data file. Values are presented for deaths that occurred in 2004.

The total case count based on the staged assignment method ($n = 2,458$) is larger than the number of deaths during 2004 that were coded as ISH in the ABS mortality data file ($n = 2,110$), a difference of 348.

The absence of direct data linkage between these sources in this project prevented direct identification of the particular cases in the NCIS that account for the difference. However,

use of the UCoD codes that are present in about 87% of the NCIS records allowed an assessment of the relationship to be made.

The staged assignment method indicates that 301 (13.9%) of the ISH cases for which an UCoD was available in the NCIS were misclassified to other causes of death, and 288 had missing UCoD values (Table 7.2). If the proportion of ISH cases misclassified to other UCoD codes (i.e. false negative ISH cases) is similar among these 288 to that observed among the other ISH cases, then about 40 of the 288 can be expected to have been assigned UCoD codes other than ISH. This implies a total of 301 + about 40 = about 341 false negative ISH cases in the ABS mortality data file.

False positive ISH cases in the ABS mortality data file can be estimated in a similar way. The staged assignment found that 24 cases coded as ISH according to UCoD codes did not meet criteria for this cause of death. If the proportion of false positive ISH cases among the cases in NCIS with UCoD codes (0.14%) also applies to the NCIS cases without an UCoD code ($n = 2,575$) then the total of false positive ISH cases in the ABS mortality data file is estimated to be $24 + 4 = 28$ cases.

This estimated relationship between the ABS mortality data file and the NCIS data is summarised in Table 7.9.

Table 7.9: Comparison of ISH according to the ABS data file mortality and the NCIS data

ISH according to:		Staged assessment of NCIS records		
		Yes	No	Total
UCoD in ABS mortality file	Yes	2,082	348	2,430
	No	28	-	28
	Total	2,110	348	2,458

As shown in Section 7.3, the number of cases in the NCIS identifiable as ISH depends on the criteria used and the time at which they are applied.

In this section, we present summary data on ISH deaths that occurred in 2004 in Australia according to four criteria:

1. Values from the ABS mortality data file.
2. Estimate based on the NCIS that apply our attempt to replicate the criteria applied by the ABS to produce (1) above, as at the publication date of *Causes of death, Australia, 2004*.
3. The same criteria as (2) above, applied to the NCIS data as at January 2008.
4. Estimate based on all cases identified as ISH according to the staged assignment process (Section 7.2.1).

All of the estimates are limited to cases where *Year of death* = 2004. The methods for these estimates are given in Section 5.2.10.

The values in Table 7.10 are simply the numbers of cases in ABS mortality data files of deaths registered in 2004 and 2005 where *Year of death* is 2004 and the UCoD code is in the range X60–X84. Note that this value differs a little from the number of ISH deaths that were registered in 2004 ($n = 2,098$).

Table 7.10: ISH according to ABS mortality data file

State of registration	Sex		
	Male	Female	Total
	Count	Count	Count
NSW	463	120	583
Vic	398	127	525
Qld	365	85	450
SA	144	36	180
WA	161	37	198
Tas	64	19	83
NT	51	6	57
ACT	24	10	34
Total	1,670	440	2,110

Inclusion criteria: UCoD = X60–X84, cases in ABS mortality data file where *Year of death* = 2004 and *Year of registration* = 2004 or 2005.

The values in Table 7.11 are the subset of all cases identified as ISH by means of the staged assignment process that had closed by the date of release of *Causes of death, Australia, 2004* (14 March 2006) according to both the *Date Case Closed* and *Coroner Closed* fields. Also included are the additional cases coded as ISH by the ABS by this date, despite one or both of the *Date Case Closed* and *Coroner Closed* fields indicating that the case was still open at that date. These cases have been included to improve meaningful comparison between Tables 7.10 and the other three tables in this section. The table total in Table 7.11 is 3% higher than in Table 7.10

Table 7.11: Closed ISH cases in the NCIS as at publication date of *Causes of death, Australia, 2004*

Case State	Sex		
	Male	Female	Total
	Count	Count	Count
NSW	455	115	570
Vic	408	130	538
Qld	427	102	529
SA	152	39	191
WA	155	37	192
Tas	63	18	81
NT	48	5	53
ACT	19	6	25
Total	1,727	452	2,179

Inclusion criteria: Cases assigned as ISH on the basis of NCIS where (a) LCMS closure and coroner closure had occurred by 14 March 2006; or (b) *ICD-10 Cause of Death* in NCIS = X60–X84.

Table 7.12 includes the cases in the previous table, plus other cases identified as ISH on the basis of NCIS data for which both the *Date Case Closed* and *Coroner Closed* fields had been set by the date of the NCIS data extract used for this analysis (January 2008). The table total is

11% higher than in Table 7.10. This is slightly (nearly 1%) higher than the number of ISH deaths that occurred in 2003 according to ABS mortality data.

Table 7.12: Closed ISH cases in NCIS as at date of extract (January 2008)

Case state	Sex		Total
	Male	Female	
	Count	Count	Count
NSW	484	128	612
Vic	421	134	555
Qld	452	109	561
SA	163	41	204
WA	186	46	232
Tas	63	18	81
NT	48	5	53
ACT	24	11	35
Total	1,841	492	2,333

Inclusion criteria: Cases assigned as ISH on the basis of NCIS where (a) LCMS closure and coroner closure had occurred by 8 January 2008; or (b) *ICD-10 Cause of Death* in NCIS = X60–X84.

Finally, Table 7.13 presents a summary of all cases coded as ISH according to the staged assignment described in Section 7.2.1. It includes the remaining ISH cases that were still open at the date of the extract. The table total is 16% higher than in Table 7.10. This is close to the number of ISH deaths that occurred in 2001 according to ABS mortality data and about 1% less than the number in 1999.

Table 7.13: All ISH cases in NCIS as at date of extract (8 January 2008)

Case state	Sex		Total
	Male	Female	
	Count	Count	Count
NSW	578	149	727
Vic	421	134	555
Qld	453	109	562
SA	163	41	204
WA	193	47	240
Tas	63	18	81
NT	48	5	53
ACT	25	11	36
Total	1,944	514	2,458

Inclusion criteria: Cases assigned as ISH on the basis of staged assignment of NCIS data.

Note that it is likely that some deaths in 2004 that will ultimately be identifiable as due to ISH are not included in Table 7.13. At the date on which the extract used for this study was made (January 2008), there were 2,338 open records in the NCIS, in addition to the 328 open

records that have been identified as ISH by the methods used in this project. Of these, 78% are New South Wales cases. The great majority of the 2,338 cases will be found to be due to a cause other than ISH. However, some might be ISH cases which, because of the scantiness of the information provided in the NCIS for many open cases, escaped detection in this project¹¹. This will become evident after these cases are closed.

The values from the ABS mortality data file (Table 7.10) are lower than the others, mainly because many cases assigned UCoD codes other than ISH were assignable as ISH when information available in the NCIS as at early 2008 was used. The largest part of this misclassification appears to have resulted from application of ICD-10 rules for deciding the intent of cases at a time when information sufficient to satisfy this criterion was not available in the NCIS, because the coroner had not decided the case, because information on the case had not been finalised in the NCIS, or both.

The data available in the NCIS are sufficiently rich to enable many combinations of criteria for ISH to be applied, resulting in many possible numerical estimates of ISH deaths in 2004. This is exemplified by Tables 7.11 to 7.13. For example, should assignment as ISH be strictly limited to cases where the coroner has completed work on the case and the finding is available? How long is it appropriate to wait for this condition to be met? Are all cases assignable as due to ISH properly considered suicide? If not, what are the criteria for each, and how can the types be distinguished, given the data available in the NCIS?

None of the many possible sets of criteria stands out as 'correct' or ideal following the analysis undertaken for this study. Considerations leading to this conclusion are:

- **Inclusion of open cases.** Even by January 2008, 3 to 4 years after date of death, many cases plausibly assignable as ISH remain open in the NCIS. Some of these were assigned as ISH by the ABS. Should not the remaining open cases with similar characteristics be considered for inclusion in a revised estimate? Does the information in the NCIS provide a sufficient basis for deciding how to code them?
- **Differing extent of case information in the NCIS.** Both open and closed records in the NCIS show great variation in the extent of case information. Among open cases, Queensland records provide very little information (generally too little to assess intent), whereas Victorian open cases often contain information on which a plausible assessment of the likely intent can be made. Among closed cases, the range is from minimal information in South Australian records to often extensive information from Victoria, New South Wales and Western Australia.
- **Differing specificity in NCIS records of intent as determined by the coroner.** Almost all closed NCIS records of deaths due to an external cause contain an *Intent – Case Completion* code, one possible value of which means ISH. Assessment of intent is assisted by the presence of a specific coroner finding on the matter ('I find that he died by suicide...') and by further information on the rationale for the decision, especially where possible doubts or special circumstances exist. However, only a minority of NCIS records assigned as ISH provide much beyond the relevant *Intent – Case Completion* value.

We see an argument for continuing the practice of reporting as ISH (or suicide) the deaths found by coroners to be of these types. However, it should be recognised that coronial practice encourages a presumption against a finding of suicide, because of a perception that it is a grave finding, with serious consequences. A coroner can find a death to have been due

11 A supplementary benefit of undertaking a study of trends in under-estimation of ISH is that it should reveal the extent of such late-identified ISH cases.

to intentional self-harm, but refrain from finding that it was suicide, because of doubt about the intention of the person, or because the coroner concludes that the person's reasoning was clouded by mental illness, for example, or that he or she was incapable of forming an intention to die. Furthermore, coronial practice prefers to avoid making findings that are stigmatising or worded in an unnecessarily distressing way (Freckelton & Ranson 2006, p634). Our observation of differences between Australian jurisdictions in the wording of findings, as represented in the NCIS, such as variation in whether the word 'suicide' appears, suggests diversity in interpretation or implementation of these principles, with potential to influence statistics of suicide and ISH.

Cases closed by coroners are, in the main, the basis of the current official statistics. As noted above, however, some of the deaths in 2004 that were assigned an UCoD meaning ISH were open when coded, and the ABS has described criteria for coding such cases, using information other than a coroner's finding (ABS 2007b). However, at least for deaths in 2004, an estimate according to this criterion made reasonably soon after the end of the reference period (say, 1 year) would be a substantial underestimate, and several years (certainly more than 3) would have to pass before nearly all likely ISH cases would have been closed by a Coroner. Hence, completeness and timeliness of estimates conflict with adherence to the principle of basing ISH statistics on coroners' findings.

Three general types of approach to this problem can be considered:

- i. Assessments of ISH, such as the one made for this report, can be made in which broader inclusion criteria are used. The results should not be regarded as equivalent to official statistics but as supplementary, providing information likely to be useful for a range of purposes, such as monitoring ISH for certain population health purposes. A standard method could be adopted to maximise the consistency of assignment.
- ii. Improved estimates of ISH deaths could be obtained relatively promptly by means of periodic assessment and modelling to predict final count on the basis of information to date and patterns observed for previous data years.
- iii. Efforts could be made to work with coroners and the NCIS to enable more rapid finalisation of cases.

These approaches are discussed further in the next chapter.

8 Discussion

In this project we have:

- reviewed and discussed the ways intentional self-harm mortality data are produced in Australia.
- identified possible points of vulnerability to error, misclassification or other measurement problems
- described data from the ABS mortality collection and from the NCIS, focusing on deaths in 2004
- used data from the NCIS to do the following:
 - identify ISH cases in terms of ABS-sourced codes and in terms of NCIS data
 - compare these sets, revealing cases where there is disagreement in ISH status
 - examine these sets in detail, to describe their characteristics and attempt to explain their occurrence
 - undertake a recoding exercise to investigate the potential of NCIS data to be used as the basis for reviewing and perhaps recoding cases (for example, after they are closed by a coroner)
 - produce estimates of numbers of case that appear to be codable as ISH on the basis of all NCIS data as they were at the time of this study.

The main outcomes expected for the project are:

- revised estimates of ISH in Australia in the study period
- measurement and description of misclassification of ISH
- assessment of reasons for misclassification
- potential solutions to problems detected

Our findings in each of these areas are discussed below, followed by a section presenting conclusions.

8.1 Revised estimates of ISH in Australia

We have shown that the NCIS can be used to produce revised estimates. We have provided revised numerical estimates according to three criteria, based on staged assignment of NCIS records (Section 7.4) and another based on a recoding exercise (Section 7.2.2). All are higher than values taken from ABS mortality data for the same period.

The revised estimates are 3% higher than the ABS value when criteria similar to the ABS are used, 11% higher when cases closed between the publication of *Causes of death, Australia, 2004* in March 2006 and the extraction date of the data used in this project (January 2008) are added, and 16% higher when all deaths identified as ISH in the NCIS data are included.

These revised estimates should not be regarded as equivalent to or replacements for official statistics on suicide in Australia. The main reasons for this are:

- These estimates do not allow for ISH deaths among NCIS records that were open at the date of extraction and contained too little data to allow assessment, or for the possibility of ISH cases not having an NCIS record at that date.

- Lack of linkage of ABS records with NCIS records for this study limited comparisons between the two sources. This problem could be readily overcome in a future study, provided permission was obtained to undertake record linkage.
- Missing UCoD codes in about 13% of the NCIS records assessed complicated aggregate data comparisons between the two sources. This would not be a problem if a future study used record linkage.
- The criteria used by ABS officers to assign deaths as due to ISH were not entirely clear, limiting our ability to produce new estimates that we are sure have conceptual fidelity with the original estimates. This led us to use three criteria in our manual recode exercise – the first strictly based on coroner findings, the second a somewhat more inclusive definition following information in the ABS discussion paper on suicide coding (ABS 2007b), and the third a still more inclusive criterion, designed to have high sensitivity. This was also a consideration promoting presentation of several sets of revised estimates in Section 7.4.
- Case information in NCIS records varied greatly in extent and utility as a basis for assigning cases as ISH. In particular, some cases potentially assignable as ISH remained open in the NCIS. It is arguable that these cases should be assessed for inclusion as ISH, although variation in the information content of these NCIS records, particularly between jurisdictions, could impede this.

Different purposes will be better served by a revision process that adopts one or another type of criterion. Coroners often apply stringent tests before finding a death to be due to suicide, with the result that some ‘suicide-like’ deaths are not formally found to be due to suicide (Freckelton & Ranson 2006). For example, in a case of definite self-hanging a coroner might have some doubt about the state of mind of the deceased person, either because no suicide note was found, or because there is doubt about the deceased person’s capacity to have formed a suicidal intent – perhaps because the person was young or had some cognitive impairment, or perhaps because the person’s mind was clouded by mental illness.

We conclude that there is value in a measure that exactly reflects coroners’ decisions on suicidal intent (providing a firm minimum estimate, perhaps retained as an official statistic), and also value in a measure that includes a somewhat wider group of deaths due to apparently intentional self-harm, most of which will have been suicide and all of which probably have implications for prevention. We note, however, that coroners do not always make a finding concerning intent.

We think that further discussion is warranted before a conclusion is reached. We think that it will probably be desirable to use at least two criteria: one designed to reflect coroners’ decisions as closely as possible, and another broader criterion designed for higher sensitivity and with a scope encompassing deaths relevant to public and policy interest in suicide and ISH.

8.2 Misclassification of ISH

We confirmed the presence of misclassification of ISH cases. It largely took the forms expected: some ISH cases were assigned ICD-10 codes that were appropriate for that case given the information available to the coder when the coding took place, but which do not reflect the intent of the death given the information that became available later. When information was lacking on intent, such cases were classified to various codes in the Unintentional range of the external causes chapter of ICD-10, generally correctly reflecting

the mechanism of injury (Table 7.2). In the absence of any information on cause, they were usually coded to R99. Classification in this way complies with the rules governing the use of ICD-10. Misclassification was related to time, particularly the date of publication of *Causes of death, Australia, 2004*.

We found few cases in which there was reason to suspect an error in coding, and in some of the few that we did find the error appears to have been in NCIS coding. Hence, this work indicates generally good-quality coding, but constrained by lack of necessary information for some cases within the period allowed caused by deadlines that are inherent in the production process that has been used by the ABS for deaths registered before 2007.

We considered the possibility that the matching process that enabled the provision of UCoD codes in about 87% of NCIS records for deaths in 2004 might have been unreliable as well as incomplete. We assessed the codes assigned in relation to other information in the NCIS records in several ways, both directly for this purpose and in the course of other parts of the analysis. We do not know how the matching was done, which limited the potential to develop tests. However, we note that we found very few records where the UCoD code was implausible given other information in the NCIS record.

8.3 Sources of error in estimates of ISH

As described in Chapter 4, there are numerous potential sources of error which could adversely affect national suicide statistics. In this discussion we focus on three that are closely related to the data sources that we examined, the ABS mortality data file and the NCIS.

The main reason for under-enumeration of suicide in the ABS mortality data file appears to be the relative timing of certain events, complicated by the scanty information in some NCIS records (Section 7.3). These factors differ by jurisdiction, with potential to result in more complete identification of suicide in some jurisdictions than others.

8.3.1 Time-related misclassification

We found numerous instances of deaths that had been assigned UCoD codes not in the range usually reported as suicide but which clearly are cases that are codable as ISH, based on the extract of NCIS data as at January 2008. We also found a much smaller number of cases coded as ISH where review of NCIS data indicates that this is not correct.

It appears that the main source of this misclassification is factors related to the timing of certain steps in the process that generates mortality data.

The set of records found to be incorrectly coded as non-ISH (i.e. false negatives) have LCMS case closure dates that peak sharply in the period just before the publication date of *Causes of death, Australia, 2004* (see Figure 7.9). The set of ISH records lacking an UCoD code also show an upward step in LCMS closure at this time (Figure 7.7), which suggests that some cases in that group were also misclassified.

Given NCIS data as they are, the criterion used to identify cases as ISH and the choice of a cut-off date for reporting will determine the national ISH count obtained (Figure 7.10).

The time-course of ISH cases differs considerably by jurisdiction (Figure 7.6). Hence, the choice of cut-off date also has potential to bias ISH case counts by jurisdiction.

Since different methods were used by the ABS in earlier years (for example, ABS officers often attended Coroners' Offices and scrutinised files), it is possible that the extent of misclassification has changed over time. It was beyond the scope of this project to examine the time-course of undercounting of suicide. NCIS data exist for the period since mid-2000 (early 2001 for Queensland), so there is potential to extend the method used here to that period.

8.3.2 Ambiguity in identification of deaths as 'suicide'

The deaths considered for this study were (or will be) certified by the coroner who makes a finding. A forensic pathologist is often involved, and provides a medical cause of death. It might be thought that the resulting information would provide a clear basis for classification as suicide (or not) for statistical purposes.

Indeed, some NCIS records contain extensive, specific and detailed information about the cause and circumstances of a death and about a coroner's conclusion concerning the role of human intent. These cases, which are the minority, provide an excellent basis for deciding how to assign the case for statistical purposes.

At the other end of the spectrum, many NCIS records contain very scanty information relevant to the issue of deciding whether to assign them as being suicide cases. This is the norm for open NCIS cases, for which there is the related question of whether it is proper or meaningful to decide the question in advance of the coroner making a finding (though there is much more information in the NCIS records for open cases from some jurisdictions [e.g. Victoria] than others [e.g. Queensland]). However, the scantiness of the information in many closed cases also presents serious challenges to coders, and is a threat to valid coding.

Cause of death text

This was available to us for nearly all closed cases and for some open cases, although there are state-specific differences in what was available for open cases (see below). Words commencing 'suicid' (i.e. suicide, suicidal) are present in only 69 NCIS records of the more than 4,000 ISH deaths in 2004 and 2005. Terms referring to common means of suicide are more common, but text relating to cause of death can state the means (or mechanism) of death clearly while leaving intent unclear. For example, many consist only of the word 'hanging'. Many phrases are used that tend to imply that the author has concluded that death was by suicide, without actually saying so. It has been reported that coroners in Queensland indicate in their findings that a death was intentional by omitting a statement that it was not intentional (Walker et al. 2008).

This results in a sort of guessing game concerning the intent of the coroner on the matter of suicidal intent. We understand the often sensitive nature of this cause of death, and that some cases are truly hard to decide, but 'undetermined intent' is available when the coroner remains unsure after investigation. However, the sensitivity of suicide is one of the reasons there is interest in obtaining reliable statistics, and this form of writing coronial findings does not help achieve that goal.

Intent—Case Completion

This field is, as its name suggests, normally completed only after a case has been set from open to closed status. However, it is sometimes available for cases marked open: 916 (2%) of 38,356 records of deaths in 2004 and 2005 were open cases with *Intent – Case Completion* set to

a specific value. The most important category of this variable for this project is the one that means 'intentional self-harm', which is defined in the NCIS coding manual in terms very similar to the ICD-10 definition for the categories usually reported as ISH or suicide (X60–X84).

However, it is not entirely clear to us how the *Intent – Case Completion* item comes to be coded, nor under which precise circumstances it can be coded as 'intentional self-harm'. Is it only ever assigned after a coroner has made a finding of suicide? Apparently not, since we found 271 cases recorded as still being open in which *Intent – Case Completion* was coded as ISH.

In many NCIS records, *Intent – Case Completion* is pretty much the only basis for regarding the case as being due to ISH. This is so for cases which have no finding attached, or those with a finding that makes no clear statement about intent, and with nothing helpful in the *Cause of death* text fields.

In summary, we note that many records in the NCIS have scanty and/or unhelpfully vague or non-committal information about intent. This tends to force much reliance on the *Intent – Case Completion* item. That, in turn, raises questions about the exact origin of decisions to set this variable to the value meaning 'intentional self-harm', and the case definition(s) in the minds of the people making this assignment. We see potential value in working with the NCIS and coroners with the aims of (a) learning more about the assignment of *Intent – Case Completion* (and certain other codes relevant to this topic, such as *Incident Activity Details* Level 2 = 98.1); (b) informing coroners and their staff who enter data into the NCIS of the extent to which these coding decisions influence national statistics on suicide; and (c) seeking ways to enhance the relevant information content of NCIS records.

More fundamentally, there is potential benefit in studying certain terms used, the meaning attached to them, and the ways in which they are interpreted by providers and users of the mortality data on ISH. The most important terms are 'suicide' and 'intentional self-harm'. The key parties whose interpretation and application of these are important are coroners, the staff of Coroner's Offices responsible for coding and entering data into the NCIS, NCIS staff, ABS personnel responsible for mortality coding and people expert in interpretation of ICD-10 coding rules. As noted by Silverman et al. (2007b), ambiguous terminology and usage have the potential to lead to miscommunication concerning suicide and self-harm. The honours thesis by Leonie Dodds (2007) provides a starting point for investigations, which should be taken further and be put on a more formal footing.

The significance of their work for national mortality statistics is probably not a consideration for most coroners, yet the decisions they make, the basis on which they do so, and the way they record their decisions are the foundation on which national suicide statistics rest.

Ultimately, reliable suicide statistics depend on use of common terms and definitions. When rich case information is present in NCIS records, this can be used as the basis for assessing whether the decisions on assignment of those cases as ISH (or suicide) are consistent with a definition of interest. However, many NCIS records do not contain case information sufficient for such assessment, including those coded simply on the basis of the presence of an *Intent – Case Completion* value of ISH. In the absence of rich data, there is implicit reliance on the coding decisions taken by coroners' staff on the basis of coroners' decisions and written findings. There is at present no empirical basis for believing that these decisions are all made with the same criteria in mind, nor that the results, in terms of the types of cases thus included as ISH, are comparable.

8.3.3 State-specific differences in the content of NCIS records

NCIS records differ from one to another in information content. However, there are also state-specific patterns. In the context of this project, some of these had a significant impact on our ability to decide intent, and our confidence in doing so.

Some examples of differences follow.

Case summary in ‘*Incident address text*’ in most closed cases from Victoria

This case description, which ranges from a few words to a few sentences in length, is often extremely helpful for the purpose of assessing intent. Inclusion of something similar for cases from other jurisdictions would be enormously helpful.

Extent of information available to us for open cases

Several fields were available for open cases from some jurisdictions, but not from others. For example, *Incident Activity Details* and *Location* codes were available for some jurisdictions. *Incident Activity Details* Level 2 was particularly helpful, because code value 98.1 means self-inflicted harm. Analysis of closed cases shows that this value is a strong indication that the case will ultimately be assigned as ISH. Cause of death text was available for open cases from most jurisdictions, and was also helpful. Open cases from one jurisdiction (Queensland) provided neither cause of death text nor activity (nor much else) and were thus harder to process.

Availability of attachments (especially coroner’s finding) and the extent of information in attachments

An informative coroner’s finding can be by far the most useful part of an NCIS record. However, findings are not available for some states/territories, and those available for one state/territory are very often unhelpful, because they are so brief and vaguely worded, simply stating what the named person died from, for example, multiple injuries or suffocation, with no finding concerning intent.

Variation in coroners’ findings concerning intent

A related matter is the large difference between jurisdictions in the extent to which findings documents, when present, provide a clear statement of the conclusion that the coroner reached about the role of intent in the death on which findings are presented. Findings were not available for Queensland cases. A findings document was often available for South Australian cases, but was usually very brief and of no assistance on the matter of intent. In contrast, findings documents from Western Australia, Victoria and (more variably) New South Wales often included a forthright statement of conclusions concerning intent. Some findings, particularly those following an inquest, also include supporting or contextual comments on the reasoning that led to the decision.

Records with rich information on the finding have potential for validation that is lacking from those with minimal information. In particular, rich information, when available, provides a potential basis for assessment of whether the criteria for assigning *Intent – Case Completion* = ISH are similar or different between cases, jurisdictions and time periods. Doing this was beyond the scope of the present project.

These systematic differences in case information are likely to have effects on the quality of data. For example, if case data from one state/territory is consistently vague about intent, it is possible that relatively more cases from that jurisdiction will be coded as unintentional and fewer as ISH.

8.4 Impediments and solutions

There were two important impediments to this project related to data and methods, both of which could be overcome in similar studies in future.

8.4.1 Missing values of Underlying Cause of Death in the NCIS

This project was planned as an internal analysis of NCIS data, supplemented by aggregate-level comparisons with tables generated using separate ABS-sourced mortality data files.

We expected this to provide a satisfactory basis for using the NCIS to understand aspects of the ABS mortality data file because we were aware that, under arrangements between the NCIS and the ABS, certain data from the ABS mortality collection have, for some time, been provided to the NCIS for inclusion in their file. The most important of the ABS-sourced variables for the purposes of this project is the UCoD code.

This field, classified according to ICD-10, is the usual basis for reporting mortality statistics, including ISH counts and rates. We expected to be able to use this item in the NCIS to select sets of records that would be readily comparable with logically equivalent tables based on the ABS mortality data file. For example, we envisaged selecting all cases from each source with the same year of death and the same range of ICD-10 UCoD codes (such as X60–X84, a range commonly used to represent suicide).

In practice, this aspect of the project was complicated by problems with the *ICD-10 Cause of Death* data in the NCIS. The most important of these problems is that the UCoD was missing from many cases (about 13% of cases with *Year of death* = 2004). Two possible explanations for this set of cases were considered: that they were in the ABS mortality data file, but not matched in the NCIS, or that they were missing from the ABS mortality data file. We conclude that the former is the probable explanation (this would have been easy to confirm had we obtained permission to case-link data from the ABS mortality data file with NCIS data).

As shown in Section 6.4, the cases with missing values of UCoD were not a random subset of cases, complicating efforts to allow for the unmatched cases. This defect of the data prevented us from being able to undertake specific comparisons between NCIS-derived data and the ABS mortality data file, because it introduced uncertainty that obscured many matters that we wanted to study. Consequently, the project has focused more on internal analysis of the NCIS file than anticipated.

The utility of the UCoD values in the NCIS depends, to a large extent, on (a) all, or nearly all NCIS records being assigned an UCoD code and (b) assurance that this is the same code that is in the equivalent record in the ABS mortality data file. We recommend that the NCIS and ABS should try to achieve this, certainly for future years and preferably for all years since the start of the NCIS.

We also recommend that year of death registration should be added to the items of ABS-sourced data included in the NCIS, as the annual mortality data publications and files released by the ABS are mostly framed in terms of year of registration. The lack of this item in the NCIS complicated several aspects of the project.

8.4.2 Record linkage

The problems with the *ICD-10 Cause of Death* item in the NCIS would not be relevant for a study in which direct record linkage was undertaken between NCIS and the ABS mortality data file (or, equivalently, the National Death Index, held by the AIHW). In that case, the analyst would be able to use the UCoD in its 'native' setting (i.e. in the final form released by the ABS), so the copy available in 87% of NCIS records would be of much less importance.

There would be little technical difficulty linking the files. *Date of Death, Date of Birth, Sex* and certain other demographic items available for both sources are quite sufficient bases for good-quality probabilistic record linkage. In addition, linkage could use the death registration number that has been added to most NCIS records. This death registration number is supplied by the ABS and, like UCoD, is missing from many records, usually but not always the same ones. If linkage was to be done to the National Death Index (NDI), then the name information that exists in NCIS and NDI could also be used.

The potential obstacle to undertaking linkage is to obtain the permission of the relevant data custodians and institutional ethics committees.

Having undertaken this project without record linkage we conclude that linkage should certainly be the basis for a similar study in the future. With record linkage, we could have carried out more quickly and precisely work that took a great deal of time and labour to do less well with non-linked data.

8.5 Changes to ABS process

The ABS has introduced changes to its process for processing deaths due to external causes, which take into account the long time that elapses before some cases have been closed by the responsible coroner and recorded in the NCIS (ABS 2008c). These changes can be expected to improve the situation for the period starting with deaths registered on 1 January 2007.

The most important change for ISH is the introduction of a revision process for causes of death. Deaths registered before 2007 were processed only once by the ABS, and this had to be done before the release of the report of the causes of all deaths registered in the relevant calendar year (e.g. by March 2008 for deaths registered in 2006). Under the new system, causes of deaths certified by a coroner can be reviewed for at least 2 years after this (i.e. to March 2011 for deaths registered in 2007). The first release of cause data for deaths registered by a coroner in a given calendar year will continue to occur about 15 months after the end of that year (e.g. the first release of data on deaths registered in 2008 is expected to occur in March 2010). The ABS (2008c) has published this description of the new process:

The full Causes of Death publication relating to the 2007 Causes of Death, Australia (cat. no. 3303.0) will be published in Mar 2009. Following that release, Causes of death for 2007 coroner certified deaths will be updated as more information becomes available to the ABS. Revised data for 2007 will be published both on a year registration basis and a year of occurrence basis in the 2008 Causes of death publication, due to be released in

Mar 2010 and again in the publication relating to the 2009 collection due for release in 2011. Revisions will only impact on coroner certified deaths, as further information becomes available to the ABS about the causes of these deaths.

One aspect of the change has been enabled by alteration to the 2007 edition of the ICD-10 classification, which allows use of the categories for events of undetermined intent (Y10–Y34) in a wider range of circumstances, including when intent has not (yet) been specified. Based on our analysis of deaths in 2004, we think that likely effects of the introduction of the revision process will be that:

- ISH case counts at 15 months after the end of a registration year (i.e. at the current publication date) may be less complete than for recent years (due to there being less pressure to code all cases, irrespective of the adequacy of information available), but more reliable (i.e. fewer of the coded cases will have been misclassified).
- ISH case counts at 39 months after the end of a registration year (i.e. at the ABS' proposed finalisation date under the revised system) will be much more complete than the values reported in recent years. This is mainly because they will include cases finalised by coroners during the additional 2 years.
- If the time-course of case closure in the NCIS seen for deaths in 2004 remains similar in later years, and if the ABS relies solely on this source, then the new final values will not be entirely complete. Many NCIS records of deaths in 2004 remained open in January 2008, 36 months after the end of the reference year, and these include more than 100 cases with characteristics suggesting that they are likely to be ISH. Other ISH deaths might also be among open cases for which there was too little information in NCIS to allow us to make an assessment.

Although it is not possible to provide an exact prediction of the effect that this change will have on the completeness of future suicide data in Australia, our analysis suggests that it is likely that more than half of ISH deaths misclassified under the previous system will be correctly classified under the new approach. This proportion will be higher if the ABS review period is extended, or if fewer coroner cases remain open by the end of the proposed period.

8.6 Conclusions

Conventionally, coroners' decisions have been regarded as the basis on which official suicide statistics should rest. While most deaths as suicide acquire this status after closure of a coroner case and with the presence in the NCIS of an *Intent – Case Completion* value of ISH, the relationship between this code and the coroners' finding concerning intent is often unclear. The ABS has reported using a practice that allows the inclusion of some cases in which a coroner has not (yet) made a finding (ABS 2007b).

Figure 7.11 shows the slow and diminishing rate at which likely ISH cases acquired the status of having been closed by a coroner during the 21 months after the publication of *Causes of death, Australia, 2004*, and the large number of likely ISH cases that still did not have this status in January 2008.

This has implications for the production of suicide statistics in Australia. Three desirable attributes of such statistics are completeness (the count truly represents the number of ISH deaths that occurred), reliability of trends (measured values should rise or fall in proportion to changes in case occurrence), and timeliness (in order to be useful, statistics should be available soon enough after the period to which they refer).

8.6.1 Completeness

Analysis presented in this report leads us to conclude that the ABS mortality data, the source usually relied upon for statistics on suicide in Australia, under-estimated ISH to a significant extent, at least for deaths in 2004.

8.6.2 Reliability of trends

Further study is required to test whether ISH trends based on routine mortality data have been a reliable indicator of change in ISH mortality. It is possible that ISH has been under-estimated by a very similar proportion every year. If so, then trend estimates based on routine mortality data would be reliable, even though the value for each year is an under-estimate. However, there are several reasons to think that this is unlikely, including the trends in deaths coded to categories known to be the main destinations of misclassified ISH (see Table 2.4), and substantial changes in the data acquisition process, involving first no reliance, then some reliance, then full reliance on the NCIS as the means by which ABS obtains information on coroners' cases.

8.6.3 Timeliness

Findings from this study show that the time-course for closure by coroners of the last fifth or so of ISH cases is slow (Figure 7.11). Waiting for long enough might allow a complete count of the deaths that occurred in a year and that were found by a coroner to be due to ISH, but this certainly would not be a timely indicator. Ignoring these cases threatens the completeness of estimates and the validity of trends.

How can the marriage of completeness, reliability of trends and timeliness be achieved? Broadly, three approaches can be described, each with strengths and weaknesses:

1. Further relax adherence to the requirement that a coroner must have decided a case before allowing it to be counted as ISH in official statistics.
2. Use statistical modelling.
3. Hasten coroner case closure.

Approach 1 was used by the ABS for deaths in 2004. Some of the 2004 deaths coded as ISH had not been closed when *Causes of death, Australia, 2004* was published, at least according to data in the NCIS. The ABS has stated that deaths can be coded as ISH in the absence of a coroner's decision, provided information of certain other types is available (ABS 2007b). A version of this approach was used for the staged attribution of ISH described in Section 7.2.1 of this report.

An advantage of this method is its conceptual and administrative simplicity. Case selection criteria are widened, but otherwise the information system and the statistics produced remain the same.

This approach has limitations. First, there may be good public policy reasons to rely on a coroner's decision as the basis for deciding whether a death should be counted as ISH for statistical purposes. Coroners are public officials with a specific role and training relevant to this decision, and are likely to have available to them more evidence than is accessible through the NCIS, especially for open cases. (Note, however, the remarks below on the

desirability of achieving a better understanding of the criteria for coroners' decisions, and the consistency with which their decisions are made.)

Second, application of this method to the NCIS will not detect all ISH cases within an acceptable reporting period, because some cases will not yet have NCIS records, or the information in these is insufficient to satisfy the additional criteria for ISH. Also, this process is likely to be biased by jurisdiction, because of the jurisdiction-specific differences in information available in NCIS records, especially open ones.

Approach 2, statistical modelling, would use data up to a given date (say, 1 year after the year for which estimates are to be made), in combination with information about previous years, to estimate the final total number of ISH deaths that will ultimately be found by coroners (or found on the basis of some other criterion) to have occurred in a period of interest.

Approach 2 has the advantage that it can be applied at any point in time to produce an estimate of total number of ISH deaths that occurred in a period. However, if it is applied early (i.e. when most of the expected ISH cases for the period have yet to be confirmed by coroners), then the estimates produced will be less reliable than if it is applied later.

This method has the disadvantage that it has not yet been applied to the problem of estimating ISH, so its reliability has not yet been established. Also, the information system is susceptible to fluctuations resulting from administrative factors, which may turn out to be hard to model.

Approach 3 is included for logical completeness, since coroners' practices and the factors governing the timing of case closure are beyond the scope of this project. Increased communication with coroners concerning their significant role as the foundation for statistics on ISH and other external causes of death is desirable for other reasons, and perhaps such communication might reveal ways to obtain coroners' findings for statistical purposes in a timely manner.

In conclusion, the following points are offered as suggested responses to the findings of this report.

1. Concerning deaths registered before 2007:

- Analysis of data in the NCIS shows that it is not currently feasible to produce counts of suicide in Australia that are both timely and complete, particularly if case closure by a coroner is required before a case can be coded as ISH.
- The inclusion of deaths meeting certain criteria as being due to ISH, even though a coroner's finding is not yet available, and statistical modelling both have potential to provide estimates of ISH incidence that have better combinations of completeness and timeliness than the estimates available in recent years. Both methods have limitations, and require further investigation and careful implementation.
- Interpretation of suicide trends should be made with great caution until the time-course of under-ascertainment is known. The interpretation of data for the period starting in 2001 could be substantially improved by conducting a study similar to this one, but focusing on effects of misclassification on the estimation of trends. The study should be based on case-linkage of ABS and NCIS data. The same study could be used to develop and test the modelling approach described above.

2. Concerning deaths registered in 2007 and subsequently:

- The changed ABS process, described in Section 8.5 above, can be expected to produce estimates of ISH that occurred during a year that are ultimately more complete than those produced by the previous method, but several additional years will pass before the most complete estimates for that year become available (e.g. final estimates from the ABS for suicide deaths registered in 2007 will not be available until 2011). The new system is thus likely to provide a final estimate of suicide during a given year that is more complete but less timely than those provided by the previous system.
- The ABS' processing of cause data on deaths certified by coroners is limited fundamentally by the slowness of the coronial process. The NCIS has much the same constraint. Findings of this project suggest that the ABS was able to hasten record closure in the NCIS when approaching its publication deadline (though at the expense of case misclassification) but not the timing of case closure by coroners. Although not guaranteed to reveal a solution to this problem for statistical reporting, further communication with coroners and their administrative systems is surely a necessary step to finding a solution to this problem of mismatched timing of two separate administrative systems, one of which relies on the other.
- 'Suicide' and 'intentional self-harm' are complex ideas, subject to interpretation and differences in usage of the terms. Suicide statistics rely on judgments and interpretations by many people. Coroners deal with one death at a time, operate within a tradition that requires substantial evidence before finding that a death due to a self-inflicted harmful act was suicide, and are cautious in wording findings, being conscious of the potential effects of a finding of suicide. An approach to compiling suicide statistics that includes only the deaths designated as such by coroners is, thus, likely to be conservative, and to produce case counts lower than a population-based estimate of mortality attributable to suicide or self-harm.
- The information presently available in the NCIS is not sufficient to permit systematic application of a standard case definition of ISH that would allow for variation in coroners' criteria, judgments and use of terms, although it is sufficient to reveal the presence of such differences. Further investigation of the nature and extent of variation is warranted, along with ongoing collaboration with coroners that recognises and aims at strengthening their role in providing the foundation on which Australia's suicide statistics rest.

Appendix

Table A.1: Suicide deaths reported in Australian mortality data, 1964–2006

Year ^(c)	Cases ^(a)		Rates per 100,000 population ^(b)	
	Male	Female	Male	Female
1964	1,070	549	23.3	11.5
1965	1,070	608	22.3	12.4
1966	1,012	606	21.3	12.2
1967	1,125	653	23.0	12.9
1968	1,020	505	20.4	9.9
1969	1,025	477	20.3	9.1
1970	1,076	475	20.6	8.8
1971	1,150	588	20.9	10.4
1972	1,084	539	19.3	9.4
1973	1,035	492	18.0	8.3
1974	1,053	487	18.0	8.1
1975	1,050	478	17.6	8.0
1976	1,096	406	18.0	6.6
1977	1,127	438	18.1	7.0
1978	1,125	468	17.5	7.3
1979	1,198	479	18.2	7.2
1980	1,199	408	18.1	6.1
1981	1,259	413	18.7	6.1
1982	1,318	459	19.0	6.7
1983	1,308	418	18.6	5.9
1984	1,309	403	18.1	5.6
1985	1,428	399	19.1	5.3
1986	1,531	451	20.2	6.0
1987	1,773	467	23.3	6.0
1988	1,730	467	21.9	5.9
1989	1,658	438	20.6	5.4
1990	1,735	426	21.0	5.1
1991	1,847	513	22.2	6.0
1992	1,820	474	21.3	5.4
1993	1,687	394	19.6	4.5
1994	1,830	428	21.0	4.8
1995	1,872	495	21.1	5.5
1996	1,931	462	21.5	5.1
1997	2,146	577	23.6	6.2

(continued)

Table A.1 (continued): Suicide deaths reported in Australian mortality data, 1964–2006

Year ^(c)	Cases ^(a)		Rates per 100,000 population ^(b)	
	Male	Female	Male	Female
1998	2,150	533	23.2	5.6
1999	2,002	490	21.6	5.1
2000	1,864	503	19.9	5.2
2001	1,936	521	20.3	5.3
2002	1,817	503	18.8	5.0
2003	1,737	477	17.7	4.7
2004	1,661	437	16.8	4.3
2005	1,658	444	16.4	4.3
2006	1,398	401	13.6	3.8

(a) Deaths assigned UCoD codes from the range referring to suicide (ICD7, 8 and 9) or intentional self-harm (ICD-10).

(b) Age-adjusted using the population of Australia in 2001 as the reference.

(c) Calendar year of death registration.

References

A wide range of reference material was used in the compilation of this preliminary report. Much of the information concerning processes was sourced from the websites of the relevant agencies and in numerous personal communications over the years between the Director of NISU and a variety of agencies. In particular, the following websites were valuable sources of information:

- State and territory Registrars of Births, Deaths and Marriages
- Australasian Legal Information Institute (access to relevant state and territory legislation and regulations)
- National Coroners Information System
- Australian Bureau of Statistics
- National Centre for Classifications in Health

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List of tables

Table 2.1:	Number of suicide deaths in Australia according to ABS causes of death data by sex and year of death registration, 1997–2006	5
Table 2.2:	Number of suicide deaths registered in Australia by selected age groups and year of death registration, 1997–2006	5
Table 2.3:	Deaths coded as suicide by jurisdiction and year of registration, 1997–2006.....	6
Table 2.4:	Accidental threats to breathing, undetermined intent, unattended and ill-defined deaths by year of death registration, Australia, 1997–2006.....	6
Table 2.5:	Number of suicide deaths by selected external cause groups and year of death registration, Australia, 1997–2006.....	8
Table 5.1:	Flags applied to NCIS data.....	28
Table 5.2:	Process for assignment of ISH status	31
Table 6.1:	Number of cases in each group by gender, Year of death = 2004.....	39
Table 6.2:	Age comparison of each group, Year of death = 2004.....	39
Table 6.3:	Case jurisdiction by group, Year of death = 2004.....	40
Table 6.4:	Number of cases in each group by cases status, Year of death = 2004.....	40
Table 6.5:	Information in the NCIS on open cases in Groups A and F, deaths occurring in 2004.....	41
Table 6.6:	ABS codes assigned in Group B cases, deaths registered in 2004	43
Table 6.7:	ISH according to NCIS and other cause according to ICD-10 Cause of Death, deaths in 2004.....	45
Table 6.8:	Group C cases, ICD-10 Cause of Death by selected ICD-10 codes by jurisdiction, deaths registered in 2004	46
Table 6.9:	ICD-10 assigned codes for Group F cases, deaths during in 2004	48
Table 6.10:	ISH deaths according to the ABS mortality data file and ABS-coded data in NCIS, deaths occurring in 2004	50
Table 6.11:	ISH deaths according to the ABS mortality data file and NCIS Intent – Case Completion, deaths occurring in 2004	51
Table 6.12:	Selected variables in NCIS by whether an UCoD code is present in the record, deaths occurring in 2004	53
Table 6.13:	Selected variables in NCIS by whether an UCoD code is present in the record, deaths occurring in 2004 for which Intent – Case Completion = ISH	54
Table 7.1:	Assignment as ISH of NCIS records by stage of processing, deaths in 2004, Australia.....	58
Table 7.2:	NCIS records of deaths in 2004 by ISH assignment and ABS-originated UCoD codes, Australia.....	59
Table 7.3:	Categories of cases that were checked for retention as ISH.....	60
Table 7.4:	Deaths assigned as ISH that occurred in Australia during 2004 by case group and sex	62
Table 7.5:	Deaths assigned as ISH according to ABS mortality data and NCIS by jurisdiction, deaths during 2004	63

Table 7.6:	Resulting proportions of self-harm when coders use different coding standards – for Groups B, C, E and F, deaths in 2004	65
Table 7.7:	Estimated cases of self-harm for Groups B, C, E and F based on two criteria tests in the recoding feasibility study, deaths in 2004.....	66
Table 7.8:	Estimated cases of intentional self-harm for all groups based on coding criteria and data in the NCIS, deaths in 2004.....	66
Table 7.9:	Comparison of ISH according to the ABS data file mortality and the NCIS data	83
Table 7.10:	ISH according to ABS mortality data file	84
Table 7.11:	Closed ISH cases in the NCIS as at publication date of Causes of death, Australia, 2004.....	84
Table 7.12:	Closed ISH cases in NCIS as at date of extract (January 2008).....	85
Table 7.13:	All ISH cases in NCIS as at date of extract (8 January 2008).....	85
Table A.1:	Suicide deaths reported in Australian mortality data, 1964–2006	100

List of figures

Figure 2.1:	All ages age-adjusted rates of suicide by sex, deaths registered in Australia 1965-2006.....	7
Figure 3.1:	Organisations and processes involved in recording and processing information on deaths in Australia.....	11
Figure 3.2:	Length of time from case completion in coroner-investigated deaths to registration in NCIS as closed in Australia, 2002-2006.....	16
Figure 6.1:	‘Intentional self-harm’ according to Intent – Case Completion code and ICD-10 Cause of Death code, NCIS cases with Year of death = 2004.....	38
Figure 7.1:	Mechanism of Injury by case group, deaths assigned as ISH that occurred in Australia during 2004 and had NCIS Case Status = Closed by January 2008	61
Figure 7.2:	Deaths assigned as ISH that occurred in Australia during 2004 by case group and age at death.....	62
Figure 7.3:	From Date of Death to Coroner Closed date by case type, deaths during 2004, Australia	68
Figure 7.4:	Date of publication (14 March 2006) to Coroner Closed date, deaths during 2004, Australia	69
Figure 7.5:	Coroner Closed date in relation to publication date (14 March 2006) by ICD-10 Cause of Death code: ISH occurring during 2004, Australia	70
Figure 7.6:	From Coroner Closed date to ABS publication date (14 March 006): ISH cases selected using all NCIS data, deaths in 2004, Australia, by jurisdiction.....	72
Figure 7.7:	Date Case Closed in local coroner management system (LCMS) by case type, deaths during 2004, Australia.....	74
Figure 7.8:	Coroner Closed date by case type, deaths during 2004, Australia.....	74
Figure 7.9:	ISH cases according to whether ICD-10 Cause of Death = ISH by month of case closure in LCMS, deaths during 2004, Australia	76
Figure 7.10:	ISH cases identifiable in the NCIS by January 2008: cumulative counts in calendar year of case closure by coroner and by LCMS, deaths during 2004, Australia	77
Figure 7.11:	ISH cases identifiable in the NCIS by January 2008: cumulative counts and proportions of count as at 14 March 2006 according to date of case closure by coroner and by LCMS, deaths during 2004, Australia	78
Figure 7.12:	Closure of ISH cases in the NCIS during the period between publication (14 March 2006) and the end of 2007 by jurisdiction, deaths during 2004, Australia	79
Figure 7.13:	Closure of cases in the NCIS with ICD-10 Cause of Death = ISH during the period between publication of Causes of death, Australia, 2004 and the end of 2007 by jurisdiction, deaths during 2004, Australia	80