

Part V: Sudden unexpected deaths in infancy, 2013–14

Chapter 8 - Sudden unexpected deaths in infancy

This section provides details of sudden unexpected infant deaths.

Key findings

- There were 43 cases of sudden unexpected death in infancy (SUDI) in 2013–14, a rate of 69.9 deaths per 100,000 infants (aged under 1 year). Over the last five reporting periods there have been between 43 and 55 SUDI deaths each year.
- Nineteen deaths were attributed to Sudden Infant Death Syndrome (SIDS) and undetermined causes (of the 25 SUDIs with an official cause of death). Official causes of death were still pending for 18 deaths.
- Six of the sudden and unexpected infant deaths were found, following post-mortem examination, to have an explained cause of death. All six infants died as a result of illnesses unrecognised prior to their deaths. These deaths are included in this chapter, however they are also included in the chapter relating to the specific cause of the deaths.
- Aboriginal and Torres Strait Islander infants are over-represented in SUDI deaths. During 2013–14, they died suddenly and unexpectedly at four times the rate of non-Indigenous infants.

Child death and injury prevention activities

Data requests

The CCYPCG provided data from the Queensland Child Death Register for one data request relating to SUDI deaths to inform research. The information included complex summaries of circumstances of slow suffocation deaths to inform safe sleeping and safe infant handling research undertaken by the University of the Sunshine Coast.

Research collaborations and grants

CCYPCG supported research activities and initiatives with a number of stakeholders including the University of Sunshine Coast trial of a safe sleep enabler, known as Pepi-Pod, for vulnerable infants in high risk shared sleep environments. The CCYPCG was also involved in the development of a survey relating to baby sling carriers for the Queensland University of Technology.

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Sudden unexpected deaths in infancy, 2013–14

A copy of Table 8.1 containing data since 2004 is available online at www.qfcc.qld.gov.au

Table 8.1: Summary of sudden unexpected deaths in infancy in Queensland, 2009–2014

	2009–10		2010–11		2011–12		2012–13		2013–14		Yearly average
	Total <i>n</i>	Rate per 100,000	Total <i>n</i>	Rate per 100,000	Total <i>n</i>	Rate per 100,000	Total <i>n</i>	Rate per 100,000	Total <i>n</i>	Rate per 100,000	Rate per 100,000
All sudden unexpected deaths in infancy (SUDI)											
Sudden unexpected deaths in infancy	53	85.2	55	89.0	51	84.8	48	78.0	43	69.9	83.1
Sex											
Female	14	46.5	21	70.0	20	67.8	20	66.9	20	66.9	64.4
Male	39	121.7	34	107.0	31	101.1	28	88.5	23	72.7	101.1
Aboriginal and Torres Strait Islander status											
Indigenous	18	352.9	10	199.2	11	226.2	9	178.3	12	237.8	246.8
Non-Indigenous	35	61.3	45	79.3	40	72.3	39	69.1	31	54.9	68.7
Geographical area of usual residence (ARIA+)											
Remote	5	147.2	6	183.0	7	220.8	2	*	3	*	145.1
Regional	27	123.6	23	106.1	23	109.2	24	113.2	20	94.4	111.1
Metropolitan	20	54.2	25	67.9	21	58.5	20	53.7	20	53.7	59.0
Socio-economic status of usual residence (SEIFA)											
Low to very low	26	101.5	29	114.1	27	109.2	25	99.3	31	123.2	111.7
Moderate	12	97.6	12	98.3	7	59.1	9	74.6	6	49.7	77.6
High to very high	14	57.7	13	53.8	17	72.1	12	49.4	6	24.7	52.6
Known to the child protection system											
Known to the child protection system	8	6.2	14	9.3	19	11.7	10	6.0	14	8.4	8.0
Unexplained SUDI											
Unexplained SUDI	41	65.9	44	71.2	39	64.8	34	55.3	37	60.1	64.8
<i>Sudden infant death syndrome</i>	34	54.7	36	58.3	34	56.5	25	40.6	13	21.1	47.2
<i>Undetermined causes</i>	7	11.3	8	12.9	5	8.3	5	8.1	6	9.8	10.3
<i>Cause of death pending</i>	0	0.0	0	0.0	0	0.0	4	6.5	18	29.3	7.3
Explained SUDI											
Explained SUDI	12	19.3	11	17.8	12	19.9	14	22.8	6	9.8	18.3
<i>Unrecognised infant illness</i>	10	16.1	9	14.6	7	11.6	7	11.4	6	9.8	13.0
<i>Other non-intentional injury / Sleep accident</i>	2	*	1	*	4	6.6	5	8.1	0	0.0	*
<i>Fatal assault</i>	0	0.0	1	*	1	*	2	*	0	0.0	*

Data source: Queensland Child Death Register (2009–14)

* Rates have not been calculated for numbers less than 4.

- Notes:
1. Data presented here are current in the Queensland Child Death Register as at June 2014, and thus may differ from those presented in previously published reports.
 2. Rates are based on the most up-to-date denominator data available and are calculated per 100,000 children (in the age/sex/Indigenous status) in each year. ARIA and SEIFA rates are calculated per 100,000 infants under 1 year.
 3. The number of children known to the child protection system represents the number of children whose deaths were registered in the reporting period who were known to the Department of Communities in the 3 years prior to their death.
 4. Rates of SUDI for 'Known to the child protection system' are calculated per 100,000 children aged 0–17 years in Queensland, instead of per 100,000 infants under the age of 1 year, in order to provide a comparable rate.
 5. ARIA and SEIFA were not able to be calculated for children whose usual place of residence was not Queensland.
 6. Average annual rates have been calculated using the estimated resident population data at June 2011 (the mid-point for the period).

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The classification of sudden unexpected deaths in infancy

Sudden unexpected death in infancy (SUDI) is a research classification and does not correspond with any single medical definition or categorisation. Rather, the aim of this grouping is to report on the deaths of apparently well infants who would be expected to thrive yet, for reasons often unknown, die suddenly and unexpectedly. Grouping deaths in this way assists in the identification of possible risk factors and associations for sudden infant death and, most significantly, those factors that may be preventable or amenable to change.

The Police Report of Death to a Coroner (Form 1), which includes a summary of the circumstances surrounding the death as initially reported,⁵⁵ is used to identify relevant deaths. The circumstances of the death must meet all of the following criteria to be included in the SUDI grouping:

- child less than 1 year of age
- sudden in nature
- unexpected, with no previously known condition that was likely to cause death, and
- no immediately obvious cause of death.

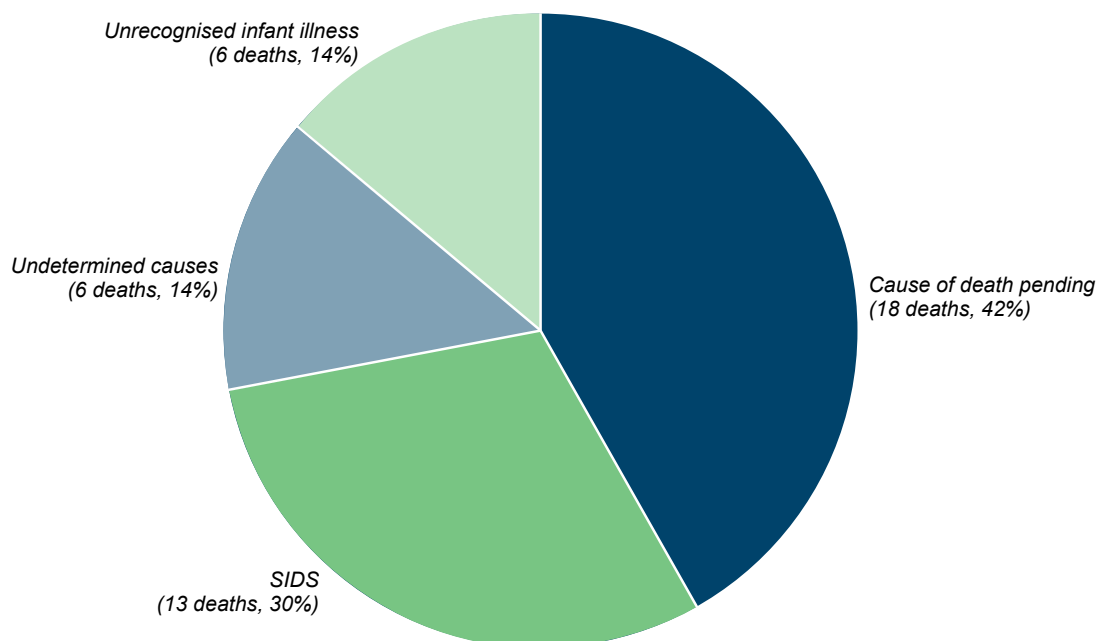
The SUDI grouping includes deaths found to be associated with infections or anatomical/ developmental abnormalities not recognised before death, sleep accidents due to inhalation of gastric contents, and deaths that initially present as sudden and unexpected but are revealed by investigations to be the result of non-accidental injury. It also includes deaths due to Sudden Infant Death Syndrome (SIDS) and infant deaths where a cause could not be determined.⁵⁶

Sudden unexpected deaths in infancy: Findings, 2013–14

There were 43 cases of SUDI in 2013–14, a rate of 69.9 deaths per 100,000 infants (an infant mortality rate of 0.7 per 1000 live births). Over the last five reporting periods there have been between 43 and 55 SUDI deaths each year.

Figure 8.1 shows the cause of death breakdown for cases of SUDI.

Figure 8.1: Sudden unexpected deaths in infancy by cause of death, 2013–14



Data source: Queensland Child Death Register (2013–14)

55. In Queensland, section 8 of the *Coroners Act 2003* requires that all violent or unnatural/unusual deaths be reported to a coroner. All unexpected infant deaths fall within that description. All cases of SUDI require a comprehensive investigation, which should include a full autopsy, examination of the death scene and review of the clinical history.

56. Cases of SUDI that were explained at post-mortem are also counted and discussed in the chapter appropriate to their cause of death. Deaths found at autopsy to be caused by previously unrecognised illnesses or congenital anomalies are counted in Chapter 2, Deaths from diseases and morbid conditions.

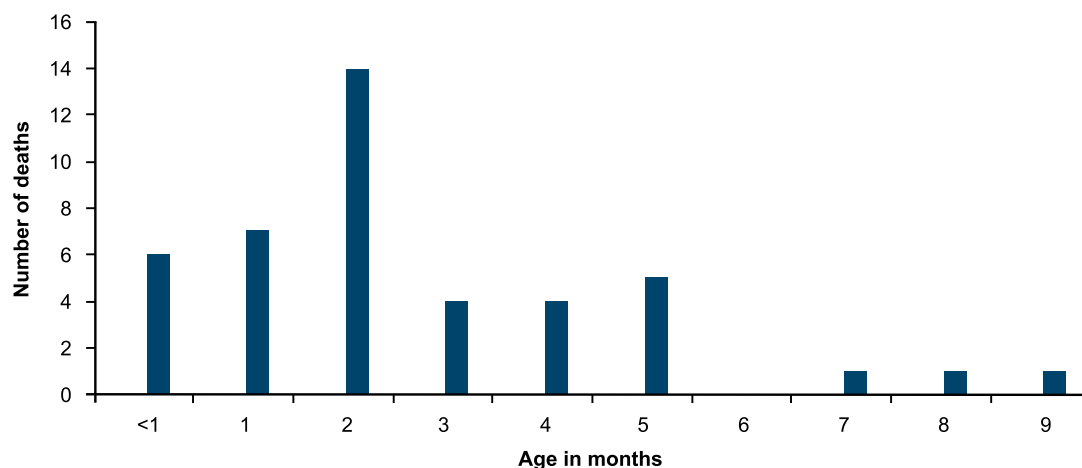
Sex

Of the 43 infants who died, 23 were male and 20 were female.

Age

Figure 8.2 shows SUDIs by age at death. Infants' age ranged from 3 days to 9 months. The majority of deaths occurred among infants aged less than six months (40 of the 43 deaths).

Figure 8.2: Sudden unexpected deaths in infancy by age at death, 2013–14



Data source: Queensland Child Death Register (2013–14)

Aboriginal and Torres Strait Islander status

Twelve of the 43 infants who died suddenly and unexpectedly were identified as Aboriginal and Torres Strait Islander (27.9%). Indigenous infants died suddenly and unexpectedly at four times the rate of non-Indigenous infants, with 237.8 deaths per 100,000 Indigenous infants, compared with 54.9 deaths per 100,000 non-Indigenous infants.

Geographical area of usual residence (ARIA+)

Twenty infants who died were from metropolitan areas of Queensland (94.4 deaths per 100,000 infants) and 20 were from regional areas (53.7 deaths per 100,000). Three SUDI deaths were infants from remote areas.

Socio-economic status of usual residence (SEIFA)

The highest number and rate of SUDI occurred in infants from low to very low socio-economic areas (31 deaths, 123.2 per 100,000). This was followed by infants from moderate socio-economic areas (6 deaths, 49.7 per 100,000). Six SUDI deaths were infants from high to very high socio-economic areas (24.7 per 100,000).

Children known to the child protection system

Of the 43 infants who died suddenly and unexpectedly, 14 were known to the child protection system (32.6%). Information sources available to the Commission also enable the identification of cases where, while the deceased infant had not come to the attention of the Department of Communities, the infant's siblings had. In a further three cases, the deceased infant's siblings or parents were known to the child protection system.

Cause of death

Cases of SUDI are grouped broadly into two categories:

- **Unexplained SUDIs** – those infant deaths where a cause of death could not be determined (including SIDS and undetermined cases and those with a cause of death pending).
- **Explained SUDIs** – infant deaths where a cause of death was not immediately obvious however post-mortem examinations were able to identify a specific reason for the death (including unrecognised infant illnesses, sleep accidents and deaths as a result of non-accidental injury).

Unexplained sudden unexpected deaths in infancy

At the time of reporting there were 37 unexplained SUDIs from 2013–14. Nineteen infants had been classified as having an unexplained cause of death following post-mortem examination, and for a further 18 the cause of death had not yet been ascertained.

SIDS and undetermined causes

The definition of SIDS applied in this report and currently accepted by most experts within Australia⁵⁷ is as follows:

The sudden, unexpected death of an infant under one year of age, with onset of the fatal episode apparently occurring during sleep, that remains unexplained after a thorough investigation including performance of a complete autopsy and review of the circumstances of death and the clinical history.

Cases of SUDI are classified as ‘undetermined’ if:

- natural disease processes are detected that are not considered sufficient to cause death but that preclude a diagnosis of SIDS
- there are signs of significant stress
- non-accidental but non-lethal injuries are present, or
- toxicology testing detects non-prescribed but non-lethal drugs.

Further classification of the 19 unexplained SUDIs in 2013–14 identified:

- 13 deaths were Sudden Infant Death Syndrome (SIDS), and
- 6 deaths with cause undetermined.

When considering SIDS alone, the rate of death was 21.1 per 100,000 infants (an infant mortality rate of 0.2 deaths per 1000 live births).

Risk factors for SIDS

Infant, parental and environmental factors have been associated with an increased risk of SIDS.

Infant factors relate to the vulnerability of the infant and include:

- prematurity (less than 37 weeks gestation) and low birth weight (less than 2500 grams)
- multiple gestation (twins, triplets)
- neonatal health problems
- male sex, and
- history of minor viral respiratory infections and/or gastrointestinal illness in the days leading up to death.

57. Krous H et al, (2004) ‘Sudden infant death syndrome and unclassified sudden infant deaths: a definitional and diagnostic approach’, *Paediatrics*, vol 114, pp 234–8.

Parental factors include:

- cigarette smoking during pregnancy and after birth
- young maternal age (≤ 20 years)
- single marital status
- high parity (number of births by mother) and short intervals between pregnancies
- poor or delayed prenatal care, and
- high-risk lifestyles, including alcohol and illicit drug abuse.

Environmental factors include:

- poor socio-economic status (social disadvantage and poverty)
- sleeping on soft surfaces and loose bedding
- prone (on stomach) sleeping position and side sleeping position
- overwrapping/overheating, and
- some forms of shared sleeping.

A number of known SIDS risk factors were found in these deaths. Table 8.3 (over page) provides a summary of known risk factors for the 37 cases of unexplained SUDI.

Infant sleep position

Table 8.2 shows the position of infants, when placed for sleep or when found, whose deaths were classified as unexplained SUDI.

Table 8.2: Unexplained SUDI by sleep position and position when found, 2013–14

Sleep position	SIDS <i>n</i>	Undetermined <i>n</i>	Cause of death pending <i>n</i>	Total <i>n</i>
Position when placed to sleep				
Back	6	5	8	19
Stomach	3	0	1	4
Side	3	1	2	6
Unknown	1	0	7	8
Total	13	6	18	37
Position when found				
Back	5	2	6	13
Stomach	3	3	5	11
Side	3	0	2	5
Other	2	0	1	3
Unknown	0	1	4	5
Total	13	6	18	37

Data source: Queensland Child Death Register (2013–14)

Table 8.3: Summary of SIDS risk factors in cases of unexplained SUDI, 2013–14

Cause of death	Indigenous	Infant factors			Parental factors			Environmental factors					Known to child protection system
		Low birth weight	Pre-term birth	Young maternal age	Smoking	Drugs/alcohol	Shared sleeping	Sleep surface	Prone/side sleeping	Chaotic social circumstances	Low SES		
SIDS total (13)	5	2	2	2	6	7	8	6	8	11	4 (5*)		
SIDS					✓	✓		bassinet	✓	✓	✓		
SIDS	✓		✓				✓	mattress on floor	✓	✓			
SIDS	✓				✓	✓	✓	adult bed	✓	✓	✓		
SIDS	✓		✓		✓	✓	✓	adult bed	✓	✓	*		
SIDS							✓	adult bed	✓				
SIDS								adult bed		✓			
SIDS					✓	✓	✓	mattress on floor	✓	✓			
SIDS	✓				✓	✓	✓	mattress on floor	✓	✓			
SIDS		✓			✓	✓	✓	adult bed	✓	✓	✓		
SIDS						✓		port-a-cot	✓	✓			
SIDS	✓							port-a-cot	✓	✓			
SIDS						✓	✓	mattress on floor	✓	✓	✓		
SIDS								port-a-cot	unk				
Undetermined total (6)	2	1	0	0	5	4	3	1	4	5	3 (3*)		
Undetermined					✓	✓	✓		✓	✓	✓		
Undetermined	✓				✓	✓	✓	mattress on floor	✓	✓	✓		
Undetermined					✓	✓		adult bed	✓	✓	✓		
Undetermined					✓	✓		bassinet	✓	✓			
Undetermined								adult bed	✓				
Undetermined		✓			✓			cot		✓			
Undetermined	✓				✓	✓	✓	adult bed	✓	✓	✓		

Cause of death	Indigenous	Infant factors		Parental factors			Environmental factors				Known to child protection system
		Low birth weight	Pre-term birth	Young maternal age	Smoking	Drugs/alcohol	Shared sleeping	Sleep surface	Prone/side sleeping	Chaotic social circumstances	
Pending total (18)	3	3	3	1	2	6	8	3	9	12	5 (7*)
Pending					✓	✓		3	✓	✓	*
Pending		✓	✓				✓			✓	
Pending											
Pending						✓			✓		
Pending			✓						✓		✓
Pending		✓		✓				✓	✓	✓	
Pending	✓					✓			✓	✓	✓
Pending		✓					unk	unk		✓	
Pending							✓		✓	✓	✓
Pending										✓	
Pending							✓			✓	
Pending					✓					✓	✓
Pending							✓			✓	*
Pending							✓			✓	
Pending								✓		✓	
Pending	✓					✓				✓	✓
Total (37)	10	6	5	3	13	17	19	10	21	28	12 (15*)

Data source: Queensland Child Death Register (2013–14)

✓ = Risk factor identified for the infant based on the evidence available at the time of reporting.

n/a = Not applicable – not a sleep-related incident.

unk = Information not recorded/unknown.

* Family of infant known to child protection system refers to those cases where information available to the Commission identifies that the infant's family were known to the Department of Communities prior to the infant's death.

Notes: 1. Young maternal age refers to mothers aged 20 or younger.

2. Low SES refers to location of incident as opposed to area of usual residence.

3. 'Prone/side sleeping' refers to the position the child was put to sleep.

4. Drug and/or alcohol use includes both current and historical use of either or both parents.

5. Chaotic social circumstances refers to social factors such as parental criminal history, domestic and family violence, parental mental health issues present within the infant's life.

Shared sleeping with other risk factors

Nineteen of the 37 infants whose deaths were classified as unexplained SUDI were sharing a sleep surface with one or more people at the time of death (8 SIDS, 3 undetermined, 8 cause pending). Of these 19 infants:

- 6 were sharing a sleep surface with one other person, and
- 13 were sharing with two or more people.

Evidence of habitual smoking or smoking during pregnancy was found in 10 of the 19 deaths in which shared sleeping was reported. Additionally, evidence of habitual drug/ alcohol use or drug/alcohol use at the time of the sleep incident was noted in 11 deaths where co-sleeping was identified.

Sharing a sleep surface with a baby increases the risk of SIDS and fatal sleep accidents in some circumstances.⁵⁸ Some studies have found that there is an increased risk of SIDS only when mothers who smoke share a bed with their infant, although such findings are insufficient to enable complete reassurance that bed sharing is safe for non-smokers. Risks are also associated with shared sleeping if infants are sharing a sleep surface with a caregiver who is under the influence of alcohol or drugs that cause sedation, if the caregiver is excessively tired or there are multiple people in the bed with the infant.

Aboriginal and Torres Strait Islander status

Ten of the 37 infants whose deaths were classified as unexplained SUDI were Aboriginal and Torres Strait Islander. Aboriginal and Torres Strait Islander infants were over-represented in cases of unexplained SUDI, dying at a rate four times that of non-Indigenous infants, with 198.1 deaths per 100,000 Indigenous infants, compared with 47.8 deaths per 100,000 non-Indigenous infants.

Explained sudden unexpected deaths in infancy

In 2013–14, six infants of the 43 SUDI deaths were classified as having an explained cause of death following post-mortem examination. All six infants died as a result of illnesses unrecognised prior to their deaths. These deaths are included in this chapter (as sudden and unexpected), however are also included in the chapter relating to the specific cause of the deaths.

Table 8.4 shows the breakdown of explained SUDI by cause of death.

Table 8.4: Explained SUDI by cause of death, 2013–14

Cause of death	Total <i>n</i>
Unrecognised infant illness	6
<i>Certain infectious and parasitic diseases</i>	2
Viral infection of unspecified site (B34)	1
Other sepsis (A41)	1
<i>Diseases of the circulatory system</i>	1
Cardiomyopathy (I42)	1
<i>Diseases of the respiratory system</i>	2
Bacterial pneumonia, not elsewhere classified (J15)	1
Pneumonia, organism unspecified (J18)	1
<i>Congenital malformations, deformations and chromosomal abnormalities</i>	1
Congenital malformations of cardiac septa (Q21)	1
Total	6

Data source: Queensland Child Death Register (2013–14)

Note: 1. ICD-10 underlying cause of death code included in parentheses.

58. Blair, PS, Fleming, PJ, Smith, IJ, Platt, MW, Young, J, Nadin, P, Berry, PJ, Golding, J and the CESDI SUDI research group (1999). 'Babies sleeping with parents: case-control study of factors influencing the risk of the sudden infant death syndrome', *BMJ*, vol 319, pp 1457–61.

Death certification

Queensland Health has advised that paediatric autopsies are among the most complex forms of autopsies undertaken. Within the specific context of SUDI, following the development of a new definition of SIDS in 2004 (termed the San Diego definition), all cases of SUDI optimally require the performance of a complete autopsy (including toxicology, microbiology, radiology, vitreous chemistry and metabolic screening studies).⁵⁹ There is also an additional focus on establishing that there is no evidence of unexplained trauma, abuse, or unintentional injury before a classification of SIDS can be assigned. This frequently involves more extensive gross and microscopic examination during autopsy than in cases of explained infant and child deaths.

Queensland Health also reports an increase in the number and complexity of autopsies that are performed since the introduction of the *Coroners Act 2003*, which has led to more in-hospital deaths being deemed reportable.⁶⁰ These autopsies are frequently more complex due to the presence of multiple co-morbidities.

The above factors contribute to a high proportion of SUDI cases (18 of 43) pending death certification at time of reporting.

59. See Krous, HF, Beckwith, B, Byard, R, Rognum, TO, Bajanowski, T, Corey, T, Cutz, E, Hanzlick, R, Keens, TG & Mitchell, EA (2004). 'Sudden infant death syndrome and unclassified sudden infant deaths: A definitional and diagnostic approach', *Pediatrics*, 114(1), 234–238.

60. Under section 7(3)(a) of the *Coroners Act 2003* a reportable death includes a death that was not reasonably expected to be the outcome of a health procedure.