

11. REVIEW OF PERINATAL DEATHS 2002

Introduction

This chapter presents the results of perinatal death reviews carried out by the NSW Maternal and Perinatal Committee, which is a quality assurance committee established under the *Health Administration Act 1982*. The Committee is privileged under the Act to carry out confidential reviews of maternal and perinatal deaths.

NSW Department of Health Circular No. 2002/6 describes hospital procedures for review and reporting of perinatal deaths. The circular is available on the Department's web site at: www.health.nsw.gov.au/fcsd/rmc/cib/circulars/2002/cir2002-6.pdf. The Maternal and Perinatal Committee carries out reviews of perinatal deaths occurring among fetuses or infants of at least 22 weeks gestation or at least 500 grams birthweight. The criteria used by the NSW Midwives Data Collection (MDC) for reporting of births is at least 400 grams birthweight or at least 20 weeks gestation. The Maternal and Perinatal Committee reviews deaths that have a slightly higher threshold to focus attention on deaths that are more likely to be preventable.

Perinatal deaths were reviewed by the Committee's Perinatal Outcomes Working Party. Both stillbirths and neonatal deaths were classified according to an obstetric cause-specific classification, the Australia and New Zealand Antecedent Classification of Perinatal Mortality (ANZACPM). Neonatal deaths were also classified by neonatal cause according to the Australia and New Zealand Neonatal Death Classification.

Of the 637 perinatal deaths of at least 22 weeks gestation or at least 500 grams birthweight reported to the NSW Midwives Data Collection in 2002, confidential reports on 613 (96.2 per cent) were reviewed and classified. Of the 424 stillbirths and 213 neonatal deaths reported to the MDC, reviews were carried out on 411 (96.9 per cent) and 202 (94.8 per cent) respectively.

Comparative information is also presented for 2001. Figures presented for 2001 may differ from those in the *NSW Mothers and Babies 2001* report as additional information on some deaths in 2001 was received after the report was published.

Trends in obstetric antecedents of perinatal death

Between 2001 and 2002 there was a reduction in the proportion of unexplained antepartum deaths, from 31.0 to 26.3 per cent (Figure 22, Table 126). This was associated with an increase in the proportion of deaths for which postmortem examinations were carried out — from 27.1 per cent in 2001 to 30.3 per cent in 2002; and an increase in the proportion of deaths for which placental histopathology examinations were carried out — from

75.0 per cent in 2001 to 79.0 per cent in 2002. There was an increase in the proportion of deaths attributed to fetal growth restriction, fetal abnormality, antepartum haemorrhage and maternal conditions.

Obstetric antecedents of perinatal death 2002

1. Congenital abnormality

Congenital abnormalities were the underlying cause for 103 deaths (Table 127). Chromosomal abnormalities were most common ($n=25$, 24.3 per cent). Of these, 8 were trisomy 13, 7 were trisomy 18, 4 were trisomy 13, 3 were Turner syndrome, and 3 were other abnormalities.

Twenty-five deaths were associated with abnormalities of the central nervous system (24.3 per cent), of which 18 were neural tube defects. Seventeen deaths occurred among babies who had multiple abnormalities not associated with a chromosomal abnormality. Eight deaths were associated with congenital diaphragmatic hernia.

2. Perinatal infection

Twenty-seven deaths were found to be due to infection, of which 17 were stillbirths and 10 were neonatal deaths. In 16 deaths there was an associated chorioamnionitis.

The most common infective organism identified was group B streptococcus, which was considered responsible for 4 neonatal deaths and 3 stillbirths. Four neonatal deaths were caused by *E. Coli* infection. Four stillbirths followed cytomegalovirus infection and one was associated with an *E. faecalis* infection. One neonatal death was attributed to cardiomyopathy caused by a Cocksackie virus infection. The causative organism was not specified for 10 deaths.

3. Hypertension

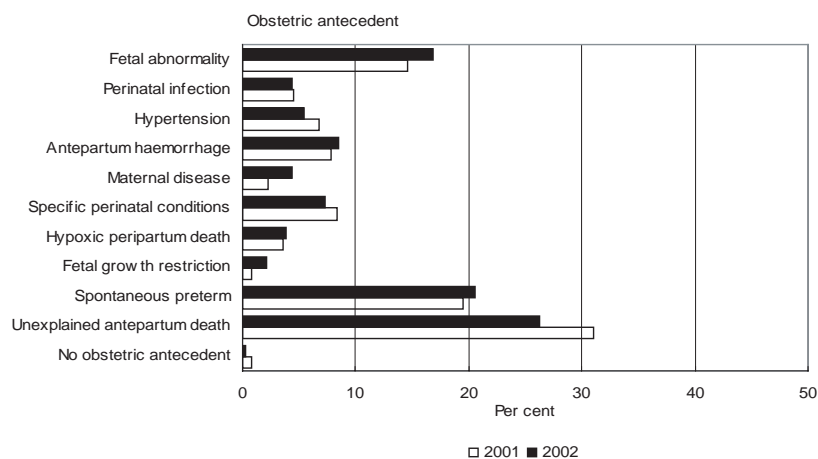
Thirty-four (5.6 per cent) deaths were considered to be due to maternal hypertension, with the majority ($n=28$, 82.4 per cent) occurring in mothers with pre-eclampsia. There were twenty stillbirths and 14 neonatal deaths. Four deaths were among babies of twin pregnancies. Three deaths in this group were associated with placental abruption. Two deaths were associated with maternal diabetes, and one with hyperthyroidism.

4. Antepartum haemorrhage

Fifty-two deaths were due to antepartum haemorrhage, of which 40 were due to placental abruption, and 1 was due to placenta praevia. There were thirty-five stillbirths, of whom 3 died during labour, and 17 were neonatal deaths. Six cases of placental abruption were associated with a twin pregnancy. Three cases were associated with maternal hypertension.

FIGURE 22

PERINATAL DEATHS BY OBSTETRIC ANTECEDENT AND YEAR, NSW 2001–2002



Source: NSW Maternal and Perinatal Committee, NSW Department of Health.

TABLE 126

PERINATAL DEATHS BY OBSTETRIC ANTECEDENT AND YEAR, NSW 2001–2002

Obstetric cause	Year					
	2001		2002			
	No.	%	No.	%		
1. Fetal abnormality	90	14.6	103	16.8		
2. Perinatal infection	28	4.5	27	4.4		
3. Hypertension	41	6.7	34	5.5		
4. Antepartum haemorrhage	48	7.8	52	8.5		
5. Maternal disease	14	2.3	27	4.4		
6. Specific perinatal conditions	52	8.4	45	7.3		
7. Hypoxic peripartum death	22	3.6	23	3.8		
8. Fetal growth restriction	5	0.8	13	2.1		
9. Spontaneous preterm	120	19.5	126	20.6		
10. Unexplained antepartum death	191	31.0	161	26.3		
11. No obstetric antecedent	5	0.8	2	0.3		
TOTAL	616	100.0	613	100.0		

Source: NSW Maternal and Perinatal Committee, NSW Department of Health.

TABLE 127

PERINATAL DEATHS BY OBSTETRIC ANTECEDENT AND PERINATAL OUTCOME, NSW 2002

Obstetric cause	Stillbirth		Perinatal outcome Neonatal death		TOTAL	
	No.	%	No.	%	No.	%
1. Fetal abnormality						
Central nervous system	19	4.6	6	3.0	25	4.1
Cardiovascular system	8	1.9	2	1.0	10	1.6
Urinary tract	3	0.7	3	1.5	6	1.0
Gastrointestinal system	1	0.2	1	0.5	2	0.3
Chromosomal	17	4.1	8	4.0	25	4.1
Metabolic	1	0.2	1	0.5	2	0.3
Multiple	8	1.9	9	4.5	17	2.8
Other	4	1.0	12	5.9	16	2.6
Total	61	14.8	42	20.8	103	16.8
2. Perinatal infection						
Group B Streptococcus	3	0.7	4	2.0	7	1.1
E Coli	0	0.0	4	2.0	4	0.7
Other bacterial	1	0.2	0	0.0	1	0.2
Unspecified bacterial	3	0.7	0	0.0	3	0.5
Cytomegalovirus	4	1.0	0	0.0	4	0.7
Other viral	0	0.0	1	0.5	1	0.2
Unspecified organism	6	1.5	1	0.5	7	1.1
Total	17	4.1	10	5.0	27	4.4
3. Hypertension						
Chronic: Secondary eg renal	1	0.2	1	0.5	2	0.3
Gestational	0	0.0	2	1.0	2	0.3
Pre-eclampsia	16	3.9	9	4.5	25	4.1
Pre-eclampsia superimposed on pre-existing	2	0.5	1	0.5	3	0.5
Unspecified	1	0.2	1	0.5	2	0.3
Total	20	4.9	14	6.9	34	5.5
4. Antepartum haemorrhage						
Placental abruption	28	6.8	12	5.9	40	6.5
Placenta praevia	1	0.2	0	0.0	1	0.2
Undetermined origin	5	1.2	3	1.5	8	1.3
Other	1	0.2	2	1.0	3	0.5
Total	35	8.5	17	8.4	52	8.5
5. Maternal disease						
Termination of pregnancy other than for fetal abnormality	1	0.2	0	0.0	1	0.2
Diabetes—gestational diabetes	5	1.2	1	0.5	6	1.0
Maternal injury: Accidental	2	0.5	1	0.5	3	0.5
Maternal injury: Non-accidental	1	0.2	0	0.0	1	0.2
Sepsis	0	0.0	1	0.5	1	0.2
Other	13	3.2	2	1.0	15	2.4
Total	22	5.4	5	2.5	27	4.4
6. Specific perinatal conditions						
Twin-to-twin transfusion	13	3.2	1	0.5	14	2.3
Fetomaternal haemorrhage	5	1.2	0	0.0	5	0.8
Antepartum cord complications	8	1.9	1	0.5	9	1.5
Uterine abnormality	1	0.2	1	0.5	2	0.3
Idiopathic hydrops	4	1.0	6	3.0	10	1.6
Other	5	1.2	0	0.0	5	0.8
Total	36	8.8	9	4.5	45	7.3
7. Hypoxic peripartum death						
Uterine rupture	3	0.7	0	0.0	3	0.5
Other intrapartum complication	0	0.0	9	4.5	9	1.5
No intrapartum complication	1	0.2	1	0.5	2	0.3
Unspecified	3	0.7	6	3.0	9	1.5
Total	7	1.7	16	8.0	23	3.8
8. Fetal growth restriction						
With evidence of uteroplacental insufficiency	4	1.0	2	1.0	6	1.0
With chronic villitis	1	0.2	1	0.5	2	0.3
Without the above placental pathology	2	0.5	1	0.5	3	0.5
No placental examination	2	0.5	0	0.0	2	0.3
Total	9	2.2	4	2.0	13	2.1

TABLE 127 (continued)
PERINATAL DEATHS BY OBSTETRIC ANTECEDENT AND PERINATAL OUTCOME, NSW 2002

Obstetric cause	Stillbirth		Perinatal outcome Neonatal death		TOTAL	
	No.	%	No.	%	No.	%
9. Spontaneous preterm						
Intact membranes or membrane rupture less than 24 hours:						
with chorioamnionitis	13	3.2	26	12.9	39	6.4
without chorioamnionitis	10	2.4	20	9.9	30	4.9
no placental examination	1	0.2	2	1.0	3	0.5
unspecified placental examination	2	0.5	0	0.0	2	0.3
Membrane rupture 24 hours or more:						
with chorioamnionitis	10	2.4	15	7.4	25	4.1
without chorioamnionitis	2	0.5	2	1.0	4	0.7
no placental examination	1	0.2	3	1.5	4	0.7
unspecified placental examination	0	0.0	4	2.0	4	0.7
Membrane rupture unknown duration:						
with chorioamnionitis	1	0.2	6	3.0	7	1.1
without chorioamnionitis	2	0.5	2	1.0	4	0.7
no placental examination	0	0.0	3	1.5	3	0.5
unspecified placental examination	1	0.2	0	0.0	1	0.2
Total	43	10.5	83	41.1	126	20.6
10. Unexplained antepartum death						
With evidence of uteroplacental insufficiency	32	7.8	0	0.0	32	5.2
With chronic villitis	3	0.7	0	0.0	3	0.5
Without the above placental pathology	99	24.1	0	0.0	99	16.2
No placental examination	14	3.4	0	0.0	14	2.3
Unspecified placental examination	13	3.2	0	0.0	13	2.1
Total	161	39.2	0	0.0	161	26.3
11. No obstetric antecedent						
Unknown/unexplained	0	0.0	2	1.0	2	0.3
Total	0	0.0	2	1.0	2	0.3
TOTAL	411	100.0	202	100.0	613	100.0

Source: NSW Maternal and Perinatal Committee, NSW Department of Health.

5. Maternal disease

Twenty-seven deaths were attributed to other maternal conditions including: diabetes (6), motor vehicle accident (2), other maternal injury (2), sepsis (1), cholestasis (2), hypotension following rupture of maternal splenic artery aneurysm (2), chemotherapy (1), liver failure (1), antiphospholipid syndrome (2), laparotomy for bowel obstruction (1), renal failure (1), and anaphylaxis (1).

6. Specific perinatal conditions

Of the 45 deaths in this group, twin-twin transfusion accounted for 14 deaths, followed by idiopathic hydrops (10) and antepartum cord complications (9). Other causes were: fetomaternal haemorrhage (5), uterine abnormalities (2), uterine rupture (1), fetal teratoma (1), prolonged premature rupture of membranes (1), feto-maternal blood group incompatibility (1), and haemorrhage and necrosis of fetal brain of unknown cause (1).

7. Hypoxic peripartum death

There were 23 deaths associated with peripartum hypoxia. Four deaths occurred prior to the onset of labour, two of which were associated with uterine rupture. Three deaths of singleton term babies occurred during labour. The remaining 16 deaths occurred in the neonatal period.

8. Fetal growth restriction

In 13 cases, the main obstetric cause of death was considered to be fetal growth restriction (FGR). Of these, 9 were stillbirths and 4 were neonatal deaths. FGR is defined as less than the tenth percentile of birthweight for gestational age with no major congenital abnormalities. If a maternal or fetal cause of FGR was known then the cause of death was classified to the underlying cause of the FGR. Stillbirths with evidence of maceration were not classified as FGR unless there was evidence of growth restriction on serial ultrasound during pregnancy.

9. Spontaneous preterm

There were 126 perinatal deaths associated with spontaneous preterm birth, which comprises normally formed babies born before 37 weeks gestation. Of these, 43 (34.1 per cent) were stillbirths and 83 (65.9 per cent) were neonatal deaths. Thirty-four deaths (27.0 per cent) were at 21–22 weeks gestation, 63 (50.0 per cent) were at 22–25 weeks gestation, and 29 (23.0 per cent) occurred between 26 and 36 weeks gestation. Chorioamnionitis was reported in 54 deaths (42.9 per cent). Thirty-three deaths (26.2 per cent) were associated with membrane rupture of 24 hours or more.

10. Unexplained antepartum death

The cause of death could not be adequately explained in 161 stillbirths (39.2 per cent). Of these, 98 (60.9 per cent) were low birthweight and 95 (59.0 per cent) were premature. There were a variety of associated maternal conditions reported in this group, including: multiple pregnancy (11 deaths), maternal hypertension (9), diabetes (6), hypothyroidism (1), and history of drug dependency or abuse (2). Placental histopathology results were provided for 134 unexplained antepartum deaths (83.2 per cent) and evidence of uteroplacental insufficiency was found in 24.

11. No obstetric antecedent

Two deaths were considered not to have an obstetric antecedent. Both these babies died shortly after birth and no cause of death could be identified. Post mortem examination was not carried out in either case.

Obstetric cause of perinatal death by hospital service level 2002

Obstetric service levels are described in the Explanatory Notes of the Methods section (page 16). The majority of perinatal deaths occurred in Level 6 hospitals (52.5 per cent, Table 128). The proportion of unexplained intrauterine deaths was substantially lower in level 6 hospitals than other hospitals, possibly due to better access to perinatal postmortem services. The proportion of deaths associated with congenital abnormalities was highest in level 6 hospitals, reflecting patterns of referral for diagnosis and treatment.

Time of death 2002

Of the 613 perinatal deaths in 2002, 286 (46.7 per cent) occurred before the onset of labour, 47 (7.7 per cent) occurred during labour, 78 (12.7 per cent) occurred at an unknown time before birth, and 202 (33.0 per cent) were neonatal deaths.

Trends in neonatal causes of death

In both 2001 and 2002 extreme prematurity was the most common cause of neonatal death, accounting for about 40 per cent of all neonatal deaths (Table 129). Congenital abnormalities were the next most common cause of neonatal death for both years. There were slightly more deaths attributed to neurological conditions in 2002 compared with 2001, particularly hypoxic ischaemic encephalopathy.

Neonatal causes of death 2002

Of the 202 neonatal deaths reviewed for 2002, 159 (78.7 per cent) were less than 37 weeks gestation (Table 130). The most common neonatal cause of death was extreme prematurity ($n=80$, 39.6 per cent). Thirty-nine infants died from a congenital abnormality. There were 16 deaths due to hypoxic ischaemic encephalopathy and 11 deaths due to intracranial haemorrhage.

Perinatal deaths associated with maternal drug dependency–abuse 2002

No perinatal deaths were directly attributed to maternal drug dependency or drug abuse. Ten perinatal deaths occurred among babies of mothers reported to have a history of drug dependency or abuse, but drug use was not considered to be the main cause of death.

Postmortem examination 2002

Postmortem examination is valuable in ascertaining or confirming the cause of death, identifying additional factors which may have contributed to the death, and counselling parents about the cause of death.

In 2002, postmortem examinations were carried out for 186 (30.3 per cent) deaths: 147 among stillborn infants (35.8 per cent) and 33 among babies who died in the neonatal period (17.8 per cent). Placental histopathology was carried out in 484 perinatal deaths (79.0 per cent).

TABLE 128

PERINATAL DEATHS BY OBSTETRIC CAUSE AND HOSPITAL SERVICE LEVEL, NSW 2002

Obstetric cause	Hospital service level												TOTAL	
	Level 2		Level 3		Level 4		Level 5		Level 6		Private			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1. Fetal abnormality	0	0.0	3	14.3	17	17.7	12	11.3	64	19.9	7	10.6	103	16.8
2. Perinatal infection	0	0.0	2	9.5	3	3.1	4	3.8	14	4.3	4	6.1	27	4.4
3. Hypertension	0	0.0	1	4.8	4	4.2	3	2.8	25	7.8	1	1.5	34	5.5
4. Antepartum haemorrhage	1	50.0	2	9.5	3	3.1	13	12.3	25	7.8	8	12.1	52	8.5
5. Maternal disease	0	0.0	0	0.0	4	4.2	4	3.8	14	4.3	5	7.6	27	4.4
6. Specific perinatal conditions	0	0.0	1	4.8	5	5.2	7	6.6	23	7.1	9	13.6	45	7.3
7. Hypoxic peripartum death	0	0.0	2	9.5	1	1.0	3	2.8	13	4.0	4	6.1	23	3.8
8. Fetal growth restriction	0	0.0	0	0.0	4	4.2	2	1.9	5	1.6	2	3.0	13	2.1
9. Spontaneous preterm	1	50.0	1	4.8	12	12.5	17	16.0	85	26.4	10	15.2	126	20.6
10. Unexplained antepartum death	0	0.0	8	38.1	43	44.8	41	38.7	54	16.8	15	22.7	161	26.3
11. No obstetric antecedent	0	0.0	1	4.8	0	0.0	0	0.0	0	0.0	1	1.5	2	0.3
TOTAL	2	100.0	21	100.0	96	100.0	106	100.0	322	100.0	66	100.0	613	100.0

Source: NSW Maternal and Perinatal Committee, NSW Department of Health.

TABLE 129

NEONATAL DEATHS BY CAUSE AND YEAR, NSW 2001–2002

Neonatal cause	2001		Year 2002		TOTAL	
	No.	%	No.	%	No.	%
1. Congenital abnormality						
Central nervous system	6	3.2	6	3.0	12	3.1
Cardiovascular system	8	4.2	2	1.0	10	2.6
Urinary tract	5	2.6	2	1.0	7	1.8
Gastrointestinal tract	2	1.1	2	1.0	4	1.0
Chromosomal	3	1.6	8	4.0	11	2.8
Metabolic	0	0.0	1	0.5	1	0.3
Multiple	5	2.6	5	2.5	10	2.6
Unspecified	0	0.0	1	0.5	1	0.3
Other	14	7.4	12	5.9	26	6.6
Total	43	22.8	39	19.3	82	21.0
2. Extreme prematurity						
Not resuscitated	34	18.0	39	19.3	73	18.7
Unsuccessful resuscitation	34	18.0	31	15.3	65	16.6
Resuscitation unspecified or unknown	16	8.5	10	5.0	26	6.6
Total	84	44.4	80	39.6	164	41.9
3. Cardio-respiratory disorders						
Hyaline membrane disease– Respiratory distress syndrome	8	4.2	5	2.5	13	3.3
Meconium aspiration syndrome	1	0.5	1	0.5	2	0.5
Primary persistent pulmonary hypertension	2	1.1	2	1.0	4	1.0
Pulmonary hypoplasia	6	3.2	8	4.0	14	3.6
Other	6	3.2	8	4.0	14	3.6
Total	23	12.2	24	11.9	47	12.0
4. Infection						
Congenital bacterial	2	1.1	7	3.5	9	2.3
Acquired bacterial	4	2.1	8	4.0	12	3.1
Fungal	0	0.0	1	0.5	1	0.3
Unspecified organism	2	1.1	0	0.0	2	0.5
Other	0	0.0	1	0.5	1	0.3
Total	8	4.2	17	8.4	25	6.4
5. Neurological						
Hypoxic ischaemic encephalopathy– perinatal asphyxia	8	4.2	16	7.9	24	6.1
Intracranial haemorrhage	10	5.3	11	5.4	21	5.4
Total	18	9.5	27	13.4	45	11.5
6. Gastrointestinal						
Necrotising enterocolitis	2	1.1	5	2.5	7	1.8
Other	1	0.5	1	0.5	2	0.5
Total	3	1.6	6	3.0	9	2.3
7. Other						
Trauma	0	0.0	1	0.5	1	0.3
Other	7	3.7	3	1.5	10	2.6
Undetermined—not stated	3	1.6	5	2.5	8	2.0
Total	10	5.3	9	4.5	19	4.9
TOTAL	189	100.0	202	100.0	391	100.0

Source: NSW Maternal and Perinatal Committee, NSW Department of Health.

TABLE 130
NEONATAL DEATHS BY CAUSE AND GESTATIONAL AGE, NSW 2002

Neonatal cause	Gestational age (weeks)					
	Less than 37		37+		TOTAL	
	No.	%	No.	%	No.	%
1. Congenital abnormality						
Central nervous system	3	1.9	3	7.0	6	3.0
Cardiovascular system	2	1.3	0	0.0	2	1.0
Urinary tract	1	0.6	1	2.3	2	1.0
Gastrointestinal tract	1	0.6	1	2.3	2	1.0
Chromosomal	5	3.1	3	7.0	8	4.0
Metabolic	0	0.0	1	2.3	1	0.5
Multiple	2	1.3	3	7.0	5	2.5
Other	8	5.0	4	9.3	12	5.9
Unspecified	1	0.6	0	0.0	1	0.5
Total	23	14.5	16	37.2	39	19.3
2. Extreme prematurity						
Not resuscitated	39	24.5	0	0.0	39	19.3
Unsuccessful resuscitation	31	19.5	0	0.0	31	15.3
Resuscitation unspecified or unknown	10	6.3	0	0.0	10	5.0
Total	80	50.3	0	0.0	80	39.6
3. Cardio-respiratory disorders						
Hyaline membrane disease– Respiratory distress syndrome	5	3.1	0	0.0	5	2.5
Meconium aspiration syndrome	0	0.0	1	2.3	1	0.5
Primary persistent pulmonary hypertension	2	1.3	0	0.0	2	1.0
Pulmonary hypoplasia	7	4.4	1	2.3	8	4.0
Other	4	2.5	4	9.3	8	4.0
Total	18	11.3	6	14.0	24	11.9
4. Infection						
Congenital bacterial	7	4.4	0	0.0	7	3.5
Acquired bacterial	7	4.4	1	2.3	8	4.0
Fungal	1	0.6	0	0.0	1	0.5
Other	1	0.6	0	0.0	1	0.5
Total	16	10.1	1	2.3	17	8.4
5. Neurological						
Hypoxic ischaemic encephalopathy– perinatal asphyxia	1	0.6	15	34.9	16	7.9
Intracranial haemorrhage	11	6.9	0	0.0	11	5.4
Total	12	7.5	15	34.9	27	13.4
6. Gastrointestinal						
Necrotising enterocolitis	5	3.1	0	0.0	5	2.5
Other	1	0.6	0	0.0	1	0.5
Total	6	3.8	0	0.0	6	3.0
7. Other						
Trauma	1	0.6	0	0.0	1	0.5
Other	1	0.6	2	4.7	3	1.5
Undetermined–Unknown	2	1.3	3	7.0	5	2.5
Total	4	2.5	5	11.6	9	4.5
TOTAL	159	100.0	43	100.0	202	100.0

Source: NSW Maternal and Perinatal Committee, NSW Department of Health.