

12. PERINATAL DEATHS

Review of perinatal deaths 2004

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 *NSW 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 Policy Directive No. 2005_228 describes hospital procedures for review and reporting of perinatal deaths. The circular is available on the Department's website at www.health.nsw.gov.au/policies/PD/2005/PD2005_228.html. 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 birth weight. The criteria used by the NSW Midwives Data Collection (MDC) for reporting of births is at least 400 grams birth weight 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 Perinatal Society of Australia and New Zealand Perinatal Death Classification (PSANZ-PDC). Neonatal deaths were also classified by neonatal cause according to the Perinatal Society of Australia and New Zealand Neonatal Death Classification (PSANZ-NDC).

There were 649 perinatal deaths of at least 22 weeks gestation or at least 500 grams birth weight reported to the MDC in 2004. Confidential reports on 643 deaths were reviewed. Of the 471 stillbirths reported to the MDC, reviews were carried out on 449 (95.3 per cent). The MDC was notified of 178 neonatal deaths. However, reviews were carried out on 194 neonatal deaths, reflecting under-enumeration of neonatal deaths on the MDC. Comparative information is also presented for 2001, 2002 and 2003.

Trends in obstetric antecedents of perinatal death

Between 2001 and 2004, the pattern of antecedent causes of death remained fairly stable (Table 143). Unexplained antepartum deaths comprised the largest category in 2004 (Figure 18), as for previous years. The next most common categories were fetal abnormalities followed by spontaneous preterm birth.

Obstetric antecedents of perinatal death 2004

1. Congenital abnormality

In 2004, congenital abnormalities were the underlying cause for 125 deaths (Table 144). The most common abnormalities were chromosomal (n=35, 28.0 per cent). Of these, 14 were trisomy 18, 8 were trisomy 21, 5 were trisomy 13, 1 was Turner syndrome, and there were 7 other abnormalities.

Nineteen deaths were associated with abnormalities of the central nervous system (15.2 per cent), of which 8 were neural tube defects and a further 6 deaths were among babies with congenital hydrocephalus.

Twenty-four deaths were due to multiple abnormalities not associated with a chromosomal abnormality.

Twelve deaths were associated with abnormalities of the cardiovascular system, of which 4 were cases of hypoplastic left heart syndrome. Four deaths were associated with congenital diaphragmatic hernia.

2. Perinatal infection

Fourteen deaths were found to be due to infection, of which 6 were stillbirths and 8 were neonatal deaths. In 25 deaths there was an associated chorioamnionitis.

The most common infective organism identified was group B streptococcus, which was considered responsible for 3 stillbirths and 2 neonatal deaths. Two neonatal deaths were caused by *Escherichia coli* infection, one neonatal death following a *Staphylococcus aureus* infection, and one stillbirth following congenital cytomegalovirus infection. The causative organism was not specified for 5 deaths.

3. Hypertension

Thirty (23.4 per cent) deaths were considered to be due to maternal hypertension. There were 26 stillbirths and 4 neonatal deaths. The majority (n=19, 63.3 per cent) occurred in mothers with pre-eclampsia. Only one death in this group was associated with placental abruption, and one was associated with maternal diabetes.

4. Antepartum haemorrhage

Fifty-nine deaths were due to antepartum haemorrhage, of which 50 were due to placental abruption, one was due to placenta praevia, and 2 due to vasa praevia.

5. Maternal disease

Twenty-one deaths were attributed to other maternal conditions including: diabetes (8), maternal injury (2), termination of pregnancy (2), cholestasis (1), systemic lupus erythematosus (1), antiphospholipid syndrome (1), and maternal death (1).

TABLE 143

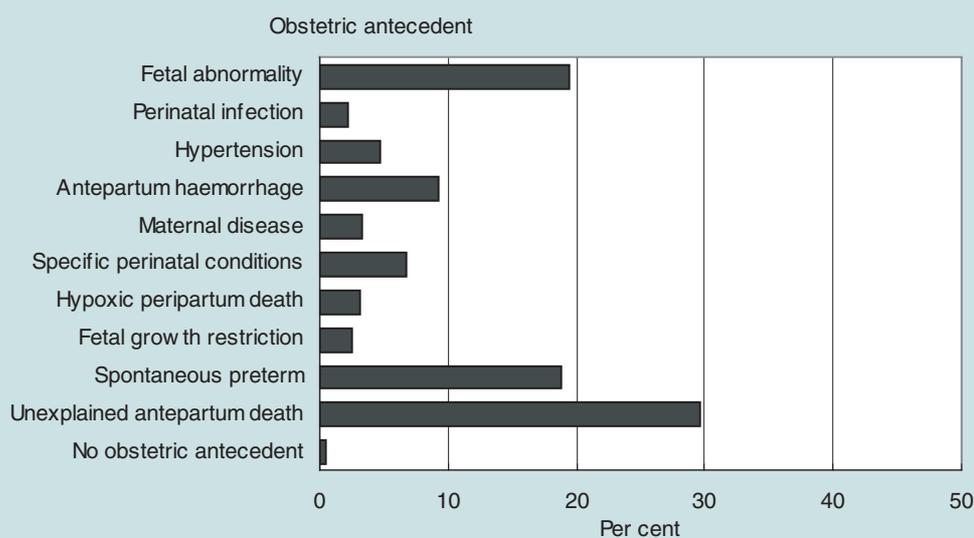
PERINATAL DEATHS BY OBSTETRIC ANTECEDENT AND YEAR, NSW 2001–2004

Obstetric antecedent	2001		2002		2003		2004	
	No.	%	No.	%	No.	%	No.	%
1. Fetal abnormality	90	14.6	103	16.8	95	16.0	125	19.4
2. Perinatal infection	28	4.5	27	4.4	30	5.0	14	2.2
3. Hypertension	41	6.7	34	5.5	32	5.4	30	4.7
4. Antepartum haemorrhage	48	7.8	52	8.5	44	7.4	59	9.2
5. Maternal disease	14	2.3	27	4.4	28	4.7	21	3.3
6. Specific perinatal conditions	52	8.4	45	7.3	51	8.6	43	6.7
7. Hypoxic peripartum death	22	3.6	23	3.8	21	3.5	20	3.1
8. Fetal growth restriction	5	0.8	13	2.1	10	1.7	16	2.5
9. Spontaneous preterm	120	19.5	126	20.6	94	15.8	121	18.8
10. Unexplained antepartum death	191	31.0	161	26.3	184	30.9	191	29.7
11. No obstetric antecedent	5	0.8	2	0.3	6	1.0	3	0.5
TOTAL	616	100.0	613	100.0	595	100.0	643	100.0

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

FIGURE 18

PERINATAL DEATHS BY OBSTETRIC ANTECEDENT AND YEAR, NSW 2004



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

TABLE 144

PERINATAL DEATHS BY OBSTETRIC ANTECEDENT AND PERINATAL OUTCOME, NSW 2004

Obstetric antecedent	Stillbirth		Perinatal outcome Neonatal death		TOTAL	
	No.	%	No.	%	No.	%
1. Fetal abnormality						
Central nervous system	10	2.2	9	4.6	19	3.0
Cardiovascular system	6	1.3	6	3.1	12	1.9
Urinary tract	3	0.7	4	2.1	7	1.1
Gastrointestinal system	1	0.2	1	0.5	2	0.3
Chromosomal	21	4.7	14	7.2	35	5.4
Metabolic	1	0.2	3	1.5	4	0.6
Multiple	7	1.6	17	8.8	24	3.7
Other	10	2.2	11	5.7	21	3.3
Unspecified	1	0.2	0	0.0	1	0.2
Total	60	13.4	65	33.5	125	19.4
2. Perinatal infection						
Group B Streptococcus	3	0.7	2	1.0	5	0.8
<i>E. coli</i>	0	0.0	2	1.0	2	0.3
Other bacterial	0	0.0	1	0.5	1	0.2
Unspecified bacterial	2	0.4	1	0.5	3	0.5
Cytomegalovirus	1	0.2	0	0.0	1	0.2
Unspecified organism	0	0.0	2	1.0	2	0.3
Total	6	1.3	8	4.1	14	2.2
3. Hypertension						
Chronic: Essential	2	0.4	0	0.0	2	0.3
Chronic: Secondary (for example, renal)	2	0.4	0	0.0	2	0.3
Gestational	3	0.7	0	0.0	3	0.5
Pre-eclampsia	14	3.1	3	1.5	17	2.6
Pre-eclampsia superimposed on pre-existing hypertension	1	0.2	1	0.5	2	0.3
Unspecified	4	0.9	0	0.0	4	0.6
Total	26	5.8	4	2.1	30	4.7
4. Antepartum haemorrhage						
Placental abruption	36	8.0	14	7.2	50	7.8
Placenta praevia	1	0.2	0	0.0	1	0.2
Vasa praevia	2	0.4	0	0.0	2	0.3
Undetermined origin	5	1.1	1	0.5	6	0.9
Total	44	9.8	15	7.7	59	9.2
5. Maternal disease						
Termination of pregnancy other than for fetal abnormality	1	0.2	1	0.5	2	0.3
Diabetes—gestational diabetes	8	1.8	0	0.0	8	1.2
Maternal injury: Accidental	1	0.2	1	0.5	2	0.3
Other	8	1.8	1	0.5	9	1.4
Total	18	4.0	3	1.5	21	3.3
6. Specific perinatal conditions						
Twin-to-twin transfusion	14	3.1	7	3.6	21	3.3
Fetomaternal haemorrhage	4	0.9	0	0.0	4	0.6
Antepartum cord complications	6	1.3	0	0.0	6	0.9
Uterine abnormality	0	0.0	1	0.5	1	0.2
Haemolytic disease	1	0.2	0	0.0	1	0.2
Idiopathic hydrops	5	1.1	4	2.1	9	1.4
Other	1	0.2	0	0.0	1	0.2
Total	31	6.9	12	6.2	43	6.7
7. Hypoxic peripartum death						
Uterine rupture	1	0.2	2	1.0	3	0.5
Cord prolapse	2	0.4	0	0.0	2	0.3
Shoulder dystocia	0	0.0	1	0.5	1	0.2
Other intrapartum complication	3	0.7	6	3.1	9	1.4
No intrapartum complication	1	0.2	1	0.5	2	0.3
Unspecified	2	0.4	1	0.5	3	0.5
Total	9	2.0	11	5.7	20	3.1
8. Fetal growth restriction						
With evidence of uteroplacental insufficiency	6	1.3	2	1.0	8	1.2
With chronic villitis	0	0.0	2	1.0	2	0.3
Without the above placental pathology	2	0.4	2	1.0	4	0.6
No placental examination	0	0.0	2	1.0	2	0.3
Total	8	1.8	8	4.1	16	2.5

TABLE 144 (continued)

PERINATAL DEATHS BY OBSTETRIC ANTECEDENT AND PERINATAL OUTCOME, NSW 2004

Obstetric antecedent	Stillbirth		Perinatal outcome Neonatal death		TOTAL	
	No.	%	No.	%	No.	%
9. Spontaneous preterm						
Intact membranes or membrane rupture less than 24 hours:						
with chorioamnionitis	12	2.7	21	10.8	33	5.1
without chorioamnionitis	9	2.0	16	8.2	25	3.9
no placental examination	2	0.4	4	2.1	6	0.9
unspecified placental examination	3	0.7	0	0.0	3	0.5
Membrane rupture 24 hours or more:						
with chorioamnionitis	18	4.0	15	7.7	33	5.1
without chorioamnionitis	3	0.7	5	2.6	8	1.2
no placental examination	0	0.0	1	0.5	1	0.2
Membrane rupture unknown duration:						
with chorioamnionitis	4	0.9	0	0.0	4	0.6
without chorioamnionitis	2	0.4	2	1.0	4	0.6
no placental examination	3	0.7	1	0.5	4	0.6
Total	56	12.5	65	33.5	121	18.8
10. Unexplained antepartum death						
With evidence of uteroplacental insufficiency	40	8.9	0	0.0	40	6.2
With chronic villitis	5	1.1	0	0.0	5	0.8
Without the above placental pathology	127	28.3	0	0.0	127	19.8
No placental examination	14	3.1	0	0.0	14	2.2
Unspecified placental examination	5	1.1	0	0.0	5	0.8
Total	191	42.5	0	0.0	191	29.7
11. No obstetric antecedent	0	0.0	3	1.5	3	0.5
TOTAL	449	100.0	194	100.0	643	100.0

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

6. Specific perinatal conditions

Of the 43 deaths in this group, twin-to-twin transfusion accounted for 21 deaths, followed by idiopathic hydrops (9), antepartum cord complications (6) and fetomaternal haemorrhage (4). Other causes were: uterine abnormality (1), haemolytic disease (1), and maternal autoimmune disease (1).

7. Hypoxic peripartum death

There were 20 deaths associated with peripartum hypoxia. Three deaths followed uterine rupture. Two deaths followed cord prolapse and one death followed shoulder dystocia.

One death occurred before the onset of labour, 4 during labour and 4 at an unspecified time prior to birth. The remaining 11 deaths occurred in the neonatal period.

8. Fetal growth restriction

In 16 cases, the main obstetric cause of death was considered to be fetal growth restriction (FGR). Of these, 8 were stillbirths and 8 were neonatal deaths.

FGR is defined as less than the tenth percentile of birth weight 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 121 perinatal deaths associated with spontaneous preterm birth, which comprises normally formed and appropriately grown babies born before 37 weeks gestation. Of these, 56 (46.3 per cent) were stillbirths and 65 (53.7 per cent) were neonatal deaths.

Forty-four deaths (36.4 per cent) were at less than 23 weeks gestation, 59 (48.8 per cent) were at 23–25 weeks gestation, and 18 (14.9 per cent) occurred between 26 and 36 weeks gestation. Thirty-six deaths (29.8 per cent) were associated with membrane rupture of 24 hours or more.

10. Unexplained antepartum death

Of the 191 unexplained stillbirths, 122 (63.9 per cent) were low birth weight babies and 114 (59.7 per cent) were premature. A variety of associated maternal conditions were reported in this group including: multiple pregnancy (9 deaths), maternal hypertension (11), diabetes (5), epilepsy (2), asthma (2), systemic lupus erythematosus (2), drug abuse (1) and cholestasis of pregnancy (1). Placental histopathology results were provided for 176 unexplained antepartum deaths (92.1 per cent) and evidence of uteroplacental insufficiency was found in 40.

11. No obstetric antecedent

No obstetric cause of death could be identified for 3 neonatal deaths. Two of these babies had a post-mortem examination. Placental histopathology examination had been carried out in 2 cases.

Obstetric cause of perinatal death by hospital service level 2004

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 (52.7 per cent, Table 145). The proportion of unexplained intrauterine deaths was substantially lower in level 6 hospitals than other hospitals, possibly due to better access to perinatal post-mortem 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 2004

Of the 643 perinatal deaths in 2004, 292 (45.4 per cent) occurred before the onset of labour, 46 (7.2 per cent) occurred during labour, 111 (17.3 per cent) occurred at an unknown time before birth, and 194 (30.3 per cent) were neonatal deaths.

Trends in neonatal causes of death

Between 2001 and 2004 extreme prematurity was the most common cause of neonatal death, accounting for over one-third of all neonatal deaths in 2004 (Table 146). Congenital abnormalities were the next most common cause of neonatal death for the 4 years. There were slightly more deaths attributed to congenital abnormalities in 2004 compared with previous years.

Neonatal causes of death 2004

Of the 194 neonatal deaths reviewed for 2004, 154 (79.4 per cent) were less than 37 weeks gestation (Table 147). The most common neonatal cause of death was extreme prematurity (n=67, 34.5 per cent). Fifty-six infants died from a congenital abnormality. There were 20 deaths due to hypoxic ischaemic encephalopathy and 12 deaths due to intracranial haemorrhage.

Perinatal deaths associated with maternal drug dependency–abuse 2004

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

Post-mortem examination 2004

Postmortem examination is valuable in ascertaining or confirming the cause of death, identifying additional factors that may have contributed to the death, and counselling parents about the cause of death. Postmortem examinations were carried out for 212 (33.0 per cent) deaths: 166 stillborn infants (37.0 per cent of all reported stillbirths) and 46 neonatal deaths (23.7 per cent of all reported neonatal deaths). Placental histopathology was carried out in 543 perinatal deaths (84.5 per cent).

TABLE 145

PERINATAL DEATHS BY OBSTETRIC ANTECEDENT AND HOSPITAL SERVICE LEVEL, NSW 2004

Obstetric antecedent	Level 2		Level 3		Hospital service level Level 4		Level 5		Level 6		Private		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1. Fetal abnormality	0	0.0	6	14.6	9	9.2	11	12.6	93	27.4	6	8.7	125	19.4
2. Perinatal infection	0	0.0	0	0.0	2	2.0	1	1.1	9	2.7	2	2.9	14	2.2
3. Hypertension	0	0.0	1	2.4	6	6.1	6	6.9	13	3.8	4	5.8	30	4.7
4. Antepartum haemorrhage	2	28.6	4	9.8	11	11.2	9	10.3	29	8.6	4	5.8	59	9.2
5. Maternal disease	0	0.0	2	4.9	5	5.1	2	2.3	10	2.9	2	2.9	21	3.3
6. Specific perinatal conditions	0	0.0	2	4.9	3	3.1	7	8.0	24	7.1	7	10.1	43	6.7
7. Hypoxic peripartum death	2	28.6	2	4.9	0	0.0	2	2.3	13	3.8	1	1.4	20	3.1
8. Fetal growth restriction [#]	0.0	0	0.0	3	3.1	1	1.1	12	3.5	0	0.0	16	2.5	
9. Spontaneous preterm	0	0.0	8	19.5	13	13.3	13	14.9	74	21.8	12	17.4	121	18.8
10. Unexplained antepartum death	3	42.9	15	36.6	46	46.9	35	40.2	61	18.0	31	44.9	191	29.7
11. No obstetric antecedent	0	0.0	1	2.4	0	0.0	0	0.0	1	0.3	0	0.0	3	0.5
TOTAL	7	100.0	41	100.0	98	100.0	87	100.0	339	100.0	69	100.0	643	100.0

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

[#] The *spontaneous preterm* and *no obstetric antecedent* categories each include one perinatal death that occurred in a level 1 hospital.

TABLE 146

NEONATAL DEATHS BY CAUSE AND YEAR, NSW 2001–2004

Neonatal cause	Year							
	2001		2002		2003		2004	
	No.	%	No.	%	No.	%	No.	%
1. Congenital abnormality								
Central nervous system	6	3.2	6	3.0	9	4.7	12	6.2
Cardiovascular system	8	4.2	2	1.0	11	5.7	6	3.1
Urinary tract	5	2.6	2	1.0	3	1.6	3	1.5
Gastrointestinal tract	2	1.1	2	1.0	2	1.0	4	2.1
Chromosomal	3	1.6	8	4.0	3	1.6	11	5.7
Metabolic	0	0.0	1	0.5	0	0.0	2	1.0
Multiple	5	2.6	5	2.5	2	1.0	9	4.6
Unspecified	0	0.0	1	0.5	0	0.0	7	3.6
Other	14	7.4	12	5.9	7	3.6	2	1.0
Total	43	22.8	39	19.3	37	19.3	56	28.9
2. Extreme prematurity								
Not resuscitated	34	18.0	39	19.3	45	23.4	36	18.6
Unsuccessful resuscitation	34	18.0	31	15.3	22	11.5	23	11.9
Resuscitation unspecified or unknown	16	8.5	10	5.0	19	9.9	8	4.1
Total	84	44.4	80	39.6	86	44.8	67	34.5
3. Cardio-respiratory disorders								
Hyaline membrane disease—Respiratory distress syndrome	8	4.2	5	2.5	6	3.1	3	1.5
Meconium aspiration syndrome	1	0.5	1	0.5	1	0.5	1	0.5
Primary persistent pulmonary hypertension	2	1.1	2	1.0	1	0.5	3	1.5
Pulmonary hypoplasia	6	3.2	8	4.0	5	2.6	5	2.6
Chronic neonatal lung disease	0	0.0	0	0.0	2	1.0	0	0.0
Other	6	3.2	8	4.0	6	3.1	4	2.1
Total	23	12.2	24	11.9	21	10.9	16	8.2
4. Infection								
Congenital bacterial	2	1.1	7	3.5	3	1.6	6	3.1
Acquired bacterial	4	2.1	8	4.0	6	3.1	3	1.5
Fungal	0	0.0	1	0.5	1	0.5	0	0.0
Unspecified organism	2	1.1	0	0.0	0	0.0	1	0.5
Other	0	0.0	1	0.5	1	0.5	2	1.0
Total	8	4.2	17	8.4	11	5.7	12	6.2
5. Neurological								
Hypoxic ischaemic encephalopathy—perinatal asphyxia	8	4.2	16	7.9	13	6.8	20	10.3
Intracranial haemorrhage	10	5.3	11	5.4	10	5.2	12	6.2
Other	0	0.0	0	0.0	1	0.5	0	0.0
Total	18	9.5	27	13.4	24	12.5	32	16.5
6. Gastrointestinal								
Necrotising enterocolitis	2	1.1	5	2.5	5	2.6	2	1.0
Other	1	0.5	1	0.5	1	0.5	1	0.5
Total	3	1.6	6	3.0	6	3.1	3	1.5
7. Other								
SIDS	0	0.0	0	0.0	1	0.5	0	0.0
Trauma	0	0.0	1	0.5	0	0.0	0	0.0
Other	7	3.7	3	1.5	5	2.6	7	3.6
Undetermined—not stated	3	1.6	5	2.5	1	0.5	1	0.5
Total	10	5.3	9	4.5	7	3.6	8	4.1
TOTAL	189	100.0	202	100.0	192	100.0	194	100.0

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

TABLE 147

NEONATAL DEATHS BY CAUSE AND GESTATIONAL AGE, NSW 2004

Neonatal cause	Less than 37		Gestational age (weeks) 37+		TOTAL	
	No.	%	No.	%	No.	%
1. Congenital abnormality						
Central nervous system	9	5.8	3	7.5	12	6.2
Cardiovascular system	2	1.3	4	10.0	6	3.1
Urinary tract	3	1.9	0	0.0	3	1.5
Gastrointestinal tract	3	1.9	1	2.5	4	2.1
Chromosomal	9	5.8	2	5.0	11	5.7
Metabolic	0	0.0	2	5.0	2	1.0
Multiple	7	4.5	2	5.0	9	4.6
Other	5	3.2	2	5.0	7	3.6
Unspecified	0	0.0	2	5.0	2	1.0
Total	38	24.7	18	45.0	56	28.9
2. Extreme prematurity						
Not resuscitated	36	23.4	0	0.0	36	18.6
Unsuccessful resuscitation	23	14.9	0	0.0	23	11.9
Resuscitation unspecified or unknown	8	5.2	0	0.0	8	4.1
Total	67	43.5	0	0.0	67	34.5
3. Cardio-respiratory disorders						
Hyaline membrane disease						
Respiratory distress syndrome	3	1.9	0	0.0	3	1.5
Meconium aspiration syndrome	0	0.0	1	2.5	1	0.5
Primary persistent pulmonary hypertension	1	0.6	2	5.0	3	1.5
Pulmonary hypoplasia	3	1.9	2	5.0	5	2.6
Other	4	2.6	0	0.0	4	2.1
Total	11	7.1	5	12.5	16	8.2
4. Infection						
Congenital bacterial	5	3.2	1	2.5	6	3.1
Acquired bacterial	3	1.9	0	0.0	3	1.5
Unspecified organism	1	0.6	0	0.0	1	0.5
Other	0	0.0	2	5.0	2	1.0
Total	9	5.8	3	7.5	12	6.2
5. Neurological						
Hypoxic ischaemic encephalopathy– perinatal asphyxia	7	4.5	13	32.5	20	10.3
Intracranial haemorrhage	12	7.8	0	0.0	12	6.2
Total	19	12.3	13	32.5	32	16.5
6. Gastrointestinal						
Other	1	0.6	0	0.0	1	0.5
Necrotising enterocolitis	2	1.3	0	0.0	2	1.0
Total	3	1.9	0	0.0	3	1.5
7. Other						
Undetermined–Unknown	0	0.0	1	2.5	1	0.5
Other	7	4.5	0	0.0	7	3.6
Total	7	4.5	1	2.5	8	4.1
TOTAL	154	100.0	40	100.0	194	100.0

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