

9. NEONATAL INTENSIVE CARE

The information presented in this chapter was obtained from the Neonatal Intensive Care Units' (NICUS) Data Collection (see Chapter 3, Data Sources).

Registration rate

There were 2,296 infants registered in NICUS in 2006. The most common reasons for registration of an infant were assisted ventilation for four hours or more (46.5 per cent) and gestational age less than 29 weeks (16.2 per cent). Infants generally met more than one of the registration criteria.

The NICUS registration rate in 2006 was 23.5 per 1,000 livebirths, which decreased slightly since 2004 (24.8 per 1,000 live births). Table 98 shows the registration rate according to the mothers' health area of residence. The relatively low registration rates from the health areas adjoining the New South Wales border reflect the fact that some infants are preferentially referred interstate. The registration rate in health areas with low numbers of births should be interpreted with caution.

Ninety-five of the 2,296 infants (4.1 per cent) registered in NICUS were born to Aboriginal or Torres Strait Islander mothers. There were 2,736 livebirths to Aboriginal or Torres Strait Islander women recorded by the NSW and ACT Midwives Data Collections for 2006. The registration rate for these infants was 34.7 per 1,000 livebirths and has decreased since 2004. Ninety of the 2,083 mothers (4.3 per cent) were Aboriginal or Torres Strait Islander, of whom 22 (24.3 per cent) were residents of the Greater Western and North Coast Health Areas (Table 99). Twenty-one of the 353 mothers (5.9 per cent) of infants less than 29 weeks and/or less than 1,000 grams were Aboriginal or Torres Strait Islander.

Maternal characteristics

There were 2,083 mothers of the 2,296 infants registered in NICUS during 2006. The majority of mothers were residents of the Sydney South West, Sydney West, Hunter & New England, Northern Sydney & Central Coast, and South Eastern Sydney & Illawarra Health Areas. The distribution of the mothers' health area of residence for infants less than 29 weeks and/or less than 1,000 grams was similar to those for the whole group (81 per cent compared with 81.8 per cent).

The age of mothers of NICUS infants ranged from 14 to 50 years, with a mean age of 30 years. The mean maternal age was similar across all gestational age groups and has remained constant since 1992. In 2006, 23.6 per cent of mothers were aged 35 years or more (range 13.7 per cent in 1992 to 23.6 per cent in 2006). In 2006, 4.3 per cent of mothers were aged less than 20 years (range 4.3 per cent in 2006 to 6.8 per cent in 2000) (Table 100). The health area of residence with the highest proportion of teenage mothers was Greater Western.

There were 1,848 mothers (88.7 per cent) who had an antenatal complication. The most common antenatal complications were preterm labour (42.9 per cent), fetal compromise (20.2 per cent), antepartum haemorrhage (16.6 per cent), pregnancy induced hypertension (16.4 per cent), and intrauterine growth restriction (10.5 per cent). Antenatal complications were more frequent in mothers delivering at less than 37 weeks compared with at term. Even so, 62.6 per cent of mothers giving birth at term had an antenatal complication (Table 101).

TABLE 98

NICUS REGISTRATIONS BY HEALTH AREA OF RESIDENCE, NSW & ACT 2006

Health area	Total NICUS registrants		Total NSW and ACT livebirths	Registrations per 1000 livebirths
	No.	%	No.	
Sydney South West	494	21.5	20572	24.0
South Eastern Sydney & Illawarra	311	13.6	15144	20.5
Sydney West	415	18.1	17388	23.9
Northern Sydney & Central Coast	300	13.1	14281	21.0
Hunter & New England	360	15.7	10665	33.8
North Coast	52	2.3	4975	10.5
Greater Southern	111	4.8	4962	22.4
Greater Western	104	4.5	4091	25.4
ACT	132	5.8	4596	28.7
Overseas	10	0.4	0	0.0
Interstate	7	0.3	739	9.5
Unknown Health Area	0	0.0	89	0.0
TOTAL	2296	100.0	97504#	23.5

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research. NSW Midwives Data Collection 2006. Centre for Epidemiology and Research, NSW Department of Health.

Administration of corticosteroids to the mother prior to preterm birth improves the outcome for the infant. In 2006, 83.2 per cent of mothers of infants born at less than 28 weeks' received corticosteroids (Figure 5, Table 102). Nearly

ninety per cent of mothers of 28–31 week gestation infants received antenatal corticosteroids. The overall proportion of mothers receiving antenatal corticosteroids increased from 45 per cent in 1992 to 74.1 per cent in 2001.

TABLE 99

MOTHERS OF NICUS REGISTRANTS BY HEALTH AREA OF RESIDENCE AND ABORIGINALITY, NSW & ACT 2006

Health Area	Non-Aboriginal		Aboriginal		TOTAL	
	No.	%	No.	%	No.	%
Sydney South West	439	97.8	10	2.2	449	21.6
South Eastern Sydney & Illawarra	263	96.7	9	3.3	272	13.1
Sydney West	363	96.0	15	4.0	378	18.1
Northern Sydney & Central Coast	267	98.9	3	1.1	270	13.0
Hunter & New England	315	94.0	20	6.0	335	16.1
North Coast	47	95.9	2	4.1	49	2.4
Greater Southern	95	93.1	7	6.9	102	4.9
Greater Western	79	79.8	20	20.2	99	4.8
ACT	112	99.1	1	0.9	113	5.4
Overseas	10	100.0	0	0.0	10	0.5
Interstate	3	33.3	3	66.7	6	0.3
TOTAL	1993	95.7	90	4.3	2083	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

TABLE 100

MOTHERS OF NICUS REGISTRANTS BY HEALTH AREA OF RESIDENCE AND MATERNAL AGE, NSW & ACT 2006

Health Area	Maternal age (years)						TOTAL	
	Less than 20		20–34		35+		No.	%
	No.	%	No.	%	No.	%		
Sydney South West	15	3.3	332	73.9	102	22.7	449	21.6
South Eastern Sydney & Illawarra	12	4.4	181	66.8	78	28.8	271	13.0
Sydney West	15	4.0	276	73.0	87	23.0	378	18.1
Northern Sydney & Central Coast	5	1.9	187	69.3	78	28.9	270	13.0
Hunter & New England	20	6.0	247	73.7	68	20.3	335	16.1
North Coast	1	2.0	37	75.5	11	22.4	49	2.4
Greater Southern	5	4.9	78	76.5	19	18.6	102	4.9
Greater Western	7	7.1	83	83.8	9	9.1	99	4.8
ACT	6	5.3	69	61.1	38	33.6	113	5.4
Overseas	1	11.1	7	77.8	1	11.1	9	0.4
Interstate	1	16.7	4	66.7	1	16.7	6	0.3
Not stated	0	0.0	0	0.0	0	0.0	2	0.1
TOTAL	88	4.2	1501	72.1	492	23.6	2083	100.0

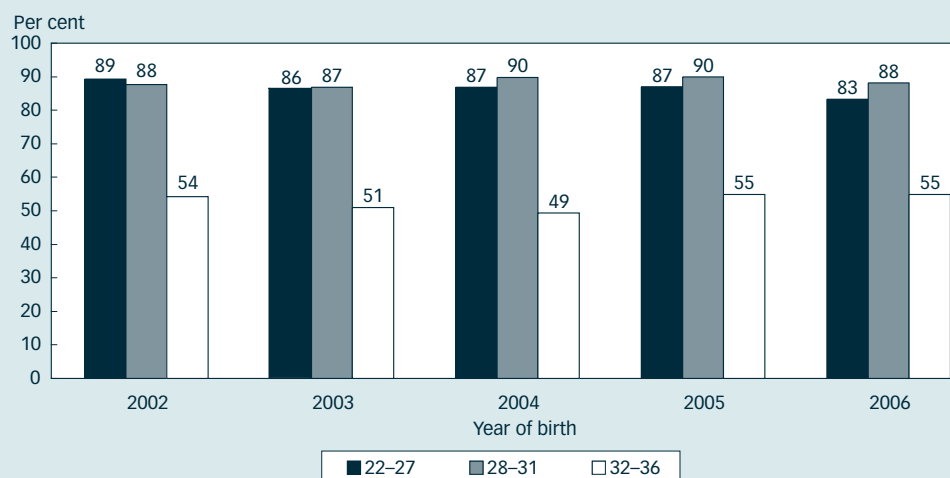
Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

TABLE 101

MOTHERS OF NICUS REGISTRANTS BY ANTENATAL COMPLICATIONS AND GESTATIONAL AGE, NSW & ACT 2006

Antenatal complication	Gestational age (weeks)										TOTAL	
	23–27		28–31		32–36		37–41		42+		No.	%
	No.	%	No.	%	No.	%	No.	%	No.	%		
Preterm labour	171	77.7	347	62.4	369	52.3	7	1.2	0	0.0	894	42.9
Pregnancy induced hypertension	30	13.6	124	22.3	137	19.4	49	8.2	2	28.6	342	16.4
Antepartum haemorrhage	68	30.9	124	22.3	119	16.9	34	5.7	1	14.3	346	16.6
Intrauterine growth restriction	14	6.4	63	11.3	113	16.0	28	4.7	0	0.0	218	10.5
Fetal compromise	35	15.9	118	21.2	140	19.8	125	21.0	3	42.9	421	20.2
Fetal diagnosis of anomaly	3	1.4	9	1.6	49	6.9	88	14.8	0	0.0	149	7.2
Gestational diabetes	5	2.3	23	4.1	46	6.5	38	6.4	1	14.3	113	5.4
Chorioamnionitis	68	30.9	79	14.2	28	4.0	14	2.4	1	14.3	190	9.1
Any complication	220	100.0	554	99.6	698	98.9	371	62.5	5	71.4	1848	88.7
TOTAL MOTHERS	220	100.0	556	100.0	706	100.0	594	100.0	7	100.0	2083	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research

FIGURE 5**MOTHERS OF NICUS REGISTRANTS BY ANTENATAL CORTICOSTEROID ADMINISTRATION AND GESTATIONAL AGE, NSW & ACT 2002–2006**

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research

TABLE 102**MOTHERS OF NICUS REGISTRANTS BY ANTENATAL CORTICOSTEROID ADMINISTRATION AND GESTATIONAL AGE, NSW & ACT 2002–2006**

Year	Corticosteroid administration	Gestational age (weeks)						TOTAL	
		22–27		28–31		32–36			
		No.	%	No.	%	No.	%	No.	%
2002	No	27	10.7	63	12.3	279	45.8	369	26.9
	Yes	225	89.3	449	87.7	330	54.2	1004	73.1
	TOTAL	252	100.0	512	100.0	609	100.0	1373	100.0
2003	No	31	13.8	68	13.1	310	49.0	409	29.7
	Yes	193	86.2	450	86.9	323	51.0	966	70.3
	TOTAL	224	100.0	518	100.0	633	100.0	1375	100.0
2004	No	30	13.2	56	10.3	361	50.7	447	30.1
	Yes	197	86.8	490	89.7	351	49.3	1038	69.9
	TOTAL	227	100.0	546	100.0	712	100.0	1485	100.0
2005	No	28	13.0	54	10.0	328	45.1	410	27.6
	Yes	188	87.0	488	90.0	400	54.9	1076	72.4
	TOTAL	216	100.0	542	100.0	728	100.0	1486	100.0
2006	No	37	16.8	66	11.9	319	45.2	422	28.5
	Yes	183	83.2	490	88.1	387	54.8	1060	71.5
	TOTAL	220	100.0	556	100.0	706	100.0	1482	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research

Transfer status, labour and birth

Infants are admitted to a neonatal intensive care unit after:

- birth that has been booked to occur in a tertiary centre;
- birth in a tertiary centre following maternal transfer;
- birth in a non-tertiary centre followed by infant transfer to a tertiary centre.

Thirty-six per cent of all births were booked at a tertiary centre, ranging from 30.1 per cent for the 23–27 week gestational age group to 41.9 per cent for the 32–36 weeks gestational age group (Table 103). Maternal transfer was most common at gestations less than 32 weeks. The rate of maternal transfer was similar for infants born before 28 weeks gestation (57.9 per cent) and for those born at 28–31 weeks gestation (55.9 per cent). The overall rate of maternal transfer was 34.1 per cent.

TABLE 103

NICUS REGISTRANTS BY BOOKING STATUS, TRANSFER STATUS AND GESTATIONAL AGE, NSW & ACT 2006

Booking status and transfer status	Gestational age (weeks)											
	23–27		28–31		32–36		37–41		42+		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Booked at tertiary hospital	78	30.1	230	35.3	328	41.9	197	33.1	3	42.9	836	36.4
Maternal transfer	150	57.9	364	55.9	239	30.5	29	4.9	0	0.0	782	34.1
Transfer after birth	30	11.6	51	7.8	194	24.8	357	59.9	3	42.9	635	27.7
Booked at non tertiary hospital	1	0.4	6	0.9	22	2.8	13	2.2	1	14.3	43	1.9
TOTAL	259	100.0	651	100.0	783	100.0	596	100.0	7	100.0	2296	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

Nearly thirty per cent of infants were transferred to a tertiary centre following birth. There were 4.4 per cent (100/2,296) of infants transferred from one tertiary centre to another during the first day of life for assisted ventilation and/or major surgery. Transfer following birth was most common in the 37-plus weeks gestational age group (59.7 per cent). Fifty-seven infants (57/1,386; 4.1 per cent) greater than 31 weeks gestation were discharged home prior to the admission that qualified them for registration in NICUS.

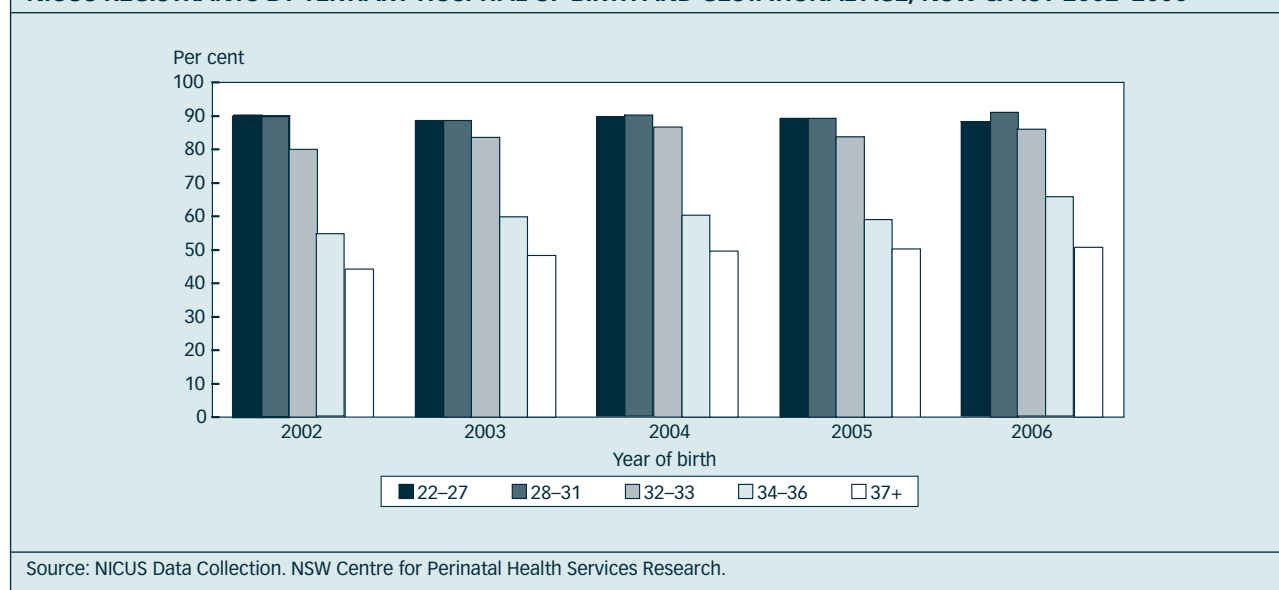
The inverse relationship between gestational age groups and the proportion of births in a tertiary centre is shown in

Figure 6 and Table 104. The proportion of infants born in a tertiary centre increased from 60 per cent in 1992 to 74.8 per cent 2000. In 2006, 90.2 per cent of infants less than 32 weeks gestation were born in a tertiary centre compared with 75.5 per cent of 32–36 week gestation infants and 49.8 per cent of term infants.

The pattern of transfer status (Table 105) and place of birth by birth weight (Table 106) is similar to that of gestational age, with the majority (90.5 per cent) of the very low birth weight infants (less than 1,500 grams) born in a tertiary centre.

FIGURE 6

NICUS REGISTRANTS BY TERTIARY HOSPITAL OF BIRTH AND GESTATIONAL AGE, NSW & ACT 2002–2006



Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

TABLE 104**NICUS REGISTRANTS BY PLACE OF BIRTH (LEVEL OF MATERNITY HOSPITAL) AND GESTATIONAL AGE, NSW & ACT 2006**

Place of birth	Gestational age (weeks)											
	23–27		28–31		32–36		37–41		42+		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Level 1	2	0.8	3	0.5	0	0.0	1	0.3	1	0.2	7	0.3
Level 2	1	0.4	3	0.5	1	0.3	1	0.3	7	1.2	13	0.6
Level 3	7	2.7	8	1.2	8	2.0	20	5.2	52	8.6	95	4.1
Level 4	5	1.9	9	1.4	6	1.5	18	4.7	81	13.4	119	5.2
Level 5	12	4.7	24	3.7	27	6.8	39	10.1	67	11.1	169	7.4
Level 6	228	88.4	593#	91.1	340	85.4	251	65.2	300	49.8	1712	74.6
Private hospital	1	0.4	1	0.2	11	2.8	46	11.9	79	13.1	138	6.0
Born before arrival	3	1.2	7	1.1	2	0.5	2	0.5	2	0.3	16	0.7
Interstate-Overseas	0	0.0	3	0.5	3	0.8	7	1.8	14	2.3	27	1.2
TOTAL	259	100.0	651	100.0	398	100.0	385	100.0	603	100.0	2296	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

358/593 (60.4%) babies born in a level six hospital were 30–31 weeks gestation.

TABLE 105**NICUS REGISTRANTS BY BOOKING STATUS, TRANSFER STATUS AND BIRTH WEIGHT, NSW & ACT 2006**

Booking status and transfer status	Birth weight (grams)									
	Less than 1,000		1,000–1,499		1,500–2,499		2,500+		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%
Booked at tertiary hospital	91	35.3	177	33.9	297	39.8	271	35.2	836	36.4
Maternal transfer	146	56.6	293	56.1	285	38.2	58	7.5	782	34.1
Transfer after birth	21	8.1	44	8.4	151	20.2	419	54.4	635	27.7
Booked at non tertiary hospital	0	0.0	8	1.5	13	1.7	22	2.9	43	1.9
TOTAL	258	100.0	522	100.0	746	100.0	770	100.0	2296	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

TABLE 106**NICUS REGISTRANTS BY PLACE OF BIRTH (LEVEL OF MATERNITY HOSPITAL) AND BIRTH WEIGHT, NSW & ACT 2006**

Place of birth	Birth weight (grams)									
	Less than 1,000		1,000–1,499		1,500–2,499		2500+		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%
Level 1	3	1.2	1	0.2	2	0.3	1	0.1	7	0.3
Level 2	1	0.4	0	0	5	0.7	7	0.9	13	0.6
Level 3	4	1.6	8	1.5	20	2.7	63	8.2	95	4.1
Level 4	1	0.4	10	1.9	22	2.9	86	11.2	119	5.2
Level 5	9	3.5	23	4.4	52	7.0	85	11.0	169	7.4
Level 6	237	92.2	469	89.8	602	80.7	404	52.5	1712	74.6
Private hospital	1	0.4	1	0.2	31	4.2	105	13.6	138	6.0
Born before arrival	2	0.8	8	1.5	4	0.5	2	0.3	16	0.7
Interstate-Overseas	0	0	2	0.4	8	1.1	17	2.2	27	1.2
TOTAL	258	100.0	522	100.0	746	100.0	770	100.0	2296	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

358/593 (60.4%) babies born in a level six hospital were 30–31 weeks gestation.

Spontaneous onset of labour was more common among mothers of infants less than 28 weeks gestation (Table 107). Augmentation and induction of labour were most common in term and post-term births. Similarly spontaneous onset of labour occurred in nearly half of all mothers of infants less than 2,500 grams birth weight (Table 108). As expected, augmentation, or induction of labour was most common in mothers of infants with a birth weight of 2,500 grams or more (26.4 per cent).

Prolonged rupture of membranes (greater than 24 hours) was more common at lower gestations, affecting 20.1 per cent of infants less than 28 weeks gestation (Table 109).

The proportion of mothers who gave birth by elective caesarean section (caesarean section without labour) was 39.9 per cent in 2006, previously ranging from 27 per cent in 1992 to 40.4 per cent in 2005 (Tables 110 and 111). The most common type of birth was caesarean section (58.9 per cent, range 45.8 per cent in 1993 to 59.7 per cent in 2004), followed by normal vaginal birth (31.4 percent, range 33.8 per cent in 1992 to 41.9 per cent in 1993) and vaginal breech birth (4.4 per cent, range 3.1 per cent in 2005 to 7 per cent in 1998). The high rate of caesarean section and breech birth in the NICUS cohort is related to the high proportion of preterm births. The rate of caesarean section in term and post-term births was 45.9 per cent, compared with 28.2 per cent for all term and post-term births in NSW and the ACT in 2006.

TABLE 107

MOTHERS OF NICUS REGISTRANTS BY ONSET OF LABOUR AND GESTATIONAL AGE, NSW & ACT 2006

Onset of labour	Gestational age (weeks)										TOTAL	
	23-27		28-31		32-36		37-41		42+			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Spontaneous	149	67.7	274	49.3	309	43.8	250	42.1	5	71.4	987	47.4
Augmented	9	4.1	18	3.2	21	3.0	54	9.1	0	0.0	102	4.9
Induced	0	0.0	8	1.4	49	6.9	123	20.7	1	14.3	181	8.7
No labour	62	28.2	256	46.0	327	46.3	167	28.1	1	14.3	813	39.0
TOTAL	220	100.0	556	100.0	706	100.0	594	100.0	7	100.0	2083	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

TABLE 108

MOTHERS OF NICUS REGISTRANTS BY ONSET OF LABOUR AND BIRTH WEIGHT, NSW & ACT 2006

Onset of labour	Birth weight (grams)								TOTAL	
	Less than 1,000		1,000-1,499		1,500-2,499		2500+			
	No.	%	No.	%	No.	%	No.	%	No.	%
Spontaneous	101	47.2	208	47.3	340	51.1	338	44.2	987	47.4
Augmented	5	2.3	9	2.0	25	3.8	63	8.2	102	4.9
Induced	0	0.0	10	2.3	32	4.8	139	18.2	181	8.7
No labour	108	50.5	213	48.4	268	40.3	224	29.3	813	39.0
TOTAL	214	100.0	440	100.0	665	100.0	764	100.0	2083	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

TABLE 109

NICUS REGISTRANTS BY DURATION OF RUPTURE OF MEMBRANES AND GESTATIONAL AGE, NSW & ACT 2006

Duration of rupture of membranes	Gestational age (weeks)										TOTAL	
	23-27		28-31		32-36		37-41		42+			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Less than 24 hours	207	79.9	498	76.5	699	89.3	559	93.8	7	100.0	1970	85.8
24 hours-7 days	24	9.3	87	13.4	56	7.2	35	5.9	0	0.0	202	8.8
8+ days	28	10.8	66	10.1	28	3.6	2	0.3	0	0.0	124	5.4
TOTAL	259	100.0	651	100.0	783	100.0	596	100.0	7	100.0	2296	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

TABLE 110**NICUS REGISTRANTS BY TYPE OF BIRTH AND GESTATIONAL AGE, NSW & ACT 2006**

Duration of rupture of membranes	Gestational age (weeks)										TOTAL	
	23–27		28–31		32–36		37–41		42+			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Normal vaginal	70	27.0	175	26.9	224	28.6	248	41.6	3	42.9	720	31.4
Forceps	6	2.3	20	3.1	16	2.0	20	3.4	0	0.0	62	2.7
Forceps rotation	0	0.0	0	0.0	1	0.1	5	0.8	0	0.0	6	0.3
Vacuum extraction	0	0.0	4	0.6	12	1.5	38	6.4	1	14.3	55	2.4
Vaginal breech	39	15.1	33	5.1	18	2.3	11	1.8	0	0.0	101	4.4
Elective Caesarean	72	27.8	298	45.8	371	47.4	173	29.0	2	28.6	916	39.9
Emergency Caesarean	72	27.8	121	18.6	141	18.0	101	16.9	1	14.3	436	19.0
TOTAL	259	100.0	651	100.0	783	100.0	596	100.0	7	100.0	2296	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

TABLE 111**NICUS REGISTRANTS BY BIRTH AND BIRTH WEIGHT, NSW AND ACT 2006**

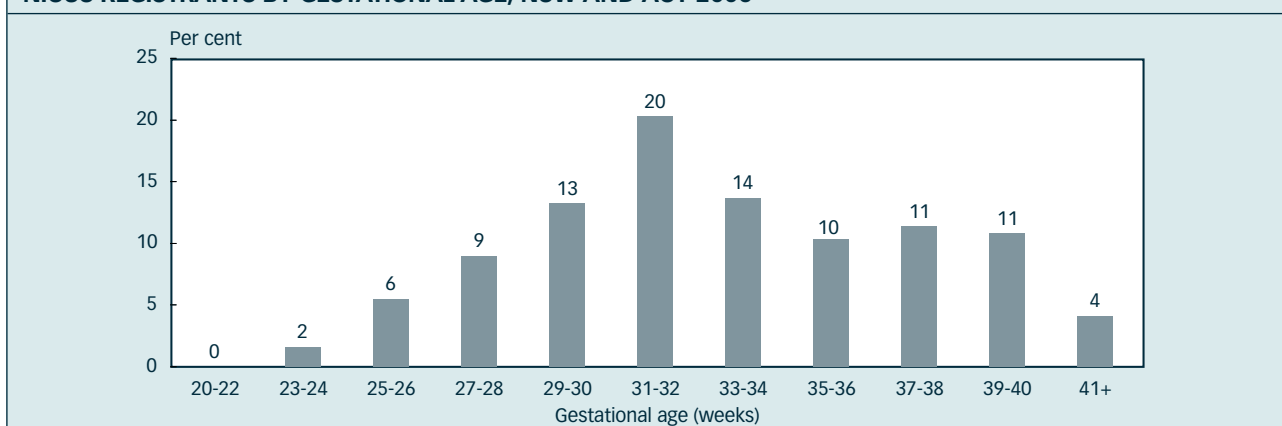
Onset of labour	Birth weight (grams)								TOTAL	
	Less than 1,000		1,000–1,499		1,500–2,499		2500+			
	No.	%	No.	%	No.	%	No.	%	No.	%
Normal vaginal	46	17.8	124	23.8	237	31.8	313	40.6	720	31.4
Forceps	3	1.2	12	2.3	22	2.9	25	3.2	62	2.7
Forceps rotation	0	0.0	0	0.0	0	0.0	6	0.8	6	0.3
Vacuum extraction	0	0.0	3	0.6	10	1.3	42	5.5	55	2.4
Vaginal breech	36	14.0	31	5.9	23	3.1	11	1.4	101	4.4
Elective Caesarean	123	47.7	258	49.4	301	40.3	234	30.4	916	39.9
Emergency Caesarean	50	19.4	94	18.0	153	20.5	139	18.1	436	19.0
TOTAL	258	100.0	522	100.0	746	100.0	770	100.0	2296	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

Infant characteristics

Three-quarters of the infants (73.7 per cent) were preterm (less than 37 weeks gestation), 39.6 per cent were very preterm (less than 32 weeks gestation) and 11.3 per cent were extremely preterm (less than 28 weeks gestation) (Figure 7). The proportion of infants in each gestational age group has

remained relatively constant (Table 112). Almost all liveborn infants at 25–31 weeks gestation were admitted to a NICU, nearly two-thirds at 32 weeks gestation, and one-fifth at 33–34 weeks gestation (Table 113).

FIGURE 7**NICUS REGISTRANTS BY GESTATIONAL AGE, NSW AND ACT 2006**

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

Sixty-six per cent of infants had a low birth weight (less than 2,500 grams), 34 per cent had a very low birth weight (less than 1,500 grams) and 11.2 per cent had an extremely low birth weight (less than 1,000 grams). The proportion of infants in each birth weight group has remained relatively constant

(Table 114). Almost all live born infants 600–1500 grams birth weight were admitted to a NICU (Table 115).

Overall, 59.1 per cent of infants were male. The ratio of males to females remains at 3:2 in most gestational age groups (Table 116).

TABLE 112

NICUS REGISTRANTS BY GESTATIONAL AGE, NSW & ACT 2002–2006

Gestational age (weeks)	Year of birth									
	2002		2003		2004		2005		2006	
	No.	%	No.	%	No.	%	No.	%	No.	%
22–27	282	14.0	254	12.0	264	11.8	243	10.8	259	11.3
28–31	604	30.0	607	28.7	649	29.0	652	28.9	651	28.4
32–36	640	31.8	678	32.1	764	34.2	778	34.5	783	34.1
37–41	480	23.8	561	26.5	555	24.8	576	25.5	596	26.0
42+	8	0.4	14	0.7	4	0.2	8	0.4	7	0.3
TOTAL	2014	100.0	2114	100.0	2236	100.0	2257	100.0	2296	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

TABLE 113

BIRTHS BY NICUS REGISTRATION AND GESTATIONAL AGE, NSW & ACT 2006

Gestational age (weeks)	NSW & ACT Stillbirths	Live births	Registrations	NICUS Rate per 1,000 live births	% of cohort
	No.	No.	No.		
Less than 21	74	22	0	0.0	0.0
21	65	24	0	0.0	0.0
22	64	31	0	0.0	0.0
23	37	41	5	122.0	0.2
24	35	47	32	680.9	1.4
25	22	43	42	976.7	1.8
26	28	85	85	1000.0	3.7
27	14	95	95	1000.0	4.1
28	19	110	111	1009.1	4.8
29	16	138	150	1087.0	6.5
30	21	156	154	987.2	6.7
31	12	245	236	963.3	10.3
32	22	398	231	580.4	10.1
33	12	477	167	350.1	7.3
34	32	871	148	169.9	6.5
35	16	1315	142	108.0	6.2
36	23	2673	95	35.5	4.1
37	36	5609	120	21.4	5.2
38	26	16361	141	8.6	6.1
39	21	23867	132	5.5	5.8
40	29	27551	116	4.2	5.1
41	16	15748	87	5.5	3.8
42	1	1448	7	4.8	0.3
43	0	125	0	0.0	0.0
44	0	7	0	0.0	0.0
45	0	1	0	0.0	0.0
46	0	0	0	0.0	0.0
47	0	0	0	0.0	0.0
48	0	1	0	0.0	0.0
TOTAL	641	97489#	2296	23.6	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research, 2006. NSW Midwives Data Collection 2006. Centre for Epidemiology and Research, NSW Department of Health. ACT Maternal Perinatal Data Collection 2006 ACT Health.

Excludes 118 babies for whom outcome was unknown and 18 babies for whom gestational age was unknown.

TABLE 114**NICUS REGISTRANTS BY BIRTH WEIGHT, NSW & ACT 2002–2006**

Birth weight (grams)	Year of birth									
	2002		2003		2004		2005		2006	
	No.	%	No.	%	No.	%	No.	%	No.	%
Less than 400	1	0.0	1	0.0	1	0.0	0	0.0	1	0.0
400–499	7	0.3	9	0.4	5	0.2	5	0.2	4	0.2
500–599	21	1.0	24	1.1	25	1.1	19	0.8	14	0.6
600–699	53	2.6	38	1.8	35	1.6	51	2.3	41	1.8
700–799	63	3.1	53	2.5	54	2.4	53	2.3	53	2.3
800–899	58	2.9	60	2.8	66	3.0	54	2.4	62	2.7
900–999	81	4.0	80	3.8	77	3.4	70	3.1	83	3.6
1,000–1,249	181	9.0	197	9.3	232	10.4	233	10.3	248	10.8
1,250–1,499	264	13.1	258	12.2	279	12.5	244	10.8	274	11.9
1,500–1,749	228	11.3	216	10.2	257	11.5	245	10.9	249	10.8
1,750–1,999	163	8.1	185	8.8	174	7.8	211	9.3	208	9.1
2,000–2,499	273	13.6	258	12.2	280	12.5	307	13.6	289	12.6
2,500–2,999	205	10.2	244	11.5	280	12.5	249	11.0	250	10.9
3,000–3,499	196	9.7	228	10.8	227	10.2	277	12.3	243	10.6
3,500–3,999	158	7.8	176	8.3	153	6.8	147	6.5	186	8.1
4,000+	62	3.1	87	4.1	91	4.1	92	4.1	91	4.0
TOTAL	2014	100.0	2114	100.0	2236	100.0	2257	100.0	2296	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

TABLE 115**BIRTHS BY NICUS REGISTRATION AND BIRTHWEIGHT, NSW & ACT 2006**

Birth weight (grams)	Stillbirths	Livebirths	Registrations	NICUS Rate per		% of cohort
	No.	No.	No.	1,000	live births	
Less than 400	20	6	1		166.7	0.0
400–499	71	44	4		90.9	0.2
500–599	50	39	14		359.0	0.6
600–699	21	61	41		672.1	1.8
700–799	22	61	53		868.9	2.3
800–899	13	61	62		1016.4	2.7
900–999	15	83	83		1000.0	3.6
1,000–1,249	27	254	248		976.4	10.8
1,250–1,499	28	284	274		964.8	11.9
1,500–1,749	17	458	249		543.7	10.8
1,750–1,999	34	733	208		283.8	9.1
2,000–2,499	44	3744	289		77.2	12.6
2,500–2,999	44	14645	250		17.1	10.9
3,000–3,499	37	34907	243		7.0	10.6
3,500–3,999	27	30400	186		6.1	8.1
4,000+	15	11636	91		7.8	4.0
TOTAL	485	97416#	2296		23.6	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research, 2006. NSW Midwives Data Collection 2006. Centre for Epidemiology and Research, NSW Department of Health. ACT Maternal Perinatal Data Collection 2006 ACT Health.

Excludes 110 babies for whom outcome was unknown and 255 babies for whom birth weight was unknown.

TABLE 116**NICUS REGISTRANTS BY GENDER AND GESTATIONAL AGE, NSW & ACT 2006**

Sex	Gestational age (weeks)											
	23–27		28–31		32–36		37–41		42+		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Male	133	51.4	388	59.6	466	59.5	365	61.2	4	57.1	1356	59.1
Female	126	48.6	263	40.4	317	40.5	231	38.8	3	42.9	940	40.9
TOTAL	259	100.0	651	100.0	783	100.0	596	100.0	7	100.0	2296	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

The overall proportion of infants who had a major congenital anomaly decreased from 22 per cent in 1992 to 15.6 per cent in 2006. Congenital anomalies were more common among term infants (37-plus weeks gestational age), of whom 35.2 per cent had a major congenital anomaly and 4 cent had a minor congenital anomaly (Table 117).

The overall proportion of infants born following a multiple pregnancy was 22.6 per cent in 2006 (range 14.5 per cent in 1993 to 22.4 per cent in 2001). In 2006, most of the infants (77.4 per cent) were from a singleton pregnancy, 19.6 per cent were from a twin pregnancy, 2.7 per cent were from a triplet pregnancy and 0.3 per cent were from a quadruplet pregnancy. The higher than expected rate of multiple births among the 2006 NICUS cohort reflects the high proportion of multiple pregnancies resulting in preterm birth with 30.6 per cent of infants less than 37 weeks gestation (Table 118). Multiple births represented 3.2 per cent of a 1 NSW/ACT live births in 2006.

Table 119 shows the median, 25th and 75th percentiles for one- and five-minute Apgar scores according to gestational age groups. For infants 32–42 weeks gestational age, the median one-minute Apgar score was eight. The median five-minute score was nine for infants 28–42 weeks gestational age. The proportion of infants with a one-minute Apgar score of 0–4 has decreased from 38.7 per cent in 1992 to 23.1 per cent in 2006. Similarly the proportion of infants with a five-minute Apgar score of 0–4 has decreased from 10.8 per cent in 1992 to 5.6 per cent in 2006 (Table 120).

Infants with major congenital anomalies ($n=359$) were excluded from the analysis of morbidity and mortality.

The majority of infants without a major congenital anomaly (1,689/1,936; 87.2 per cent) in the 2006 NICUS cohort received assisted ventilation (intermittent mandatory ventilation and/or continuous positive airways pressure) (Table 121).

TABLE 117

NICUS REGISTRANTS BY CONGENITAL ANOMALIES AND GESTATIONAL AGE, NSW & ACT 2006

Congenital anomaly	Gestational age (weeks)											
	23–27		28–31		32–36		37–41		42+		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
None	237	91.5	601	92.3	682	87.1	361	60.6	6	85.7	1887	82.2
Minor	7	2.7	8	1.2	11	1.4	24	4.0	0	0.0	50	2.2
Major	15	5.8	42	6.5	90	11.5	211	35.4	1	14.3	359	15.6
TOTAL	259	100.0	651	100.0	783	100.0	596	100.0	7	100.0	2296	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

TABLE 118

NICUS REGISTRANTS BY PLURALITY AND GESTATIONAL AGE, NSW & ACT 2006

Plurality	Gestational age (weeks)											
	23–27		28–31		32–36		37–41		42+		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Singleton	181	69.9	455	69.9	554	70.8	581	97.5	7	100.0	1778	77.4
Twins	59	22.8	173	26.6	202	25.8	15	2.5	0	0.0	449	19.6
Triplets	15	5.8	23	3.5	24	3.1	0	0.0	0	0.0	62	2.7
Quadruplets	4	1.5	0	0.0	3	0.4	0	0.0	0	0.0	7	0.3
TOTAL	259	100.0	651	100.0	783	100.0	596	100.0	7	100.0	2296	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

TABLE 119

NICUS REGISTRANTS BY APGAR SCORE AND GESTATIONAL AGE, NSW & ACT 2006

Apgar score	Gestational Age (weeks)							
	23–27		28–31		32–36		37+	
	Median (25%,75%)	Median (25%,75%)	Median (25%,75%)	Median (25%,75%)	Median (25%,75%)	Median (25%,75%)	Median (25%,75%)	Median (25%,75%)
One-minute Apgar	5	(3,6)	7	(5,8)	8	(6,9)	8	(4,9)
Five-minute Apgar	8	(6,8)	9	(8,9)	9	(8,9)	9	(7,9)

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

TABLE 120**NICUS REGISTRANTS BY APGAR SCORE AT ONE AND FIVE MINUTES, NSW & ACT 2002–2006**

Apgar score	Year of birth									
	2002		2003		2004		2005		2006	
	No.	%	No.	%	No.	%	No.	%	No.	%
One minute:										
0–4	475	23.6	475	22.5	533	23.8	531	23.5	531	23.1
5–7	692	34.4	751	35.5	735	32.9	759	33.6	745	32.4
8+	830	41.2	886	41.9	959	42.9	961	42.6	996	43.4
Not stated	17	0.8	2	0.1	9	0.4	6	0.3	24	1.0
TOTAL	2014	100.0	2114	100.0	2236	100.0	2257	100.0	2296	100.0
Five minutes:										
0–4	139	6.9	110	5.2	135	6.0	141	6.2	129	5.6
5–7	394	19.6	382	18.1	437	19.5	437	19.4	480	20.9
8+	1469	72.9	1619	76.6	1656	74.1	1674	74.2	1664	72.5
Not stated	12	0.6	3	0.1	8	0.4	5	0.2	23	1.0
TOTAL	2014	100.0	2114	100.0	2236	100.0	2257	100.0	2296	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research

TABLE 121**NICUS REGISTRANTS BY ASSISTED VENTILATION AND GESTATIONAL AGE, NSW & ACT 2002–2006#**

Year	Assisted ventilation	Gestational age (weeks)								TOTAL	
		22–27		28–31		32–36		37+			
		No.	%	No.	%	No.	%	No.	%	No.	%
2002	No	2	0.7	90	16.3	50	9.0	6	2.1	148	8.9
	Yes	267	99.3	463	83.7	505	91.0	286	97.9	1521	91.1
	TOTAL	269	100.0	553	100.0	555	100.0	292	100.0	1669	100.0
2003	No	1	0.4	104	18.0	98	16.0	75	20.1	278	15.4
	Yes	235	99.6	475	82.0	515	84.0	298	79.9	1523	84.6
	TOTAL	236	100.0	579	100.0	613	100.0	373	100.0	1801	100.0
2004	No	0	0.0	78	12.9	83	12.8	62	17.2	223	12.1
	Yes	239	100.0	525	87.1	563	87.2	298	82.8	1625	87.9
	TOTAL	239	100.0	603	100.0	646	100.0	360	100.0	1848	100.0
2005	No	1	0.4	114	18.4	91	13.4	48	12.6	254	13.3
	Yes	225	99.6	506	81.6	587	86.6	333	87.4	1651	86.7
	TOTAL	226	100.0	620	100.0	678	100.0	381	100.0	1905	100.0
2006	No	2	0.8	98	16.1	101	14.6	46	11.8	247	12.8
	Yes	242	99.2	511	83.9	591	85.4	345	88.2	1689	87.2
	TOTAL	244	100.0	609	100.0	692	100.0	391	100.0	1936	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

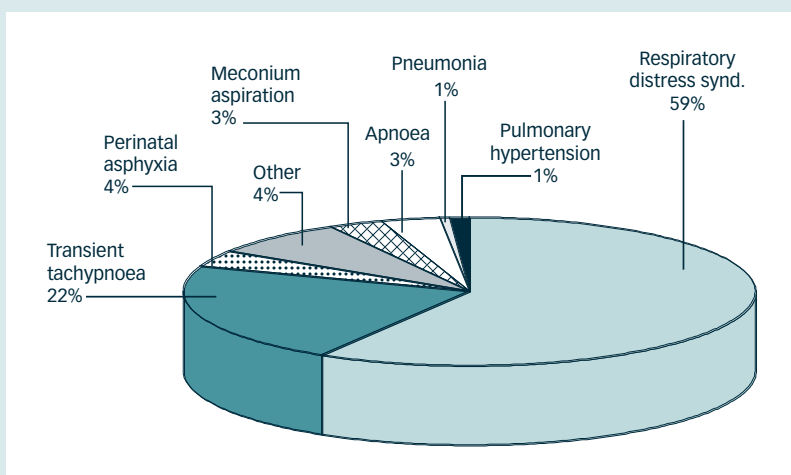
Babies with major congenital anomalies excluded.

The main indication for assisted ventilation for most infants was respiratory distress syndrome (Figure 8). The main indication for assisted ventilation varied with gestational age. Respiratory distress syndrome, immature lung, apnoea and transient tachypnoea were more common in the preterm groups, whereas perinatal asphyxia, meconium aspiration and pulmonary hypertension were more common in term infants (Figure 8, Table 122).

The overall proportion of ventilated infants who received surfactant was 37.1 in 2006 (range 33.8 per cent in 1992 to 51.9 per cent in 1998) (Table 123). In 2006, 56.6 per cent of the infants who received surfactant were less than 32 weeks gestational age. Nearly half (57.6 per cent) of ventilated infants with a diagnosis of respiratory distress syndrome received surfactant.

FIGURE 8

NICUS REGISTRANTS BY MAIN INDICATION FOR ASSISTED VENTILATION, NSW & ACT 2006



Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.
#Babies with major congenital anomalies excluded. Babies not ventilated excluded.

TABLE 122

NICUS REGISTRANTS BY MAIN INDICATION FOR ASSISTED VENTILATION & GESTATIONAL AGE, NSW & ACT 2006#

Indication	Gestational age (weeks)								TOTAL	
	23-27		28-31		32-36		37+			
	No.	%	No.	%	No.	%	No.	%	No.	%
Transient tachypnoea of newborn	0	0.0	86	16.8	198	33.5	88	25.5	372	22.0
Hyaline membrane disease	222	91.7	371	72.6	322	54.5	75	21.7	990	58.6
Meconium aspiration	0	0.0	0	0.0	2	0.3	52	15.1	54	3.2
Pneumonia	0	0.0	1	0.2	5	0.8	5	1.4	11	0.7
Pulmonary hypertension	0	0.0	1	0.2	2	0.3	14	4.1	17	1.0
Immature lung	11	4.5	11	2.2	1	0.2	0	0.0	23	1.4
Apnoea	5	2.1	20	3.9	22	3.7	7	2.0	54	3.2
Other	3	1.2	19	3.7	24	4.1	41	11.9	87	5.2
Peri surgery	0	0.0	2	0.4	2	0.3	16	4.6	20	1.2
Newborn encephalopathy	1	0.4	0	0.0	13	2.2	47	13.6	61	3.6
TOTAL	242	100.0	511	100.0	591	100.0	345	100.0	1689	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.
#Babies with major congenital anomalies excluded. Babies not ventilated excluded.

TABLE 123**NICUS REGISTRANTS BY SURFACTANT ADMINISTRATION AND GESTATIONAL AGE, NSW & ACT 2002–2006#**

Year	Surfactant administration	Gestational age (weeks)								TOTAL	
		22–27		28–31		32–36		37+			
		No.	%	No.	%	No.	%	No.	%	No.	%
2002	No	66	24.7	275	59.4	367	72.7	243	85.0	951	62.5
	Yes	201	75.3	188	40.6	138	27.3	43	15.0	570	37.5
	TOTAL	267	100.0	463	100.0	505	100.0	286	100.0	1521	100.0
2003	No	45	19.1	257	54.1	354	68.7	239	80.2	895	58.8
	Yes	190	80.9	218	45.9	161	31.3	59	19.8	628	41.2
	TOTAL	235	100.0	475	100.0	515	100.0	298	100.0	1523	100.0
2004	No	41	17.2	303	57.7	406	72.1	248	83.2	998	61.4
	Yes	198	82.8	222	42.3	157	27.9	50	16.8	627	38.6
	TOTAL	239	100.0	525	100.0	563	100.0	298	100.0	1625	100.0
2005	No	42	18.7	309	61.1	429	73.1	268	80.5	1048	63.5
	Yes	183	81.3	197	38.9	158	26.9	65	19.5	603	36.5
	TOTAL	225	100.0	506	100.0	587	100.0	333	100.0	1651	100.0
2006	No	37	15.3	290	56.8	441	74.6	294	85.2	1062	62.9
	Yes	205	84.7	221	43.2	150	25.4	51	14.8	627	37.1
	TOTAL	242	100.0	511	100.0	591	100.0	345	100.0	1689	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

Babies with major congenital anomalies and babies not ventilated excluded.

Proven systemic infection (blood and cerebrospinal fluid) has decreased from 10.7 per cent in 2003 to 9.4 per cent in 2006. Infection was most common among infants less than 28 weeks gestation (38.5 per cent) (Table 124).

Overall, the incidence of treated patent ductus arteriosus (PDA) was 15.7 per cent in 2006 (range 10.7 in 1994 to 16 per cent in 2004). In 2006, 95.1 per cent of the infants treated

for PDA were less than 32 weeks gestational age (Table 125). The majority of infants with a PDA requiring treatment received indomethacin only (14 per cent). Surgical treatment of PDA was predominantly performed on infants less than 28 weeks gestation (9 per cent). Some infants (7.8 per cent) were treated with both indomethacin and surgery.

TABLE 124**NICUS REGISTRANTS BY PROVEN SYSTEMIC INFECTION AND GESTATIONAL AGE, NSW & ACT 2006#**

Infection	Gestational age (weeks)								TOTAL	
	23–27		28–31		32–36		37+			
	No.	%	No.	%	No.	%	No.	%	No.	%
No	150	61.5	552	90.6	677	97.7	376	96.2	1755	90.6
Yes	94	38.5	57	9.4	16	2.3	15	3.8	182	9.4
TOTAL	244	100.0	609	100.0	693	100.0	391	100.0	1937	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research. # Babies with major congenital anomalies excluded.

TABLE 125**NICUS REGISTRANTS BY TREATED PATENT DUCTUS ARTERIOSUS AND GESTATIONAL AGE, NSW & ACT 2006#**

PDA-Treatment for PDA	Gestational age (weeks)								TOTAL	
	23–27		28–31		32–36					
	No.	%	No.	%	No.	%	No.	%		
No treated PDA	113	46.3	509	83.6	681	98.3	1303	84.3		
Indomethacin only	109	44.7	95	15.6	12	1.7	216	14.0		
Surgery only	3	1.2	1	0.2	0	0.0	4	0.3		
Indomethacin AND surgery	19	7.8	4	0.7	0	0.0	23	1.5		
TOTAL	244	100.0	609	100.0	693	100.0	1546	100.0		

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research. # Babies with major congenital anomalies excluded.

Overall, the incidence of necrotising enterocolitis (NEC) was 2.8 per cent in 2006 (range 9.8 per cent in 1992 to 2.3 per cent in 2000). The diagnosis of NEC was made radiologically or at surgery in 50 per cent of infants and clinically in the remainder. NEC was more common at the lower gestational groups and 77.8 per cent of the infants with NEC were born at less than 32 weeks gestation (Table 126).

The overall incidence of major surgery was 3.9 per cent in 2006 (range 7.7 per cent in 1992 to 3.3 per cent in 2000). In 2006, 64 per cent of the infants who required major surgery were less than 32 weeks gestation (Table 127). The most common surgical procedures amongst these infants were

for patent ductus arteriosus and necrotising enterocolitis.

In 2006, the incidence of intraventricular haemorrhage (IVH) among preterm infants (less than 37 weeks gestational age) was 12.3 per cent (range 20.5 per cent in 1993 to 12.3 per cent in 2006). In 2006, confirmed IVH was most common among infants less than 28 weeks gestation (36.9 per cent); 34.4 per cent of these infants had severe IVH (grade 3 or 4). Four infants less than 32 weeks gestation with severe IVH required surgical drainage for post haemorrhagic hydrocephalus (4/40, 10 per cent). Of the surviving infants born before 32 weeks gestation, 94.8 per cent had a head ultrasound examination to detect IVH (Table 128).

TABLE 126

NICUS REGISTRANTS BY NECROTISING ENTEROCOLITIS AND GESTATIONAL AGE, NSW & ACT 2006#

NEC-Treatment for NEC	Gestational age (weeks)									
	23-27		28-31		32-36		37+		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%
No NEC	218	89.3	593	97.4	686	99.0	386	98.7	1883	97.2
Clinical diagnosis	10	4.1	8	1.3	5	0.7	4	1.0	27	1.4
X-ray diagnosis	6	2.5	4	0.7	0	0.0	1	0.3	11	0.6
Surgery for NEC	10	4.1	4	0.7	2	0.3	0	0.0	16	0.8
TOTAL	244	100.0	609	100.0	693	100.0	391	100.0	1937	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

Babies with major congenital anomalies excluded.

TABLE 127

NICUS REGISTRANTS BY MAJOR SURGERY AND GESTATIONAL AGE, NSW & ACT 2006#

Major surgery	Gestational age (weeks)									
	23-27		28-31		32-36		37+		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%
No	209	85.7	596	97.9	687	99.1	370	94.6	1862	96.1
Yes	35	14.3	13	2.1	6	0.9	21	5.4	75	3.9
TOTAL	244	100.0	609	100.0	693	100.0	391	100.0	1937	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

Babies with major congenital anomalies excluded.

TABLE 128

NICUS REGISTRANTS BY INTRAVENTRICULAR HAEMORRHAGE AND GESTATIONAL AGE, NSW & ACT 2006#

Head ultrasound	Gestational age (weeks)									
	23-27		28-31		32-36		37+		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%
No IVH	146	59.8	484	79.5	291	42.0	921	59.6		
Grade 1	44	18.0	61	10.0	15	2.2	120	7.8		
Grade 2	15	6.1	9	1.5	3	0.4	27	1.7		
Grade 3	7	2.9	5	0.8	1	0.1	13	0.8		
Grade 4	24	9.8	4	0.7	2	0.3	30	1.9		
Hydrocephalus requiring drainage	3	1.2	1	0.2	1	0.1	5	0.3		
Not examined and lived	0	0	44	7.2	379	54.7	423	27.4		
Not examined and died	8	3.3	2	0.3	2	0.3	12	0.8		
TOTAL	244	100.0	609	100.0	693	100.0	1546	100.0		

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

Babies with major congenital anomalies excluded.

The proportion of infants with severe grades (Grades 3 or 4) of retinopathy of prematurity (ROP) was 3 per cent in 2006 (range 7.5 per cent in 1992 to 2.8 per cent in 2004). In 2006, seven infants with Grade 3 ROP were 28–31 weeks gestation and 84.2 per cent of the infants less than

28 weeks gestation with severe ROP received laser therapy. Importantly, 17.6 per cent of surviving infants of 28–31 weeks gestational age did not have an eye examination recorded (Table 129).

TABLE 129

NICUS REGISTRANTS BY RETINOPATHY OF PREMATURITY AND GESTATIONAL AGE, NSW & ACT 2006#

Retinopathy of prematurity	Gestational age (weeks)					
	23–27		28–31		TOTAL	
	No.	%	No.	%	No.	%
No ROP	102	41.8	435	71.4	537	63.0
Grade 1	38	15.6	21	3.4	59	6.9
Grade 2	44	18.0	27	4.4	71	8.3
Grade 3	17	7.0	7	1.1	24	2.8
Grade 4	2	0.8	0	0.0	2	0.2
Treatment with laser therapy	16	6.6	2	0.3	18	2.1
Not examined and lived	1	0.4	107	17.6	108	12.7
Not examined and died	40	16.4	12	2.0	52	6.1
TOTAL	244	100.0	609	100.0	853	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

Babies with major congenital anomalies excluded.

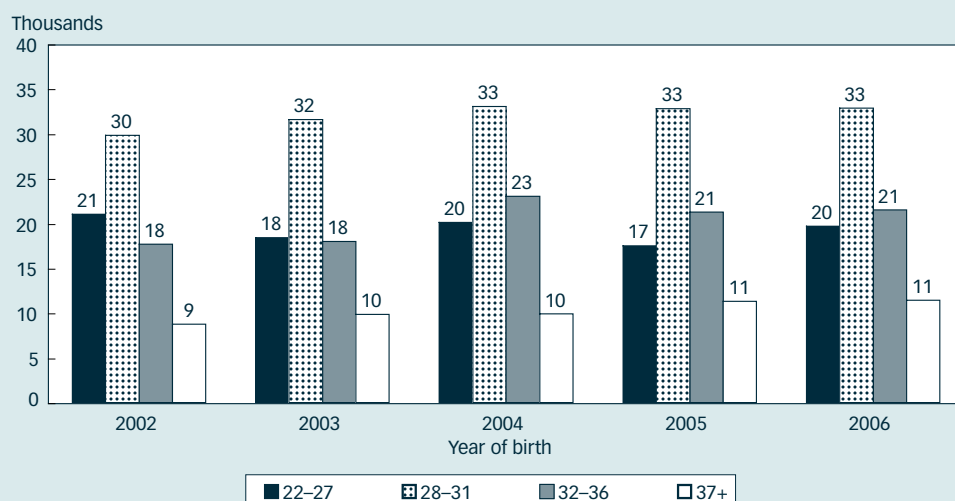
Service utilisation

Indicators of service utilisation collected as part of NICUS include length of stay in tertiary and non-tertiary centres, days on assisted ventilation, and days in oxygen (Figures 9, 10 and 11 and Table 130). On an individual basis, infants born at less than 28 weeks gestation consumed most resources. However, as a group those born at 28–31 weeks

gestation consumed more bed days than any other group. In 2006, the total cohort used 63,951 bed days in a tertiary centre in NSW and the ACT; as well as 21,575 in a non-tertiary centre (level 2 neonatal unit) in NSW and the ACT. Even when these infants leave the neonatal intensive care unit, they still require substantial resources.

FIGURE 9

NICUS REGISTRANTS BY TOTAL NUMBER OF DAYS IN HOSPITAL AND GESTATIONAL AGE, NSW & ACT 2002-2006

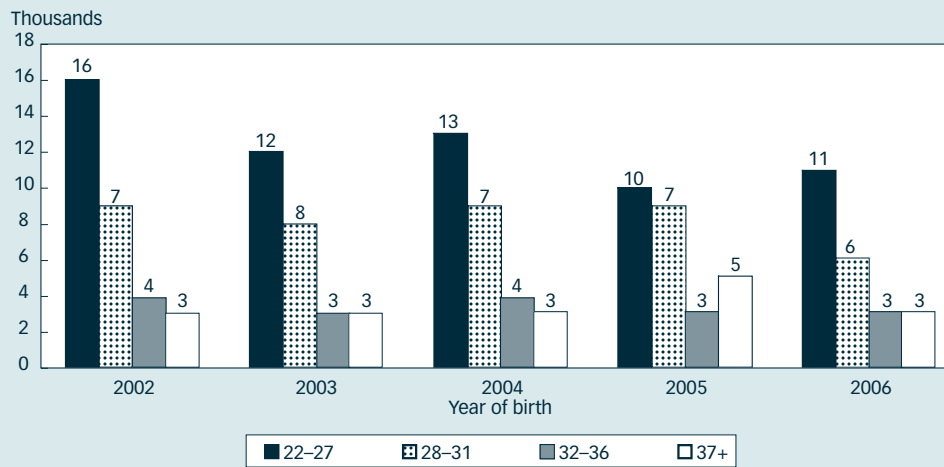


Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

#Babies with major congenital anomalies excluded. Babies not ventilated excluded.

FIGURE 10

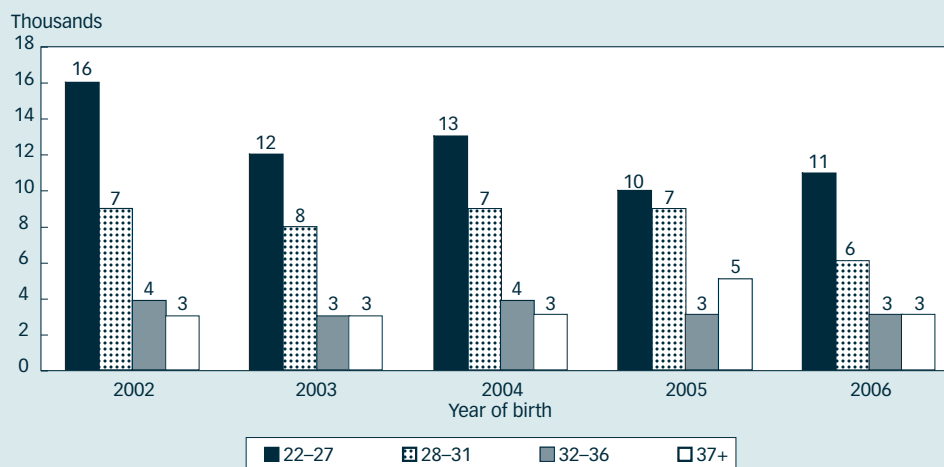
NICUS REGISTRANTS BY TOTAL NUMBER OF DAYS ASSISTED VENTILATION AND GESTATIONAL AGE, NSW & ACT 2002–2006



Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

FIGURE 11

NICUS REGISTRANTS BY TOTAL NUMBER OF DAYS OF OXYGEN THERAPY AND GESTATIONAL AGE, NSW & ACT 2002–2006



Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

TABLE 130**NICUS REGISTRANTS BY SERVICE UTILISATION INDICATORS AND GESTATIONAL AGE, NSW & ACT 2006**

Indicators	Gestational Age (weeks)				TOTAL
	23-27	28-31	32-36	37+	
Non-tertiary hospital stay (days):					
Minimum	0	0	0	0	0
Maximum	153	82	81	180	180
Sum	2508	10441	6884	1742	21575
Median	0	15	2	0	1
25th percentile	0	0	0	0	0
75th percentile	18	29	17	3	17
Tertiary hospital stay (days):					
Minimum	0	0	0	0	0
Maximum	160	364	451	364	451
Sum	17186	22478	14610	9677	63951
Median	73	31	12	9	16
25th percentile	44	15	7	5	7
75th percentile	92	49	22	17	38
Total hospital stay (days):					
Minimum	1	1	1	1	1
Maximum	211	364	451	364	451
Sum	19694	32863	21484	11419	85460
Median	81	47	23	11	30
25th percentile	62	38	15	6	14
75th percentile	100	60	34	20	51
Mechanical ventilation (days):					
Minimum	0	0	0	0	0
Maximum	61	31	68	304	304
Sum	2610	818	1020	1672	6120
Median	4	0	0	1	1
25th percentile	1	0	0	0	0
75th percentile	14	1	1	3	2
Continuous Positive Airways Pressure (days):					
Minimum	0	0	0	0	0
Maximum	126	63	79	87	126
Sum	6071	3936	1373	651	12031
Median	22	4	1	0	1
25th percentile	6	1	0	0	0
75th percentile	36	9	3	1	5
Assisted ventilation (days):					
Minimum	0	0	0	0	0
Maximum	129	63	96	304	304
Sum	8681	4754	2394	2323	18151
Median	31	4	2	2	3
25th percentile	12	1	1	1	1
75th percentile	52	11	4	4	7
Oxygen (days):					
Minimum	0	0	0	0	0
Maximum	157	364	124	162	364
Sum	10828	6203	2880	3156	23067
Median	26	1	1	2	2
25th percentile	4	0	0	1	1
75th percentile	73	6	4	6	6

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research

In 2006, NICUS registrants used 18,151 days of assisted ventilation (range 15,282 in 1993 to 18,994 in 2000) and 23,067 days of oxygen therapy (range 22,526 in 1993 to 30,750 in 2001). In 2006, 50 (2.7 per cent) surviving infants were discharged home on oxygen therapy (range 2.4 per

cent in 1992 to 5.4 per cent in 1998). The proportion of surviving infants less than 28 weeks gestation discharged home on oxygen therapy was 20.1 per cent (range 11.4 per cent in 1992 to 30.4 per cent in 2002) (Table 131).

TABLE 131

NICUS REGISTRANTS BY HOME OXYGEN ADMINISTRATION AND GESTATIONAL AGE, NSW & ACT 2002–2006#

Year	Home oxygen	Gestational age (weeks)									
		22–27		28–31		32–36		37+		TOTAL	
		No.	%	No.	%	No.	%	No.	%	No.	%
2002	No	133	69.6	515	97.5	538	99.4	265	98.1	1451	94.8
	Yes	58	30.4	13	2.5	3	0.6	5	1.9	79	5.2
	TOTAL	191	100.0	528	100.0	541	100.0	270	100.0	1530	100.0
2003	No	138	79.8	543	95.8	603	99.7	353	99.4	1637	96.3
	Yes	35	20.2	24	4.2	2	0.3	2	0.6	63	3.7
	TOTAL	173	100.0	567	100.0	605	100.0	355	100.0	1700	100.0
2004	No	137	75.3	576	98.0	634	99.7	338	99.4	1685	96.5
	Yes	45	24.7	12	2.0	2	0.3	2	0.6	61	3.5
	TOTAL	182	100.0	588	100.0	636	100.0	340	100.0	1746	100.0
2005	No	138	84.7	580	97.2	668	99.9	359	99.4	1745	97.5
	Yes	25	15.3	17	2.8	1	0.1	2	0.6	45	2.5
	TOTAL	163	100.0	597	100.0	669	100.0	361	100.0	1790	100.0
2006	No	159	79.9	585	98.3	681	100.0	366	100.0	1791	97.3
	Yes	40	20.1	10	1.7	0	0.0	0	0.0	50	2.7
	TOTAL	199	100.0	595	100.0	681	100.0	366	100.0	1841	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

Babies surviving to hospital discharge. Babies with major congenital anomalies excluded.

Survival

Infants with a major congenital anomaly have been excluded from the analysis of survival, with the exception of data reported in Table 135.

The six-month survival rate for all infants without a major congenital anomaly in the 2006 cohort was 94.9 per cent (range 87.8 per cent in 1992 to 94.9 per cent in 2006). Survival of infants born at less than 25 weeks gestation was 57.1 per cent (range 33.9 per cent in 1998 to 54.8 per cent in 1993). There was a trend for survival to improve with gestational age (Figure 12 and Table 132). There was no difference in the survival rate between term (93.4 per cent) and preterm infants (95.3 per cent). Among infants who died, 60.6 per cent of deaths occurred during the first week of life (range 60.6 per cent in 1998 to 76.8 per cent in 2002) with a further 26.3 per cent occurring during the first month of life (Table 132).

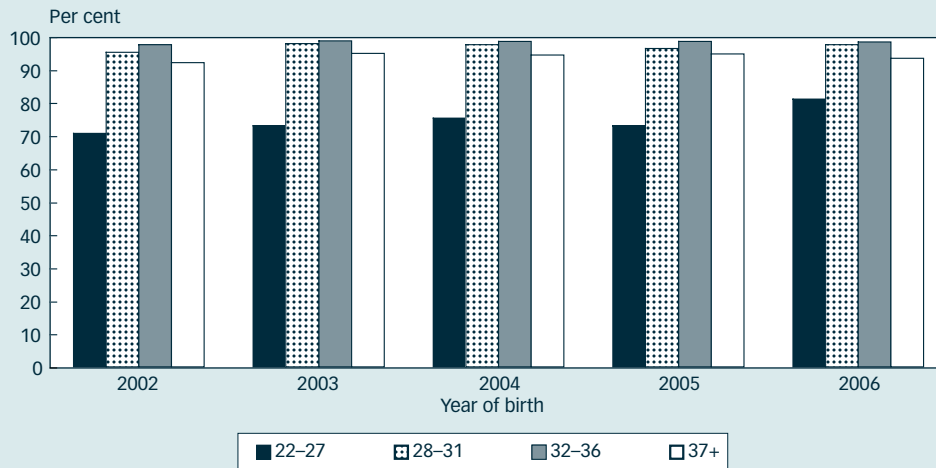
The six-month survival rate improved with increasing birth weight, ranging from 69.2 per cent for infants in the 500–599 gram group to 85.5 per cent for the 900–999 gram group. Six-month survival continued to improve with increasing birth weight to a maximum of 99.6 per cent for infants of 1,500–1,749 grams birth weight and then decreased slightly (Table 133).

The majority of infants registered in NICUS were born at a tertiary centre. Although the gestational age is the most important risk factor for mortality, disease severity is also important. At each gestational age group those with severe disease are more likely to be transferred to a neonatal intensive care unit.

In 2006, the six-month survival rate for 23–27 week infants born in a tertiary centre (82.3 per cent) was significantly higher than for those born in a non-tertiary centre (74.1 per cent). Place of birth did not significantly affect survival for infants in any of the other gestational age groups (Table 134).

The six-month survival rate was similar for males (95 per cent) and females (94.7 per cent) overall, and for all gestational age groups: less than 28 weeks (75 per cent versus 87.1 per cent); 28–31 weeks (97.8 per cent versus 97.2 per cent); 32–36 weeks (98.3 per cent versus 98.2 per cent); and 37–41 weeks gestation groups (95.1 per cent versus 90.1 per cent).

The six-month survival rate was 94.7 per cent ($n=1,368$) for singleton infants and 95.3 per cent ($n=470$) for multiple gestation infants. In 2006 plurality did not significantly influence survival in any of the gestational age groups.

FIGURE 12**NICUS REGISTRANTS BY 6-MONTHS SURVIVAL AND GESTATIONAL AGE, NSW & ACT 2002–2006**

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research

TABLE 132**NICUS REGISTRANTS BY DURATION OF SURVIVAL AND GESTATIONAL AGE, NSW & ACT 2006#**

Gestational age (weeks)	Alive at 6 months		Age at death (days)						TOTAL	
			0-7		8-28		28+			
	No.	%	No.	%	No.	%	No.	%	No.	%
23	2	40.0	3	60.0	0	0.0	0	0.0	5	0.3
24	18	60.0	3	10.0	6	20.0	3	10.0	30	1.5
25	29	76.3	6	15.8	3	7.9	0	0.0	38	2.0
26	69	84.1	6	7.3	4	4.9	3	3.7	82	4.2
27	80	89.9	6	6.7	1	1.1	2	2.2	89	4.6
28	88	88.9	5	5.1	2	2.0	4	4.0	99	5.1
29	138	98.6	1	0.7	1	0.7	0	0.0	140	7.2
30	144	99.3	1	0.7	0	0.0	0	0.0	145	7.5
31	224	99.6	1	0.4	0	0.0	0	0.0	225	11.6
32	214	98.6	1	0.5	2	0.9	0	0.0	217	11.2
33	155	98.1	3	1.9	0	0.0	0	0.0	158	8.2
34	128	98.5	1	0.8	1	0.8	0	0.0	130	6.7
35	116	100.0	0	0.0	0	0.0	0	0.0	116	6.0
36	68	94.4	2	2.8	2	2.8	0	0.0	72	3.7
37	83	96.5	1	1.2	1	1.2	1	1.2	86	4.4
38	73	92.4	4	5.1	2	2.5	0	0.0	79	4.1
39	70	92.1	5	6.6	1	1.3	0	0.0	76	3.9
40	72	88.9	9	11.1	0	0.0	0	0.0	81	4.2
41	61	96.8	2	3.2	0	0.0	0	0.0	63	3.3
42	6	100.0	0	0.0	0	0.0	0	0.0	6	0.3
TOTAL	1838	94.9	60	3.1	26	1.3	13	0.7	1937	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

Babies with major congenital anomalies excluded.

TABLE 133**NICUS REGISTRANTS BY DURATION OF SURVIVAL AND BIRTH WEIGHT, NSW & ACT 2006#**

Birth weight (grams)	Alive at 6 months		Age at death (days)						TOTAL	
	No.	%	0-7		8-28		28+		No.	%
			No.	%	No.	%	No.	%		
Less than 400	0	0.0	1	100.0	0	0.0	0	0.0	1	0.1
400-499	1	50.0	0	0.0	1	50.0	0	0.0	2	0.1
500-599	9	69.2	3	23.1	0	0.0	1	7.7	13	0.7
600-699	23	63.9	4	11.1	7	19.4	2	5.6	36	1.9
700-799	42	84.0	5	10.0	1	2.0	2	4.0	50	2.6
800-899	50	86.2	6	10.3	2	3.4	0	0.0	58	3.0
900-999	65	85.5	6	7.9	2	2.6	3	3.9	76	3.9
1,000-1,249	217	96.0	3	1.3	3	1.3	3	1.3	226	11.7
1,250-1,499	255	97.0	6	2.3	1	0.4	1	0.4	263	13.6
1,500-1,749	236	99.6	1	0.4	0	0.0	0	0.0	237	12.2
1,750-1,999	186	98.4	2	1.1	1	0.5	0	0.0	189	9.8
2,000-2,499	229	96.6	5	2.1	3	1.3	0	0.0	237	12.2
2,500-2,999	179	99.4	1	0.6	0	0.0	0	0.0	180	9.3
3,000-3,499	157	93.5	6	3.6	5	3.0	0	0.0	168	8.7
3,500-3,999	126	92.6	9	6.6	0	0.0	1	0.7	136	7.0
4,000+	63	96.9	2	3.1	0	0.0	0	0.0	65	3.4
TOTAL	1838	94.9	60	3.1	26	1.3	13	0.7	1937	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

Babies with major congenital anomalies excluded.

TABLE 134**NICUS REGISTRANTS BY DURATION OF SURVIVAL, PLACE OF BIRTH AND GESTATIONAL AGE, NSW & ACT 2006#**

Gestational age (weeks)	Place of birth	Alive at 6 months		Age at death (days)						TOTAL	
		No.	%	0-7		8-28		28+		No.	%
				No.	%	No.	%	No.	%		
23-27	Non tertiary	20	74.1	5	18.5	0	0.0	2	7.4	27	11.2
	Tertiary	177	82.3	19	8.8	13	6.0	6	2.8	215	88.8
	Sub-total	197	81.4	24	9.9	13	5.4	8	3.3	242	100.0
28-31	Non tertiary	48	98.0	1	2.0	0	0.0	0	0.0	49	8.1
	Tertiary	539	97.5	7	1.3	3	0.5	4	0.7	553	91.9
	Sub-total	587	97.5	8	1.3	3	0.5	4	0.7	602	100.0
32-36	Non tertiary	159	97.0	2	1.2	3	1.8	0	0.0	164	23.8
	Tertiary	520	98.9	4	0.8	2	0.4	0	0.0	526	76.2
	Sub-total	679	98.4	6	0.9	5	0.7	0	0.0	690	100.0
37-41	Non tertiary	185	93.0	10	5.0	3	1.5	1	0.5	199	52.1
	Tertiary	171	93.4	11	6.0	1	0.5	0	0.0	183	47.9
	Sub-total	356	93.2	21	5.5	4	1.0	1	0.3	382	100.0
42+	Non tertiary	3	100.0	0	0.0	0	0.0	0	0.0	3	50.0
	Tertiary	3	100.0	0	0.0	0	0.0	0	0.0	3	50.0
	Sub-total	6	100.0	0	0.0	0	0.0	0	0.0	6	100.0
TOTAL		1825	95.0	59	3.1	25	1.3	13	0.7	1922	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

Babies with major congenital anomalies excluded. Babies born before arrival excluded.

As expected, the overall survival rate was generally lower (88 per cent) in the presence of a major congenital anomaly (Table 135).

TABLE 135

NICUS REGISTRANTS BY DURATION OF SURVIVAL, MAJOR CONGENITAL ANOMALY AND GESTATIONAL AGE, NSW & ACT 2006

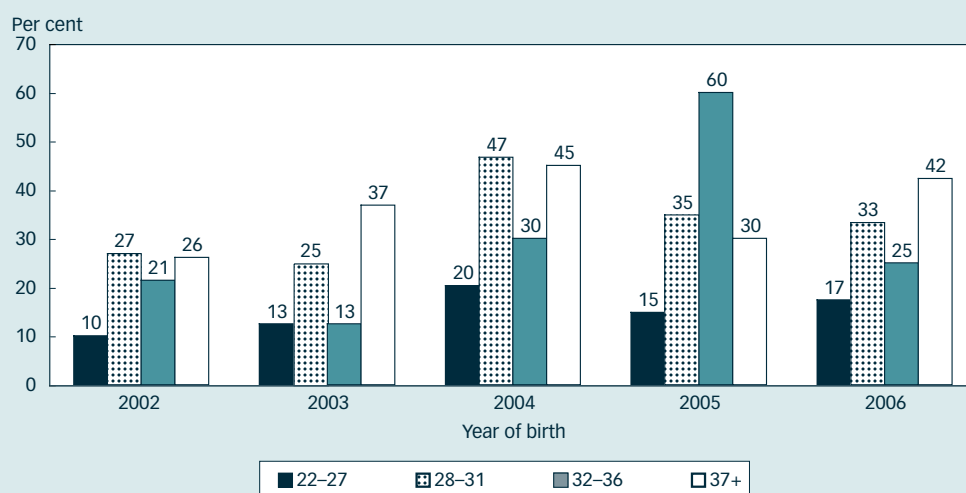
Gestational age (weeks)	Major congenital anomaly	Alive at 6 months		Age at death (days)						TOTAL	
				0-7		8-28		28+			
		No.	%	No.	%	No.	%	No.	%	No.	%
23-27	No	198	81.1	24	9.8	14	5.7	8	3.3	244	94.2
	Yes	10	66.7	3	20.0	1	6.7	1	6.7	15	5.8
	Sub-total	208	80.3	27	10.4	15	5.8	9	3.5	259	100.0
28-31	No	594	97.5	8	1.3	3	0.5	4	0.7	609	93.5
	Yes	39	92.9	2	4.8	1	2.4	0	0.0	42	6.5
	Sub-total	633	97.2	10	1.5	4	0.6	4	0.6	651	100.0
32-36	No	681	98.3	7	1.0	5	0.7	0	0.0	693	88.5
	Yes	70	77.8	10	11.1	5	5.6	5	5.6	90	11.5
	Sub-total	751	95.9	17	2.2	10	1.3	5	0.6	783	100.0
37-41	No	359	93.2	21	5.5	4	1.0	1	0.3	385	64.6
	Yes	196	92.9	11	5.2	3	1.4	1	0.5	211	35.4
	Sub-total	555	93.1	32	5.4	7	1.2	2	0.3	596	100.0
42+	No	6	100.0	0	0.0	0	0.0	0	0.0	6	85.7
	Yes	1	100.0	0	0.0	0	0.0	0	0.0	1	14.3
	Sub-total	7	100.0	0	0.0	0	0.0	0	0.0	7	100.0
TOTAL		2154	93.8	86	3.7	36	1.6	20	0.9	2296	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

Post-mortem examinations were performed on 27/99 infants (27.3 per cent) who died in the 2006 cohort (Figure 13 and Table 136). Post-mortem examinations were most commonly not requested for infants 32–36 weeks gestation (58.3 per cent). The highest rate of refusal was in the 23–27 week group (30.4 per cent) and the highest rate of post-mortem examination was in the 37-plus week group (42.3 per cent).

FIGURE 13

NICUS REGISTRANT DEATHS BY POST-MORTEM EXAMINATION AND GESTATIONAL AGE, NSW & ACT 2002–2006



Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.
#Babies with major congenital anomalies excluded.

TABLE 136

NICUS REGISTRANTS BY POST-MORTEM EXAMINATION AND GESTATIONAL AGE, NSW & ACT 2006#

Post-mortem	Gestational age (weeks)									
	23–27		28–31		32–36		37+		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%
Not requested	24	52.2	8	53.3	7	58.3	10	38.5	49	49.5
Refused	14	30.4	2	13.3	2	16.7	5	19.2	23	23.2
Done	8	17.4	5	33.3	3	25.0	11	42.3	27	27.3
TOTAL	46	100.0	15	100.0	12	100.0	26	100.0	99	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.
Babies with major congenital anomalies excluded.