

8. 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 2,231 infants registered in NICUS in 2004. The most common reasons for registration of an infant were assisted ventilation for 4 hours or more (47.4 per cent) and gestational age less than 29 weeks (16.6 per cent). Infants generally met more than one of the registration criteria.

The NICUS registration rate in 2004 was 24.8 per 1,000 livebirths, which has increased slightly each year since 1992 (17.9 per 1,000 livebirths). Table 67 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-two of the 2,231 infants (4.1 per cent) registered in NICUS were born to Aboriginal or Torres Strait Islander mothers. There were 2,392 livebirths to Aboriginal or Torres Strait Islander women recorded by the NSW and ACT Midwives Data Collections for 2004. The registration rate for these infants was 38.5 per 1,000 livebirths and has increased since 1992. Eighty-four of the 2,038 mothers (4.1 per cent) were Aboriginal or Torres Strait Islander, of whom 18 (21.4 per cent) were residents of the Greater Western and North Coast Health Areas (Table 68). Twenty-seven of the 353 mothers (7.6 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 2,038 mothers of the 2,231 infants registered in NICUS during 2004. Just over 80 per cent of the 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. Of the 353 mothers of infants in this group just over three-quarters (84.7 per cent) were residents of the Sydney South West, Sydney West, Hunter & New England, Northern Sydney & Central Coast, and South Eastern Sydney & Illawarra Health Areas.

The age of mothers of NICUS infants ranged from 15 to 48 years, with a mean age of 29.8 years. The mean maternal age was similar across all gestational age groups and has remained constant since 1992. In 2004, 22.3 per cent of mothers were aged 35 years or more (range 13.7 per cent in 1992 to 22.3 per cent in 2004). In 2004, 4.8 per cent of mothers were aged less than 20 years (range 4.7 per cent in 2004 to 6.8 per cent in 2000) (Table 69). The health area of residence with the highest proportion of teenage mothers was North Coast.

There were 1,795 mothers (88.1 per cent) who had an antenatal complication. The most common antenatal complications were preterm labour (45.2 per cent), pregnancy induced hypertension (17.6 per cent), fetal distress (16.7 per cent), antepartum haemorrhage (16.5 per cent), and intrauterine growth restriction (10.3 per cent). Antenatal complications were more frequent in mothers delivering at less than 37 weeks compared with at term. Even so, 56.2 per cent of mothers giving birth at term had an antenatal complication (Table 70).

TABLE 67

NICUS REGISTRATIONS BY HEALTH AREA OF RESIDENCE, NSW & ACT 2004

Health Area	Total NICUS registrants		Total NSW & ACT live births No.	Registrants per 1,000 live births
	No.	%		
Sydney South West	476	21.3	18893	25.2
South Eastern Sydney & Illawarra	281	12.6	14224	19.8
Sydney West	445	20.0	16017	27.8
Northern Sydney & Central Coast	256	11.5	13169	19.4
Hunter & New England	337	15.1	9761	34.5
North Coast	54	2.4	4585	11.8
Greater Southern	131	5.9	4621	28.3
Greater Western	100	4.5	3851	26.0
ACT	140	6.3	4115	34.0
Overseas	7	0.3	0	0.0
Interstate	4	0.2	614	11.4
TOTAL	2231	100.00	89850	24.8

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research. NSW Midwives Data Collection 2004. Centre for Epidemiology and Research, NSW Department of Health. ACT Maternal Perinatal Data Collection 2003, ACT Health.

Administration of corticosteroids to the mother prior to preterm birth improves the outcome for the infant. In 2004, 86.7 per cent of mothers of infants born at less than 28 weeks received corticosteroids (Figure 5, Table 71). 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 68

MOTHERS OF NICUS REGISTRANTS BY HEALTH AREA OF RESIDENCE AND ABORIGINALITY, NSW & ACT 2004

Health Area	Non-Aboriginal		Aboriginal		TOTAL	
	No.	%	No.	%	No.	%
Sydney South West	432	97.7	10	2.3	442	21.7
South Eastern Sydney & Illawarra	247	98.0	5	2.0	252	12.4
Sydney West	395	97.5	10	2.5	405	19.9
Northern Sydney & Central Coast	224	98.2	4	1.8	228	11.2
Hunter & New England	286	91.4	27	8.6	313	15.4
North Coast	44	86.3	7	13.7	51	2.5
Greater Southern	117	94.4	7	5.6	124	6.1
Greater Western	76	87.4	11	12.6	87	4.3
ACT	122	97.6	3	2.4	125	6.1
Overseas	7	100.0	0	0.0	7	0.3
Interstate	4	100.0	0	0.0	4	0.2
TOTAL	1954	95.9	84	4.1	2038	100.0

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

TABLE 69

MOTHERS OF NICUS REGISTRANTS BY HEALTH AREA OF RESIDENCE AND MATERNAL AGE, NSW & ACT 2004

Health Area	Maternal age (years)						TOTAL	
	Less than 20		20–34		35+		No.	%
Sydney South West	12	2.7	315	71.3	115	26.0	442	21.7
South Eastern Sydney & Illawarra	13	5.2	176	69.8	63	25.0	252	12.4
Sydney West	16	4.0	310	76.5	79	19.6	405	19.9
Northern Sydney & Central Coast	4	1.8	153	67.1	71	31.4	228	11.2
Hunter & New England	23	7.3	242	77.3	48	15.3	313	15.4
North Coast	5	9.8	38	74.5	8	15.7	51	2.5
Greater Southern	10	8.1	94	75.8	20	16.1	124	6.1
Greater Western	8	9.2	64	73.6	15	17.2	87	4.3
ACT	4	3.2	85	68.0	36	28.8	125	6.1
Overseas	0	0.0	7	100.0	0	0.0	7	0.3
Interstate	0	0.0	4	100.0	0	0.0	4	0.2
TOTAL	95	4.7	1488	73.0	455	22.3	2038	100.0

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

TABLE 70

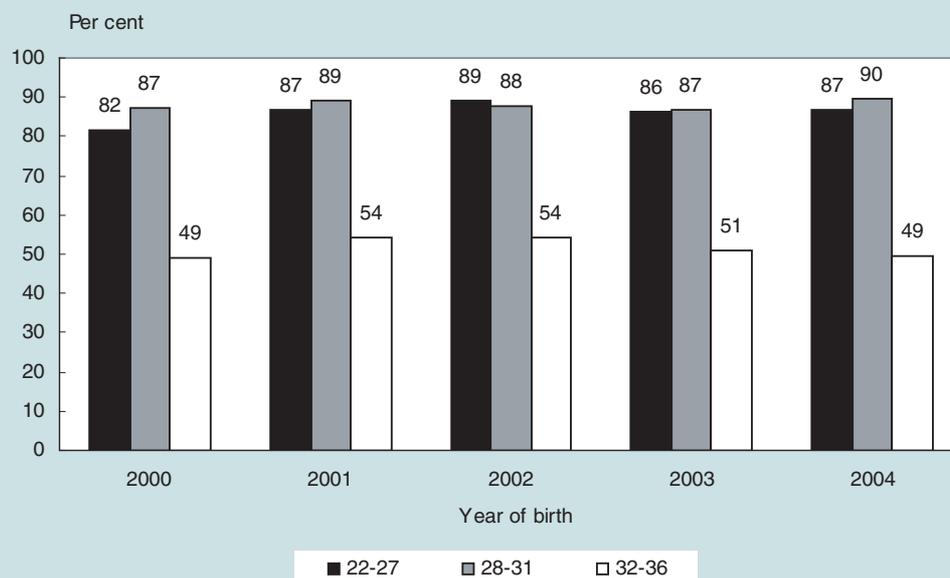
MOTHERS OF NICUS REGISTRANTS BY ANTENATAL COMPLICATIONS AND GESTATIONAL AGE, NSW & ACT 2004

Antenatal complication	Gestational age (weeks)										TOTAL	
	23–27		28–31		32–36		37–41		42+		No.	%
	No.	%	No.	%	No.	%	No.	%	No.	%		
Threatened preterm labour	177	78.3	333	61.0	399	56.1	12	2.2	0	0.0	921	45.2
Pregnancy induced hypertension	31	13.7	125	22.9	160	22.5	42	7.6	0	0.0	358	17.6
Fetal distress	36	15.9	76	13.9	117	16.5	111	20.1	1	25.0	341	16.7
Antepartum haemorrhage	66	29.2	133	24.4	114	16.0	23	4.2	0	0.0	336	16.5
Intrauterine growth restriction	16	7.1	68	12.5	110	15.5	15	2.7	0	0.0	209	10.3
Fetal diagnosis of anomaly	1	0.4	12	2.2	54	7.6	73	13.2	0	0.0	140	6.9
Chorioamnionitis	49	21.7	50	9.2	21	3.0	5	0.9	0	0.0	125	6.1
Gestational diabetes	4	1.8	22	4.0	46	6.5	39	7.1	0	0.0	111	5.4
Any complication	226	100.0	546	100.0	711	100.0	311	56.4	1	25.0	1795	88.1
TOTAL MOTHERS	226	100.0	546	100.0	711	100.0	551	100.0	4	100.0	2038	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 2000–2004



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

TABLE 71

MOTHERS OF NICUS REGISTRANTS BY ANTENATAL CORTICOSTEROID ADMINISTRATION AND GESTATIONAL AGE, NSW & ACT 2000–2004

Year	Corticosteroid Administration	Gestational age (weeks)						TOTAL	
		22–27		28–31		32–36		No.	%
		No.	%	No.	%	No.	%	No.	%
2000	No	45	18.5	65	12.6	287	50.9	397	30.0
	Yes	198	81.5	451	87.4	277	49.1	926	70.0
	TOTAL	243	100.0	516	100.0	564	100.0	1323	100.0
2001	No	33	13.3	57	10.8	260	45.6	350	25.9
	Yes	216	86.7	473	89.2	310	54.4	999	74.1
	TOTAL	249	100.0	530	100.0	570	100.0	1349	100.0
2002	No	27	10.8	63	12.3	279	45.7	369	26.9
	Yes	224	89.2	449	87.7	331	54.3	1004	73.1
	TOTAL	251	100.0	512	100.0	610	100.0	1373	100.0
2003	No	31	13.9	68	13.1	310	49.1	409	29.8
	Yes	192	86.1	451	86.9	322	50.9	965	70.2
	TOTAL	223	100.0	519	100.0	632	100.0	1374	100.0
2004	No	30	13.3	56	10.3	360	50.6	446	30.1
	Yes	196	86.7	490	89.7	351	49.4	1037	69.9
	TOTAL	226	100.0	546	100.0	711	100.0	1483	100.0

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

Transfer status, labour and delivery

Infants are admitted to a neonatal intensive care unit after:

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

Thirty-five per cent of all births were booked at a tertiary centre, ranging from 30 per cent for the 23–27 week gestational age group to 40.5 per cent for the 32–36 weeks gestational age group (Table 72). Maternal transfer was most common at gestations less than 32 weeks. The rate of maternal transfer was identical for infants born before 28 weeks gestation and for those born at 28–31 weeks gestation (58.9 per cent). The overall rate of maternal transfer was 35 per cent.

Nearly 30 per cent of infants were transferred to a tertiary centre following birth. There were 3.3 per cent (73/2,231) 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 (58.7 per cent). Forty-four infants (44/1,320; 3.3 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 73. The proportion of infants born in a tertiary centre increased from 60.0 per cent in 1992 to 74.8 per cent 2000. In 2004, 89.7 per cent of infants

less than 32 weeks gestation were born in a tertiary centre compared with 72.3 per cent of 32–36 week gestation infants and 48.7 per cent of term infants.

The pattern of transfer status (Table 74) and place of birth by birth weight (Table 75) is similar to that of gestational age, with the majority (88.7 per cent) of the very low birth weight infants (less than 1,500 grams) born in a tertiary centre.

Spontaneous onset of labour was more common among mothers of infants less than 28 weeks gestation (Table 76). Augmentation and induction of labour were most common in term and post-term births. Similarly spontaneous onset of labour occurred in half (51.2 per cent) of all mothers of infants less than 2,500 grams birth weight (Table 77). As expected, augmentation, or induction of labour was most common in mothers of infants with a birth weight of 2,500 grams or more (29.1 per cent).

Prolonged rupture of membranes (greater than 24 hours) was more common at lower gestations, affecting 23.2 per cent of infants less than 28 weeks gestation (Table 78).

The proportion of NICUS registrants born by elective caesarean section (caesarean section without labour) was 38.3 per cent in 2004, previously ranging from 27.0 per cent in 1992 to 38.4 per cent in 2003 (Tables 79 and 80). The most common type of delivery was caesarean section (45.8 per cent in 1993 to 59.7 per cent in 2004), followed by 32.8 per cent for normal vaginal delivery (previously 41.9 per cent in 1993 to 35.6 per cent in 2003) and 3.3 per cent for vaginal breech delivery (7.0 per cent in 1998 to 4.2 per cent in 2003). The high rate of caesarean section and breech delivery 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 41.3 per cent, compared with 27.7 per cent for all livebirths in NSW in 2004.

Continued on page 62

TABLE 72

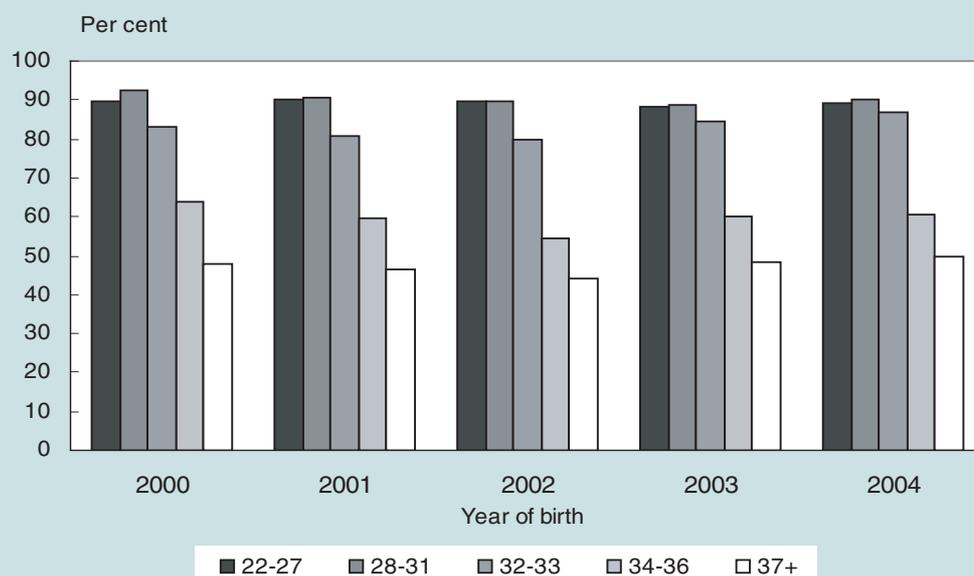
NICUS REGISTRANTS BY BOOKING STATUS, TRANSFER STATUS AND GESTATIONAL AGE, NSW & ACT 2004

Booking status and transfer status	23–27		28–31		Gestational age (weeks)				42+		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Booked at tertiary hospital	79	30.0	200	30.9	309	40.5	187	33.8	3	75.0	778	34.9
Transfer before birth	155	58.9	382	59.0	217	28.4	26	4.7	0	0.0	780	35.0
Transfer after birth	28	10.6	65	10.0	217	28.4	326	59.0	1	25.0	637	28.6
Booked at non-tertiary hospital	1	0.4	1	0.2	20	2.6	14	2.5	0	0.0	36	1.6
TOTAL	263	100.0	648	100.0	763	100.0	553	100.0	4	100.0	2231	100.0

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

FIGURE 6

NICUS REGISTRANTS BY TERTIARY HOSPITAL BIRTH AND GESTATIONAL AGE, NSW & ACT 2000-2004



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

TABLE 73

NICUS REGISTRANTS BY PLACE OF BIRTH (LEVEL OF OBSTETRIC HOSPITAL) AND GESTATIONAL AGE, NSW & ACT 2004

Place of birth	22-27		28-31		Gestational age (weeks)				37+		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Level 1	0	0.0	1 [#]	0.2	0	0.0	0	0.0	1	0.2	2	0.1
Level 2	1	0.4	2 [#]	0.3	1	0.3	2	0.5	11	2.0	17	0.8
Level 3	3	1.1	10 [#]	1.5	4	1.1	12	2.9	28	5.0	57	2.6
Level 4	13	4.9	19 [#]	2.9	8	2.3	37	9.0	71	12.7	148	6.6
Level 5	9	3.4	17 [#]	2.6	22	6.3	50	12.1	68	12.2	166	7.4
Level 6	234	89.0	583 [#]	90.0	303	86.6	249	60.3	271	48.7	1640	73.5
Private hospital	3	1.1	6 [#]	0.9	8	2.3	54	13.1	92	16.5	163	7.3
Born before arrival	0	0.0	6 [#]	0.9	2	0.6	1	0.2	4	0.7	13	0.6
Interstate-Overseas	0	0.0	4 [#]	0.6	2	0.6	8	1.9	11	2.0	25	1.2
TOTAL	263	100.0	648	100.0	350	100.0	413	100.0	557	100.0	2231	100.0

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

39/65 (60.0%) babies not born in a level 6 hospital were 30-31 weeks gestation. 358/583 (61.4%) babies born in a level 6 hospital were 30-31 weeks gestation.

TABLE 74

NICUS REGISTRANTS BY BOOKING STATUS, TRANSFER STATUS AND BIRTH WEIGHT, NSW & ACT 2004

Booking status and transfer status	Less than 1,000		1,000-1,499		Birth weight (grams)				TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%
Booked at tertiary hospital	82	31.2	175	34.4	249	35.0	272	36.3	778	34.9
Transfer before birth	157	59.7	269	53.0	302	42.5	52	6.9	780	35.0
Transfer after birth	24	9.1	56	11.0	148	20.8	409	54.6	637	28.6
Booked at non-tertiary hospital	0	0.0	8	1.6	12	1.7	16	2.1	36	1.6
TOTAL	263	100.0	508	100.0	711	100.0	749	100.0	2231	100.0

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

TABLE 75

NICUS REGISTRANTS BY PLACE OF BIRTH (LEVEL OF OBSTETRIC HOSPITAL) AND BIRTH WEIGHT, NSW & ACT 2004

Place of birth	<1,000		1,000–1,499		Birth weight (grams) 1,500–2,499		2,500+		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%
Level 1	0	0.0	1	0.2	0	0.0	1	0.1	2	0.1
Level 2	0	0.0	2	0.4	4	0.6	11	1.5	17	0.8
Level 3	3	1.1	7	1.4	16	2.3	31	4.1	57	2.6
Level 4	12	4.6	17	3.3	29	4.1	90	12.0	148	6.6
Level 5	6	2.3	25	4.9	45	6.3	90	12.0	166	7.4
Level 6	239	90.9	445	87.6	566	79.6	390	52.1	1640	73.5
Private hospital	2	0.8	4	0.8	40	5.6	117	15.6	163	7.3
Born before arrival	1	0.4	4	0.8	4	0.6	4	0.5	13	0.6
Interstate–Overseas	0	0.0	3	0.6	7	0.9	15	2.0	25	1.2
TOTAL	263	100.0	508	100.0	711	100.0	749	100.0	2231	100.0

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

TABLE 76

MOTHERS OF NICUS REGISTRANTS BY ONSET OF LABOUR AND GESTATIONAL AGE, NSW & ACT 2004

Onset of labour	23–27		28–31		Gestational age (weeks)				42+		TOTAL	
	No.	%	No.	%	32–36		37–41		No.	%	No.	%
Spontaneous	163	72.1	276	50.5	302	42.5	230	41.7	3	75.0	974	47.8
Augmented	7	3.1	14	2.6	24	3.4	60	10.9	0	0.0	105	5.2
Induced	0	0.0	6	1.1	45	6.3	130	23.6	1	25.0	182	8.9
No labour	56	24.8	250	45.8	340	47.8	131	23.8	0	0.0	777	38.1
TOTAL	226	100.0	546	100.0	711	100.0	551	100.0	4	100.0	2038	100.0

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

TABLE 77

MOTHERS OF NICUS REGISTRANTS BY ONSET OF LABOUR AND BIRTH WEIGHT, NSW & ACT 2004

Onset of labour	Less than 1,000		1,000–1,499		Birth weight (grams) 1,500–2,499		2,500+		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%
Spontaneous	126	57.8	203	46.2	332	52.3	313	42.0	974	47.8
Augmented	3	1.4	16	3.6	18	2.8	68	9.1	105	5.2
Induced	1	0.5	10	2.3	22	3.5	149	20.0	182	8.9
No labour	88	40.4	210	47.8	263	41.4	216	29.0	777	38.1
TOTAL	218	100.0	439	100.0	635	100.0	746	100.0	2038	100.0

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

TABLE 78

NICUS REGISTRANTS BY DURATION OF RUPTURE OF MEMBRANES AND GESTATIONAL AGE, NSW & ACT 2004

Duration of rupture of membranes	23–27		28–31		Gestational age (weeks)				42+		TOTAL	
	No.	%	No.	%	32–36		37–41		No.	%	No.	%
Less than 24 hours	202	76.8	510	78.7	679	89.0	534	96.6	4	100.0	1929	86.5
24 hours–7 days	32	12.2	78	12.0	65	8.5	17	3.1	0	0.0	192	8.6
8+ days	29	11.0	60	9.3	19	2.5	2	0.4	0	0.0	110	4.9
TOTAL	263	100.0	648	100.0	763	100.0	553	100.0	4	100.0	2231	100.0

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

TABLE 79

NICUS REGISTRANTS BY TYPE OF DELIVERY AND GESTATIONAL AGE, NSW & ACT 2004

Type of delivery	Gestational age (weeks)										TOTAL	
	23-27		28-31		32-36		37-41		42+			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Normal vaginal	89	33.8	165	25.5	203	26.6	273	49.4	2	50.0	732	32.8
Forceps	1	0.4	12	1.9	17	2.2	13	2.4	1	25.0	44	2.0
Forceps rotation	0	0.0	4	0.6	0	0.0	1	0.2	0	0.0	5	0.2
Vacuum extraction	0	0.0	3	0.5	11	1.4	30	5.4	0	0.0	44	2.0
Vaginal breech	27	10.3	29	4.5	11	1.4	7	1.3	0	0.0	74	3.3
Elective caesarean	65	24.7	289	44.6	370	48.5	131	23.7	0	0.0	855	38.3
Emergency caesarean	81	30.8	146	22.5	151	19.8	98	17.7	1	25.0	477	21.4
TOTAL	263	100.0	648	100.0	763	100.0	553	100.0	4	100.0	2231	100.0

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

TABLE 80

NICUS REGISTRANTS BY TYPE OF DELIVERY AND BIRTH WEIGHT, NSW & ACT 2004

Type of delivery	Birth weight (grams)								TOTAL	
	Less than 1,000		1,000-1,499		1,500-2,499		2,500+			
	No.	%	No.	%	No.	%	No.	%	No.	%
Normal vaginal	65	24.7	114	22.4	218	30.7	335	44.7	732	32.8
Forceps	1	0.4	8	1.6	17	2.4	18	2.4	44	2.0
Forceps rotation	0	0.0	3	0.6	1	0.1	1	0.1	5	0.2
Vacuum extraction	0	0.0	0	0.0	8	1.1	36	4.8	44	2.0
Vaginal breech	24	9.1	22	4.3	22	3.1	6	0.8	74	3.3
Elective caesarean	102	38.8	243	47.8	292	41.1	218	29.1	855	38.3
Emergency caesarean	71	27.0	118	23.2	153	21.5	135	18.0	477	21.4
TOTAL	263	100.0	508	100.0	711	100.0	749	100.0	2231	100.0

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

*(Continued from page 59)***Infant characteristics**

Three-quarters of the infants (75 per cent) were preterm (less than 37 weeks gestation), 40.8 per cent were very preterm (less than 32 weeks gestation) and 11.8 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 81). Almost all liveborn infants at 24-31 weeks gestation were admitted to a NICU, about two-thirds at 32 weeks gestation, and one-fifth at 33-34 weeks gestation (Table 82).

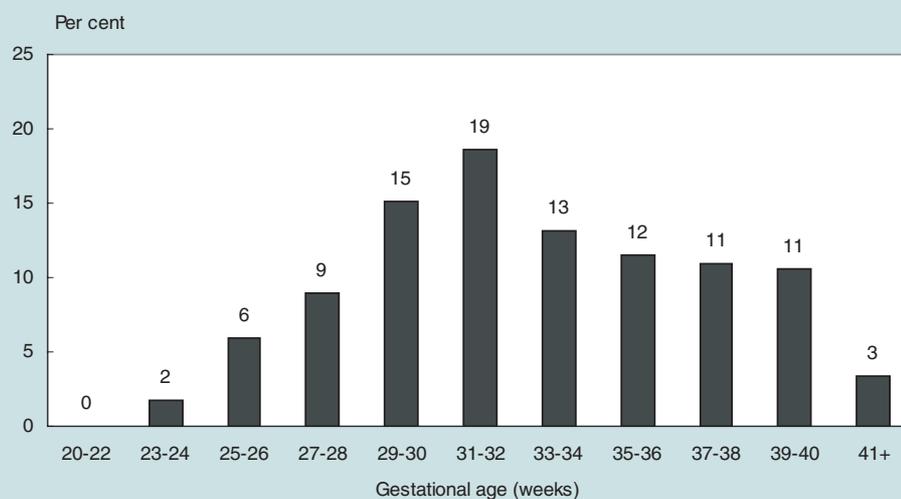
Sixty-seven per cent of infants had a low birth weight (less than 2,500 grams), 34.6 per cent had a very low birth weight (less than 1,500 grams) and 11.8 per cent had an extremely low birth weight (less than 1,000 grams). The proportion of infants in each birth weight group has

remained constant (Table 83). Almost all liveborn infants 600-1500 grams birth weight were admitted to a NICU (Table 84).

Overall, 58.8 per cent of infants were male. The ratio of males to females was approximately 3:2 in most gestational age groups (Table 85).

The overall proportion of the infants who had a major congenital anomaly decreased from 22.0 per cent in 1992 to 17.3 per cent in 2004. Congenital anomalies were more common among term infants (37-plus weeks gestational age), of whom 35.5 per cent had a major congenital anomaly and 2.3 per cent had a minor congenital anomaly (Table 86).

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FIGURE 7**NICUS REGISTRANTS BY GESTATIONAL AGE, NSW & ACT 2004**

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

TABLE 81**NICUS REGISTRANTS BY GESTATIONAL AGE, NSW & ACT 2000-2004**

Gestational age (weeks)	2000		2001		Year of birth 2002		2003		2004	
	No.	%	No.	%	No.	%	No.	%	No.	%
22-27	275	13.7	277	13.8	281	14.0	253	12.0	263	11.8
28-31	609	30.3	640	31.8	604	30.0	608	28.8	648	29.0
32-36	601	29.9	611	30.4	640	31.8	677	32.0	763	34.2
37-41	512	25.5	473	23.5	479	23.8	561	26.5	553	24.8
42+	10	0.5	9	0.4	8	0.4	14	0.7	4	0.2
TOTAL	2007	100.0	2010	100.0	2012	100.0	2113	100.0	2231	100.0

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

TABLE 82

BIRTHS BY NICUS REGISTRATION AND GESTATIONAL AGE, NSW & ACT 2004

Gestational age (weeks)	NSW & ACT NICUS Stillbirths No.	Live births No.	Registrations No.	Rate per 1,000 live births	% of cohort
Less than 21	48	17	0	0.0	0.0
21	68	24	0	0.0	0.0
22	55	36	0	0.0	0.0
23	48	18	11	611.1	0.5
24	29	34	29	852.9	1.3
25	25	66	53	803.0	2.4
26	20	85	78	917.6	3.5
27	25	86	92	1069.8	4.1
28	12	104	108	1038.5	4.8
29	12	135	143	1059.3	6.4
30	17	180	194	1077.8	8.7
31	21	212	203	957.5	9.1
32	21	342	212	619.9	9.5
33	25	455	138	303.3	6.2
34	21	788	155	196.7	7.0
35	20	1276	129	101.1	5.8
36	21	2331	129	55.3	5.8
37	29	5165	109	21.1	4.9
38	24	14101	135	9.6	6.1
39	22	21475	110	5.1	4.9
40	26	26514	127	4.8	5.7
41	25	14592	72	4.9	3.2
42	1	1694	4	2.4	0.2
43	1	143	0	0.0	0.0
44	0	1	0	0.0	0.0
TOTAL	616	89874 [#]	2231	24.8	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research. NSW Midwives Data Collection 2004. Centre for Epidemiology and Research, NSW Department of Health. ACT Maternal Perinatal Data Collection 2003, ACT Health.

[#] Excludes 8 babies reported to the MDC in 2003–2004 for whom the birth outcome was not known.

TABLE 83

NICUS REGISTRANTS BY BIRTH WEIGHT, NSW & ACT 2000–2004

Birth weight (grams)	Year of birth									
	2000		2001		2002		2003		2004	
	No.	%	No.	%	No.	%	No.	%	No.	%
Less than 400	1	0.0	2	0.1	1	0.0	1	0.0	1	0.0
400–499	6	0.3	5	0.2	7	0.3	9	0.4	5	0.2
500–599	21	1.0	30	1.5	21	1.0	24	1.1	25	1.1
600–699	56	2.8	49	2.4	53	2.6	38	1.8	35	1.6
700–799	62	3.1	49	2.4	63	3.1	54	2.6	54	2.4
800–899	53	2.6	72	3.6	58	2.9	60	2.8	66	3.0
900–999	84	4.2	63	3.1	81	4.0	80	3.8	77	3.5
1,000–1,249	212	10.6	219	10.9	181	9.0	197	9.3	230	10.3
1,250–1,499	281	14.0	274	13.6	263	13.1	257	12.2	278	12.5
1,500–1,749	204	10.2	231	11.5	228	11.3	215	10.2	257	11.5
1,750–1,999	144	7.2	159	7.9	163	8.1	185	8.8	174	7.8
2,000–2,499	254	12.7	251	12.5	273	13.6	258	12.2	280	12.6
2,500–2,999	201	10.0	215	10.7	205	10.2	244	11.5	280	12.6
3,000–3,499	200	10.0	195	9.7	195	9.7	228	10.8	226	10.1
3,500–3,999	149	7.4	132	6.6	158	7.9	176	8.3	153	6.9
4,000+	79	3.9	64	3.2	62	3.1	87	4.1	90	4.0
TOTAL	2007	100.0	2010	100.0	2012	100.0	2113	100.0	2231	100.0

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

TABLE 84**BIRTHS BY NICUS REGISTRATION AND BIRTH WEIGHT, NSW & ACT 2004**

Birth weight (grams)	NSW & ACT		Registrations No.	NICUS Rate per 1,000 live births	% of cohort
	Stillbirths No.	Live births No.			
Less than 400	143	56	1	17.9	0.04
400–499	67	34	5	147.1	0.22
500–599	59	55	25	454.5	1.12
600–699	28	41	35	853.7	1.57
700–799	19	54	54	1000.0	2.42
800–899	13	73	66	904.1	2.96
900–999	14	78	77	987.2	3.45
1,000–1,249	32	234	230	982.9	10.31
1,250–1,499	21	292	278	952.1	12.46
1,500–1,749	27	445	257	577.5	11.52
1,750–1,999	22	641	174	271.5	7.80
2,000–2,499	46	3367	280	83.2	12.55
2,500–2,999	52	13419	280	20.9	12.55
3,000–3,499	39	31889	226	7.1	10.13
3,500–3,999	23	28007	153	5.5	6.86
4,000+	10	11196	90	8.0	4.03
TOTAL	615#	89881#	2231	24.8	100.00

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research. NSW Midwives Data Collection 2004. Centre for Epidemiology and Research, NSW Department of Health ACT Maternal Perinatal Data Collection 2003, ACT Health.
Excludes 6 babies reported to the MDC in 2003–2004 for whom the birth outcome was not known.

TABLE 85**NICUS REGISTRANTS BY GENDER AND GESTATIONAL AGE, NSW & ACT 2004**

Sex	Gestational age (weeks)											
	23–27		28–31		32–36		37–41		42+		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Male	144	54.8	354	54.6	464	60.8	346	62.6	3	75.0	1311	58.8
Female	119	45.2	294	45.4	299	39.2	207	37.4	1	25.0	920	41.2
TOTAL	263	100.0	648	100.0	763	100.0	553	100.0	4	100.0	2231	100.0

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

TABLE 86**NICUS REGISTRANTS BY CONGENITAL ANOMALIES AND GESTATIONAL AGE, NSW & ACT 2004**

Congenital anomaly	Gestational age (weeks)											
	23–27		28–31		32–36		37–41		42+		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
None	233	88.6	590	91.0	631	82.7	343	62.0	3	75.0	1800	80.7
Minor	5	1.9	11	1.7	15	2.0	13	2.4	0	0.0	44	2.0
Major	25	9.5	47	7.3	117	15.3	197	35.6	1	25.0	387	17.3
TOTAL	263	100.0	648	100.0	763	100.0	553	100.0	4	100.0	2231	100.0

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

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The overall proportion of infants born following a multiple pregnancy was 21.4 per cent in 2004 (range 14.5 per cent in 1993 to 22.4 per cent in 2001). In 2004, most of the infants (78.7 per cent) were from a singleton pregnancy, 18.8 per cent were from a twin pregnancy, 2.4 per cent were from a triplet pregnancy and 0.2 per cent were from a quadruplet pregnancy. The higher than expected rate of multiple births among the 2004 NICUS cohort reflects the high proportion of multiple pregnancies resulting in preterm birth with 27.4 per cent of infants less than 37 weeks gestation (Table 87). Multiple births represented 3.1 per cent of all NSW–ACT livebirths in 2004.

Table 88 shows the median, 25th and 75th percentiles for one and 5 minute Apgar scores according to gestational age groups. For infants 32–42 weeks gestational age, the median one-minute Apgar score was 8. The median 5 minute score was 9 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 23.8 per cent in 2004. Similarly the proportion of infants with a 5 minute Apgar score of 0–4 has decreased from 10.8 per cent in 1992 to 6.1 per cent in 2004 (Table 89).

Infants with major congenital anomalies (n=387) were excluded from the analysis of morbidity and mortality.

The majority of infants without a major congenital anomaly (1,621/1,844; 87.9 per cent) in the 2004 NICUS cohort received assisted ventilation (intermittent mandatory ventilation and/or continuous positive airways pressure) (Table 90).

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, and transient tachypnoea were more common in the preterm groups, whereas perinatal asphyxia, meconium aspiration, pulmonary hypertension and apnoea were more common in term infants (Figure 8, Table 91).

The overall proportion of ventilated infants who received surfactant was 38.6 in 2004 (range 33.8 per cent in 1992 to 51.8 per cent in 1998) (Table 92). In 2004, 54.9 per cent of the infants who received surfactant were less than 32 weeks gestational age. The majority (56.2 per cent) of ventilated infants with a diagnosis of respiratory distress syndrome received surfactant.

Proven systemic infection has decreased from 21.5 per cent in 1992 to 9.8 per cent of infants in 2004. Infection was most common among infants less than 28 weeks gestation (37.4 per cent) (Table 93).

Overall, the incidence of treated patent ductus arteriosus (PDA) was 15.9 per cent in 2004 (range 10.7 in 1994 to 15.9 per cent in 2004). In 2004, 93.2 per cent of the infants treated for PDA were less than 32 weeks gestational age (Table 94). The majority of infants with a PDA requiring treatment received indomethacin only (14.3 per cent). Surgical treatment of PDA was predominantly performed on infants less than 28 weeks gestation (7.9 per cent). Some infants (7.1 per cent) were treated with both indomethacin and surgery.

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TABLE 87

NICUS REGISTRANTS BY PLURALITY AND GESTATIONAL AGE, NSW & ACT 2004

Plurality	Gestational age (weeks)										TOTAL	
	23–27		28–31		32–36		37–41		42+			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Singleton	186	70.7	446	68.8	584	76.5	535	96.7	4	100.0	1755	78.7
Twins	65	24.7	178	27.5	158	20.7	18	3.3	0	0.0	419	18.8
Triplets	12	4.6	24	3.7	17	2.2	0	0.0	0	0.0	53	2.4
Quads	0	0.0	0	0.0	4	0.5	0	0.0	0	0.0	4	0.2
TOTAL	263	100.0	648	100.0	763	100.0	553	100.0	4	100.0	2231	100.0

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

TABLE 88

NICUS REGISTRANTS BY APGAR SCORE AND GESTATIONAL AGE, NSW & ACT 2004

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

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

TABLE 89

NICUS REGISTRANTS BY APGAR SCORE AT ONE AND 5 MINUTES, NSW & ACT 2000–2004

Apgar score	Year of birth									
	2000		2001		2002		2003		2004	
	No.	%	No.	%	No.	%	No.	%	No.	%
ONE MINUTE										
0–4	509	25.4	516	25.7	474	23.6	475	22.5	530	23.8
5–7	746	37.2	744	37.0	691	34.3	750	35.5	733	32.9
8+	738	36.8	735	36.6	830	41.3	886	41.9	958	42.9
Not stated	14	0.7	15	0.7	17	0.8	2	0.1	10	0.4
TOTAL	2007	100.0	2010	100.0	2012	100.0	2113	100.0	2231	100.0
FIVE MINUTES										
0–4	154	7.7	143	7.1	139	6.9	110	5.2	135	6.1
5–7	399	19.9	425	21.1	394	19.6	382	18.1	436	19.5
8+	1441	71.8	1429	71.1	1467	72.9	1618	76.6	1652	74.0
Not stated	13	0.6	13	0.6	12	0.6	3	0.1	8	0.4
TOTAL	2007	100.0	2010	100.0	2012	100.0	2113	100.0	2231	100.0

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

TABLE 90

NICUS REGISTRANTS BY ASSISTED VENTILATION AND GESTATIONAL AGE, NSW & ACT 2000–2004#

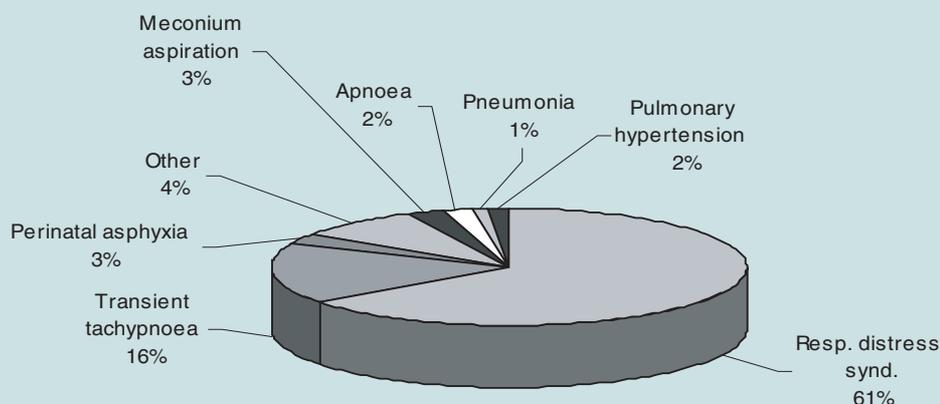
Year	Assisted ventilation	Gestational age (weeks)									
		22–27		28–31		32–36		37+		TOTAL	
		No.	%	No.	%	No.	%	No.	%	No.	%
2000	No	1	0.4	117	20.5	65	12.4	6	1.9	189	11.3
	Yes	261	99.6	455	79.5	461	87.6	304	98.1	1481	88.7
	TOTAL	262	100.0	572	100.0	526	100.0	310	100.0	1670	100.0
2001	No	2	0.7	126	20.7	61	11.6	3	1.1	192	11.4
	Yes	265	99.3	482	79.3	464	88.4	276	98.9	1487	88.6
	TOTAL	267	100.0	608	100.0	525	100.0	279	100.0	1679	100.0
2002	No	2	0.7	90	16.2	50	9.0	4	1.4	146	8.8
	Yes	266	99.3	464	83.8	504	91.0	284	98.6	1518	91.2
	TOTAL	268	100.0	554	100.0	554	100.0	288	100.0	1664	100.0
2003	No	1	0.4	104	17.9	97	15.8	75	20.1	277	15.4
	Yes	234	99.6	476	82.1	515	84.2	298	79.9	1523	84.6
	TOTAL	235	100.0	580	100.0	612	100.0	373	100.0	1800	100.0
2004	No	0	0.0	78	13.0	83	12.8	62	17.3	223	12.1
	Yes	238	100.0	523	87.0	563	87.2	297	82.7	1621	87.9
	TOTAL	238	100.0	601	100.0	646	100.0	359	100.0	1844	100.0

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

Babies with major congenital anomalies excluded.

FIGURE 8

NICUS REGISTRANTS BY MAIN INDICATION FOR ASSISTED VENTILATION, NSW & ACT 2004#



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

TABLE 91

NICUS REGISTRANTS BY MAIN INDICATION FOR ASSISTED VENTILATION AND GESTATIONAL AGE, NSW & ACT 2004#

Indication	Gestational age (weeks)								TOTAL	
	23-27		28-31		32-36		37+			
	No.	%	No.	%	No.	%	No.	%	No.	%
Transient tachypnoea of newborn	0	0.0	81	15.5	128	22.7	65	21.9	274	16.9
Hyaline membrane disease	225	94.5	394	75.3	366	65.0	60	20.2	1045	64.5
Meconium aspiration	0	0.0	0	0.0	2	0.4	40	13.5	42	2.6
Pneumonia	2	0.8	0	0.0	4	0.7	11	3.7	17	1.0
Pulmonary hypertension	1	0.4	0	0.0	4	0.7	19	6.4	24	1.5
Immature lung	1	0.4	8	1.5	1	0.2	0	0.0	10	0.6
Apnoea	0	0.0	10	1.9	10	1.8	11	3.7	31	1.9
Congenital anomaly	0	0.0	2	0.4	2	0.4	0	0.0	4	0.2
Other	9	3.8	23	4.4	39	6.9	49	16.5	120	7.4
Perinatal surgery	0	0.0	0	0.0	1	0.2	4	1.3	5	0.3
Newborn encephalopathy	0	0.0	3	0.6	5	0.9	38	12.8	46	2.8
Not stated	0	0.0	2	0.4	1	0.2	0	0.0	3	0.2
TOTAL	238	100.0	523	100.0	563	100.0	297	100.0	1621	100.0

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

TABLE 92**NICUS REGISTRANTS BY SURFACTANT ADMINISTRATION AND GESTATIONAL AGE, NSW & ACT 2000–2004[#]**

Year	Surfactant administration	Gestational age (weeks)								TOTAL	
		22–27		28–31		32–36		37+		No.	%
		No.	%	No.	%	No.	%	No.	%	No.	%
2000	No	59	22.6	255	56.0	282	61.2	255	83.9	851	57.5
	Yes	202	77.4	200	44.0	179	38.8	49	16.1	630	42.5
	TOTAL	261	100.0	455	100.0	461	100.0	304	100.0	1481	100.0
2001	No	56	21.1	275	57.1	325	70.0	221	80.1	877	59.0
	Yes	209	78.9	207	42.9	139	30.0	55	19.9	610	41.0
	TOTAL	265	100.0	482	100.0	464	100.0	276	100.0	1487	100.0
2002	No	66	24.8	276	59.5	366	72.6	241	84.9	949	62.5
	Yes	200	75.2	188	40.5	138	27.4	43	15.1	569	37.5
	TOTAL	266	100.0	464	100.0	504	100.0	284	100.0	1518	100.0
2003	No	45	19.2	257	54.0	353	68.5	239	80.2	894	58.7
	Yes	189	80.8	219	46.0	162	31.5	59	19.8	629	41.3
	TOTAL	234	100.0	476	100.0	515	100.0	298	100.0	1523	100.0
2004	No	42	17.6	301	57.6	406	72.1	247	83.2	996	61.4
	Yes	196	82.4	222	42.4	157	27.9	50	16.8	625	38.6
	TOTAL	238	100.0	523	100.0	563	100.0	297	100.0	1621	100.0

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

TABLE 93**NICUS REGISTRANTS BY PROVEN SYSTEMIC INFECTION AND GESTATIONAL AGE, NSW & ACT 2004[#]**

Infection	Gestational age (weeks)								TOTAL	
	23–27		28–31		32–36		37+		No.	%
	No.	%	No.	%	No.	%	No.	%	No.	%
No	149	62.6	549	91.3	632	97.8	333	92.8	1663	90.2
Yes	89	37.4	52	8.7	14	2.2	26	7.2	181	9.8
TOTAL	238	100.0	601	100.0	646	100.0	359	100.0	1844	100.0

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

TABLE 94**NICUS REGISTRANTS BY TREATED PATENT DUCTUS ARTERIOSUS (PDA) AND GESTATIONAL AGE, NSW & ACT 2004[#]**

PDA—Treatment for PDA	Gestational age (weeks)								TOTAL	
	23–27		28–31		32–36		37+		No.	%
	No.	%	No.	%	No.	%	No.	%	No.	%
No treated PDA	109	45.8	510	84.9	630	97.5	1249	84.1		
Indomethacin only	110	46.2	87	14.5	16	2.5	213	14.3		
Surgery only	2	0.8	2	0.3	0	0.0	4	0.3		
Indomethacin & surgery	17	7.1	2	0.3	0	0.0	19	1.3		
TOTAL	238	100.0	601	100.0	646	100.0	1485	100.0		

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

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Overall, the incidence of necrotising enterocolitis (NEC) was 2.4 per cent in 2004 (range 9.8 per cent in 1992 to 2.2 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 age groups and 89.1 per cent of the infants with NEC were born at less than 32 weeks gestation (Table 95).

The overall incidence of major surgery was 3.5 per cent in 2004 (range 7.7 per cent in 1992 to 3.1 per cent in 2000). In 2004, 75 per cent of the infants who required major surgery were less than 32 weeks gestation (Table 96). The most common surgical procedures amongst these infants were for patent ductus arteriosus and necrotising enterocolitis.

In 2004, the incidence of intraventricular haemorrhage (IVH) among preterm infants (less than 37 weeks gestational age) was 13.9 per cent (range 20.5 per cent in

1993 to 12.9 per cent in 2003). In 2004, confirmed IVH was most common among infants less than 28-weeks gestation (46.2 per cent); 38.5 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 (4/53, 7.5 per cent). Of the surviving infants born before 32 weeks gestation, 95.8 per cent had a head ultrasound examination to detect IVH (Table 97).

The proportion of infants with severe grades (Grades 3, 4 or 5) of retinopathy of prematurity (ROP) was 2.8 per cent in 2004 (range 7.5 per cent in 1992 to 2.8 per cent in 2004). In 2004, 4 infants with Grade 3 ROP were 28–31 weeks gestation and 94.7 per cent of the infants less than 28 weeks gestation with severe ROP received either cryo- or laser therapy. Importantly, 25 per cent of surviving infants of 28–31 weeks gestational age did not have an eye examination recorded (Table 98).

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TABLE 95

NICUS REGISTRANTS BY NECROTISING ENTEROCOLITIS (NEC) AND GESTATIONAL AGE, NSW & ACT 2004[#]

NEC—Treatment for NEC	23–27		28–31		Gestational age (weeks)				TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%
No NEC	217	91.2	581	96.7	643	99.5	357	99.4	1798	97.5
Clinical diagnosis	9	3.8	10	1.7	2	0.3	2	0.6	23	1.2
X-ray diagnosis	8	3.4	4	0.7	1	0.2	0	0.0	13	0.7
Surgery for NEC	4	1.7	6	1.0	0	0.0	0	0.0	10	0.5
TOTAL	238	100.0	601	100.0	646	100.0	359	100.0	1844	100.0

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

TABLE 96

NICUS REGISTRANTS BY MAJOR SURGERY AND GESTATIONAL AGE, NSW & ACT 2004[#]

Major surgery	23–27		28–31		Gestational age (weeks)				TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%
No	212	89.1	579	96.3	640	99.1	349	97.2	1780	96.5
Yes	26	10.9	22	3.7	6	0.9	10	2.8	64	3.5
TOTAL	238	100.0	601	100.0	646	100.0	359	100.0	1844	100.0

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

TABLE 97**NICUS REGISTRANTS BY INTRAVENTRICULAR HAEMORRHAGE (IVH) AND GESTATIONAL AGE, NSW & ACT 2004[#]**

Head ultrasound	Gestational age (weeks)						TOTAL	
	23–27		28–31		32–36		No.	%
	No.	%	No.	%	No.	%	No.	%
No IVH	121	50.8	485	80.7	250	38.7	856	57.6
Grade 1	43	18.1	59	9.8	19	2.9	121	8.1
Grade 2	21	8.8	6	1.0	2	0.3	29	2.0
Grade 3	15	6.3	10	1.7	2	0.3	27	1.8
Grade 4	25	10.5	3	0.5	1	0.2	29	2.0
Hydrocephalus requiring drainage	3	1.3	1	0.2	2	0.3	6	0.4
Not examined & lived	0	0.0	35	5.8	370	57.3	405	27.3
Not examined & died	13	5.5	3	0.5	2	0.3	18	1.2
TOTAL	238	100.0	601	100.0	646	100.0	1485	100.0

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

TABLE 98**NICUS REGISTRANTS BY RETINOPATHY OF PREMATURITY (ROP) AND GESTATIONAL AGE, NSW & ACT 2004[#]**

Retinopathy of prematurity (ROP)	Gestational age (weeks)						TOTAL	
	23–27		28–31		32–36		No.	%
	No.	%	No.	%	No.	%	No.	%
No ROP	83	34.9	402	66.9	485	57.8	485	57.8
Grade 1	34	14.3	20	3.3	54	6.4	54	6.4
Grade 2	44	18.5	10	1.7	54	6.4	54	6.4
Grade 3	16	6.7	4	0.7	20	2.4	20	2.4
Grade 5	3	1.3	0	0.0	3	0.4	3	0.4
Treatment with cryo–laser therapy	18	7.6	2	0.3	20	2.4	20	2.4
Not examined & lived	0	0	150	25.0	150	17.9	150	17.9
Not examined & died	58	24.4	15	2.5	73	8.7	73	8.7
TOTAL	238	100.0	601	100.0	839	100.0	839	100.0

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

(Continued from page 70)

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 99). 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 2004, the total cohort used 62,852 bed days in a tertiary centre in NSW and the ACT (range 46,090 in 1993 to 62,852 in 2004); as well as 21,342 in a non-tertiary centre (level 2 neonatal unit) in NSW and the ACT (14,288 in

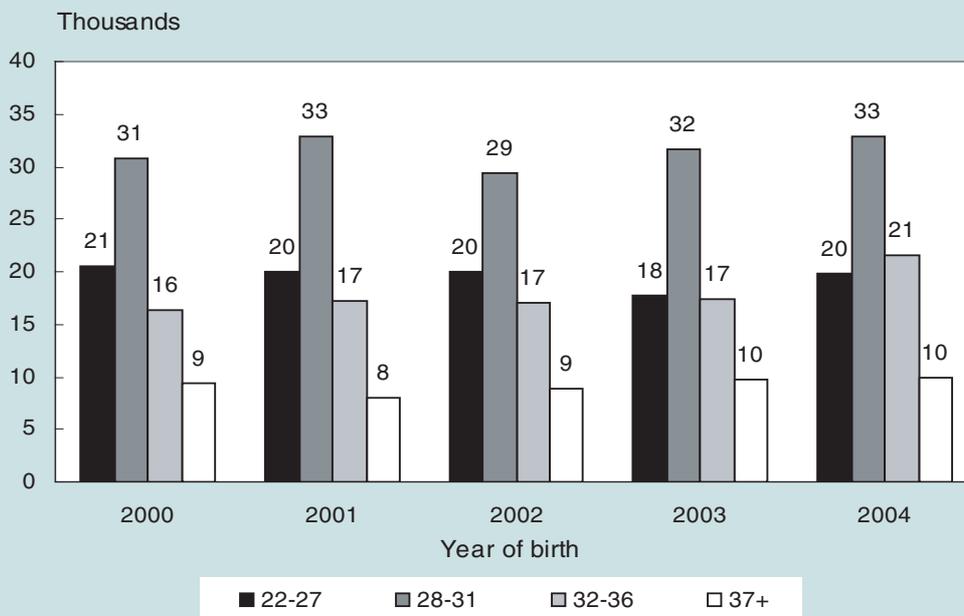
1992 to 21,342 in 2004). Even when these infants leave the neonatal intensive care unit, they still require substantial resources.

In 2004, NICUS registrants used 18,557 days of assisted ventilation (range 15,282 in 1993 to 18,557 in 2004) and 27,575 days of oxygen therapy (range 22,526 in 1992 to 30,802 in 2001). In 2004, 59 (3.2 per cent) infants were discharged home on oxygen therapy (range 2.1 per cent in 1992 to 5.1 per cent in 1998). The proportion of infants less than 28 weeks gestation discharged home on oxygen therapy was 18.5 per cent (range 7.5 per cent in 1992 to 21.3 per cent in 2002) (Table 100).

Continued on page 76

FIGURE 9

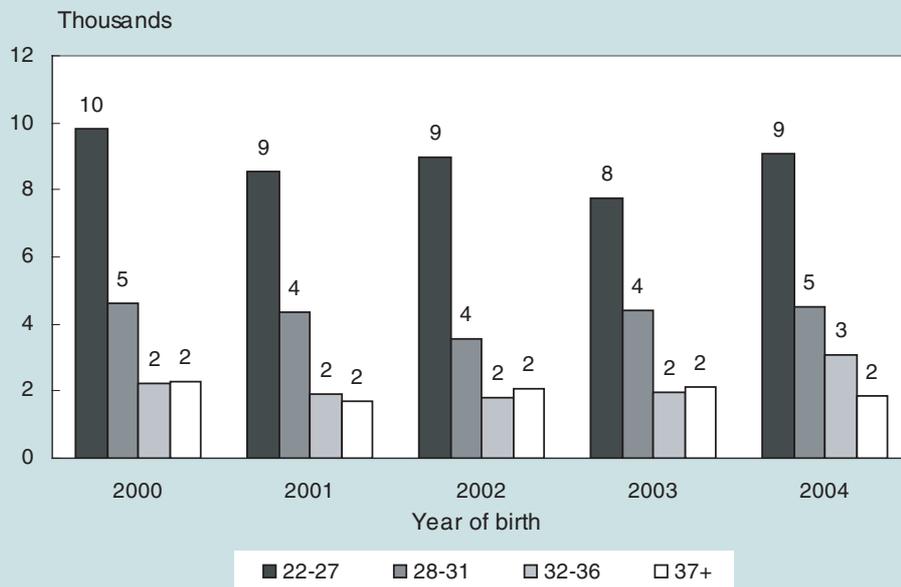
NICUS REGISTRANTS BY TOTAL NUMBER OF DAYS IN HOSPITAL AND GESTATIONAL AGE, NSW & ACT 2004



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

FIGURE 10

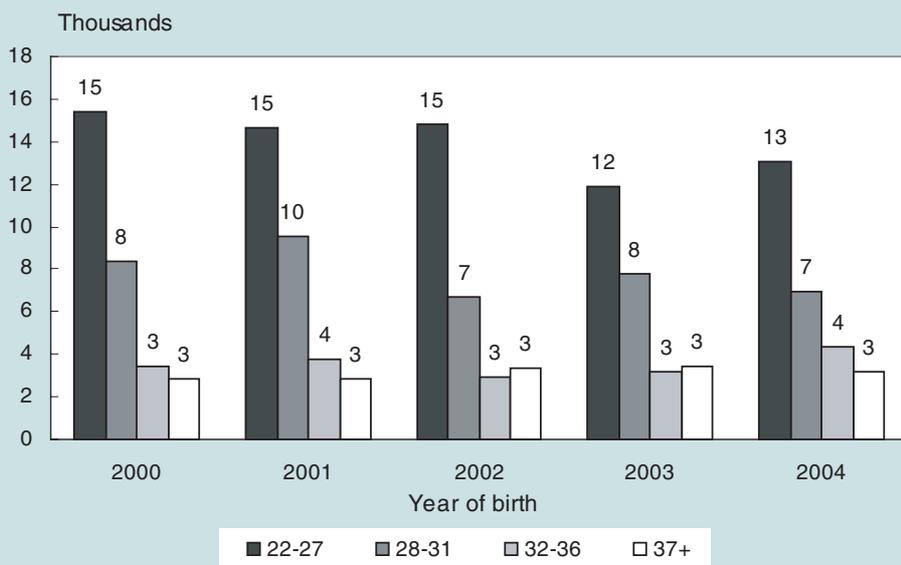
NICUS REGISTRANTS BY TOTAL NUMBER OF DAYS OF ASSISTED VENTILATION AND GESTATIONAL AGE, NSW & ACT 2004



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 2000-2004



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

TABLE 99

NICUS REGISTRANTS BY SERVICE UTILISATION INDICATORS AND GESTATIONAL AGE, NSW & ACT 2004

Indicators	Gestational age (weeks)				TOTAL
	23-27	28-31	32-36	37+	
Non-tertiary hospital stay (days)					
Minimum	0	0	0	0	0
Maximum	95	99	160	336	336
Sum	2327	10552	6881	1582	21342
Median	0	16	4	0	1
25th percentile	0	0	0	0	0
75th percentile	14	29	16	3	17
Tertiary hospital stay (days)					
Minimum	0	0	0	0	0
Maximum	394	403	642	322	642
Sum	17525	22352	14639	8336	62852
Median	72	29	12	9	16
25th percentile	36	15	7	5	7
75th percentile	92	48	21	18	37
Total hospital stay (days)					
Minimum	0	1	1	1	0
Maximum	394	448	642	440	642
Sum	19852	32824	21498	9899	84073
Median	79	47	23	11	29
25th percentile	60	38	16	6	0
75th percentile	98	60	33	20	50
Mechanical ventilation (days)					
Minimum	0	0	0	0	0
Maximum	191	90	217	43	21
Sum	3415	1420	1461	1457	7753
Median	5	0	0	1	1
25th percentile	1	0	0	0	0
75th percentile	18	1	1	3	3
Continuous Positive Airways Pressure (days)					
Minimum	0	0	0	0	0
Maximum	155	83	132	35	155
Sum	5675	3117	1601	411	10804
Median	19	2	1	0	1
25th percentile	4	0	0	0	0
75th percentile	33	5	2	1	3
Assisted ventilation (days)					
Minimum	0	0	0	0	0
Maximum	345	164	315	56	345
Sum	9090	4537	3062	1868	18557
Median	31	3	2	2	2
25th percentile	11	1	0	0	0
75th percentile	50	8	4	4	6
Oxygen (days)					
Minimum	0	0	0	0	0
Maximum	274	193	317	245	317
Sum	13098	6960	4330	3187	27575
Median	35	2	2	2	3
25th percentile	7	1	1	1	1
75th percentile	80	9	5	7	8

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

TABLE 100
NICUS REGISTRANTS BY HOME OXYGEN ADMINISTRATION AND GESTATIONAL AGE, NSW & ACT 2000–2004#

Year	Home oxygen	Gestational age (weeks)								TOTAL	
		22–27		28–31		32–36		37+			
		No.	%	No.	%	No.	%	No.	%	No.	%
2000	No	211	80.5	557	97.4	519	98.7	306	98.7	1593	95.4
	Yes	51	19.5	15	2.6	7	1.3	4	1.3	77	4.6
	TOTAL	262	100.0	572	100.0	526	100.0	310	100.0	1670	100.0
2001	No	217	81.3	579	95.2	524	99.8	276	98.9	1596	95.1
	Yes	50	18.7	29	4.8	1	0.2	3	1.1	83	4.9
	TOTAL	267	100.0	608	100.0	525	100.0	279	100.0	1679	100.0
2002	No	210	78.4	541	97.7	551	99.5	283	98.3	1585	95.3
	Yes	58	21.6	13	2.3	3	0.5	5	1.7	79	4.7
	TOTAL	268	100.0	554	100.0	554	100.0	288	100.0	1664	100.0
2003	No	200	85.1	556	95.9	610	99.7	371	99.5	1737	96.5
	Yes	35	14.9	24	4.1	2	0.3	2	0.5	63	3.5
	TOTAL	235	100.0	580	100.0	612	100.0	373	100.0	1800	100.0
2004	No	194	81.5	589	98.0	644	99.7	358	99.7	1785	96.8
	Yes	44	18.5	12	2.0	2	0.3	1	0.3	59	3.2
	TOTAL	238	100.0	601	100.0	646	100.0	359	100.0	1844	100.0

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

(Continued from page 72)

Survival

Infants with a major congenital anomaly have been excluded from the analysis of survival, with the exception of data reported in Table 104.

The 6 month survival rate for all infants without a major congenital anomaly in the 2004 cohort was 94.4 per cent (range 87.8 per cent in 1992 to 94.4 per cent in 2004). Survival of infants born at less than 25 weeks gestation was 50 per cent (range 33.3 per cent in 2003 to 54.8 per cent in 1993). There was a trend for survival to improve with gestational age (Figure 12 and Table 101). There was no difference in the survival rate between term (94.4 per cent) and preterm infants (94.3 per cent). Among infants who died, 75 per cent of deaths occurred during the first week of life (range 62.5 per cent in 1998 to 76.2 per cent in 2002) with a further 18.3 per cent occurring during the first month of life (Table 101).

The 6 month survival rate improved with increasing birth weight, ranging from 30.4 per cent for infants in the 500–599 gram group to 91 per cent for the 900–999 gram group. Six-month survival continued to improve with increasing birth weight to a maximum of 98.3 per cent for infants of 2,000–2,499 grams birth weight and then decreased slightly (Table 102).

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 2004, place of birth did not significantly affect survival for infants in any of the gestational age groups (Table 103).

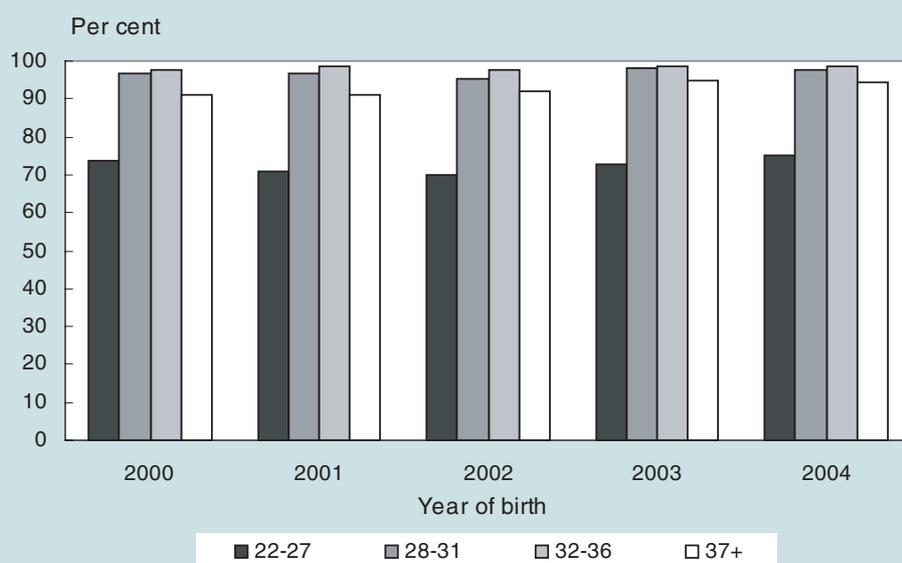
The 6 month survival rate was similar for males (94.8 per cent) and females (93.7 per cent) overall, and for all gestational age groups: less than 28 weeks (76 per cent versus 74.3 per cent); 28–31 weeks (97.2 per cent versus 97.8 per cent); 32–36 weeks (98.7 per cent versus 98 per cent); and 37–41 weeks gestation groups (95.2 per cent versus 93 per cent).

The 6 month survival rate was 93.8 per cent (n=1,410) for singleton infants and 96.3 per cent (n=434) for multiple gestation infants. Plurality did not influence survival in infants 28–36 weeks gestational age. In 2004 the survival rate for infants in the less than 28 week gestation group was higher for infants born of a multiple (58/73; 79.5 per cent) than a singleton pregnancy (121/165; 73.3 per cent); this was due to the high survival rate (31/33; 93.9 per cent) of infants born of multiple pregnancies at 27 weeks who accounted for almost half of the multiples in the 23–27 week gestational age group.

As expected the overall survival rate was generally lower (82.7 per cent) in the presence of a major congenital anomaly (Table 104).

FIGURE 12

NICUS REGISTRANTS BY 6-MONTHS SURVIVAL AND GESTATIONAL AGE, NSW & ACT 2000–2004#



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

Post-mortem examinations were performed on 31/104 infants (29.8 per cent) who died in the 2004 cohort (Figure 13 and Table 105). Post-mortem examinations were most commonly not requested for infants 23–27 weeks gestation (52.5 per cent). The highest rate of refusal was in the

32–36 week group (40 per cent) and the highest rate of post-mortems done was in the 28–31 week (46.7 per cent) and over 37 week group (45 per cent).

TABLE 101

NICUS REGISTRANTS BY DURATION OF SURVIVAL AND GESTATIONAL AGE, NSW & ACT 2004*

Gestational age (weeks)	Alive at 6 months		Age at death (days)						TOTAL	
	No.	%	0–7		8–28		28+		No.	%
23	3	30.0	6	60.0	0	0.0	1	10.0	10	0.5
24	15	57.7	7	26.9	4	15.4	0	0.0	26	1.4
25	31	66.0	12	25.5	2	4.3	2	4.3	47	2.5
26	52	76.5	11	16.2	3	4.4	2	2.9	68	3.7
27	78	89.7	7	8.0	1	1.1	1	1.1	87	4.7
28	88	91.7	7	7.3	1	1.0	0	0.0	96	5.2
29	128	100.0	0	0.0	0	0.0	0	0.0	128	6.9
30	178	97.8	2	1.1	2	1.1	0	0.0	182	9.9
31	192	98.5	3	1.5	0	0.0	0	0.0	195	10.6
32	196	99.5	0	0.0	1	0.5	0	0.0	197	10.7
33	123	98.4	2	1.6	0	0.0	0	0.0	125	6.8
34	131	98.5	0	0.0	1	0.8	1	0.8	133	7.2
35	98	98.0	2	2.0	0	0.0	0	0.0	100	5.4
36	88	96.7	2	2.2	1	1.1	0	0.0	91	4.9
37	78	96.3	3	3.7	0	0.0	0	0.0	81	4.4
38	78	95.1	2	2.4	2	2.4	0	0.0	82	4.4
39	59	96.7	2	3.3	0	0.0	0	0.0	61	3.3
40	81	94.2	4	4.7	1	1.2	0	0.0	86	4.7
41	40	87.0	6	13.0	0	0.0	0	0.0	46	2.5
42	3	100.0	0	0.0	0	0.0	0	0.0	3	0.2
TOTAL	1740	94.4	78	4.2	19	1.0	7	0.4	1844	100.0

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

TABLE 102

NICUS REGISTRANTS BY DURATION OF SURVIVAL AND BIRTH WEIGHT, NSW & ACT 2004#

Birth weight (grams)	Alive at 5 months		Age at death (days)						TOTAL	
	No.	%	0–7		8–28		28+		No.	%
Less than 400		0	0.0	100.0	0	0.0	0	0.0	1	0.1
400–499	2	40.0	2	40.0	1	20.0	0	0.0	5	0.3
500–599	7	30.4	10	43.5	3	13.0	3	13.0	23	1.2
600–699	22	68.8	10	31.3	0	0.0	0	0.0	32	1.7
700–799	36	78.3	5	10.9	4	8.7	1	2.2	46	2.5
800–899	48	82.8	9	15.5	1	1.7	0	0.0	58	3.1
900–999	61	91.0	4	6.0	1	1.5	1	1.5	67	3.6
1,000–1,249	194	96.0	6	3.0	1	0.5	1	0.5	202	11.0
1,250–1,499	257	97.3	6	2.3	1	0.4	0	0.0	264	14.3
1,500–1,749	235	98.3	4	1.7	0	0.0	0	0.0	239	13.0
1,750–,999	151	98.1	2	1.3	1	0.6	0	0.0	154	8.4
2,000–2,499	234	98.3	2	0.8	2	0.8	0	0.0	238	12.9
2,500–2,999	197	96.6	4	2.0	2	1.0	1	0.5	204	11.1
3,000–3,499	140	95.2	5	3.4	2	1.4	0	0.0	147	8.0
3,500–3,999	94	96.9	3	3.1	0	0.0	0	0.0	97	5.3
4,000+	62	92.5	5	7.5	0	0.0	0	0.0	67	3.6
TOTAL	1740	94.4	78	4.2	19	1.0	7	0.4	1844	100.0

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

TABLE 103

NICUS REGISTRANTS BY DURATION OF SURVIVAL, PLACE OF BIRTH AND GESTATIONAL AGE, NSW & ACT 2004*

Gestational age (weeks)	Place of birth	Alive at 6 months		0-7		Age at death (days)				TOTAL	
		No.	%	No.	%	8-28		28+		No.	%
23-27	Non tertiary	22	78.6	6	21.4	0	0.0	0	0.0	28	11.8
	Tertiary	157	74.8	37	17.6	10	4.8	6	2.9	210	88.2
	Sub-total	179	75.2	43	18.1	10	4.2	6	2.5	238	100.0
28-31	Non tertiary	49	94.2	3	5.8	0	0.0	0	0.0	52	8.7
	Tertiary	531	97.8	9	1.7	3	0.6	0	0.0	543	91.3
	Sub-total	580	97.5	12	2.0	3	0.5	0	0.0	595	100.0
32-36	Non tertiary	169	97.1	2	1.1	2	1.1	1	0.6	174	27.0
	Tertiary	465	98.9	4	0.9	1	0.2	0	0.0	470	73.0
	Sub-total	634	98.4	6	0.9	3	0.5	1	0.2	644	100.0
37-41	Non tertiary	181	95.3	8	4.2	1	0.5	0	0.0	190	53.8
	Tertiary	152	93.3	9	5.5	2	1.2	0	0.0	163	46.2
	Sub-total	333	94.3	17	4.8	3	0.8	0	0.0	353	100.0
42+	Non tertiary	1	100.0	0	0.0	0	0.0	0	0.0	1	33.3
	Tertiary	2	100.0	0	0.0	0	0.0	0	0.0	2	66.7
	Sub-total	3	100.0	0	0.0	0	0.0	0	0.0	3	100.0
TOTAL		1729	94.3	78	4.3	19	1.0	7	0.4	1833	100.0

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

TABLE 104

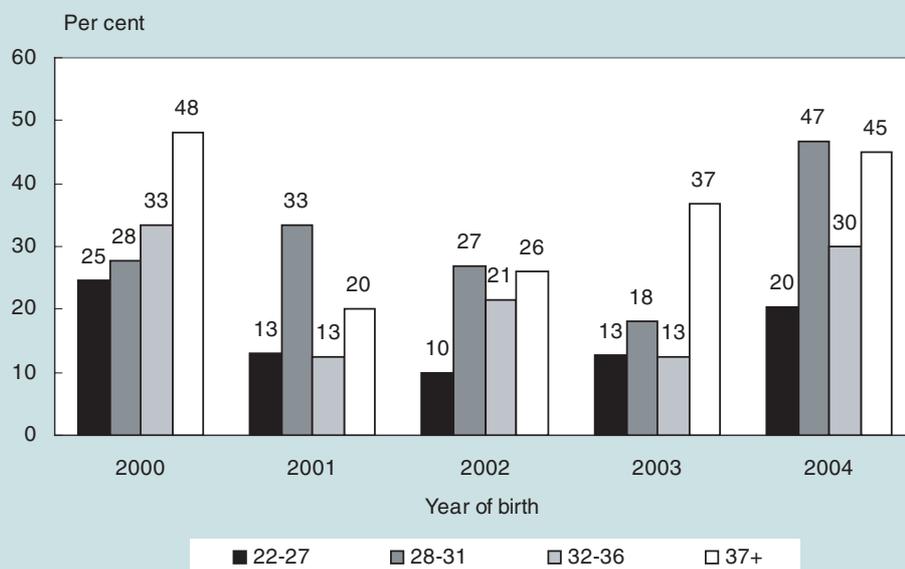
NICUS REGISTRANTS BY DURATION OF SURVIVAL, MAJOR CONGENITAL ANOMALY AND GESTATIONAL AGE, NSW & ACT 2004

Gestational age (weeks)	Major congenital anomaly	Alive at 6 months		0-7		Age at death (days)				TOTAL	
		No.	%	No.	%	8-28		28+		No.	%
23-27	No	79	75.2	43	18.1	10	4.2	6	2.5	238	90.5
	Yes	19	76.0	2	8.0	0	0.0	4	16.0	25	9.5
	Sub-total	198	75.3	45	17.1	10	3.8	10	3.8	263	100.0
28-31	No	586	97.5	12	2.0	3	0.5	0	0.0	601	92.7
	Yes	40	85.1	3	6.4	0	0.0	4	8.5	47	7.3
	Sub-total	626	96.6	15	2.3	3	0.5	4	0.6	648	100.0
32-36	No	636	98.5	6	0.9	3	0.5	1	0.2	646	84.7
	Yes	89	76.1	17	14.5	5	4.3	6	5.1	117	15.3
	Sub-total	725	95.1	23	3.0	8	1.0	7	0.9	763	100.0
37-41	No	336	94.4	17	4.8	3	0.8	0	0.0	356	64.4
	Yes	172	87.3	14	7.1	3	1.5	8	4.1	197	35.6
	Sub-total	508	91.9	31	5.6	6	1.1	8	1.4	553	100.0
42+	No	3	100.0	0	0.0	0	0.0	0	0.0	3	75.0
	Yes	0	0.0	1	100.0	0	0.0	0	0.0	1	25.0
	Sub-total	3	75.0	1	25.0	0	0.0	0	0.0	4	100.0
TOTAL		2060	92.4	115	5.2	27	1.2	29	1.3	2231	100.0

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

FIGURE 13

NICUS REGISTRANT DEATHS BY POST-MORTEM EXAMINATION AND GESTATIONAL AGE, NSW & ACT 2000–2004*



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

TABLE 105

NICUS REGISTRANTS BY POST-MORTEM EXAMINATION AND GESTATIONAL AGE, NSW & ACT 2004*

Post-mortem	23–27		28–31		Gestational age (weeks)				TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%
Not requested	31	52.5	3	20.0	3	30.0	4	20.0	41	39.4
Refused	16	27.1	5	33.3	4	40.0	7	35.0	32	30.8
Done	12	20.3	7	46.7	3	30.0	9	45.0	31	29.8
TOTAL	59	100.0	15	100.0	10	100.0	20	100.0	104	100.0

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