

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 2,003 infants registered in NICUS in 2002. The most common reasons for registration of an infant were assisted ventilation for four hours or more (66.2 per cent) and gestational age less than 29 weeks (18.5 per cent). Infants generally met more than one of the registration criteria.

The NICUS registration rate in 2002 was 22.2 per 1,000 livebirths, which has increased slightly each year since 1992 (17.9 per 1,000 live births). 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. The proportion of mothers in each health area has remained relatively constant since 1992.

Seventy-four of the 2,003 infants (3.7 per cent) registered in NICUS were born to Aboriginal or Torres Strait Islander mothers. There were 2,219 livebirths to Aboriginal or Torres Strait Islander women recorded by the NSW and ACT Midwives Data Collections for 2002. The registration rate for these infants was 33.3 per 1,000 livebirths and has increased since 1992. Seventy-two of the 1,851 mothers (3.9 per cent) were Aboriginal or Torres Strait Islander, of whom 31 (43.1 per cent) were residents of the Far West, Macquarie, Mid North Coast, Mid Western, New England and Northern Rivers Health Areas (Table 62). Fifteen of the 359 mothers (4.2 per cent) of infants less than 29 weeks and/or less than 1,000 grams were Aboriginal or Torres Strait Islander.

TABLE 67

NICUS REGISTRATIONS BY HEALTH AREA OF RESIDENCE, NSW & ACT 2002

Health Area	Total NICUS registrants		Total NSW & ACT live births No.	Registrants per 1,000 live births
	No.	%		
Central Sydney	134	6.7	6727	19.9
Northern Sydney	160	8.0	9462	16.9
South Eastern Sydney	195	9.7	9524	20.5
South Western Sydney	274	13.7	12916	21.2
Wentworth	90	4.5	4177	21.5
Western Sydney	229	11.4	11221	20.4
Central Coast	97	4.8	3621	26.8
Hunter	258	12.9	6994	36.9
Illawarra	95	4.7	4361	21.8
Far West	9	0.5	498	18.1
Greater Murray	58	2.9	2515	23.1
Macquarie	27	1.4	1472	18.3
Mid North Coast	70	3.5	2822	24.8
Mid Western	62	3.1	2159	28.7
New England	59	3.0	2289	25.8
Northern Rivers	8	0.4	2688	3.0
Southern	56	2.8	2041	27.4
ACT	104	5.2	4182	24.9
Interstate	12	0.6	510	23.5
Overseas	6	0.3	0	0.0
Not stated	0	0.0	47	0.0
TOTAL	2003	100.0	90226	22.2

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research. NSW Midwives Data Collection 2002. Centre for Epidemiology and Research, NSW Department of Health. ACT Maternal-Perinatal Data Collection, 2000.

Maternal characteristics

There were 1,851 mothers of the 2,003 infants registered in NICUS during 2002. Nearly 80 per cent of the mothers were residents of the Sydney, Central Coast, Hunter and Illawarra Health Areas (Table 68). 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 359 mothers of infants in this group just over half (58.5 per cent) were residents of the South Western Sydney, Western Sydney, Hunter, Northern Sydney or Central Sydney Health Areas.

The age of mothers of NICUS infants ranged from 14 to 48 years, with a mean age of 29.6 years. The mean maternal age was similar across all gestational age groups and has remained constant since 1992. In 2002, 21.1 per cent of mothers were aged 35 years or more (range 13.7 per cent in 1992 to 21.1 per cent in 2002). In 2002, 5.0 per cent of mothers were aged less than 20 years (range 5.0 per cent in 1999 to 6.8 per cent in 2000) (Table 69). The health areas of residence with the highest proportion

of teenage mothers were Far West, Macquarie, Mid North Coast, New England and Northern Rivers.

There were 1,662 mothers (89.8 per cent) who had an antenatal complication. The most common antenatal complications were preterm labour (49.4 per cent), antepartum haemorrhage (19.2 per cent), fetal distress (20.5 per cent) and pregnancy induced hypertension (16.2 per cent). Antenatal complications were more frequent in mothers delivering at less than 37 weeks compared with at term. Even so, 61.4 per cent of mothers giving birth at term had an antenatal complication (Table 70).

Administration of corticosteroids to the mother prior to preterm birth improves the outcome for the infant. In 2002, 89.1 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.

Continued on page 61

TABLE 68

MOTHERS OF NICUS REGISTRANTS BY HEALTH AREA OF RESIDENCE AND ABORIGINALITY, NSW & ACT 2002

Health Area	Non-Aboriginal		Aboriginal		TOTAL	
	No.	%	No.	%	No.	%
Central Sydney	119	97.5	3	2.5	122	6.6
Northern Sydney	145	100.0	0	0.0	145	7.8
South Eastern Sydney	176	97.8	4	2.2	180	9.7
South Western Sydney	253	99.2	2	0.8	255	13.8
Wentworth	83	96.5	3	3.5	86	4.6
Western Sydney	208	99.0	2	1.0	210	11.3
Central Coast	86	96.6	3	3.4	89	4.8
Hunter	230	95.8	10	4.2	240	13.0
Illawarra	82	93.2	6	6.8	88	4.8
Far West	4	50.0	4	50.0	8	0.4
Greater Murray	50	94.3	3	5.7	53	2.9
Macquarie	23	88.5	3	11.5	26	1.4
Mid North Coast	60	89.6	7	10.4	67	3.6
Mid Western	50	86.2	8	13.8	58	3.1
New England	45	84.9	8	15.1	53	2.9
Northern Rivers	7	87.5	1	12.5	8	0.4
Southern	48	92.3	4	7.7	52	2.8
ACT	95	100.0	0	0.0	95	5.1
Interstate	9	90.0	1	10.0	10	0.5
Overseas	6	100.0	0	0.0	6	0.3
TOTAL	1779	96.1	72	3.9	1851	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 2002**

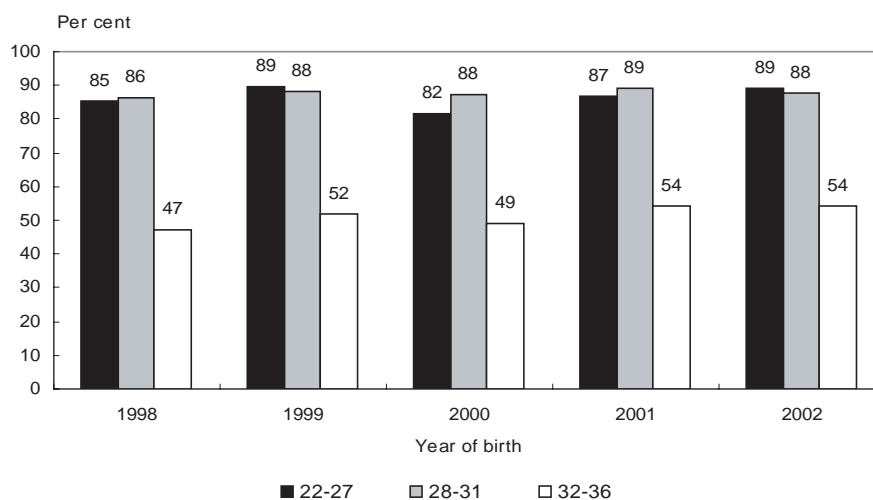
Health Area	Maternal age (years)						TOTAL	
	Less than 20		20-34		35+			
	No.	%	No.	%	No.	%	No.	%
Central Sydney	2	1.6	75	61.5	45	36.9	122	6.6
Northern Sydney	4	2.8	91	62.8	50	34.5	145	7.8
South Eastern Sydney	3	1.7	128	71.1	49	27.2	180	9.7
South Western Sydney	18	7.1	190	74.5	47	18.4	255	13.8
Wentworth	2	2.3	72	83.7	12	14.0	86	4.6
Western Sydney	6	2.9	153	72.9	51	24.3	210	11.3
Central Coast	6	6.7	67	75.3	16	18.0	89	4.8
Hunter	15	6.3	183	76.3	42	17.5	240	13.0
Illawarra	4	4.5	74	84.1	10	11.4	88	4.8
Far West	1	12.5	7	87.5	0	0.0	8	0.4
Greater Murray	1	1.9	43	81.1	9	17.0	53	2.9
Macquarie	4	15.4	18	69.2	4	15.4	26	1.4
Mid North Coast	8	11.9	49	73.1	10	14.9	67	3.6
Mid Western	4	6.9	46	79.3	8	13.8	58	3.1
New England	6	11.3	43	81.1	4	7.5	53	2.9
Northern Rivers	1	12.5	5	62.5	2	25.0	8	0.4
Southern	5	9.6	40	76.9	7	13.5	52	2.8
ACT	1	1.1	73	76.8	21	22.1	95	5.1
Interstate	1	10.0	7	70.0	2	20.0	10	0.5
Overseas	1	16.7	3	50.0	2	33.3	6	0.3
TOTAL	93	5.0	1367	73.9	391	21.1	1851	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 2002**

Antenatal complication	Gestational age (weeks)										TOTAL	
	22-27		28-31		32-36		37-41		42+			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Preterm labour	194	78.2	340	66.4	370	60.8	10	2.1	0	0.0	914	49.4
Antenatal fetal distress	39	15.7	80	15.6	105	17.2	123	25.9	2	25.0	349	18.9
Antepartum haemorrhage	76	30.6	146	28.5	111	18.2	22	4.6	0	0.0	355	19.2
Pregnancy induced hypertension	32	12.9	100	19.5	124	20.4	43	9.1	0	0.0	299	16.2
Intrauterine growth restriction	20	8.1	73	14.3	81	13.3	26	5.5	0	0.0	200	10.8
Chorioamnionitis	55	22.2	62	12.1	22	3.6	4	0.8	0	0.0	143	7.7
Antenatal fetal anomaly diagnosis	2	0.8	11	2.1	37	6.1	69	14.6	1	12.5	120	6.5
Gestational diabetes	7	2.8	23	4.5	39	6.4	23	4.9	0	0.0	92	5.0
Any complication	248	100.0	512	100.0	606	99.5	292	61.6	4	50.0	1662	89.8
TOTAL MOTHERS	248	100.0	512	100.0	609	100.0	474	100.0	8	100.0	1851	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 1998–2002**

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 1998–2002**

Year	Corticosteroid administration	Gestational age (weeks)						TOTAL	
		22–27		28–31		32–36		No.	%
		No.	%	No.	%	No.	%	No.	%
1998	No	37	14.7	70	13.6	274	52.9	381	29.7
	Yes	214	85.3	444	86.4	244	47.1	902	70.3
	TOTAL	251	100.0	514	100.0	518	100.0	1283	100.0
1999	No	27	10.6	57	12.0	273	47.9	357	27.4
	Yes	228	89.4	419	88.0	297	52.1	944	72.6
	TOTAL	255	100.0	476	100.0	570	100.0	1301	100.0
2000	No	45	18.5	64	12.5	287	50.9	396	30.0
	Yes	198	81.5	448	87.5	277	49.1	923	70.0
	TOTAL	243	100.0	512	100.0	564	100.0	1319	100.0
2001	No	33	13.3	57	10.7	260	45.5	350	25.9
	Yes	215	86.7	475	89.3	310	54.5	1000	74.1
	TOTAL	248	100.0	532	100.0	570	100.0	1350	100.0
2002	No	27	10.9	63	12.3	279	45.8	369	27.0
	Yes	221	89.1	449	87.7	330	54.2	1000	73.0
	TOTAL	248	100.0	512	100.0	609	100.0	1369	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-one per cent of all births were booked at a tertiary centre, ranging from 34.4 per cent for the 28–31 week gestational age group to 25.3 per cent for the 37-plus weeks gestational age group (Table 72). 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 (63.7 per cent) and for those born at 28–31 weeks gestation (55.3 per cent). The overall rate of maternal transfer was 36.5 per cent.

Thirty-one per cent of infants were transferred to a tertiary centre following birth. There were 4.3 per cent (87/2,003) 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 (68.9 per cent). Forty-seven infants (47/1,121; 4.2 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 74.7 per cent 2000. In 2002, 89.9 per cent of infants less than 32 weeks gestation were born in a tertiary centre

compared with 67.0 per cent of 32–36 week gestation infants and 44.2 per cent of term infants.

The pattern of transfer status (Table 74) and place of birth by birthweight (Table 75) is similar to that of gestational age, with the majority (89.8 per cent) of the very low birthweight 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 just over half (55.2 per cent) of all infants less than 2,500 grams birthweight (Table 77). As expected, augmentation, or induction of labour was most common in mothers of infants with a birthweight of 2,500 grams or more (29.2 per cent).

Prolonged rupture of membranes (greater than 24 hours) was more common at lower gestations, affecting 28.4 per cent of infants less than 28 weeks gestation (Table 78).

The proportion of mothers who gave birth by elective caesarean section (caesarean section without labour) increased from 27.0 per cent in 1992 to 34.4 per cent in 2002 (Table 79). The most common type of delivery was caesarean section (45.8 per cent in 1993 to 54.9 per cent in 2002), followed by normal vaginal delivery (41.9 per cent in 1993 to 36.4 per cent in 2002) and vaginal breech delivery (7.0 per cent in 1998 to 4.2 per cent in 2002) (Table 80). 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 37.8 per cent, compared with 24.2 per cent for all livebirths in NSW in 2002.

Continued on page 64

TABLE 72

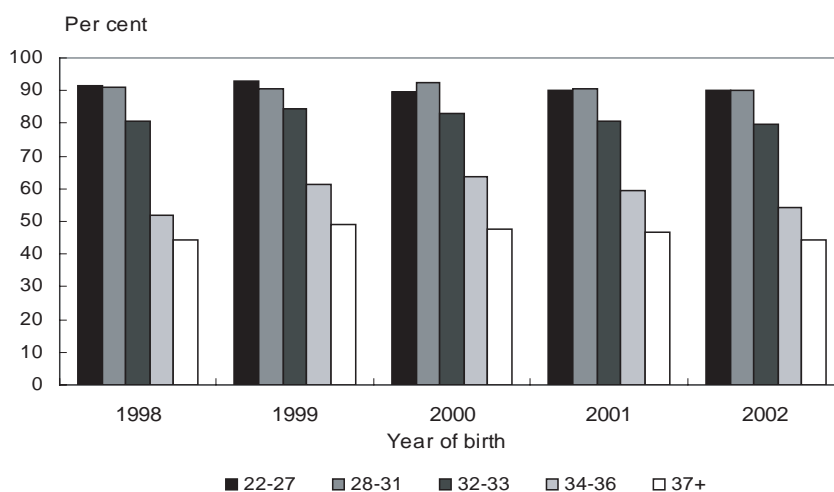
NICUS REGISTRANTS BY BOOKING STATUS, TRANSFER STATUS AND GESTATIONAL AGE, NSW & ACT 2002

Booking status and transfer status	22–27		28–31		Gestational age (weeks)				42+		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Booked at tertiary hospital	73	26.3	208	34.4	214	33.5	120	25.3	2	25.0	617	30.8
Transfer before birth	177	63.7	334	55.3	199	31.1	22	4.6	0	0.0	732	36.5
Transfer after birth	27	9.7	59	9.8	198	31.0	326	68.8	6	75.0	616	30.8
Booked at non tertiary hosp.	1	0.4	3	0.5	28	4.4	6	1.3	0	0.0	38	1.9
TOTAL	278	100.0	604	100.0	639	100.0	474	100.0	8	100.0	2003	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 1998–2002



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 2002

Place of birth	Gestational age (weeks)										TOTAL	
	22–27		28–31		32–33		34–36		37+		No.	%
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Level 1–4	19	6.8	37#	6.1	41	12.9	109	34.1	215	44.6	421	21.0
Level 5	6	2.2	23#	3.8	22	6.9	34	10.6	50	10.4	135	6.7
Level 6	250	89.9	543#	89.9	254	79.6	174	54.4	213	44.2	1434	71.6
Planned home birth	0	0.0	0	0.0	0	0.0	0	0.0	1	0.2	1	0.1
Born before arrival	3	1.1	1#	0.2	2	0.6	3	0.9	3	0.6	12	0.6
TOTAL	278	100.0	604	100.0	319	100.0	320	100.0	482	100.0	2003	100.0

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

44/61 (72.1%) babies not born in a level six hospital were 30–31 weeks gestation.
354/543 (65.2%) babies born in a level six hospital were 30–31 weeks gestation.

TABLE 74

NICUS REGISTRANTS BY BOOKING STATUS, TRANSFER STATUS AND BIRTHWEIGHT, NSW & ACT 2002

Booking status and transfer status	Birthweight (grams)								TOTAL	
	Less than 1,000		1,000–1,499		1,500–2,499		2,500+		No.	%
	No.	%	No.	%	No.	%	No.	%	No.	%
Booked at tertiary hospital	79	28.1	159	35.8	210	31.7	169	27.4	617	30.8
Transfer before birth	183	65.1	229	51.6	275	41.5	45	7.3	732	36.5
Transfer after birth	18	6.4	49	11.0	159	24.0	390	63.3	616	30.8
Booked at non tertiary hospital	1	0.4	7	1.6	18	2.7	12	1.9	38	1.9
TOTAL	281	100.0	444	100.0	662	100.0	616	100.0	2003	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 BIRTHWEIGHT, NSW & ACT 2002**

Place of birth	Birthweight (grams)									
	Less than 1,000		1,000–1,499		1,500–2,499		2,500+		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%
Level 1–4	12	4.3	28	6.4	111	16.8	270	43.8	421	21.0
Level 5	6	2.1	22	5.0	44	6.6	63	10.2	135	6.7
Level 6	262	93.2	389	87.6	504	76.1	279	45.3	1434	71.6
Planned home birth	0	0.0	0	0.0	0	0.0	1	0.2	1	0.1
Born before arrival	1	0.4	5	1.1	3	0.5	3	0.5	12	0.6
TOTAL	281	100.0	444	100.0	662	100.0	616	100.0	2003	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 2002**

Onset of labour	Gestational age (weeks)											
	22–27		28–31		32–36		37–41		42+		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Spontaneous	172	69.4	291	56.8	287	47.1	215	45.4	1	12.5	966	52.2
Augmented	6	2.4	14	2.7	25	4.1	41	8.6	1	12.5	87	4.7
Induced	5	2.0	7	1.4	41	6.7	121	25.5	6	75.0	180	9.7
No labour	65	26.2	200	39.1	256	42.0	97	20.5	0	0.0	618	33.4
TOTAL	248	100.0	512	100.0	609	100.0	474	100.0	8	100.0	1851	100.0

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

TABLE 77**MOTHERS OF NICUS REGISTRANTS BY ONSET OF LABOUR AND BIRTHWEIGHT, NSW & ACT 2002**

Onset of labour	Birthweight (grams)									
	Less than 1,000		1,000–1,499		1,500–2,499		2,500+		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%
Spontaneous	135	54.7	204	53.0	345	56.8	282	46.1	966	52.2
Augmented	5	2.0	9	2.3	24	4.0	49	8.0	87	4.7
Induced	3	1.2	12	3.1	35	5.8	130	21.2	180	9.7
No labour	104	42.1	160	41.6	203	33.4	151	24.7	618	33.4
TOTAL	247	100.0	385	100.0	607	100.0	612	100.0	1851	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 2002**

Duration of rupture of membranes	Gestational age (weeks)											
	22–27		28–31		32–36		37–41		42+		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Less than 24 hours	199	71.6	465	77.0	562	87.9	449	94.7	8	100.0	1683	84.0
24 hours–7 days	34	12.2	82	13.6	56	8.8	22	4.6	0	0.0	194	9.7
8+ days	45	16.2	57	9.4	21	3.3	3	0.6	0	0.0	126	6.3
TOTAL	278	100.0	604	100.0	639	100.0	474	100.0	8	100.0	2003	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 2002**

Type of delivery	Gestational age (weeks)											
	22–27		28–31		32–36		37–41		42+		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Normal vaginal	100	36.0	197	32.6	190	29.7	241	50.8	2	25.0	730	36.4
Forceps	6	2.2	10	1.7	7	1.1	19	4.0	1	12.5	43	2.1
Forceps rotation	0	0.0	1	0.2	0	0.0	2	0.4	0	0.0	3	0.1
Vacuum extraction	0	0.0	3	0.5	7	1.1	31	6.5	1	12.5	42	2.1
Vaginal breech	32	11.5	23	3.8	26	4.1	3	0.6	0	0.0	84	4.2
Elective Caesarean	74	26.6	238	39.4	273	42.7	104	21.9	1	12.5	690	34.4
Emergency Caesarean	66	23.7	132	21.9	136	21.3	74	15.6	3	37.5	411	20.5
TOTAL	278	100.0	604	100.0	639	100.0	474	100.0	8	100.0	2003	100.0

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

TABLE 80**NICUS REGISTRANTS BY TYPE OF DELIVERY AND BIRTHWEIGHT, NSW & ACT 2002**

Type of delivery	Birthweight (grams)								TOTAL	
	Less than 1,000		1,000–1,499		1,500–2,499		2,500+		No.	%
	No.	%	No.	%	No.	%	No.	%	No.	%
Normal vaginal	76	27.0	127	28.6	242	36.6	285	46.3	730	36.4
Forceps	5	1.8	5	1.1	15	2.3	18	2.9	43	2.1
Forceps rotation	0	0.0	0	0.0	1	0.2	2	0.3	3	0.1
Vacuum extraction	0	0.0	0	0.0	7	1.1	35	5.7	42	2.1
Vaginal breech	29	10.3	20	4.5	28	4.2	7	1.1	84	4.2
Elective Caesarean	118	42.0	188	42.3	224	33.8	160	26.0	690	34.4
Emergency Caesarean	53	18.9	104	23.4	145	21.9	109	17.7	411	20.5
TOTAL	281	100.0	444	100.0	662	100.0	616	100.0	2003	100.0

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

(Continued from page 61)

Infant characteristics

Nearly three quarters of the infants (75.9 per cent) were preterm (less than 37 weeks gestation), 44.0 per cent were very preterm (less than 32 weeks gestation) and 13.9 per cent were extremely preterm (less than 28 weeks gestation) (Figure 7). The proportion of infants in each gestational age group has remained constant (Table 81). Almost all liveborn infants at 24–31 weeks gestation were admitted to a NICU, about two-thirds at 31–32 weeks gestation, and one-fifth at 33–34 weeks gestation (Table 82).

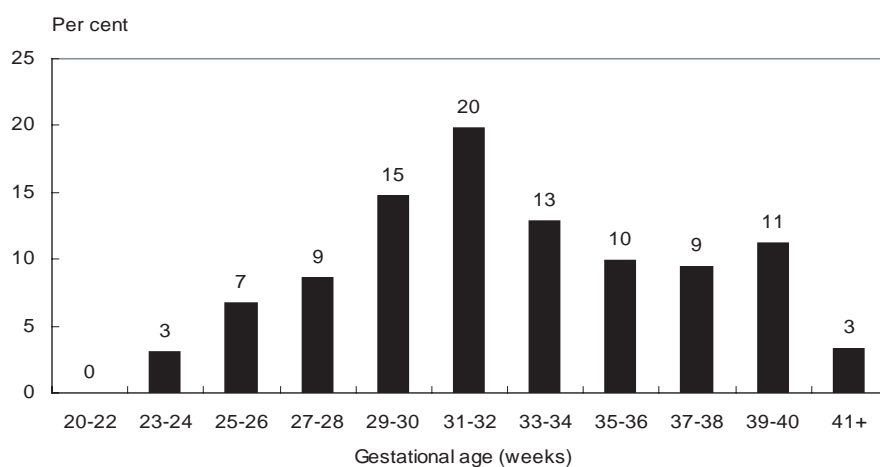
Seventy per cent of infants had a low birthweight (less than 2,500 grams), 36.2 per cent had a very low birthweight (less than 1,500 grams) and 14.0 per cent had an extremely low birthweight (less than 1,000 grams).

The proportion of infants in each birthweight group has remained constant (Table 83). Almost all liveborn infants 600–1500 grams birthweight were admitted to a NICU (Table 84).

Overall, 56.9 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 20.9 per cent in 1992 to 16.5 per cent in 2002. Congenital anomalies were more common among term infants (37-plus weeks gestational age), of whom 40.7 per cent had a major congenital anomaly and 4.6 per cent had a minor congenital anomaly (Table 86).

Continued on page 68

FIGURE 7**NICUS REGISTRANTS BY GESTATIONAL AGE, NSW & ACT 2002**

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

TABLE 81**NICUS REGISTRANTS BY GESTATIONAL AGE, NSW & ACT 1998-2002**

Gestational age (weeks)	1998		1999		Year of birth 2000		2001		2002	
	No.	%	No.	%	No.	%	No.	%	No.	%
22-27	287	15.1	290	14.6	275	13.7	275	13.7	278	13.9
28-31	589	31.0	551	27.7	605	30.2	643	32.0	604	30.2
32-36	536	28.2	623	31.3	601	30.0	611	30.4	639	31.9
37-41	479	25.2	512	25.7	512	25.6	472	23.5	474	23.7
42+	8	0.4	16	0.8	10	0.5	9	0.4	8	0.4
TOTAL	1899	100.0	1992	100.0	2003	100.0	2010	100.0	2003	100.0

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

TABLE 82**BIRTHS BY NICUS REGISTRATION AND GESTATIONAL AGE, NSW & ACT 2002**

Gestational age (weeks)	NSW & ACT			NICUS Rate per 1,000 live births	% of cohort
	Stillbirths No.	Live births No.	Registrations No.		
Less than 21	46	6	0	0.0	0.0
21	59	18	0	0.0	0.0
22	49	26	1	38.5	0.1
23	42	25	14	560.0	0.7
24	30	59	48	813.6	2.4
25	17	61	59	967.2	3.0
26	27	72	76	1055.6	3.8
27	17	91	80	879.1	4.0
28	20	93	93	1000.0	4.6
29	10	105	113	1076.2	5.6
30	8	185	183	989.2	9.1
31	16	226	215	951.3	10.7
32	14	317	183	577.3	9.1
33	11	480	136	283.3	6.8
34	20	798	121	151.6	6.0
35	17	1195	111	92.9	5.5
36	20	2323	88	37.9	4.4
37	22	4875	89	18.3	4.4
38	29	13810	101	7.3	5.0
39	26	20547	91	4.4	4.5
40	31	27546	134	4.9	6.7
41	20	15183	59	3.9	3.0
42	2	2003	8	4.0	0.4
43	0	157	0	0.0	0.0
44	0	1	0	0.0	0.0
Not stated	0	24	0	0.0	0.0
TOTAL	553	90226	2003	22.2	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research, 2002. NSW Midwives Data Collection 2002. Centre for Epidemiology and Research, NSW Department of Health. ACT Maternal-Perinatal Data Collection, 2000.

TABLE 83**NICUS REGISTRANTS BY BIRTHWEIGHT, NSW & ACT 1998-2002**

Birthweight (grams)	Year of birth									
	1998		1999		2000		2001		2002	
	No.	%	No.	%	No.	%	No.	%	No.	%
Less than 400	0	0.0	3	0.2	1	0.1	2	0.1	1	0.1
400-499	6	0.3	9	0.5	6	0.3	5	0.2	7	0.3
500-599	23	1.2	25	1.3	21	1.0	30	1.5	21	1.0
600-699	43	2.3	51	2.6	56	2.8	49	2.4	51	2.5
700-799	62	3.3	62	3.1	62	3.1	49	2.4	63	3.1
800-899	65	3.4	75	3.8	53	2.6	72	3.6	57	2.8
900-999	85	4.5	58	2.9	84	4.2	63	3.1	81	4.0
1,000-1,249	207	10.9	210	10.5	211	10.5	219	10.9	181	9.0
1,250-1,499	238	12.5	247	12.4	280	14.0	274	13.6	263	13.1
1,500-1,749	205	10.8	207	10.4	203	10.1	231	11.5	228	11.4
1,750-1,999	143	7.5	151	7.6	144	7.2	160	8.0	163	8.1
2,000-2,499	221	11.6	242	12.1	253	12.6	251	12.5	271	13.5
2,500-2,999	198	10.4	211	10.6	201	10.0	215	10.7	204	10.2
3,000-3,499	214	11.3	205	10.3	200	10.0	195	9.7	195	9.7
3,500-3,999	128	6.7	153	7.7	149	7.4	132	6.6	155	7.7
4,000+	61	3.2	83	4.2	79	3.9	63	3.1	62	3.1
TOTAL	1899	100.0	1992	100.0	2003	100.0	2010	100.0	2003	100.0

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

TABLE 84**BIRTHS BY NICUS REGISTRATION AND BIRTHWEIGHT, NSW & ACT 2002**

Birthweight (grams)	NSW & ACT		Registrations No.	NICUS Rate per 1,000 live births	% of cohort
	Stillbirths No.	Live births No.			
Less than 400	125	56	1	17.9	0.1
400-499	71	28	7	250.0	0.4
500-599	47	45	21	466.7	1.1
600-699	30	62	51	822.6	2.6
700-799	13	66	63	954.5	3.2
800-899	21	62	57	919.4	2.9
900-999	10	79	81	1025.3	4.0
1,000-1,249	20	189	181	957.7	9.0
1,250-1,499	14	284	263	926.1	13.1
1,500-1,749	20	441	228	517.0	11.4
1,750-1,999	23	685	163	238.0	8.1
2,000-2,499	36	3494	271	77.6	13.5
2,500-2,999	52	13389	204	15.2	10.2
3,000-3,499	34	32092	195	6.1	9.7
3,500-3,999	27	28182	155	5.5	7.7
4,000+	10	11072	62	5.6	3.1
TOTAL	553	90226	2003	22.2	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research, 2002. NSW Midwives Data Collection 2002. Centre for Epidemiology and Research, NSW Department of Health. ACT Maternal-Perinatal Data Collection, 2000.

TABLE 85**NICUS REGISTRANTS BY GENDER AND GESTATIONAL AGE, NSW & ACT 2002**

Sex	Gestational age (weeks)										TOTAL	
	22-27		28-31		32-36		37-41		42+			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Male	157	56.5	310	51.3	389	60.9	277	58.4	6	75.0	1139	56.9
Female	121	43.5	294	48.7	250	39.1	197	41.6	2	25.0	864	43.1
TOTAL	278	100.0	604	100.0	639	100.0	474	100.0	8	100.0	2003	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 2002**

Congenital anomaly	Gestational age (weeks)										TOTAL	
	22-27		28-31		32-36		37-41		42+			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
None	256	92.1	540	89.4	540	84.5	260	54.9	4	50.0	1600	79.9
Minor	12	4.3	17	2.8	21	3.3	22	4.6	0	0.0	72	3.6
Major	10	3.6	47	7.8	78	12.2	192	40.5	4	50.0	331	16.5
TOTAL	278	100.0	604	100.0	639	100.0	474	100.0	8	100.0	2003	100.0

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

(Continued from page 64)

The overall proportion of infants born following a multiple pregnancy was 20.4 per cent in 2002 (range 14.5 per cent in 1993 to 22.4 per cent in 2001). In 2002, most of the infants (79.6 per cent) were from a singleton pregnancy, 18.9 per cent were from a twin pregnancy and 1.5 per cent were from a triplet pregnancy. Infants born as a result of a multiple gestation were more likely to be preterm, with 26.0 per cent of infants less than 37 weeks gestation being from a multiple gestation pregnancy (Table 87). Multiple births represented 3.2 per cent of all NSW livebirths in 2002. The higher than expected rate of multiple births among the 2002 NICUS cohort reflects the high proportion of multiple pregnancies resulting in preterm birth.

Table 88 shows the median, 25th and 75th percentiles for one- and five-minute Apgar scores according to gestational age groups. For infants 28–36 weeks gestational age, the median one-minute Apgar score was eight. The median five-minute score was nine for all gestational age groups. The proportion of infants with a one-minute Apgar score of 0–4 has decreased from 38.7 per cent in 1992 to 23.6 per cent in 2002. Similarly the proportion of infants with a five-minute Apgar score of 0–4 has decreased from 10.8 per cent in 1992 to 6.9 per cent in 2002 (Table 89).

Infants with major congenital anomalies ($n=331$) were excluded from the analysis of morbidity and mortality.

The majority of infants without a major congenital anomaly (1,525/1,672; 91.2 per cent) in the 2002 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 9). 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 (Table 91).

Proven systemic infection has decreased from 22.0 per cent in 1992 to 13.3 per cent of infants in 2002. Infection was most common among infants less than 28 weeks gestation (41.0 per cent) (Table 92).

The overall proportion of ventilated infants who received surfactant was 37.3 in 2002 (range 33.8 per cent in 1992 to 51.8 per cent in 1998) (Table 93). In 2002, 52.9 per cent of the infants who received surfactant were less than 32 weeks gestational age. The majority (55.7 per cent) of ventilated infants with a diagnosis of respiratory distress syndrome received surfactant.

Overall, the incidence of treated patent ductus arteriosus (PDA) was 15.1 per cent in 2002 (range 10.9 in 1994 to 15.4 per cent in 2000). In 2002, 95.2 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 (13.7 per cent). Surgical treatment of PDA was predominantly performed on infants less than 28 weeks gestation (5.2 per cent).

Continued on page 72

TABLE 87

NICUS REGISTRANTS BY PLURALITY AND GESTATIONAL AGE, NSW & ACT 2002

Plurality	Gestational age (weeks)										TOTAL	
	22–27		28–31		32–36		37–41		42+			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Singleton	206	74.1	422	69.9	497	77.8	462	97.5	8	100.0	1595	79.6
Twins	72	25.9	158	26.2	136	21.3	12	2.5	0	0.0	378	18.9
Triplets	0	0.0	24	4.0	6	0.9	0	0.0	0	0.0	30	1.5
TOTAL	278	100.0	604	100.0	639	100.0	474	100.0	8	100.0	2003	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 2002**

Apgar Score	Gestational age (weeks)							
	22-27 Median (25%,75%)		28-31 Median (25%,75%)		32-36 Median (25%,75%)		37+ Median (25%,75%)	
One-minute Apgar	5	(3,7)	7	(5,8)	7	(5,9)	7	(4,9)
Five-minute Apgar	8	(7,9)	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 FIVE MINUTES, NSW & ACT 1998-2002**

Apgar Score	Year of birth									
	1998		1999		2000		2001		2002	
	No.	%	No.	%	No.	%	No.	%	No.	%
One minute										
0-4	533	28.1	531	26.7	509	25.4	516	25.7	472	23.6
5-7	693	36.5	689	34.6	743	37.1	745	37.1	686	34.2
8+	657	34.6	766	38.5	737	36.8	734	36.5	828	41.3
Not stated	16	0.8	6	0.3	14	0.7	15	0.7	17	0.8
TOTAL	1899	100.0	1992	100.0	2003	100.0	2010	100.0	2003	100.0
Five minutes										
0-4	142	7.5	132	6.6	154	7.7	143	7.1	139	6.9
5-7	412	21.7	437	21.9	399	19.9	425	21.1	391	19.5
8+	1329	70.0	1417	71.1	1437	71.7	1429	71.1	1461	72.9
Not stated	16	0.8	6	0.3	13	0.6	13	0.6	12	0.6
TOTAL	1899	100.0	1992	100.0	2003	100.0	2010	100.0	2003	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 1998-2002[#]**

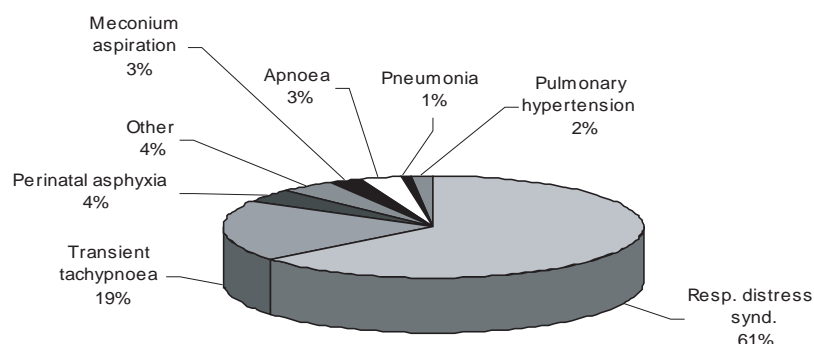
Year	Assisted ventilation	Gestational age (weeks)									
		22-27		28-31		32-36		37+		TOTAL	
		No.	%	No.	%	No.	%	No.	%	No.	%
1998	No	2	0.7	99	17.6	48	10.4	7	2.6	156	9.9
	Yes	278	99.3	465	82.4	415	89.6	264	97.4	1422	90.1
	TOTAL	280	100.0	564	100.0	463	100.0	271	100.0	1578	100.0
1999	No	1	0.4	119	22.7	60	11.5	9	3.0	189	11.6
	Yes	280	99.6	405	77.3	464	88.5	291	97.0	1440	88.4
	TOTAL	281	100.0	524	100.0	524	100.0	300	100.0	1629	100.0
2000	No	1	0.4	116	20.4	65	12.4	6	1.9	188	11.3
	Yes	261	99.6	454	79.6	461	87.6	305	98.1	1481	88.7
	TOTAL	262	100.0	570	100.0	526	100.0	311	100.0	1669	100.0
2001	No	2	0.8	127	20.8	61	11.6	3	1.1	193	11.5
	Yes	264	99.2	485	79.2	466	88.4	276	98.9	1491	88.5
	TOTAL	266	100.0	612	100.0	527	100.0	279	100.0	1684	100.0
2002	No	1	0.4	91	16.3	51	9.1	4	1.4	147	8.8
	Yes	267	99.6	466	83.7	510	90.9	282	98.6	1525	91.2
	TOTAL	268	100.0	557	100.0	561	100.0	286	100.0	1672	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 2002#



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 2002#

Indication	Gestational age (weeks)								TOTAL	
	22-27		28-31		32-36		37+			
	No.	%	No.	%	No.	%	No.	%	No.	%
Hyaline membrane disease	231	86.5	332	71.2	317	62.2	52	18.4	932	61.1
Respiratory distress syndrome	6	2.2	79	17.0	138	27.1	61	21.6	284	18.6
Newborn encephalopathy	0	0.0	3	0.6	7	1.4	47	16.7	57	3.7
Immature lung	22	8.2	17	3.6	4	0.8	1	0.4	44	2.9
Apnoea	2	0.7	15	3.2	12	2.4	13	4.6	42	2.8
Meconium aspiration	0	0.0	1	0.2	2	0.4	33	11.7	36	2.4
Pulmonary hypertension	0	0.0	3	0.6	1	0.2	22	7.8	26	1.7
Surgery	0	0.0	2	0.4	6	1.2	10	3.5	18	1.2
Pneumonia	1	0.4	0	0.0	4	0.8	7	2.5	12	0.8
Congenital anomaly	2	0.7	5	1.1	1	0.2	1	0.4	9	0.6
Other	3	1.1	9	1.9	18	3.5	35	12.4	65	4.3
TOTAL	267	100.0	466	100.0	510	100.0	282	100.0	1525	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 PROVEN SYSTEMIC INFECTION AND GESTATIONAL AGE, NSW & ACT 2002#**

Infection	22-27		28-31		Gestational age (weeks)				TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%
No	158	59.0	503	90.3	537	95.7	252	88.1	1450	86.7
Yes	110	41.0	54	9.7	24	4.3	34	11.9	222	13.3
TOTAL	268	100.0	557	100.0	561	100.0	286	100.0	1672	100.0

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

TABLE 93**NICUS REGISTRANTS BY SURFACTANT ADMINISTRATION AND GESTATIONAL AGE, NSW & ACT 1998-2002#**

Year	Surfactant administration	22-27		28-31		Gestational age (weeks)				TOTAL	
		No.	%	No.	%	No.	%	No.	%	No.	%
1998	No	53	19.1	212	45.6	213	51.3	207	78.4	685	48.2
	Yes	225	80.9	253	54.4	202	48.7	57	21.6	737	51.8
	TOTAL	278	100.0	465	100.0	415	100.0	264	100.0	1422	100.0
1999	No	57	20.4	218	53.8	282	60.8	217	74.6	774	53.8
	Yes	223	79.6	187	46.2	182	39.2	74	25.4	666	46.3
	TOTAL	280	100.0	405	100.0	464	100.0	291	100.0	1440	100.0
2000	No	59	22.6	254	55.9	282	61.2	255	83.6	850	57.4
	Yes	202	77.4	200	44.1	179	38.8	50	16.4	631	42.6
	TOTAL	261	100.0	454	100.0	461	100.0	305	100.0	1481	100.0
2001	No	56	21.2	275	56.7	327	70.2	221	80.1	879	59.0
	Yes	208	78.8	210	43.3	139	29.8	55	19.9	612	41.0
	TOTAL	264	100.0	485	100.0	466	100.0	276	100.0	1491	100.0
2002	No	67	25.1	278	59.7	372	72.9	239	84.8	956	62.7
	Yes	200	74.9	188	40.3	138	27.1	43	15.2	569	37.3
	TOTAL	267	100.0	466	100.0	510	100.0	282	100.0	1525	100.0

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

Babies with major congenital anomalies or not ventilated excluded.

TABLE 94**NICUS REGISTRANTS BY TREATED PATENT DUCTUS ARTERIOSUS (PDA) AND GESTATIONAL AGE, NSW & ACT 2002#**

PDA-Treatment for PDA	22-27		28-31		Gestational age (weeks)				TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%
No treated PDA	132	49.3	493	88.5	551	98.2	1176	84.8		
Indomethacin only	122	45.5	60	10.8	8	1.4	190	13.7		
Surgery only	0	0.0	1	0.2	2	0.4	3	0.2		
Indomethacin & surgery	14	5.2	3	0.5	0	0.0	17	1.2		
TOTAL	268	100.0	557	100.0	561	100.0	1386	100.0		

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

Babies with major congenital anomalies excluded.

(Continued on page 68)

Some infants (1.2 per cent) were treated with both indomethacin and surgery.

Overall, the incidence of necrotising enterocolitis (NEC) was 3.1 per cent in 2002 (range 9.7 per cent in 1992 to 2.2 per cent in 2000). The diagnosis of NEC was made radiologically or at surgery in 65.4 per cent of infants and clinically in the remainder. NEC was more common at the lower gestational age groups and 86.5 per cent of the infants with NEC were born at less than 32 weeks gestation (Table 95).

The overall incidence of major surgery was 4.3 per cent in 2002 (range 7.6 per cent in 1992 to 3.1 per cent in 2000). In 2002, 61.1 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 2002, the incidence of intraventricular haemorrhage (IVH) among preterm infants (less than 37 weeks

gestational age) was 13.8 per cent (range 20.5 per cent in 1993 to 13.5 per cent in 2001). In 2002, confirmed IVH was most common among infants less than 28-weeks gestation (34.3 per cent); 46.7 per cent of these infants had severe IVH (grade 3 or 4). Five infants less than 32 weeks gestation with severe IVH required surgical drainage for post haemorrhagic hydrocephalus (5/43, 11.6 per cent). Of the surviving infants born before 32 weeks gestation, 94.9 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 4.1 per cent in 2002 (range 7.5 per cent in 1992 to 3.7 per cent in 1996). In 2002, one infant with Grade 3 ROP was 32 weeks gestation and 54.8 per cent of the infants less than 28 weeks gestation with severe ROP received either cryo- or laser therapy. Importantly, 21.4 per cent of surviving infants of 28–31 weeks gestational age did not have an eye examination recorded (Table 98).

Continued on page 74

TABLE 95

NICUS REGISTRANTS BY NECROTISING ENTEROCOLITIS (NEC) AND GESTATIONAL AGE, NSW & ACT 2002[#]

NEC—Treatment for NEC	22–27		28–31		Gestational age (weeks)				TOTAL	
	No.	%	No.	%	32–36		37+		No.	%
No NEC	244	91.0	536	96.2	555	98.9	285	99.7	1620	96.9
Clinical diagnosis	7	2.6	9	1.6	1	0.2	1	0.3	18	1.1
X-ray diagnosis	8	3.0	7	1.3	4	0.7	0	0	19	1.1
Surgery for NEC	9	3.4	5	0.9	1	0.2	0	0	15	0.9
TOTAL	268	100.0	557	100.0	561	100.0	286	100.0	1672	100.0

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

Babies with major congenital anomalies excluded.

TABLE 96

NICUS REGISTRANTS BY MAJOR SURGERY AND GESTATIONAL AGE, NSW & ACT 2002[#]

Major Surgery	22–27		28–31		Gestational age (weeks)				TOTAL	
	No.	%	No.	%	32–36		37+		No.	%
No	238	88.8	543	97.5	549	97.9	270	94.4	1600	95.7
Yes	30	11.2	14	2.5	12	2.1	16	5.6	72	4.3
TOTAL	268	100.0	557	100.0	561	100.0	286	100.0	1672	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 2002#**

Head ultrasound	Gestational age (weeks)						TOTAL	
	22-27		28-31		32-36		No.	%
	No.	%	No.	%	No.	%	No.	%
No IVH	160	59.7	431	77.4	265	47.2	856	61.8
Grade 1	27	10.1	55	9.9	13	2.3	95	6.9
Grade 2	22	8.2	9	1.6	4	0.7	35	2.5
Grade 3	16	6.0	6	1.1	2	0.4	24	1.7
Grade 4	27	10.1	8	1.4	2	0.4	37	2.7
Hydrocephalus requiring drainage	3	1.1	2	0.4	1	0.2	6	0.4
Not examined & lived	0	0.0	41	7.4	269	48.0	310	22.4
Not examined & died	16	6.0	7	1.3	6	1.1	29	2.1
TOTAL	268	100.0	557	100.0	561	100.0	1386	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 2002#**

Retinopathy of prematurity (ROP)	Gestational age (weeks)						TOTAL	
	22-27		28-31		32-36		No.	%
	No.	%	No.	%	No.	%	No.	%
No ROP	73	27.2	383	68.8	456	55.3	55.3	
Grade 1	39	14.6	18	3.2	57	6.9	6.9	
Grade 2	49	18.3	12	2.2	61	7.4	7.4	
Grade 3	30	11.2	2	0.4	32	3.9	3.9	
Grade 4	1	0.4	0	0.0	1	0.1	0.1	
Grade 5	0	0.0	1	0.2	1	0.1	0.1	
Treatment with cryo-laser therapy	17	6.3	1	0.2	18	2.2	2.2	
Not examined & lived	3	1.1	119	21.4	122	14.8	14.8	
Not examined & died	73	27.2	22	3.9	95	11.5	11.5	
TOTAL	268	100.0	557	100.0	825	100.0	100.0	

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

Babies with major congenital anomalies excluded.

(Continued from page 72)

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 due to their higher numbers. In 2002, the total cohort used 56,879 bed days in a tertiary centre in NSW and the ACT (range 46,090 in 1993 to 58,529 in 2000); as well as 18,316 in a non-tertiary centre (Level 2

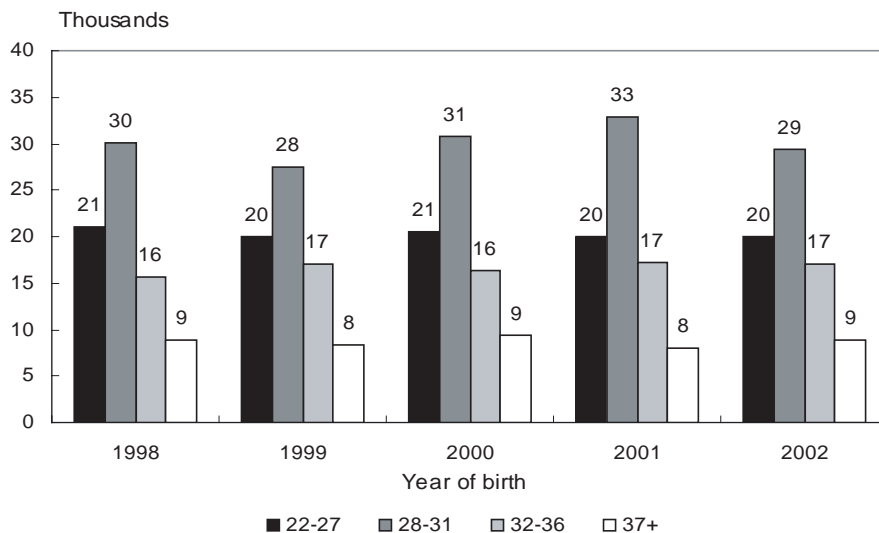
neonatal unit) in NSW and the ACT (14,288 in 1992 to 20,018 in 2001). Even when these infants leave the neonatal intensive care unit, they still require substantial resources.

In 2002, NICUS registrants used 16,431 days of assisted ventilation (range 15,282 in 1993 to 18,909 in 2000) and 27,838 days of oxygen therapy (range 22,526 in 1992 to 30,802 in 2001). In 2002, 78 (4.7 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 21.3 per cent (range 7.5 per cent in 1992 to 21.3 per cent in 2002) (Table 100).

Continued on page 78

FIGURE 9

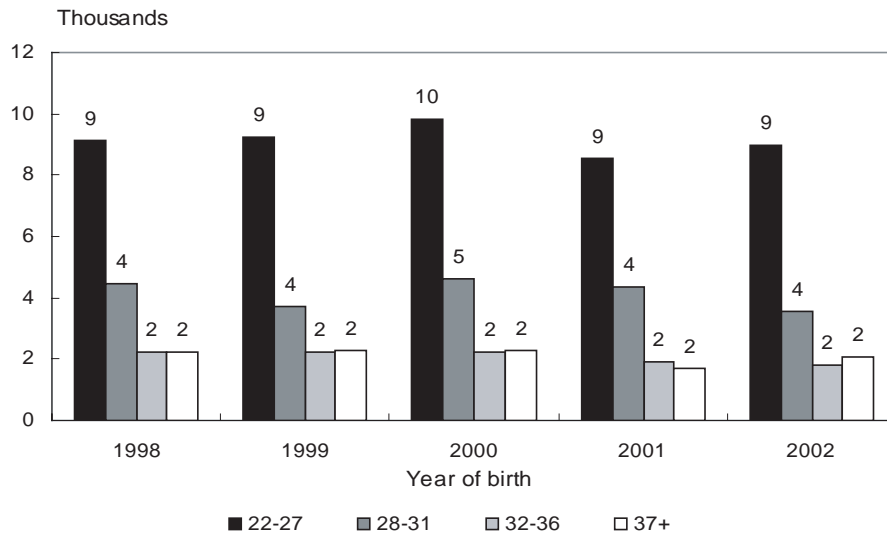
NICUS REGISTRANTS BY TOTAL NUMBER OF DAYS IN HOSPITAL AND GESTATIONAL AGE, NSW & ACT 2002



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

FIGURE 10

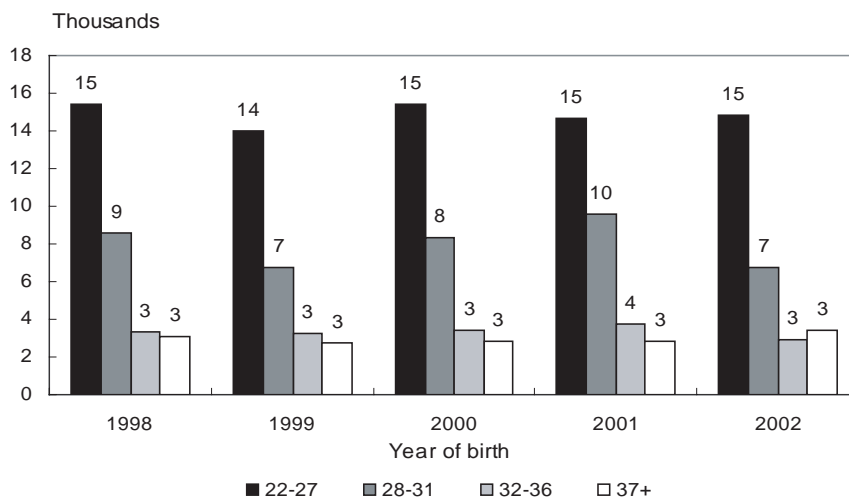
NICUS REGISTRANTS BY TOTAL NUMBER OF DAYS OF ASSISTED VENTILATION AND GESTATIONAL AGE, NSW & ACT 2002



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 1998-2002



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

TABLE 99
NICUS REGISTRANTS BY SERVICE UTILISATION INDICATORS AND GESTATIONAL AGE, NSW & ACT 2002

Indicators	Gestational age (weeks)				TOTAL
	22-27	28-31	32-36	37+	
Non-tertiary hospital stay (days)					
Minimum	0	0	0	0	0
Maximum	80	93	52	42	93
Sum	2291	8774	6024	1227	18316
Median	0	12	6	0	1
25th percentile	0	0	0	0	0
75th percentile	13	28	17	3	16
Tertiary hospital stay (days)					
Minimum	0	0	0	0	0
Maximum	192	149	433	283	433
Sum	17664	20627	10957	7631	56879
Median	72	32	12	10	16
25th percentile	19	15	6	5	7
75th percentile	94	47	23	17	39
Total hospital stay (days)					
Minimum	1	0	1	1	0
Maximum	192	195	433	283	433
Sum	19955	29400	16981	8858	75194
Median	82	46	24	12	30
25th percentile	21	37	15	7	14
75th percentile	106	58	33	20	50
Mechanical ventilation (days)					
Minimum	0	0	0	0	0
Maximum	82	46	83	91	91
Sum	3600	1146	1010	1636	7392
Median	5	0	0	2	1
25th percentile	1	0	0	0	0
75th percentile	19	2	2	3	3
Continuous Positive Airways Pressure (days)					
Minimum	0	0	0	0	0
Maximum	97	46	28	51	97
Sum	5351	2426	806	457	9040
Median	18	1	1	0	1
25th percentile	1	0	0	0	0
75th percentile	31	4	2	1	3
Assisted ventilation (days)					
Minimum	0	0	0	0	0
Maximum	119	70	104	133	133
Sum	8950	3572	1816	2093	16431
Median	29	2	2	2	2
25th percentile	5	0	1	1	1
75th percentile	52	6	3	4	6
Oxygen (days)					
Minimum	0	0	0	0	0
Maximum	192	132	81	200	200
Sum	14808	6736	2914	3380	27838
Median	44	3	2	3	3
25th percentile	4	1	1	1	1
75th percentile	94	9	5	7	9

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

TABLE 100**NICUS REGISTRANTS BY HOME OXYGEN ADMINISTRATION AND GESTATIONAL AGE, NSW & ACT 1998–2002[#]**

Year	Home oxygen	Gestational age (weeks)									
		22–27		28–31		32–36		37+		TOTAL	
		No.	%	No.	%	No.	%	No.	%	No.	%
1998	No	224	80.0	550	97.5	459	99.1	265	97.8	1498	94.9
	Yes	56	20.0	14	2.5	4	0.9	6	2.2	80	5.1
	TOTAL	280	100.0	564	100.0	463	100.0	271	100.0	1578	100.0
1999	No	243	86.5	511	97.5	521	99.4	297	99.0	1572	96.5
	Yes	38	13.5	13	2.5	3	0.6	3	1.0	57	3.5
	TOTAL	281	100.0	524	100.0	524	100.0	300	100.0	1629	100.0
2000	No	211	80.5	555	97.4	519	98.7	307	98.7	1592	95.4
	Yes	51	19.5	15	2.6	7	1.3	4	1.3	77	4.6
	TOTAL	262	100.0	570	100.0	526	100.0	311	100.0	1669	100.0
2001	No	216	81.2	583	95.3	526	99.8	276	98.9	1601	95.1
	Yes	50	18.8	29	4.7	1	0.2	3	1.1	83	4.9
	TOTAL	266	100.0	612	100.0	527	100.0	279	100.0	1684	100.0
2002	No	211	78.7	544	97.7	558	99.5	281	98.3	1594	95.3
	Yes	57	21.3	13	2.3	3	0.5	5	1.7	78	4.7
	TOTAL	268	100.0	557	100.0	561	100.0	286	100.0	1672	100.0

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

Babies with major congenital anomalies excluded.

(Continued from page 74)

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 six-month survival rate for all infants without a major congenital anomaly in the 2002 cohort was 91.4 per cent (range 87.8 per cent in 1992 to 92.5 per cent in 2000). Survival of infants born at less than 25 weeks gestation was 44.3 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 101). Term infants (92.0 per cent) were slightly more likely to survive than preterm infants (91.3 per cent). Among infants who died, 76.2 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 14.0 per cent occurring during the first month of life (Table 101).

The six-month survival rate improved with increasing birthweight, ranging from 44.4 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 birthweight to a maximum of 99.3 per cent for infants of 1,750–1,999 grams birthweight 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 2002, the six-month survival rate for infants born at 22 to 27 weeks was greater for those born in a non-tertiary centre (79.2 per cent) compared with those born in a tertiary centre (69.4 per cent). Of the surviving infants born in a non-tertiary centre, 16/19 were 26–27 weeks gestation. Term infants born in a tertiary centre (93.0 per cent) were more likely to survive than term infants born in a non-tertiary centre (89.7 per cent). Place of birth did not significantly affect survival for infants in the other gestational age groups (Table 103).

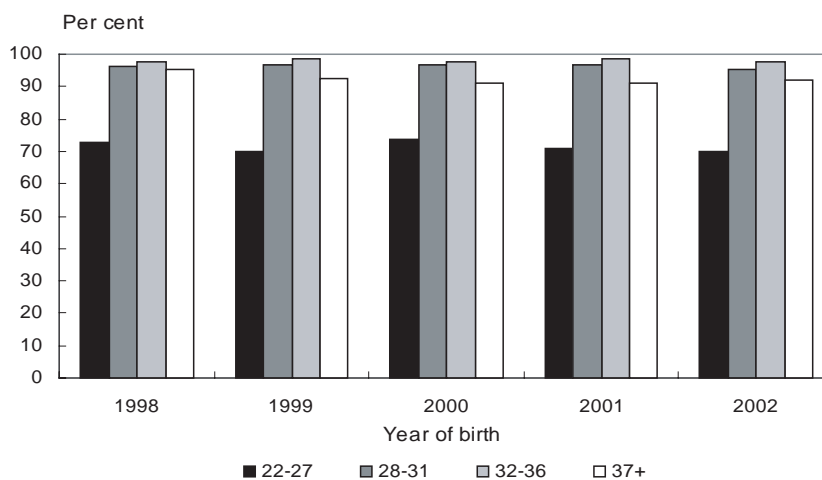
The six-month survival rate was similar for males (90.7 per cent) and females (92.4 per cent) overall, and for all gestational age groups: less than 28 weeks (65.8 per cent versus 75.9 per cent); 28–31 weeks (95.1 per cent versus 95.6 per cent); 32–36 weeks (97.1 per cent versus 98.2 per cent); and 37–41 weeks gestation groups (93.6 per cent versus 90.1 per cent).

The six-month survival rate was 91.5 per cent ($n=1,184$) for singleton infants and 91.3 per cent ($n=345$) for multiple gestation infants. Plurality did not influence survival in infants 22–36 weeks gestational age. In 2002 the survival rate for infants in the less than 28 week gestation group was similar for infants born of a multiple (50/70; 71.4 per cent) and a singleton pregnancy (138/198; 69.7 per cent).

Continued on page 79

FIGURE 12

NICUS REGISTRANTS BY 6-MONTHS SURVIVAL AND GESTATIONAL AGE, NSW & ACT 1998–2002#



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

As expected the overall survival rate was generally lower (84.3 per cent) in the presence of a major congenital anomaly (Table 104).

Post-mortem examinations were performed on 24/143 infants (16.8 per cent) who died in the 2002 cohort (Figure 13 and Table 105). Post-mortem examinations were most

commonly not requested for infants 22–27 weeks gestation (40.0 per cent) and term infants (34.8 per cent). The highest rate of refusal was in the 22–27 (50.0 per cent) and 32–36 week group (50.0 per cent) and the highest rate of post-mortems done was in the 28–31 week group (26.9 per cent).

TABLE 101

NICUS REGISTRANTS BY DURATION OF SURVIVAL AND GESTATIONAL AGE, NSW & ACT 2002#

Gestational age (weeks)	Alive at six months		Age at death (days)				TOTAL			
	No.	%	0–7		8–28		28+			
	No.	%	No.	%	No.	%	No.	%	No.	%
22	0	0.0	1	100.0	0	0.0	0	0.0	1	0.1
23	6	46.2	7	53.8	0	0.0	0	0.0	13	0.8
24	20	43.5	21	45.7	3	6.5	2	4.3	46	2.8
25	36	63.2	17	29.8	2	3.5	2	3.5	57	3.4
26	60	82.2	8	11.0	2	2.7	3	4.1	73	4.4
27	66	84.6	7	9.0	2	2.6	3	3.8	78	4.7
28	71	91.0	6	7.7	1	1.3	0	0.0	78	4.7
29	98	92.5	4	3.8	2	1.9	2	1.9	106	6.3
30	167	96.5	2	1.2	3	1.7	1	0.6	173	10.3
31	195	97.5	4	2.0	0	0.0	1	0.5	200	12.0
32	172	98.3	2	1.1	1	0.6	0	0.0	175	10.5
33	120	97.6	2	1.6	1	0.8	0	0.0	123	7.4
34	107	98.2	2	1.8	0	0.0	0	0.0	109	6.5
35	87	95.6	4	4.4	0	0.0	0	0.0	91	5.4
36	61	96.8	1	1.6	1	1.6	0	0.0	63	3.8
37	54	93.1	4	6.9	0	0.0	0	0.0	58	3.5
38	51	91.1	5	8.9	0	0.0	0	0.0	56	3.3
39	40	90.9	4	9.1	0	0.0	0	0.0	44	2.6
40	75	92.6	5	6.2	1	1.2	0	0.0	81	4.8
41	40	93.0	3	7.0	0	0.0	0	0.0	43	2.6
42	3	75.0	0	0.0	1	25.0	0	0.0	4	0.2
TOTAL	1529	91.4	109	6.5	20	1.2	14	0.8	1672	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 BIRTHWEIGHT, NSW & ACT 2002#

Birthweight (grams)	Alive at six months		Age at death (days)				TOTAL			
	No.	%	0–7		8–28		28+			
	No.	%	No.	%	No.	%	No.	%	No.	%
Less than 400	0	0.0	1	50.0	1	50.0	0	0.0	2	0.1
400–499	2	33.3	4	66.7	0	0.0	0	0.0	6	0.4
500–599	8	44.4	8	44.4	2	11.1	0	0.0	18	1.1
600–699	27	57.4	16	34.0	1	2.1	3	6.4	47	2.8
700–799	40	67.8	15	25.4	2	3.4	2	3.4	59	3.5
800–899	44	81.5	7	13.0	2	3.7	1	1.9	54	3.2
900–999	65	85.5	9	11.8	1	1.3	1	1.3	76	4.5
1,000–1,249	147	90.7	8	4.9	2	1.2	5	3.1	162	9.7
1,250–1,499	235	95.1	6	2.4	4	1.6	2	0.8	247	14.8
1,500–1,749	204	96.2	7	3.3	1	0.5	0	0.0	212	12.7
1,750–1,999	146	99.3	1	0.7	0	0.0	0	0.0	147	8.8
2,000–2,499	212	97.7	4	1.8	1	0.5	0	0.0	217	13.0
2,500–2,999	140	95.9	4	2.7	2	1.4	0	0.0	146	8.7
3,000–3,499	123	92.5	9	6.8	1	0.8	0	0.0	133	8.0
3,500–3,999	93	90.3	10	9.7	0	0.0	0	0.0	103	6.2
4,000+	43	95.6	1	2.2	1	2.2	0	0.0	45	2.7
TOTAL	1529	91.4	109	6.5	20	1.2	14	0.8	1672	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 2002[#]**

Gestational age (weeks)	Place of birth	Alive at six months		0-7		Age at death (days) 8-28		28+		TOTAL	
		No.	%	No.	%	No.	%	No.	%	No.	%
22-27	Non tertiary	19	79.2	4	16.7	1	4.2	0	0.0	24	9.0
	Tertiary	168	69.4	57	23.6	8	3.3	9	3.7	242	91.0
	Sub-total	187	70.3	61	22.9	9	3.4	9	3.4	266	100.0
28-31	Non tertiary	56	96.6	1	1.7	1	1.7	0	0.0	58	10.4
	Tertiary	475	95.2	15	3.0	5	1.0	4	0.8	499	89.6
	Sub-total	531	95.3	16	2.9	6	1.1	4	0.7	557	100.0
32-36	Non tertiary	172	97.2	4	2.3	1	0.6	0	0.0	177	31.8
	Tertiary	371	97.6	7	1.8	2	0.5	0	0.0	380	68.2
	Sub-total	543	97.5	11	2.0	3	0.5	0	0.0	557	100.0
37-41	Non tertiary	151	93.2	10	6.2	1	0.6	0	0.0	162	58.3
	Tertiary	105	90.5	11	9.5	0	0.0	0	0.0	116	41.7
	Sub-total	256	92.1	21	7.6	1	0.4	0	0.0	278	100.0
42+	Non tertiary	3	100.0	0	0.0	0	0.0	0	0.0	3	75.0
	Tertiary	0	0.0	0	0.0	1	100.0	0	0.0	1	25.0
	Sub-total	3	75.0	0	0.0	1	25.0	0	0.0	4	100.0
TOTAL		1520	91.5	109	6.6	20	1.2	13	0.8	1662	100.0

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

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

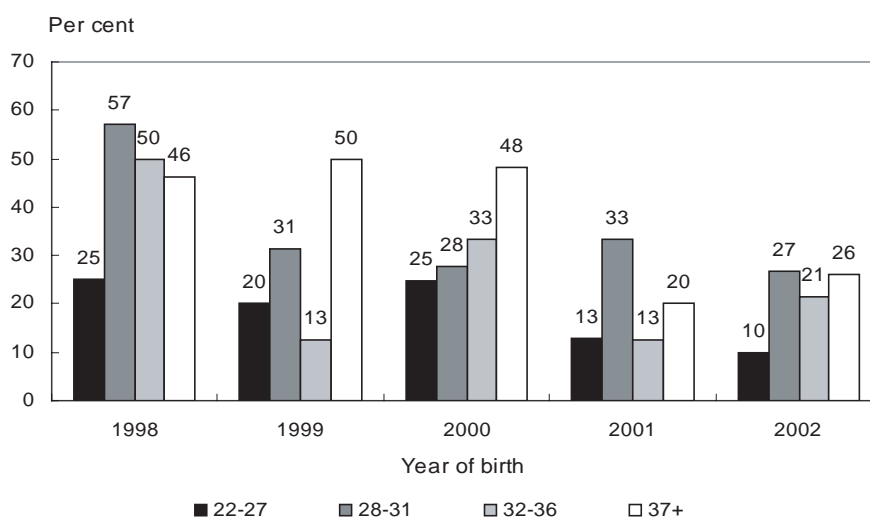
TABLE 104**NICUS REGISTRANTS BY DURATION OF SURVIVAL, MAJOR CONGENITAL ANOMALY AND GESTATIONAL AGE, NSW & ACT 2002**

Gestational age (weeks)	Major congenital anomaly	Alive at six months		0-7		Age at death (days) 8-28		28+		TOTAL	
		No.	%	No.	%	No.	%	No.	%	No.	%
22-27	No	188	70.1	61	22.8	9	3.4	10	3.7	268	96.4
	Yes	6	60.0	1	10.0	1	10.0	2	20.0	10	3.6
	Sub-total	194	69.8	62	22.3	10	3.6	12	4.3	278	100.0
28-31	No	531	95.3	16	2.9	6	1.1	4	0.7	557	92.2
	Yes	39	83.0	4	8.5	2	4.3	2	4.3	47	7.8
	Sub-total	570	94.4	20	3.3	8	1.3	6	1.0	604	100.0
32-36	No	547	97.5	11	2.0	3	0.5	0	0.0	561	87.8
	Yes	63	80.8	7	9.0	3	3.8	5	6.4	78	12.2
	Sub-total	610	95.5	18	2.8	6	0.9	5	0.8	639	100.0
37-41	No	260	92.2	21	7.4	1	0.4	0	0.0	282	59.5
	Yes	168	87.5	14	7.3	4	2.1	6	3.1	192	40.5
	Sub-total	428	90.3	35	7.4	5	1.1	6	1.3	474	100.0
42+	No	3	75.0	0	0.0	1	25.0	0	0.0	4	50.0
	Yes	3	75.0	1	25.0	0	0.0	0	0.0	4	50.0
	Sub-total	6	75.0	1	12.5	1	12.5	0	0.0	8	100.0
TOTAL		1808	90.3	136	6.8	30	1.5	29	1.4	2003	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 1998-2002#



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 2002#

Post-mortem	Gestational age (weeks)								TOTAL	
	22-27		28-31		32-36		37+		No.	%
	No.	%	No.	%	No.	%	No.	%	No.	%
Not requested	32	40.0	8	30.8	4	28.6	8	34.8	52	36.4
Refused	40	50.0	11	42.3	7	50.0	9	39.1	67	46.9
Done	8	10.0	7	26.9	3	21.4	6	26.1	24	16.8
TOTAL	80	100.0	26	100.0	14	100.0	23	100.0	143	100.0

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