

**Annual Report
for the Year 1997**
Incorporating the 36th Survey
of Perinatal Deaths in Victoria

**The Consultative Council on Obstetric
and Paediatric Mortality and Morbidity**

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The publication of this report was made possible by the generous assistance of many individuals in varied professional groups.

Members of the Consultative Council on Obstetric and Paediatric Mortality and Morbidity, and of its committees, have widely diverse areas of expertise, and continue to contribute their specialist knowledge and wisdom.

Midwives provide detailed information concerning every birth in Victoria to the Perinatal Data Collection Unit of the Council. The Congenital Malformations/Birth Defects Register is provided with valuable notifications from maternal and child health nurses, as well as from the Mercy Hospital for Women, the Monash Medical Centre, the Royal Children's Hospital, and the Royal Women's Hospital.

Medical practitioners complete the confidential medical reports on perinatal deaths, and frequently provide much additional information on perinatal and paediatric deaths. The necropsy reports by anatomical and forensic pathologists continue to play an indispensable part in the deliberations of the committees.

The State Coroner's Office, and personnel from the Victorian Institute of Forensic Medicine, provide valuable information to the Council on all cases investigated by coroners in Victoria.

The Australian Bureau of Statistics assists with the ascertainment of maternal deaths.

The Newborn Emergency Transport Service provide additional information on infants this organisation transferred to, and from, tertiary neonatal centres. The Intensive Care Unit of the Royal Children's Hospital provide the data on paediatric emergency transfers.

The Department of Human Services, contribute the information on childhood immunisation and vaccine-preventable diseases in Victoria.

The Accident Research Centre at Monash University provided the morbidity data on dog-bite injuries in Victorian children, and The Safety Centre, Royal Children's Hospital Melbourne provided the information on dog-bite prevention.

The formidable task of collecting, collating, and analysing data on all Victorian births and deaths, from 20 weeks' gestation to 14 years of age, was a considerable workload for the Council's small, dedicated staff listed in this report.

The printing and distribution costs of this publication have been funded by the Victorian Government Department of Human Services.

CHAIRMAN'S REPORT AND SUMMARY

In 1997, the **livebirth** rate continued to decline and reached 13.4 per 1,000 mean estimated population, the lowest rate recorded since Council surveys commenced in 1962 (table 4).

In 1997, the **perinatal mortality** rate fell from 7.1 per 1,000 births in 1996, to 6.9 per 1,000, which is the **lowest ever recorded in Victoria** (table 1). This improvement was achieved by a reduction in the stillbirth rate. Avoidable factors were identified in 13.1 per cent of the neonatal deaths (21 of 160), in contrast to stillbirths where avoidable factors were identified in 38.7 per cent (104 out of 269). **Stillbirths** comprised 62.7 per cent (269 of 429) of perinatal deaths and remain first priority for prevention, especially since so many are potentially avoidable. As in previous years, the important avoidable factors identified in stillbirths were inadequate antenatal monitoring of fetal well being in high-risk pregnancies (64 cases, 24 per cent of all stillbirths), and inappropriate management, usually failure of recognition, of the growth-restricted fetus (27 cases, 10 per cent of all stillbirths).

The **infant death rate** of 3.8 per 1,000 livebirths is the **lowest ever recorded in Victoria** (table 2). Since this infant death rate is reported by year of birth, the figure for 1996 are the latest available; moreover the reduction was by an impressive 15.5 per cent from 4.5 per 1,000 in 1995 (table 2). This result was mainly contributed to by the reduction in the number of postneonatal **cot deaths** as shown in figure 12. In 1985, the first year when an audit of postneonatal infant and child deaths was included in this report, cot deaths accounted for 140 of 433 deaths in children aged between 29 days and under 15 years. This figure fell to a low of 34 in 1995, was 42 in 1996, and reached the impressive record low of 25 in 1997. The public must be constantly reminded that there is a reduced risk of sudden infant death if the child sleeps back down, parents do not smoke and the infant's head remains uncovered during sleep.

Other key recommendations regarding prevention of infant and child deaths and injuries:

- Every child with asthma should have a crisis plan to cope with a sudden severe episode.
- Drowning—fence swimming pools, supervise toddlers, remember life jackets.
- Young children should always be supervised around dogs, and separated from them at feeding time.
- Depression or suicidal thoughts—refer to a specialist. In children, the possibility of depression should not be forgotten and threats of suicide should not be ignored.

The recommended **childhood immunisation schedule** is included in this report (table 41) since it warrants every method of dissemination to health professionals and the public. It is noteworthy that the incidence of ***Haemophilus influenzae type b*** disease in children aged less than five years has fallen from 71.7 per 100,000 in 1991, prior to introduction of immunisation, to 1.9 per 100,000 in 1997. The universal preadolescent **Hepatitis B immunisation** programme commenced in Victorian schools at the beginning of the 1998 school year, and approximately 80% of year 7 children received immunisation through the school programme, and a further unknown number were immunised privately. Victoria is currently the only State to deliver a community Hepatitis B immunisation programme.

The number of infant and child deaths has halved since 1985 (figure 9) emphasising that the categories that require improvement are the **birth-related deaths** and those from **acquired disease or intentional injury**.

The total number of perinatal deaths due to **malformations** fell from 112 in 1996 to 97 in 1997 (71 were neonatal deaths, table 7). However, the percentage of perinatal deaths caused by malformations increased from 20.1 per cent in 1996 to 22.6 in 1997, which is a figure similar to that of a decade ago (23.0 per cent in 1988, table 8). There was an increase in the number of **terminations for congenital malformations** before 20 weeks' gestation from 260 in 1996 to a record high of 287 in 1997 (table 30).

The **Caesarean section rate** increased to 20.3 per cent, the highest recorded in Victoria, and there was a concomitant fall in the rate of forceps delivery to 9.8%. The operative delivery rate remained stable at about 30 per cent (figure 7). The perinatal mortality rate if infants born by Caesarean section rose from 6.9 per 1,000 in 1996 to 7.5 per 1,000, although there were more births and fewer perinatal deaths of those born before 27 weeks' gestation (17 of 72 in 1996, and 13 of 93 in 1997, table 27).

In terms of perinatal mortality, **multiple pregnancy** continues to have an importance out of proportion to its prevalence which was 3.1 per cent of all births with birth weight of 500g or more (the figure was 2.8 per cent in 1996). The perinatal mortality rate for all multiple births of birth-weight \geq 500g was 29.5 per 1,000 births, compared with 5.9 for singleton births. Multiple births accounted for 13.3 per cent of all perinatal deaths.

In the past 10 years the proportion of **mothers aged 35 years or more** at confinement almost doubled from 7.5 per cent in 1988 to 16.5 per cent in 1997 (table 21).

The **length of stay in hospital after confinement** continues to decline. The proportion of mothers staying in hospital for four days or less increased from 15.8 per cent in 1985 to 58.2 per cent in 1997. Those staying one or two days increased from 3.8 per cent to 17.8 per cent in 1997 (figure 8).

There were five **maternal deaths** (two direct, two indirect, one incidental).

Professor Norman A. Beischer

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Dr Jane Halliday	Consultant epidemiologist
Dr William Kitchen	Consultant paediatrician
Dr Anne Altmann	Consultant public health physician
Ms Helen Robertson	Research midwife
Ms Sofia Mercer	Research midwife
Mrs Marilyn Riley	Senior health information manager and research officer
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Mrs Jillian Wheatley	Administrative assistant
Ms Kay Munro	Executive officer
Dr Cathie Rose	Consultant medical officer

Dr Anne Altmann commenced in mid-1997 as the Medical Coordinator for the Council, taking over from Dr Kitchen.

The Council acknowledges Dr Kitchen's valued work with gratitude.

Mrs Luljeta Zyka commenced in 1998 as the council's executive officer and assistant, taking over from Ms K. Munro and Ms A. Lapuz.

PROVISION OF DATA FOR STATISTICAL AND RESEARCH PURPOSES

Under the auspices of the Consultative Council on Obstetric and Paediatric Mortality and Morbidity the Perinatal Data Collection Unit has collated information on all Victorian births from 20 weeks' gestation since 1982. The Unit also maintains the Congenital Malformations/Birth Defects Register for Victorian children born from 1982. The Council also undertakes extensive data collection on perinatal, infant, child (to 14 years of age) and maternal mortality. *The Council encourages the release of data to all health professionals; however, foremost consideration is that the release of data by the Council will not endanger the confidentiality of information.*

The Council reviews all research projects. If access to individual case records is requested, stringent conditions apply to safeguard the security and confidentiality of any data released by the Council. In all instances, a Council nominee must be one of the project supervisors. It is suggested that details of the information requested be provided in writing when the research is being planned; if the study appears feasible, then a formal research protocol should be submitted. A fee may be charged for information retrieval.

This formal proposal must conform to the National Health and Medical Research Council *Statement on Human Experimentation and Supplementary Notes 1992*. Before the project can begin, a properly constituted Institutional Ethics Committee must have approved it. No contact with any patient or parent/guardian may be made without permission of the patient's physician at the time of birth/death, and, in the case of the birth data, the hospital at which the birth took place.

All correspondence should be addressed to:
Executive Officer
Consultative Council on Obstetric and Paediatric Mortality and Morbidity
GPO Locked Bag 4923
Melbourne 3001
Telephone: (03) 9637 4225

The Council encourages the use of information and recommendations within this report providing appropriate acknowledgement of the source is made.

INTRODUCTION

This report includes the 13th Annual Survey of Deaths in Infancy and Childhood and the 36th consecutive Survey of Perinatal Deaths. It contains details of all stillbirths, neonatal deaths, and deaths of children in Victoria up to, but not including, their 15th birthday.

The perinatal mortality rate in 1997 was 6.9 per 1,000 births, a small but continuing decline from 7.1 per 1,000 births in 1996. There was a decrease in the stillbirth rate from 4.6 in 1996 to 4.3 in 1997, and a minor change in the neonatal death rate from 2.5 in 1996 to 2.6 in 1997.

The Council compiles case histories and submits them to its specialist committees so any potentially avoidable factors in management can be identified. This allows all practitioners to share the benefits of their colleagues' experience. Clinical lessons that might not emerge from an individual practice may readily be apparent from the cumulative experience of around 62,000 births annually.

The Consultative Council wishes to thank medical staff who complete Confidential Medical Reports on Perinatal Deaths. It is appreciated that this is time consuming. Usually this information is detailed and of great value to the committees that consider these cases.

Sometimes the information is incomplete. For stillbirths, results of antenatal tests for fetal well-being are often not included (for example, glucose tolerance test, cardiotocography, biophysical profile, and oestriol levels). For neonatal deaths, where the Confidential Medical Report has been completed by a paediatrician, obstetrical information is sometimes deficient. It would be appreciated if these aspects of documentation could be improved.

The Consultative Council also wishes to thank medical practitioners who provide additional information on infant and child deaths. As there are continuing reductions in childhood mortality the Council wishes to stress the importance of accurate data collection in these age groups. Such assistance with data provision to the Council is encouraged and greatly appreciated.

The Council wishes to remind those assisting with the provision of information that it is securely maintained, strictly confidential, and inadmissible in court.

DEFINITIONS

In this report, the Council has continued to follow the recommendations of the World Health Organisation (WHO) for definitions, and classifies conditions according to the International Classification of Diseases 9th Revision Clinical Modification (ICD 9 CM).

Unless otherwise stated, the following definitions apply:

<i>Stillbirth</i>	A stillborn infant weighing at least 500g or, if the weight was not known, born after at least 22 weeks' gestation.
<i>Neonatal death</i>	A death occurring within 28 days of birth in an infant whose birth-weight was at least 500g or, if the weight was not known, an infant born after at least 22 weeks' gestation.
<i>Infant death</i>	A death, occurring within one year of birth in a liveborn infant whose birth-weight was at least 500g or at least 22 weeks' gestation if the birth-weight was not known. This category includes neonatal deaths as defined above.

STILLBIRTH RATE (PER 1,000 TOTAL BIRTHS)

$$= \frac{\text{NUMBER OF STILLBIRTHS} \times 1,000}{\text{TOTAL LIVEBIRTHS} + \text{STILLBIRTHS}}$$

NEONATAL MORTALITY RATE (PER 1,000 LIVEBIRTHS)

$$= \frac{\text{NUMBER OF NEONATAL DEATHS} \times 1,000}{\text{TOTAL LIVEBIRTHS}}$$

PERINATAL MORTALITY RATE (PER 1,000 TOTAL BIRTHS)

$$= \frac{\text{NUMBER OF NEONATAL DEATHS} + \text{STILLBIRTHS}}{\text{TOTAL LIVEBIRTHS} + \text{STILLBIRTHS}}$$

INFANT MORTALITY RATE (PER 1,000 LIVEBIRTHS)

$$= \frac{\text{NUMBER OF NEONATAL DEATHS} + \text{LATE INFANT DEATHS}}{\text{TOTAL LIVEBIRTHS}}$$

Note:

- **Council and the Australian Bureau of Statistics include as live and stillbirths only those of birth-weight of at least 500g (22 weeks or over, if the birth-weight is unknown).**
- Different denominators mean that the perinatal mortality rate is not exactly the sum of the neonatal and stillbirth rates.

LEGAL REQUIREMENTS FOR REGISTRATION OF PERINATAL DEATHS

The Australian Bureau of Statistics and the Registry of Births, Deaths, and Marriages notify the Council of all perinatal deaths registered in Victoria. The legal requirements for registration are set out in the Medical Certificate of Cause of Perinatal Death. For the purpose of the *Registration of Births, Deaths and Marriages Act*, a 'stillborn child' means any child born after the 20th week of pregnancy who did not, at any time after being born, breathe or show any signs of life, and where the duration of pregnancy is not reliably ascertainable includes any fetus weighing not less than 400g. Any infant, regardless of maturity or birth-weight, who breathes or shows any other signs of life after being born, must be registered as a livebirth, and if death subsequently occurs within 28 days, as a neonatal death.

COMPARISON OF COUNCIL DATA WITH OTHER SOURCES

The following information is relevant to those undertaking the frustrating, and potentially confusing, task of comparing data from other sources. There are three main problem areas:

1. Birth-weight and gestational age criteria for inclusion of cases

The Council has complied with the World Health Organisation (WHO) criteria uniformly since the 1980 report. Both neonatal deaths, and stillbirths of birth-weight under 500g (or under 22 weeks' if the birth-weight is unknown), are excluded from all tables, unless otherwise specified. The Australian Bureau of Statistics uses the same WHO definitions so in this respect our data are comparable.

2. Reporting of perinatal death by year of birth, not death

From 1984, the year of inception of the Victorian Perinatal Collection Unit, the Council has tabulated data according to *the year in which the birth occurred*. This means a few neonatal deaths and many infant deaths occurred in the year following the birth. As ascertainment of late infant deaths is incomplete when the year's report is published, late infant deaths in the birth cohort are in the following year's report (table 1). In contrast, the Australian Bureau of Statistics publishes statistics according to *the year when the death is registered*, not the year of death, and from 1962–83 this was also the Council's practice. For the section on postneonatal infant and child deaths, however, the data are presented by the year of the child's death.

3. Infants born in Victoria

The Council's *perinatal* mortality data refer only to those infants born in Victoria, whereas the Australian Bureau of Statistics data refer to deaths occurring in Victoria, irrespective of the State, Territory, or country of birth. For the infant and child mortality section reports on all deaths occurring in Victoria for 29 days to 14 years of age.

CHANGES IN COUNCIL DEFINITIONS SINCE 1962

If trends in mortality rates over time are to be interpreted in a meaningful way, it is important to establish the criteria for inclusion of cases since the first annual report in 1962.

From 1962 until 1971, neonatal deaths were included if the gestation was at least 20 weeks (400g if the gestation was unknown); stillbirths first reported in 1965 were included if the gestation was at least 28 weeks (1,250g if the gestation was unknown).

From 1972 to 1979, the primary criterion for all perinatal deaths was a birth-weight of at least 400g, or a gestation of 20 weeks if the birth-weight was unknown. From 1980 onward the Council adopted, and continues to use, WHO criteria (as outlined above), although data are still collated on all births from 20 weeks' gestation.

SURVEY OF PERINATAL DEATHS

PERINATAL AND INFANT DEATHS

The denominator of perinatal mortality rates is based on all births in Victoria in 1997 (62,084). Neonates who died in Victoria but were born elsewhere were excluded. In 1997 there were 269 stillbirths and 160 neonatal deaths, giving a total of 429 deaths and a perinatal mortality rate of 6.9 per 1,000 births (tables 1 and 2). Excluded perinatal deaths are recorded in table 5.

Table 1 Perinatal and postneonatal infant deaths 1988–1997

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Livebirths	63,126	63,694	66,350	64,632	65,815	64,284	64,376	63,214	62,429	61,815
Stillbirths	416	424	376	375	325	286	329	315	291	269
Neonatal deaths	279	240	273	224	191	165	184	193	157	160
Perinatal deaths	695	664	649	599	516	451	513	508	448	429
Postneonatal										
infant deaths	194	206	175	123	120	96	102	94	82	†
Total infant deaths#	473	446	448	347	311	261	286	287	239	†

† Ascertainment incomplete, final figure available in 1998 report.

Neonatal and postneonatal infant deaths.

Table 2 Perinatal mortality rates* 1988–1997

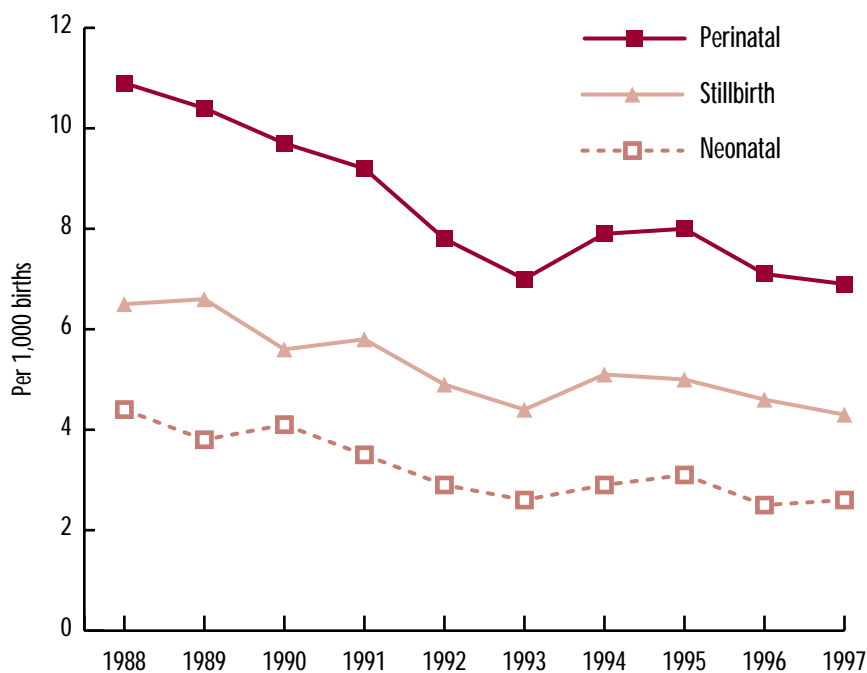
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Stillbirths	6.5	6.6	5.6	5.8	4.9	4.4	5.1	5.0	4.6	4.3
Neonatal deaths	4.4	3.8	4.1	3.5	2.9	2.6	2.9	3.1	2.5	2.6
Perinatal deaths	10.9	10.4	9.7	9.2	7.8	7.0	7.9	8.0	7.1	6.9
Infant deaths#	7.5	7.0	6.8	5.4	4.7	4.1	4.4	4.5	3.8	†

* Rate per 1,000 births.

† Ascertainment incomplete, final figure available in 1998 report.

Neonatal and postneonatal infant death rate.

Figure 1 Perinatal mortality rates 1988–1997



INTERNATIONAL COMPARISON OF PERINATAL MORTALITY

For the purposes of international comparison, WHO also recommends the publication of a standard mortality rate in which numerator and denominator are restricted to fetuses and infants of birth-weight 1,000g or over, or if birth-weight is unavailable, 28 weeks' gestation and over. The definitions are:

Stillbirth A stillborn infant weighing at least 1,000g or, if the birth-weight is not known, born after at least 28 weeks' gestation.

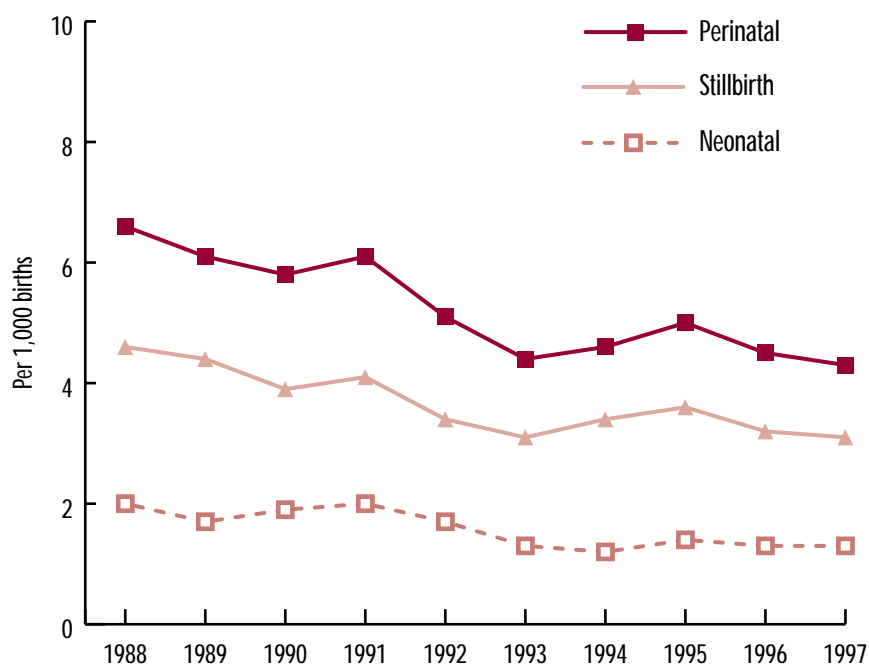
Neonatal death A death occurring in an infant whose birth-weight was at least 1,000g (or if the birth-weight is not known, an infant born after at least 28 weeks gestation) who dies within seven days of birth.

Victorian data using the above definitions are presented in table 3 and figure 2. Many countries do not use these definitions, and there is considerable variation from country to country in the way statistics are recorded. Caution must always be exercised in comparing published mortality rates.

Table 3 Perinatal mortality rates for international comparison 1988–1997

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Stillbirths	4.6	4.4	3.9	4.1	3.4	3.1	3.4	3.6	3.2	3.1
Neonatal deaths	2.0	1.7	1.9	2.0	1.7	1.3	1.2	1.4	1.3	1.3
Perinatal deaths	6.6	6.1	5.8	6.1	5.1	4.4	4.6	5.0	4.5	4.3

Figure 2 Perinatal mortality rates for international comparison 1988–1997



VICTORIAN BIRTH RATES

In 1997, the number of births fell slightly to 62,084. The livebirth rate is the number of livebirths per 1,000 of the estimated mean resident population for the year indicated. In 1997, the livebirth rate showed a continuing decline (rate 13.4) since the Council surveys commenced in 1962.

Table 4 Total births in Victoria 1962–1997*

Year	Livebirths	Total births (live and still)	Estimated mean resident population	Livebirth rate
1962	65,890	66,665	2,983,715	21.1
1963	65,649	66,441	3,041,442	21.6
1964	64,990	65,761	3,105,685	21.0
1965	63,550	64,297	3,165,594	20.1
1966	64,008	65,788	3,221,403	19.9
1967	65,485	66,282	3,227,183	20.0
1968	70,228	70,996	3,328,451	21.1
1969	71,035	71,796	3,388,417	21.0
1970	73,019	73,801	3,450,523	21.2
1971	75,498	76,258	3,602,890	21.0
1972	71,807	72,649	3,661,084	19.6
1973	67,123	67,925	3,707,460	18.1
1974	66,201	66,988	3,754,761	17.6
1975	61,897	62,610	3,788,394	16.3
1976	60,667	61,283	3,810,400	16.0
1977	59,518	60,085	3,837,400	15.5
1978	58,861	59,436	3,863,800	15.2
1979	57,767	58,257	3,886,400	14.9
1980	58,206	58,653	3,914,300	14.9
1981	59,526	59,965	3,946,900	15.1
1982	59,965	60,455	3,994,100	15.0
1983	60,149	60,591	4,037,600	15.0
1984	60,278	60,704	4,078,500	14.8
1985	60,776	61,176	4,121,500	14.7
1986	60,863	61,253	4,161,400	14.6
1987	61,089	61,474	4,208,700	14.5
1988	63,126	63,542	4,262,600	14.8
1989	63,694	64,118	4,322,400	14.7
1990	66,350	66,726	4,406,600	15.1
1991	64,632	65,007	4,427,400	14.6
1992	65,815	66,140	4,444,818	14.8
1993	64,284	64,570	4,465,200	14.4
1994	64,376	64,705	4,475,500	14.5
1995	63,214	63,529	4,501,000	14.0
1996	62,429	62,720	4,561,817	13.7
1997	61,815	62,084	4,605,148	13.4

* All births $\geq 500g$, or ≥ 22 weeks' gestation if the birth-weight is unknown.

PERINATAL DEATHS REGISTERED, BUT EXCLUDED FROM THIS SURVEY

There were 228 perinatal deaths legally required to be registered in Victoria in 1997 (see page 2) which, because of Council's definitions, have been excluded from all other tables in this report. There were 5 neonatal deaths in infants born interstate and referred to Victoria for treatment (in particular cardiac surgery). There were a further 172 stillbirths and 51 neonatal deaths who were registered, but had a birth-weight under 500g (or gestation under 22 weeks' if birth-weight unknown). Seventy-three (32.7 per cent) had congenital malformations and the pregnancy was terminated in 62 of these cases.

Table 5 Cause of death in infants of birth-weight under 500g

Cause of death	<200		200-299		300-399		400-499		Unknown		Total
	SB	NND	SB	NND	SB	NND	SB	NND	SB	NND	
Malformation	1	-	17	3	20	3	16	10	3	-	73
Infection	-	-	-	-	4	3	3	4	-	-	14
Other	17	-	27	3	34	10	28	14	2	1	136
Total	18	-	44	6	58	16	48	28	5	1	223

AVOIDABLE FACTORS IN PERINATAL DEATHS

The Stillbirth and Neonatal Committees of the Council consider cases in detail after all available information is collated. In deciding that an avoidable factor was present, the committee measures each case against the most exacting standards. It is only the application of such standards that seems likely to ensure continued reduction in the perinatal mortality rate. **It is considered that an avoidable factor is present when another course of action in the management of mother or infant might have resulted in a better outcome.** It is not implied that the death would certainly have been avoided, but is an indication that the risk of death could have been reduced.

Stillbirths

After consideration by the appropriate referee, 69.9 per cent (188 of 269) of the 1997 stillbirths were presented to the Stillbirth Committee. Of these, 84 (31.2 per cent of all stillbirths) were considered to be unavoidable. In the remaining 104 cases (38.7 per cent of all stillbirths) there were 'avoidable' factors identified (table 6). There were a total of 178 avoidable factors in these cases.

1. Inadequate antenatal monitoring

As in previous years, this remains the most frequent avoidable factor identified in stillborn infants. For most cases, there was inadequate monitoring when clinical need was apparent (64 cases, 24 per cent of all stillbirths). Misinterpretation of, or undue reliance on, the test occurred in 6 cases. This illustrates the need for expertise in the application of monitoring tests, and that clinical skill and suspicion complement antenatal monitoring.

2. Inadequate management of a growth-retarded fetus

A growth-retarded fetus has a birth-weight under the 10th percentile according to gestational age. Inadequate management of such cases was found in 27 (10 per cent) of the 269 stillbirths.

The Council wishes to repeat its warning that **leaving in utero a fetus who is growth retarded due to placental failure does not result in an increase in fetal growth.** Serious thought has to be given to the delivery of the baby, at or beyond 37 weeks' gestation, even when other tests of fetal well-being are normal.

3. Inadequate intrapartum care

Inadequate intrapartum monitoring was noted in seven cases. A Caesarean section was performed too late in two cases, or not at all when factors indicated the need to do so in three further cases.

4. Inadequate management of preeclampsia, eclampsia and maternal hypertension

There were five stillbirths (eight in 1996) associated with inadequate management of these maternal hypertensive conditions.

The Council reiterates that the **presence of persistent proteinuria is usually a signal for immediate action**, no matter what the results of antenatal monitoring.

5. Inadequate management of a big baby

Eight large babies, birth-weight above the 90th percentile according to gestational age, were inadequately managed.

Obstetricians are warned of the **potential for mechanical problems (shoulder dystocia, obstructed labour) and the need for glucose tolerance testing of the mother** during pregnancy in such cases.

6. Family neglect or ignorance

This featured in six cases.

7. Inadequate management of a diabetic mother

Seven stillbirths were associated with inadequate management of maternal diabetes, an increase from 3 in 1996.

8. Inadequate management of a prolonged pregnancy

Inadequate management of a prolonged pregnancy of over 42 weeks' gestation was implicated in three stillbirths.

Neonatal deaths

Of the 160 neonatal deaths, 56 (35 per cent) were selected for presentation to the Neonatal Committee. The remaining infants were extremely immature, severely malformed, or there were no controversial features. Of the neonatal deaths considered, thirty-five (21.9 per cent) were thought to be unavoidable. Avoidable factors were considered to be present in the remaining 21 cases (13 per cent of all neonatal deaths).

About two-thirds of these factors were obstetrical, and one-third related to paediatric care, (table 6). Delay in the recognition of sepsis was involved in three, inadequate resuscitation in four, and inadequate paediatric management in three neonatal deaths.

For obstetric factors unsuitable hospital for delivery was a factor in four cases. Failure to perform a Caesarean section (or performing it too late), inadequate intrapartum monitoring, and inadequate management of forceps delivery were also important factors.

Preventable factors and birth-weight

As in previous years, for the stillbirths and neonatal deaths reviewed by the specialist committees **preventable factors were far more commonly identified in infants of birth-weight over 1,500g**, and in particular of birth-weight over 2,500g.

Table 6 Avoidable factors in perinatal deaths

Avoidable factor	Number of cases with this factor*	
	SB	NND
Mother		
Antenatal care:		
Insufficient antenatal care	1	-
Delay/no consultation in high-risk pregnancy	1	-
Inadequate management of:		
Multiple pregnancy	1	-
Diabetic mother	7	-
Hypertension, preeclampsia	5	-
Prolonged pregnancy	3	2
Growth-retarded fetus	27	2
Macrosomia	8	1
Inappropriate maternal drugs	1	1
Maternal smoking	5	1
Family neglect/ignorance	6	3
Inadequate antenatal monitoring:		
Clinical need apparent	64	3
No clinical evidence apparent	18	-
Misinterpretation/undue reliance on test	6	-
Intrapartum care:		
Unsuitable hospital for delivery	1	4
Failure to perform Caesarean section	3	3
Caesarean section too late	2	1
Surgical induction too late	2	-
Inadequate intrapartum monitoring	7	2
Failure to expedite delivery	3	-
Inadequate management of:		
Breech/malpresentation	-	2
Obstructed labour	1	-
Fetal distress	-	1
Forceps delivery	-	3
Prolonged labour	1	-
Other maternal factor	7	1
Infant and fetus		
Delay in recognition of sepsis	-	3
Delay/failure to transfer infant	-	2
Delay/lack of consultation	-	1
Inadequate:		
Resuscitation	-	4
Paediatric management	-	3
Total number of cases	269	160
Cases presented to specialist review committee	188 (69.9%)	56 (35.0%)
Cases reviewed with avoidable factors identified	104 (38.7%)	21 (13.1%)

* Note: cases may have more than one avoidable factor present

RECOMMENDATIONS FROM THE COUNCIL ON PERINATAL DEATHS

The consideration of the obstetric and paediatric avoidable factors in 1997, and in previous years, leads the Council to make some observations and suggestions.

The ratio of stillbirths to neonatal deaths was 1.7 to 1 (269 to 160), yet the ratio of avoidable factors was 4.2 to 1. The conclusion from this is that **further reduction in perinatal wastage depends on preventing some of the stillbirths, many of whom were not low birth-weight.**

In this issue of the report there has been a change in policy in regard to avoidable factors in stillbirths. An avoidable factor is considered to be present when another course of action in the management of the mother of infant might have resulted in a better outcome. The Council has decided not to record the presence of an avoidable factor if an antenatal test of fetal well-being was not performed when there was no clinical need apparent. There are two reasons for this statement:

1. The current literature does not prove, in the opinion of the majority of the members of the stillbirth subcommittee, the benefit of routine antenatal tests of fetal well-being in normal pregnancies.
2. Routine testing of fetal well-being is not the recommended policy of the Royal Australian College of Obstetricians and Gynaecologists.

Test fetal well-being in all pregnancies departing from normal

Despite the above statement, the Council recommends that tests of fetal well-being such as ultrasound imaging, (for growth and biophysical profile) or cardiotocography be used in all cases of departure from normal, even when subtle. These conditions include:

- Bad obstetric history;
- Medical disorders including hypertension, preeclampsia, and diabetes mellitus;
- Abnormal symphysiofundal height measurement, both absolute and rate of growth;
- Oligohydramnios;
- Polyhydramnios;
- Obesity;
- Assisted reproduction;
- Reduced fetal movements;
- Poor attendance.

Encourage prompt reporting of reduced fetal movements

The Council has noted that in many cases of stillbirth the mother does not report the reduction or cessation of movements for some days. Occasionally, when the mother attends promptly because of reduced fetal movements, a baby is saved. The Council recommends that patients be encouraged to report reduced fetal movements promptly.

Cardiotocography is useful in the management of these women. About 5 per cent have an abnormal trace, and 0.5 to 1.5 per cent (the incidence varies according to presence of other complications such as hypertension or growth retardation) have the signs of severe hypoxia that warrant immediate

delivery, usually by Caesarean section. Reduced fetal movements are an indication for consideration of delivery in all patients at or beyond full term, even when cardiotocographic findings are normal. The presentation, station of the presenting part, and state of the cervix will determine whether induction of labour is the best option to effect delivery in these women.

Consider corticosteroids, level 3 centre, surfactant—for extreme immaturity

Extreme immaturity continues to contribute heavily to the neonatal death rate. Until a pregnancy can be safely prolonged to avoid extremely premature delivery, the clinician may be able to improve the outcome for the infant in several ways:

1. Corticosteroid therapy given to the mother before the birth is undoubtedly beneficial.
2. If time permits, transfer of the mother to an appropriate hospital for the delivery should be considered; extremely immature infants do better if born in level 3 centres.
3. Exogenous forms of surfactant given to babies with breathing difficulties after birth have been shown to improve survival rates of these infants.

Initiate management of obstetric patients prior to delivery

When transfer of obstetrical patients needing intensive care is contemplated or necessary, it is the responsibility of the referring doctor, preferably with advice from the receiving unit, to initiate appropriate management of the condition before the transfer. This may avoid deterioration in the patient's condition. Severe preeclampsia warrants anticonvulsant therapy and control of hypertension for the mother before transfer. If delivery of an extremely immature infant is likely, the administration of steroids to the mother before her transfer should be considered.

Exercise care when using prostaglandin

Several fetal deaths have been associated with ripening of the unfavourable cervix with prostaglandin. The Council emphasises that when this drug is used, the fetal heart should be monitored electronically before and after the instillation of the gel. Prostaglandin can be used for induction of labour when the cervix is unfavourable in the presence of high-risk factors for the fetus (such as intrauterine growth retardation or severe preeclampsia); however, continuous fetal monitoring under such circumstances is mandatory.

The Council is also aware of cases where uterine rupture followed the use of prostaglandin E2 gel on occasions where there had been no previous surgery on the uterus to increase the risk of rupture occurring. It appears the sensitivity to oxytocin, following the previous use of prostaglandin E2 gel, is increased. Therefore careful surveillance of patients in labour under such circumstances is required.

Exercise care when using oxytocin infusions in multigravidas

The use of an oxytocin infusion to initiate or augment labour in a multigravida has definite fetal and maternal complications. All patients treated in such a way should have a vaginal examination beforehand and continuous electronic fetal monitoring while the infusion is running.

Be vigilant with infertility patients

Previous infertility is associated with increased hazards for the fetus. It is recommended that infertility patients, particularly those who conceive with the assistance of clomiphene or in vitro fertilisation technologies, be carefully monitored during the pregnancy and labour.

Monitor hypertensive mothers

In mothers with hypertension, meticulous monitoring during the pregnancy and in labour is required, and induction of labour before full term should be considered.

Be aware that multiple pregnancy increases the risk of perinatal death

In 1997, 13.3 per cent of perinatal deaths were from multiple pregnancies, and the multiple pregnancy was believed to be the primary cause of death in 7.7 per cent of all perinatal deaths. Cardiotocography, performed weekly from 34 weeks' gestation, may identify (by a sinusoidal heart rate pattern) the need for urgent delivery in cases of major twin-twin transfusion. The Council recommends the management of all cases of multiple pregnancy should be referred to a specialist, preferably for delivery in a hospital with facilities for the care of the premature infant.

Take swabs when premature rupture of the membranes occurs

When premature rupture of the membranes occurs in a mother with a potentially viable fetus, it is recommended cervical swabs be taken for microscopic examination of the smear and bacterial culture.

In the presence of cervical incompetence with a cervical suture, with or without evidence of infection present, the recommended management is to remove the suture after the membranes have ruptured, perform bacteriological culture on the suture, and commence antibiotics. It is usually wise to deliver within 48 hours, and the place for steroid therapy should be considered if the gestation of pregnancy is less than 34 weeks.

Consider a Kleihauer test

Local and overseas studies have shown that fetomaternal haemorrhage is the cause of a significant proportion of 'unexplained' intrauterine deaths near term. Accordingly, when fetal jeopardy is suspected (diminished movements, growth retardation, abnormal ultrasound, low oestriol excretion) the Kleihauer test that is reasonably sensitive for detection of significant fetomaternal haemorrhage, is worthy of consideration. An haemoglobin estimation should be performed immediately on any pale or shocked neonate since a timely blood transfusion may be lifesaving.

When anti-D gamma globulin is required, if possible, a Kleihauer test should be performed to check that the dosage of gamma globulin is adequate.

When routine screening detects a positive indirect Coombs test, regardless of the antibody involved, the titre should be checked in a reference laboratory (major teaching hospital). It should not be forgotten that, except for anti-P and anti-Lewis antibodies, any of the antibodies can have an adverse effect on the fetus. This is particularly the case with anti-D, anti-C and anti-Kell antibodies. If the antibody titre is 1 in 16 (5 IU/mL) or greater, the patient should be referred for further management (amniocentesis, cordocentesis, timing of delivery). Where the antibody titre is greater than 1:64, or there is evidence of hydrops fetalis, the pregnancy should be managed in a major teaching hospital with the necessary expertise in fetal blood sampling and fetal intravascular transfusions.

Ensure appropriate monitoring of mothers with diabetes

Mothers with gestational or prepregnancy diabetes mellitus should be managed in facilities specially designed to deal with these conditions. Monitoring fetuses in both categories is essential. For mothers with gestational diabetes, it is advised that, after 36 weeks' gestation, monitoring should be performed at least weekly.

Use caution in prolonged pregnancy

The presence of oligohydramnios is an ominous sign for the outcome of a prolonged pregnancy. Ultrasonography (with estimation of fetal weight, fetal activity, umbilical artery blood flow and liquor volume) and cardiotocography are the best investigations to assess fetal condition in postterm pregnancies.

Check fetal maturity in obese mothers

Confirmation of fetal maturity by ultrasound is particularly important in obese mothers.

Investigate pruritus in pregnancy

The occurrence of pruritus and obstetric cholestasis is less common now than 20 years ago; nevertheless, it still has a significant association with perinatal mortality and morbidity. When pruritus occurs in pregnancy, tests of maternal liver function and fetal well-being should be performed.

Avoid surgery

Surgery should be avoided during pregnancy unless mandatory.

Use antibiotics early for neonates with suspected sepsis

The Council has noted several instances of deaths in newborn infants caused by bacterial infections where antibiotic therapy has been delayed unnecessarily. Sepsis should be considered in babies if there is evidence of respiratory distress, temperature instability, poor feeding, a change in behaviour, or seizures. Antibiotics should not be delayed because of failure to obtain appropriate cultures. Penicillin and gentamicin, intramuscularly if there is no venous access, would be appropriate initial antibiotics in most cases of neonatal sepsis. If in doubt, the Newborn Emergency Transport Service can be contacted on (03) 9347 7441 for advice.

With respect of group B streptococcal infection, evidence suggests that mortality is reduced by about 90 per cent if mothers are screened during pregnancy; carriers of the organism are given antibiotics during labour, and an antibiotic is also given to the newborn infant.

Ensure appropriate transfer of mature infants with severe respiratory distress

In the case of an infant of birth-weight greater than 2,500g with severe respiratory distress, consideration should be given to transferring the infant directly to a Neonatal Intensive Care Unit which has the availability of nitric oxide, high frequency ventilation, and ECMO.

Continue respiratory support in significantly asphyxiated infants.

Infants with birth asphyxia sufficiently severe to require intubation and ventilation for more than 5 minutes should have the endotracheal tube left in situ and arrangements made for transfer of the infant to an Intensive Care Unit, (see section on newborn emergency transfer page 18).

Discourage smoking in pregnancy

Maternal substance abuse, particularly heavy cigarette smoking, continues to be an important contributing factor in some perinatal deaths.

CAUSES OF PERINATAL DEATHS

In 1997, congenital malformations accounted for 22.6 per cent (97 of 429) of perinatal deaths. Of the remaining heterogeneous group of 'non-malformation' deaths, 18 (4.2 per cent) were attributable to infections (table 7). Note that cases are assigned to a single category based on the principal cause of death. Further details on the deaths due to congenital malformations are given in table 11.

Table 7 Principal causes of perinatal deaths, by birth-weight group

Birth-weight (g)	500–999		1,000–2,499		≥2,500		Unknown		Total	(%)
	SB	NND	SB	NND	SB	NND	SB	NND		
Malformation	14	7	10	35	2	29	–	–	97	(22.6)
Non-malformation										
Infection	3	3	1	3	4	4	–	–	18	(4.2)
Cot death	–	–	–	2	–	2	–	–	4	(0.9)
Other	61*	42	75	9	99	22	–	2	310	(72.3)
Total	78	52	86	49	105	57	–	2	429	(100)

* Includes one motor vehicle injury.

Table 8 Perinatal deaths by major cause, proportion of yearly total, 1988–1997

Cause of death	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
	%	%	%	%	%	%	%	%	%	%
Malformation	23.0	20.3	21.4	20.7	22.9	22.9	20.5	22.0	20.1	22.6
Non-malformation										
Infection	6.0	4.6	4.0	4.0	1.7	5.8	4.5	4.9	3.3	4.2
Erythroblastosis	0.6	0.6	0.5	0.2	0.6	0.9	0.8	0.4	0.4	–
Other	70.4	74.6	74.1	75.1	74.8	70.4	74.2	72.7	76.2	73.2

Table 9 Causes of perinatal death, incidence per 1,000 births, 1988–1997

Cause of death	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Malformation	2.5	2.1	2.1	1.9	1.8	1.6	1.6	1.8	1.4	1.6
Non-malformation										
Infection	0.7	0.5	0.4	0.4	0.1	0.4	0.4	0.4	0.2	0.3
Erythroblastosis	0.1	0.1	0.1	–	–	–	–	–	–	–
Other	7.6	7.7	7.2	6.9	5.8	4.9	5.9	5.8	5.4	5.0

Details of perinatal deaths in the 'non-malformation' group (n=332) are provided in table 10. Antepartum haemorrhage/placental abruption remains the predominant principal maternal cause of perinatal deaths (44 cases). Other important conditions were:

- Multiple pregnancy (33 cases).
- Premature rupture of the membranes (14 cases).
- Preeclampsia/eclampsia (14 cases).
- Placental infarction/insufficiency (15 cases).
- Cord around neck/true knot (9 cases).

Antepartum hypoxia was the largest fetal contributor to death and accounted for 63 stillbirths. It should be noted, however, where no cause for a stillbirth could be determined antepartum hypoxia was ascribed as the cause.

In 1997, there were 30 unexplained fetal deaths after 36 weeks' gestation. These stillbirths were neither growth retarded nor malformed, and where a postmortem was carried out, no cause of death was found. Such unexplained deaths remain a challenge to those conducting obstetrical care.

Intrapartum hypoxia was associated with four neonatal deaths, and six stillbirths, and four further neonatal deaths were as a result of severe birth asphyxia.

There were four neonatal cot deaths in 1997.

Table 10 Principal cause of the perinatal deaths (excluding malformations)

ICD code	Conditions	Birth-weight (g)								Total	%
		500-999		1,000-2,499		≥2,500		Unknown			
		SB	NND	SB	NND	SB	NND	SB	NND		
760.0	Preeclampsia and eclampsia	4	4	5	-	1	-	-	-	14	4.3
760.2	Maternal infections	-	-	-	-	1	-	-	-	1	0.3
760.8	Other maternal disorders	-	-	3	-	6	-	-	-	9	2.7
761.0	Incompetent cervix	4	-	1	-	-	-	-	-	5	1.5
761.1	Premature rupture of membranes	2	7	1	2	2	-	-	-	14	4.2
761.5	Multiple pregnancy	6	14	9	2	2	-	-	-	33	9.9
762.0	Placenta praevia	-	-	-	-	-	-	-	1	1	0.3
762.1	Antepartum haemorrhage	17	4	11	-	10	2	-	-	44	13.3
762.2	Placental infarction/insufficiency	9	-	6	-	-	-	-	-	15	4.5
762.4	Prolapsed cord	-	-	-	-	-	2	-	-	2	0.6
762.5	Cord around neck, true knot	-	-	2	-	6	1	-	-	9	2.7
762.6	Other cord conditions	-	-	1	-	4	-	-	-	5	1.5
762.7	Chorioamnionitis	2	3	-	-	3	-	-	-	8	2.4
763.0	Breech delivery	2	1	-	-	1	1	-	-	5	1.5

Table 10 Principal cause of the perinatal deaths (excluding malformations)—continued

ICD code	Conditions	Birth-weight (g)				Total	%				
		500–999		1,000–2,499				≥2,500		Unknown	
		SB	NND	SB	NND	SB	NND	SB	NND		
763.1.	Malpresentation/disproportion	–	–	–	–	2	–	–	–	2	0.6
763.2	Difficult forceps	–	–	–	–	1	1	–	1	3	0.9
763.8	Other complications of labour/delivery	–	–	–	–	–	1	–	–	1	0.3
764.0	Fetal growth retardation	3	1	16	1	9	–	–	–	30	9.1
765.0	Extreme immaturity	3	7	–	–	–	–	–	–	10	3.0
766.0	Macrosomia	–	–	–	–	4	–	–	–	4	1.2
766.2	Postterm	–	–	–	–	3	2	–	–	5	1.5
767.0	Cerebral haemorrhage	–	–	–	1	–	–	–	–	1	0.3
768.0	Hypoxia, antepartum	7	–	15	1	40	–	–	–	63	19.0
768.1	Hypoxia, intrapartum	–	–	–	–	4	6	–	–	10	3.0
768.5	Severe birth asphyxia	–	–	–	–	–	4	–	–	4	1.2
769.0	Hyaline membrane disease/ Respiratory distress syndrome	–	1	–	–	–	–	–	–	1	0.3
770.0	Congenital pneumonia	–	–	1	–	–	–	–	–	1	0.3
770.1	Congenital CMV	1	–	–	–	–	–	–	–	1	0.3
771.2	Congenital herpes/Listeriosis/ Toxoplasmosis	–	–	–	2	–	–	–	–	2	0.6
771.8	Bronchopneumonia/septicaemia	–	–	–	1	–	3	–	–	4	1.2
772.0	Fetal haemorrhage (includes donor twin-twin transfusion)	1	1	1	–	2	2	–	–	7	2.1
772.1	Subarachnoid haemorrhage	–	–	–	–	1	–	–	–	1	0.3
775.0	Infant of diabetic mother	–	–	–	–	1	–	–	–	1	0.3
776.4	Recipient twin-twin transfusion	1	–	1	–	–	–	–	–	2	0.6
777.5	Necrotising enterocolitis	–	2	–	–	–	–	–	–	2	0.6
778.0	Nonimmune hydrops	2	–	3	1	–	–	–	–	6	1.8
798.0	Cot death	–	–	–	2	–	2	–	–	4	1.2
199.0	Neuroblastoma	–	–	–	1	–	–	–	–	1	0.3
711.0	Septic arthritis	–	–	–	–	–	1	–	–	1	0.3
Total		64	45	76	14	103	28	–	2	332	100

PERINATAL DEATHS DUE TO CONGENITAL MALFORMATIONS

There were 97 perinatal deaths due to congenital malformations or birth defects (table 11). Congenital malformations of the cardiovascular system accounted for 15, multisystem malformations for 24, and chromosomal abnormalities for 17 deaths.

The proportion of all perinatal deaths due to malformations was 22.6 per cent. Of the 97 perinatal deaths with a malformation, the pregnancy had been terminated in 17 (17.5 per cent) cases.

Table 11 Perinatal deaths due to congenital malformations

ICD code	Conditions	Birth-weight (g)						Total
		500-999		1,000-2,499		≥2500		
		SB	NND	SB	NND	SB	NND	
228/239.8	Haemangioma/teratoma	-	-	-	1	-	1	2
277	Metabolic defect	-	-	-	-	-	1	1
740	Anencephalus and similar conditions	1	1	1	4	-	-	7
741	Spina bifida	-	-	-	1	-	1	2
742.0-2	Encephalocele/brain reduction deformity	1	-	-	3	-	-	4
742.3	Hydrocephalus	-	1	-	2	1	-	4
745-747	Cardiovascular anomalies	1	1	2	2	1	8	15
748	Respiratory system anomalies	-	1	-	1	-	1	3
749-751	Digestive system anomalies	-	-	-	1	-	-	1
753	Urinary system anomalies	-	-	1	1	-	3	5
755	Limb anomaly	1	-	-	-	-	-	1
756.4	Chondrodystrophy	-	-	-	1	-	1	2
756.5	Osteodystrophy	-	-	-	-	-	1	1
756.6	Diaphragmatic hernia	-	1	-	1	-	1	3
758.0	Trisomy 21	3	-	-	1	-	-	4
758.1	Trisomy 13	1	-	-	-	-	2	3
758.2	Trisomy 18	-	1	2	4	-	-	7
758.5-9	Other chromosomal anomalies	-	-	-	2	-	1	3
759.8	Multiple malformations	5	1	4	7	-	7	24
-	Other and unspecified	1	-	-	3	-	1	5
Total		14	7	10	35	2	29	97

'Other' includes: spinal muscular atrophy, thalassaemia, tuberous sclerosis, and arthrogryposis multiplex

INFECTION INVOLVED IN PERINATAL DEATHS

Of the perinatal deaths there was evidence of infection in 42 cases, with 18 of these deaths being primarily caused by the infection (as listed in tables 7 to 10). These cases are examined further, by birth-weight, in table 12.

Table 12 Perinatal deaths due primarily to infection, by birth-weight

Conditions	Birth-weight (g)						Total
	500–999		1,000–2,499		≥2500		
	SB	NND	SB	NND	SB	NND	
Chorioamnionitis	2	3	–	–	3	–	8
Congenital infections	1	–	1	2	–	–	4
Perinatal sepsis	–	–	–	1	–	4	5
Maternal infection	–	–	–	–	1	–	1
Total	3	3	1	3	4	4	18

In 24 cases, infection was not considered the principal cause of death, although it was noted in the history. The main causes of death in these cases are listed in table 13.

Table 13 Principal cause of perinatal death in cases with evidence of infection

Condition	SB	NND	Total
Premature rupture of membranes	2	3	5
Incompetent cervix	3	–	3
Multiple pregnancy	1	1	2
Hypoxia	2	–	2
Placental abruption/APH	–	1	1
Cord prolapse	–	1	1
Breech delivery	–	1	1
Maternal hypertension/preeclampsia	–	1	1
Macrosomia	1	–	1
Extreme immaturity	–	2	2
Congenital malformations	–	3	3
Neuroblastoma	–	1	1
Respiratory distress syndrome	–	1	1
Total	9	15	24

Where the organisms have been identified for all infection cases, the information has been collated in table 14.

Table 14 Organisms involved in perinatal deaths with infection

Organism	SB	NND	Total
Group B streptococcus	2	4	6
Other Streptococcus group	1	3	4
E. coli	1	2	3
Listeria monocytogenes	–	1	1
Candida albicans	–	1	1
Serratia liquefacens	–	1	1
Clostridium	–	1	1
Herpes simplex	–	1	1
CMV	1	1	2
Parvovirus	1	–	1
Enterovirus	–	1	1
Gram negative	1	1	2
Gram positive	1	–	1
Mixed organisms	2	1	3
None identified	7	7	14
Total	17	25	42

There were six documented cases with group B streptococcal infection (compared to two in 1996). Routine maternal screening by vaginal swab is suggested at 28–30 weeks' gestation, with appropriate therapy in labour and of the infant after birth.

TIME OF FETAL DEATH IN STILLBIRTHS

Death occurred during labour in 18.6 per cent of stillbirths in 1997, which was a slightly lower proportion than in 1996 (22.3 per cent).

Table 15 Time of fetal death in stillbirths

Birth-weight (g)	Before the onset of labour										Total
	During labour	Under 1 day	2nd-3rd day	4th-7th day	2nd week	3rd week	4th week	>4 weeks	Unknown days	Unknown before or during labour	
500-999	17	7	20	7	-	2	-	1	16	8	78
1,000-1,499	2	5	8	6	1	1	-	-	4	2	29
1,500-1,999	3	7	8	9	2	-	-	-	5	-	34
2,000-2,499	5	3	9	2	-	-	-	-	3	1	23
2,500-2,999	7	4	17	4	-	-	-	-	5	1	38
3,000-3,499	6	4	13	5	-	-	-	-	7	3	38
3,500-3,999	4	1	6	1	-	-	-	-	1	-	13
≥4,000	6	3	1	1	-	-	-	-	4	1	16
Total	50	34	82	35	3	3	-	1	45	16	269
(%)	(18.6)	(12.6)	(30.5)	(13.0)	(1.1)	(1.1)	(-)	(0.4)	(16.7)	(5.9)	(100)

TIME OF NEONATAL DEATH

As in previous years, approximately one-third of neonatal deaths occurred within six hours of birth.

Table 16 Age at time of death for neonates

Birth-weight (g)	< 6	6-11	12-23	2nd-3rd	4th-7th	1-<2	2-<3	3-<4	Total
	hours	hours	hours	day	day	weeks	weeks	weeks	
500-999	28	3	5	6	1	5	2	2	52
1,000-1,499	6	-	2	3	2	-	-	1	14
1,500-1,999	4	-	2	6	2	1	4	-	19
2,000-2,499	6	1	2	2	-	1	4	-	16
2,500-2,999	3	2	1	5	3	1	1	3	19
3,000-3,499	2	1	2	4	4	6	3	2	24
3,500-3,999	1	1	-	1	4	2	-	-	9
≥4,000	2	-	1	-	1	1	-	-	5
Not recorded	-	-	1	1	-	-	-	-	2
Total	52	8	16	28	17	17	14	8	160
(%)	(32.5)	(5.0)	(10.0)	(17.5)	(10.6)	(10.8)	(8.8)	(5.0)	(100)

PERINATAL NECROPSY SERVICE

Doctors are reminded of their statutory obligation to provide the Registrar of Births, Deaths and Marriages with a death certificate, in the prescribed form, within 48 hours of a death (including a stillbirth). The cause of death will often be based on clinical observations, but the ultimate necropsy findings should be communicated to the Registry of Births, Deaths and Marriages as soon as they are available.

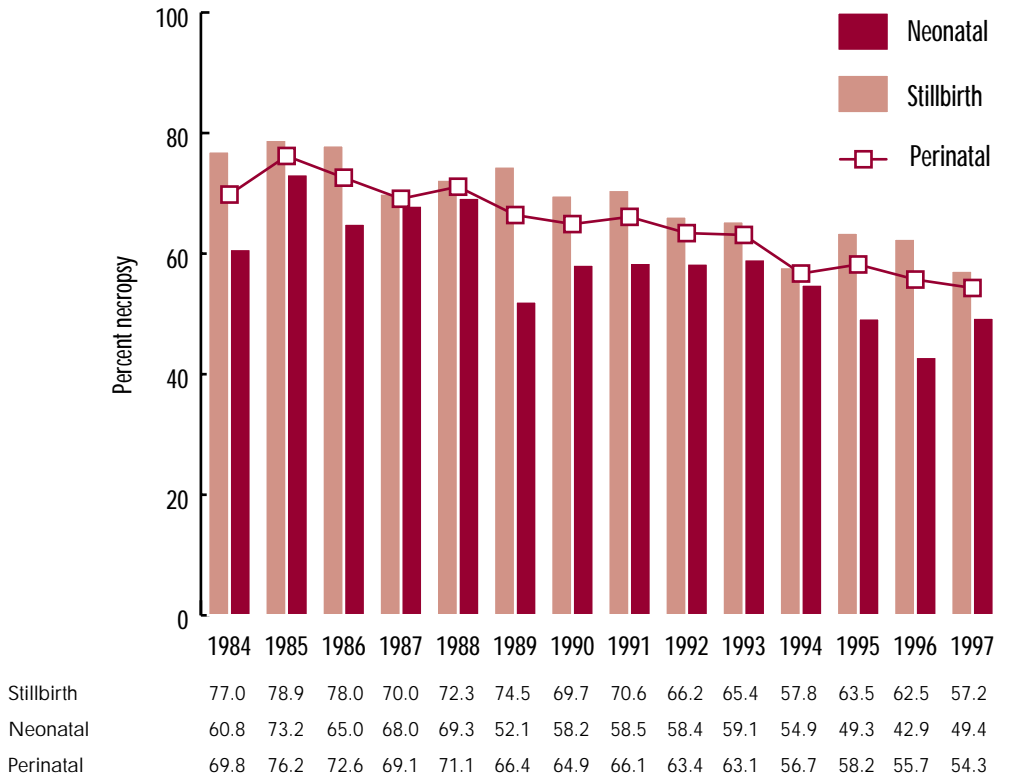
It is vital to the accuracy of the Council's surveys that full advantage be taken of the free necropsy service available for perinatal deaths occurring in Victoria. To use the service, the attending doctor should contact the *pathology department of the nearest major hospital* and arrange with a funeral director to transport the infant to the pathology centre. The Consultative Council meets costs associated with the necropsy service, and the service involves no expense for parents. Pathologists and funeral directors should send their accounts, showing all relevant details, to:

The Executive Officer
Consultative Council on Obstetric and Paediatric Mortality and Morbidity
GPO Box 4923
Melbourne 3001

In 1997, a necropsy was performed on 57.2 per cent (145 of 269) of stillbirths, and on 49.4 per cent (79 of 160) of neonatal deaths. The proportion of perinatal deaths that have had a necropsy over the past 10 years are shown in figure 3, and illustrates that there is still an ongoing fall in the necropsy rate.

All practitioners are urged to encourage parents to consent to a necropsy, including examination of the placenta, in all cases, and especially when the cause of the fetal loss is uncertain or unclear. If permission for the necropsy is not given, the placenta, if obtainable, should be examined. Usually the parents of such babies will consent to a careful external examination, X-ray and photography.

Figure 3 Perinatal necropsy rates 1984–1997



VICTORIAN BIRTH DATA 1997

The Victorian Perinatal Data Collection Unit, under the auspices of the Consultative Council on Obstetric and Paediatric Mortality and Morbidity, has collated data on all Victorian births under a legislated reporting system since 1982. The unit routinely collects information on all births of infants of 20 weeks' gestation or more, or weighing $\geq 400\text{g}$ if the gestation is unknown. However, for consistency within this report, only the infants of birth-weight $\geq 500\text{g}$, or of 22 weeks' gestation if the birth-weight is unknown, have been included in the tables.

The following tables give details of all 1997 births with respect to gender of the infant, birth-weight, parity, gravidity, maternal age, mother's country of birth, duration of pregnancy, onset of labour, method of delivery, and marital status of mother. Further details are also provided on mortality by hospital level at delivery, multiple births, and Caesarean sections.

Note: Some of these tables give the number of confinements rather than the number of births, and the resultant perinatal mortality rate is therefore slightly different from that quoted elsewhere in this report. Perinatal mortality rates presented are all per 1,000 total births.

Table 17 Gender of infants

Sex	Births		Stillbirths (n)	Neonatal deaths (n)	Perinatal mortality rate
	(n)	(%)			
Male	32,011	51.6	145	86	7.3
Female	30,066	48.4	123	72	6.5
Indeterminate or unknown	7	-	1	2	-
Total	62,084	100.0	269	160	6.9

Table 18 Maternal Parity

Previous births	Confinements	
	(n)	(%)
None	24,376	39.9
1	21,637	35.4
2	9,926	16.2
3	3,428	5.6
4	1,004	1.6
≥ 5	737	1.2
Unknown	1	-
Total	61,109	100.0

Table 19 Maternal Gravidity

Previous pregnancies	Confinements	
	(n)	(%)
None	18,533	30.3
1	19,293	31.6
2	12,058	19.7
3	6,036	9.9
4	2,748	4.5
≥5	2,437	4.0
Unknown	4	-
Total	61,109	100.0

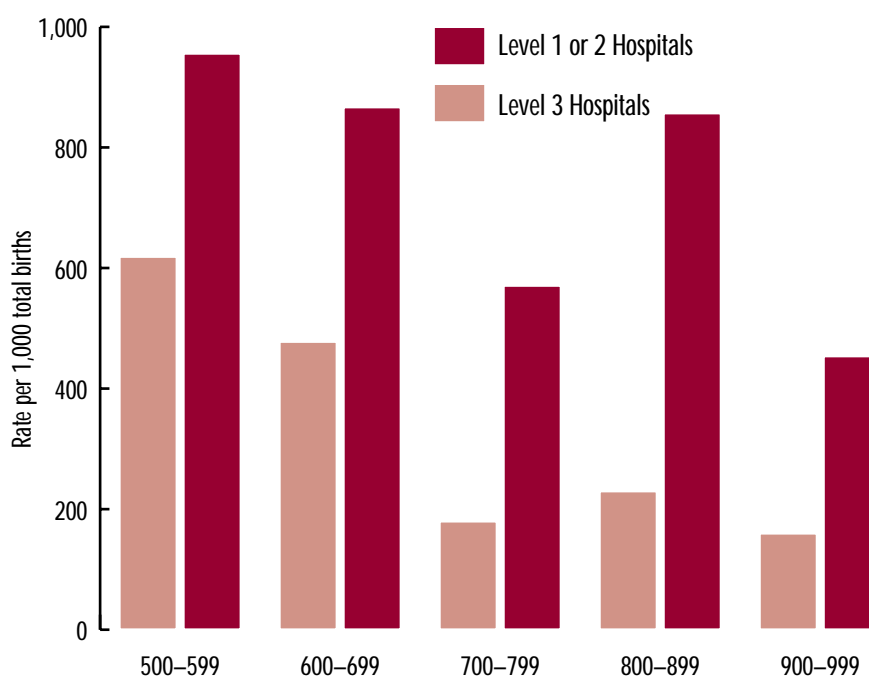
Table 20 Birth-weight distribution and perinatal mortality rate

Birth-weight (g)	Births		Stillbirths (n)	Neonatal deaths (n)	Perinatal mortality rate
	(n)	(%)			
500-999	309	0.5	79	52	423.9
1,000-1,499	369	0.6	29	14	116.5
1,500-1,999	777	1.3	33	19	66.9
2,000-2,499	2,387	3.8	24	16	16.7
2,500-2,999	9,666	15.6	37	19	5.8
3,000-3,499	22,624	36.4	38	25	2.8
3,500-3,999	18,810	30.3	13	8	1.1
4,000-4,499	6,035	9.7	15	5	3.3
4,500-4,999	987	1.6	1	-	-
≥5,000	107	0.2	-	-	-
Not known	13	-	-	2	-
Total	62,084	100.0	269	160	6.9

PERINATAL MORTALITY BY HOSPITAL OF BIRTH

While only 0.5 per cent of all infants weighed between 500 and 999g at birth, they accounted for 30.5 per cent of perinatal deaths. Council emphasises that **extremely low birth-weight infants have better prospects for survival if delivered in a level 3 centre** (a hospital with a neonatal intensive care unit). The reduced perinatal mortality at such centres compared to all other hospitals, for each 100g weight group under 1,000g, is shown in figure 4.

Figure 4 Extremely low birth-weight infant mortality rate*, by hospital level at delivery



Level 3 hospital births

Perinatal mortality rate	619	478	180	230	160
Alive (n)	15	21	50	29	40
Infant death (n)	1	3	-	1	2
Neonatal death (n)	11	8	8	6	4
Stillbirth (n)	15	14	3	3	4

Levels 1 and 2 hospital births#

Perinatal mortality rate	956	867	571	857	454
Alive (n)	1	2	6	1	6
Neonatal death (n)	5	5	2	3	-
Stillbirth (n)	17	8	6	3	5

* Mortality rate per 1,000 births.

No infant deaths listed after delivery at a level 1 or 2 hospitals at time of reporting

Table 21 Maternal age for confinements

Age (years)	Confinements		Stillbirths (n)	Neonatal deaths (n)	Perinatal mortality rate
	(n)	(%)			
<15	5	–	–	–	–
15–19	2,019	3.3	8	12	9.9
20–24	8,706	14.2	36	24	6.9
25–29	20,065	32.8	79	41	5.9
30–34	20,197	33.1	85	50	6.7
35–39	8,704	14.2	45	26	8.2
40–44	1,366	2.2	14	6	14.6
>44	47	0.1	2	1	63.8
Total	61,109	100.0	269	160	7.0

Note: the denominator for the perinatal mortality rate by maternal age is the number of confinements. This results in a slightly higher perinatal mortality rate.

The increase in the proportion of births to women older than 29 years, and the concomitant fall in those in younger age groups, are shown for the past 14 years in figure 5.

Figure 5 Maternal age at confinement 1984–1997

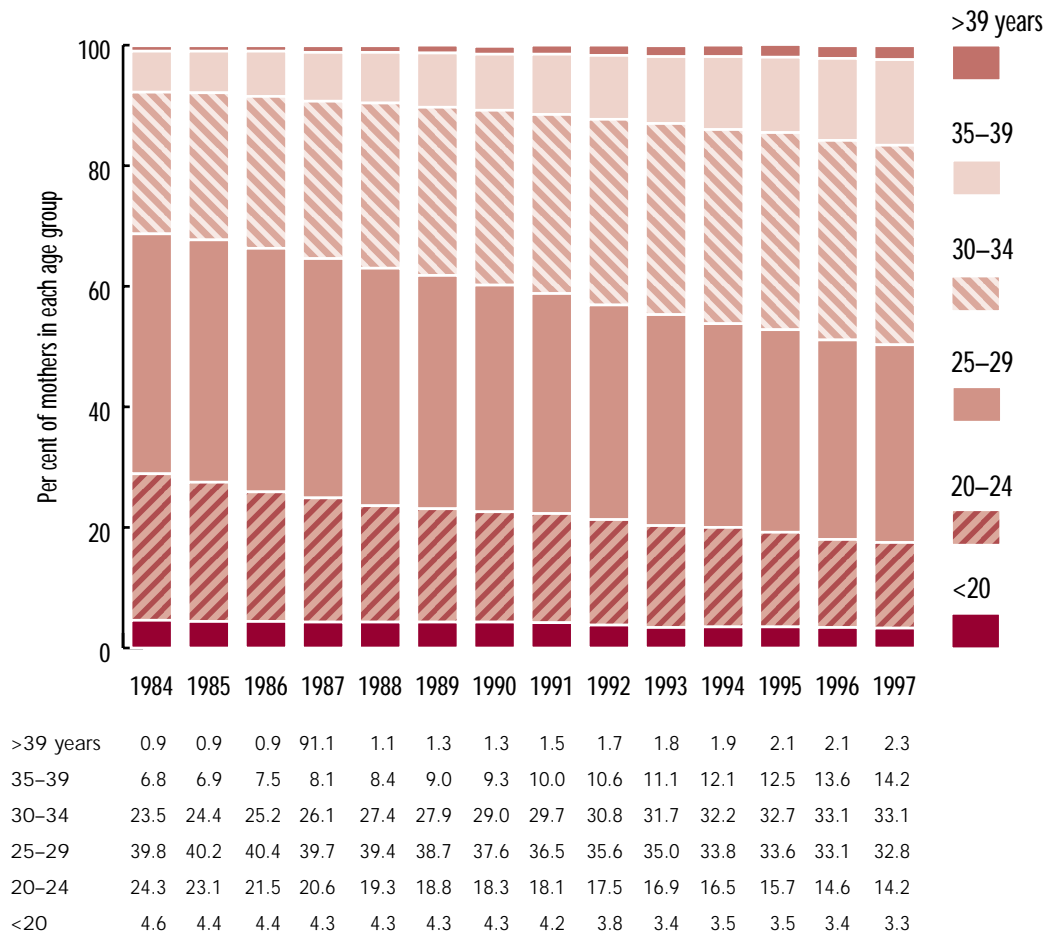


Table 22 Maternal country of birth

Place	Confinements	
	(n)	(%)
Australia	45,945	75.2
Oceania (including New Zealand)	1,409	2.3
UK	2,460	4.0
Europe	2,428	3.9
Asia (including Middle East)	7,351	12.0
South America	319	0.5
North America	320	0.5
Africa	768	1.3
At sea	2	-
Unknown	107	0.2
Total	61,109	100.0

Table 23 Maternal marital status

Category	Confinements	
	(n)	(%)
Married	47,128	77.1
Defacto	6,521	10.7
Single	6,659	10.9
Divorced	234	0.4
Separated	427	0.7
Widowed	34	0.1
Not known	106	0.2
Total	61,109	100.0

PERINATAL MORTALITY AND GESTATION

Table 24 Gestation at delivery

Weeks	Confinements	
	(n)	(%)
20–21*	5	–
22–27	235	0.4
28–31	405	0.7
32–36	3,154	5.2
37–41	56,087	91.8
>41	1,207	2.0
Unknown	16	–
Total	61,109	100.0

* Only includes those of birth-weight $\geq 500\text{g}$

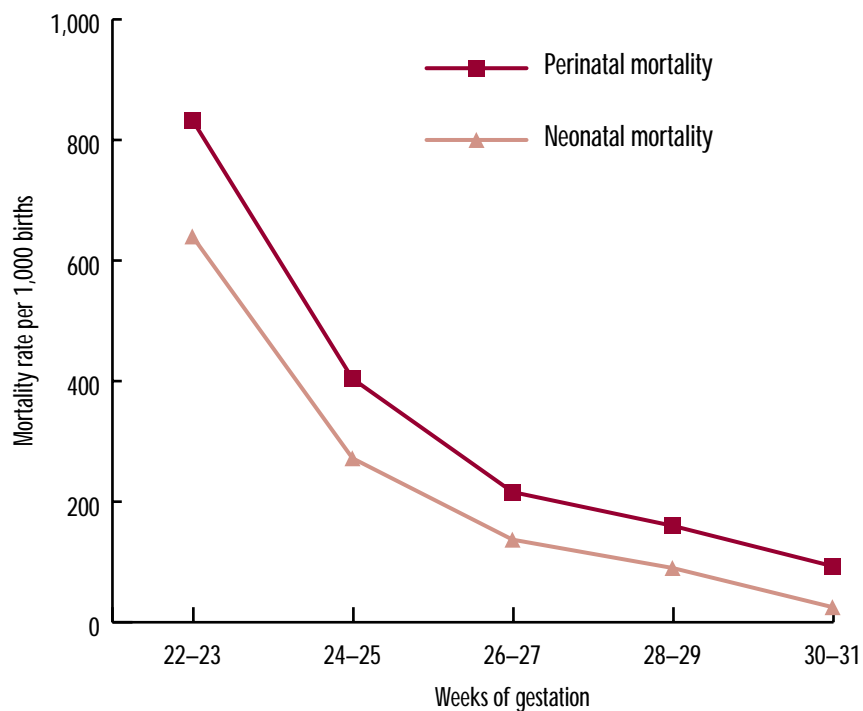
Figure 6 shows the neonatal, stillbirth and perinatal mortality rates (per 1,000 births) for the gestational age range of 22 to 31 weeks. Council considers this information will be useful to obstetricians caring for mothers who are likely to deliver an extremely immature infant, and where the fetal weight cannot be known with certainty.

In 1997, of the infants born at 22–23 weeks 13 per cent (7 of 54) survived into infancy (of the 9 neonatal survivors, two died as infants). This infancy survival rate rose to 58.5 per cent at 24–25 weeks' and 76.7 per cent for those born at 26–27 weeks' gestation.

There were 5 infants born weighing $\geq 500\text{g}$ at a gestation under 22 weeks', 4 were stillborn and one was a neonatal death.

In addition, there were 218 infants registered with the Perinatal Data Collection Unit who were under 500g (or under 22 weeks' gestation if the birth-weight was unknown). Of these infants, there were 2 who died after 28 days of age, one with a birth-weight of 476g survived, and the remainder died.

Figure 6 Perinatal mortality rates, 22–31 weeks' gestation



	22–23	24–25	26–27	28–29	30–31
Survivor >28 days (n)*	9	56	91	152	272
Neonatal deaths (n)	16	21	11	14	7
Stillbirths (n)	29	17	14	15	21
Neonatal mortality rate	640	272	137	90	25
Perinatal mortality rate	833	404	216	160	93

Note: The estimates are sometimes uncertain for the gestational age groups shown in figure 6.

* Of these survivors 13 had died in infancy at time of reporting

Table 25 Onset of labour

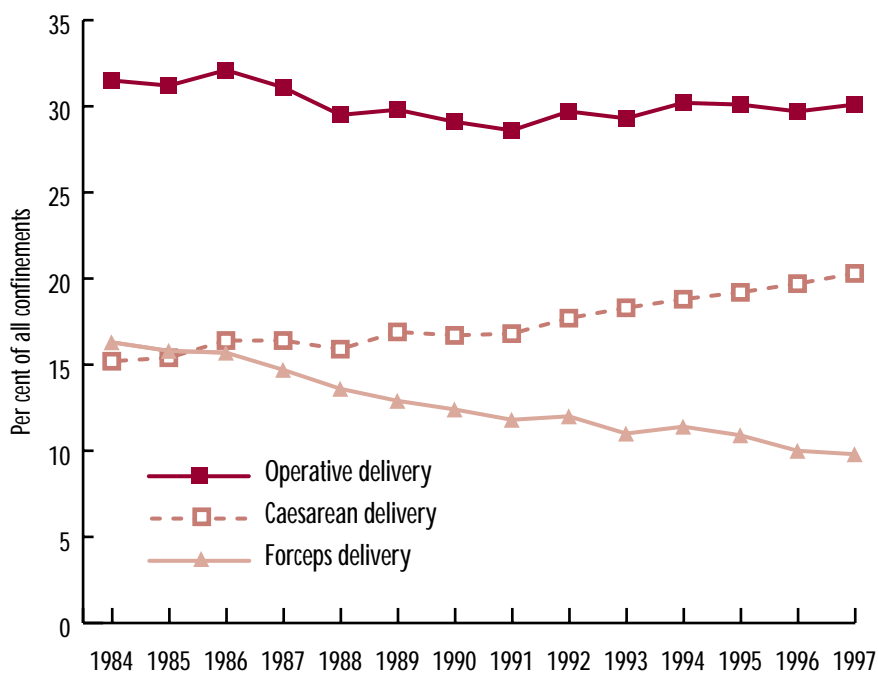
Category	Confinements	
	(n)	(%)
Spontaneous	30,900	50.6
Induced (medical and/or surgical)	15,750	25.8
Spontaneous and augmented	7,291	11.9
No labour	7,168	11.7
Total	61,109	100.0

Table 26 Method of delivery

Category	Confinements	
	(n)	(%)
Spontaneous vaginal (cephalic)	40,511	66.3
Forceps	5,963	9.8
Elective Caesarean	7,168	11.7
Emergency Caesarean	5,234	8.6
Other	1,761	2.9
Vaginal breech	471	0.8
Not known	1	-
Total	61,109	100.0

The rise in the Caesarean section rate has been accompanied by a concomitant fall in the rate of forceps delivery. Consequently, the operative delivery rate remains stable around 30 per cent (figure 7).

Figure 7 Forceps and Caesarean delivery 1984–1997



Forceps delivery	16.3	15.8	15.7	14.7	13.6	12.9	12.4	11.8	12.0	11.0	11.4	10.9	10.0	9.8
Caesarean delivery	15.2	15.4	16.4	16.4	15.9	16.9	16.7	16.8	17.7	18.3	18.8	19.2	19.7	20.3
Operative delivery	31.5	31.2	32.1	31.1	29.5	29.8	29.1	28.6	29.7	29.3	30.2	30.1	29.7	30.1

BIRTHS BY CAESAREAN SECTION

In 1997, there were 12,403 Caesarean sections resulting in the birth of 12,890 infants. This represents 20.3 per cent of all confinements. In 1997, the perinatal mortality rate for infants delivered by Caesarean section was 7.5 per 1,000 births, compared with 6.9 in 1996, 8.5 in 1995, and 8.2 in 1994.

Table 27 Caesarean section, incidence and perinatal mortality

Gestation (weeks)	Births (n)	Stillbirths (n)	Neonatal deaths (n)	Perinatal mortality rate
22-25	26	-	6	230.8
26-27	67	1	6	104.5
28-29	102	1	9	98.0
30-31	183	2	3	27.3
32-33	242	6	3	37.2
34-35	494	6	8	28.3
36-37	1,882	8	8	8.5
38-41	9,656	14	13	2.8
>41	235	-	2	8.5
Not known	3	-	2	666.7
Total	12,890	39	58	7.5

A Caesarean section before a maturity of 26 weeks was associated with a perinatal mortality rate of 231 per 1,000 births. At this gestation in 1997 there were 20 neonatal survivors compared to 13 in 1996 and 1995, 10 in 1994, nine in 1993 and four in each year from 1990 to 1992. Although the likelihood of a successful perinatal outcome is improving, Caesarean section carried out before 26 weeks' gestation is usually for maternal indications.

It is important to try to exclude the presence of a fetal anomaly in those cases where there is evidence of fetal distress (antenatally or in labour) before an emergency Caesarean section is performed.

Table 28 gives the indications for Caesarean births expressed as a percentage of all infants delivered by Caesarean section at that gestation. In many instances, more than one indication is recorded, so the total number of indications may exceed the number of cases.

Table 28 Indications for Caesarean section

Indication#	Gestation (weeks)									Total (%)
	22-25 (%)	26-27 (%)	28-29 (%)	30-31 (%)	32-33 (%)	34-35 (%)	36-37 (%)	38-41 (%)	>41 (%)	
Failure to progress/disproportion	-	-	2	2	1	8	16	43	63	36
Previous Caesarean section	4	3	4	3	8	18	32	35	11	32
Malpresentation	50	25	29	31	27	23	22	19	10	20
Fetal distress	4	41	51	31	33	30	17	18	35	19
Hypertension/preeclampsia	8	22	24	23	25	23	10	2	1	5
Antepartum haemorrhage	27	27	11	15	14	13	11	2	1	4
Preterm labour/PROM	30	34	23	30	21	11	3	*	*	2
Failed induction	-	6	1	2	3	3	3	4	12	4
Other medical disorders	-	-	3	2	2	3	3	2	-	2
Multiple pregnancy	27	12	16	23	6	18	12	1	-	4
Other	4	7	7	5	8	6	5	3	7	3
Not reported	-	-	1	1	*	-	1	1	-	2

Note: more than one indication may be recorded therefore proportions may sum to over 100%

* Less than 1 per cent.

MULTIPLE BIRTHS

In 1997, there were 1,944 multiple births (936 sets of twins, 20 sets of triplets, and 3 sets of quadruplets). The comparable figures for sets of twins were 870 in 1996, 915 in 1995 and 898 in 1994.

Multiple births comprised 3.1 per cent of all births ≥ 500 g, but contributed 13.3 per cent of perinatal deaths. For very low birth-weight infants (500–1,499g), 27.4 per cent were from multiple pregnancies, and they contributed 18.9 per cent of the deaths in this weight group.

The perinatal mortality rate for multiple births of birth-weight ≥ 500 g was 29.5 per 1,000 births compared with 5.9 for singleton births.

Table 29 Multiple births mortality rate and birth-weight distribution, 1997

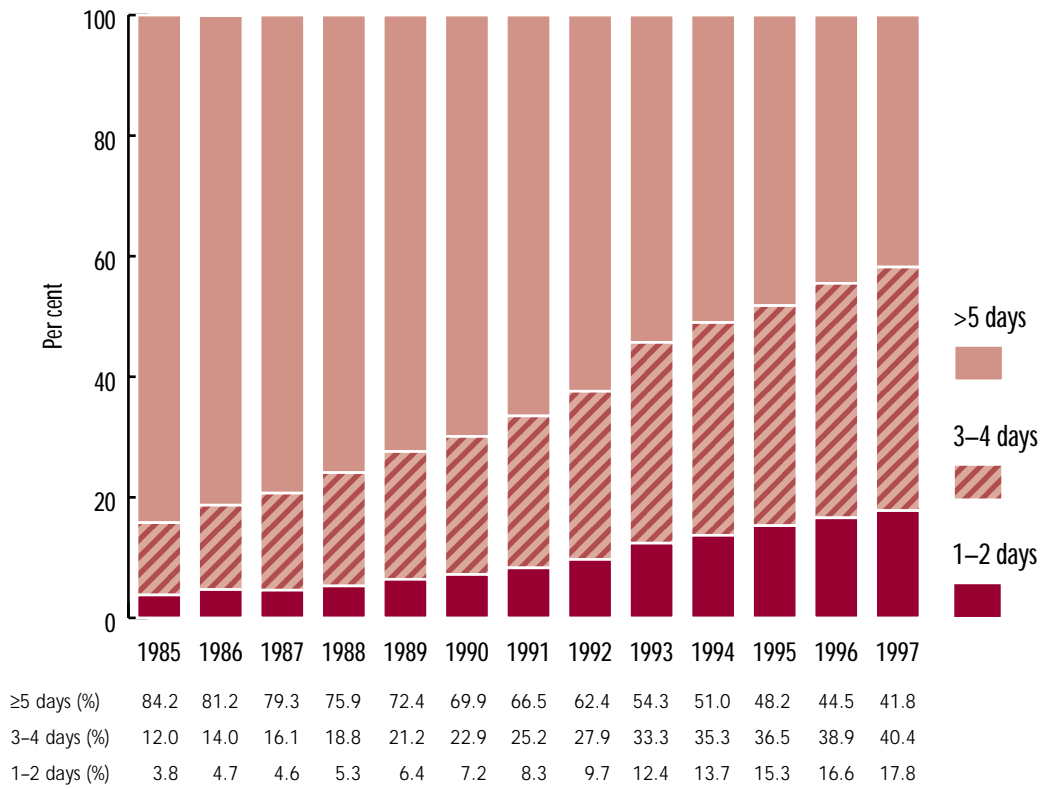
Birth-weight (g)	Multiple births		Stillbirths	Neonatal deaths	Perinatal mortality rate
	(n)	(%)			
400–499*	9	0.4	7	2	1000.0
500–999	70	4.1	10	16	371.4
1,000–1,499	116	6.0	6	1	60.3
1,500–1,999	251	12.9	5	5	39.8
2,000–2,499	562	28.9	3	2	8.9
2,500–2,999	658	33.9	2	3	7.6
3,000–3,499	243	12.5	–	–	–
3,500–3,999	31	1.6	–	–	–
$\geq 4,000$	–	–	–	–	–
Not known	4	0.2	4	–	–
Total	1,944	100.0	37	29	33.9

* There were nine multiple birth infants (all twin pregnancies) of birth-weight < 500 g who had a heavier (≥ 500 g) co-twin. The inclusion of these 9 infants of birth-weight under 500g is a possible source of confusion. These twins are included for completeness in this table of multiple births, however being under 500g they are not included in other tables in this report. There were an additional 8 registered multiple births (4 sets of twins) not included in the report, as both twins weighed under 500g.

LENGTH OF POSTNATAL HOSPITALISATION

There has been a steady decrease in the length of hospitalisation over the past 13 years. Figure 8 shows the percentage of mothers in each of the categories of length of the postnatal stay in hospital.

Figure 8 Length of postnatal hospitalisation 1985–1997



CONGENITAL MALFORMATIONS/BIRTH DEFECTS

Under the legislation by which it is constituted, Council is required to establish a register of congenital abnormalities, and to provide information to the medical profession for research into the epidemiology of these disorders. Responsibility for these functions is vested in staff of the Perinatal Data Collection Unit, who also maintain the Congenital Malformation Register.

The prevalence of congenital malformations among infants born in 1997 (summarised in table 30) **represents the number of infants rather than the number of malformations.** All infants with a recognisable syndrome or with multiple-system malformations are classed as 'multiple'. Those with a single defect, or single-system defects, are listed according to the anatomical site of the malformation (nervous system, cardiovascular etc.).

Among chromosomal disorders, Down syndrome was the most common. There were 76 fetuses with Down syndrome detected and the pregnancy induced before 20 weeks' gestation (table 32). Another seven infants with Down syndrome died in the perinatal period. Of the 152 infants alive with a chromosome abnormality, 63 had Down syndrome

As shown in table 30, the overall number and proportion of congenital malformations has increased, with particularly noticeable increases in the cardiovascular and neurosystem categories.

Table 30 Notifications to the Congenital Malformations Register for infants born in 1997

Category	Induced <20 weeks (n)	SB (n)	NND (n)	Infant/child death (n)	Alive (n)	Total (n)	Estimated rate (per 1,000 births)
Multiple	27	34	45	12	125	243	3.9
Chromosomal	145	20	15	3	52	335	5.4
Neurosystem	79	21	14	1	51	166	2.7
Cardiovascular	2	5	14	4	273	298	4.8
Gastrointestinal	1	2	2	2	131	138	2.2
Urogenital	4	7	1	1	640	653	10.5
Respiratory	0	2	2	0	29	33	0.5
Musculoskeletal/limb	9	6	4	3	518	540	8.7
Genetic/metabolic	6	0	2	2	63	77	1.2
Other**	14	4	6	1	113	138	2.2
Total	287	101*	105*	29	2096	2618	
(rate per 1,000 births)	(4.6)	(1.6)	(1.7)	(0.5)	(3.4)	(42.2)	

* Includes infants of birth-weight at least 400g or at least 20 weeks' gestation.

** 'Other' includes: cystic hygroma, conjoined twins, hydrops fetalis, neoplasms, lymphangioma, cerebral palsy, cytomegalovirus infection, eye anomalies, ear anomalies, anomalies of the integument, developmental delay, unspecified congenital anomalies, situs inversus (triad), hamartoses

Table 31 Sources of notifications to the Congenital Malformations/Birth Defects Register

Source	1994		1995		1996		1997	
	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)
Perinatal (birth) forms	1,300	40.4	1,672	45.8	1,698	48.8	1,768	51.7
Death certificates	172	5.3	183	5.0	182	5.2	189	5.5
Autopsy reports	131	4.1	127	3.5	126	3.6	134	3.9
Cytogenetic reports	272	8.4	241	6.6	233	6.7	247	7.2
Hospitals	1,029	32.0	1,147	31.4	972	27.9	848	24.9
Maternal, child health services	304	9.4	272	7.5	260	7.5	218	6.4
Paediatricians private practice	2	0.1	2	0.1	3	0.1	2	0.1
Other	8	0.2	4	0.1	4	0.1	12	0.4
Total	3,218	100.0	3,648	100.0	3,478	100.0	3,418	100.0

Table 31 summarises the sources of notifications received over five years. The direct reporting system with the Royal Children’s Hospital and Monash Medical Centre has been in place now for many years and this makes an important contribution to the register. Notifications from maternal and child health nurses also contribute a substantial proportion, however there has been a decline in notifications from them which will need to be addressed. Cytogenetic laboratories continue to provide their information to the Register. **The confidential nature of the information from all sources is of utmost importance and is always recognised and dealt with accordingly.**

TERMINATION OF PREGNANCY FOR A MALFORMATION

Information on termination of pregnancy for fetal malformation is obtained independently of the perinatal data and Table 32 summarises the categories of malformations recognised in the pregnancies terminated. All were under 20 weeks of gestation.

Table 32 Termination of pregnancy under 20 weeks for a malformation

Anomaly	(n)
Chromosome anomalies	
Down syndrome	76
Trisomy 13	11
Trisomy 18	19
Other autosomal anomalies	4
Triploidy	13
Turner syndrome	12
Klinefelter syndrome	2
Other sex chromosome anomalies	3
Other chromosome anomalies	5

Table 32 Termination of pregnancy under 20 weeks for a malformation—continued

Anomaly	(n)
Nervous system	
Anencephalus	31
Spina bifida with/without hydrocephalus	24
Multiple neural tube defects	5
Encephalocele	3
Congenital hydrocephalus	10
Other nervous system defect	6
Cardiac system	
Hypoplastic left heart syndrome	1
Other cardiac system defect	1
Urogenital system	
Potter syndrome	1
Cystic kidney disease	2
Other renal system defect	1
Musculoskeletal system	
Arthrogryposis multiplex congenita	1
Exomphalos	2
Diaphragmatic hernia	2
Other multiple musculoskeletal system defect	1
Other musculoskeletal system defect	3
Gastrointestinal system	
Tracheo-oesophageal fistula	1
Genetic/metabolic	
Thalassaemia	3
Cystic fibrosis	2
Disorders of lipid metabolism	1
Hydrops/effusions	2
Conjoined twins	4
Cystic hygroma	3
Multiple system defects	27
Other congenital anomaly	5
Total	287

There were 28 more terminations of pregnancy for fetal malformation reported to the register in 1997 compared with 1996. These data were again obtained after specific written requests were made to the hospitals where this obstetric service would be available in Victoria. In the case of two large teaching hospitals, manual retrieval of information from relevant medical records was made by unit staff. The increasing number of terminations for malformations is a direct result of the increasing number of women having prenatal screening and diagnosis in Victoria (see below).

MALFORMATION EXCLUSIONS

The conditions outlined below are excluded from the data presented on malformations.

Abnormal palmar crease	Metatarsus varus
Accessory nipples	Micrognathia (unless severe)
Anal fissure	Mongolian (blue)spots
Balanced autosomal translocation (unless with structural defects)	Occiput, flat/prominent
Birth injuries	Patent ductus arteriosus (less than 37 weeks)
Birth marks (smaller than 4cm, not including giant naevus)	Philtrum, long/short
Bowing of legs (unless severe)	Plagiocephaly
Blocked tear ducts	Preauricular sinus
Brushfield spots	Prominent forehead
Cephalhaematoma	Protruding tongue
Cleft gum	Ptosis
Clicky hips	Pyloric stenosis
Clinodactyly	Retrognathia (unless severe)
Craniotabes (unless severe)	Rocker-bottom feet (prominent heels)
Dermatoglyphic abnormalities	Sacral pits, dimples, sinuses
Ear abnormalities (minor)	Short sternum
Epicanthic folds	Simian creases
Gastro-oesophageal reflux	Single umbilical artery
Haemangioma (less than 5cm wide)	Skin folds
Hernia - inguinal, umbilical	Skin tags
High-arched palate	Slanting eyes
Hydrocoele	Small mouth
Hypertelorism	Spina bifida occulta
Imperforate hymen	Sternomastoid tumour
Laryngeal stridor	Subluxating knee joint
Laryngomalacia	Talipes (unless with a structural defect)
Low slung/set ears	Toe anomalies—minor
Macroglossia	Tongue tie
Meckel diverticulum	Torticollis
Meconium ileus	Undescended testis/testes (not requiring treatment)
Mental retardation (unless with a syndrome/structural defect)	Ureteric reflux (ultrasound diagnosed)
	Webbing of 2nd and 3rd toes/fingers
	Wide suture lines

IMPORTANCE OF MALFORMATION NOTIFICATION

Council wishes to emphasise the importance of reporting cases of suspected or proven birth defects, regardless of whether they are believed to have been notified from another source. It is only by this means that a comprehensive register of relevant conditions will be established and maintained. **The register is frequently used to answer questions about the prevalence of specific defects in Victoria, and to respond to queries about possible clusters of malformations. These functions require full and reliable information on birth defects.**

Supplies of notification forms can be obtained by writing to the Congenital Malformations Register (GPO Box 4003, Melbourne 3001) or by telephoning (03) 9637 4220.

PRENATAL DIAGNOSIS AND GENETIC COUNSELLING IN RELATION TO BIRTH DEFECTS

The increasing role of prenatal diagnosis can be seen by comparing terminations for malformations in the past 10 years: 106 (1988), 134 (1989), 139 (1990), 138 (1991), 154 (1992), 213 (1993), 250 (1994), and 259 (1995), 260 (1996) 287 (1997). Prenatal diagnosis by amniocentesis, by chorionic villus sampling (CVS), and occasionally by fetoscopy or fetal blood sampling is well established in Victoria. Routine monitoring of all diagnostic tests done in Victoria, 5874 in 1997, is done by the Murdoch Institute at the Royal Children's Hospital which produces an annual report with the details. Use of ultrasound is not monitored in the same way but is known to be widespread in Victoria, and is responsible for identifying many of the congenital malformations that are then confirmed by follow-up amniocentesis or CVS. In addition, there is increasing use of maternal serum screening for neural tube defects and Down syndrome.

Concern over the risk of Down syndrome in women aged 37 years and older is the most frequent reason for amniocentesis and chorionic villus sampling. **The utilisation of these services by women in the advanced aged groups is now stable in Victoria with approximately 60 per cent of pregnant women aged 37-39, and 75 per cent of those 40 years and over having one or other test.**

It is important for doctors to inform women of advanced maternal age of the availability, and safety of, amniocentesis and CVS (pamphlets are available from the Murdoch Institute). This should be done in a way that ensures women who could not accept prenatal diagnosis and termination of pregnancy are not made unduly anxious about the risk they are running.

Most of the other groups of women for whom prenatal diagnosis is appropriate are certain to be aware of its availability because the indication is usually related to a previous abnormal child. This applies to prenatal diagnosis of neural tube defects, inborn errors of metabolism, thalassaemia, and to couples who have already produced one child with a chromosomal abnormality.

The availability of prenatal diagnosis has increased the importance of making a precise diagnosis in any baby who is born with a serious defect, and in offering skilled genetic counselling to the parents of all such babies. Planning of genetic counselling, and consideration of the possibility of prenatal diagnosis in a future pregnancy, should begin in a doctor's mind as soon as an abnormal baby is delivered. All these services to the couple depend upon a correct diagnosis in the baby. Even when the prognosis is hopeless for the present child, failure to carry out these steps may make it impossible for geneticists to give accurate advice or to arrange prenatal diagnostic tests in a subsequent pregnancy.

Many syndromes and all metabolic disorders are more easily diagnosed in life than at necropsy. The opportunity to see an abnormal baby in life gives a consultant an optimal opportunity to recommend the most useful diagnostic procedures.

The importance of a necropsy in babies with birth defects cannot be overemphasised, and the necropsy rate among infants in this category still leaves room for improvement. Many doctors imagine the suggestion of a necropsy will distress parents very greatly, but this is not usually the case if the reasons for the necropsy are properly explained and importance of correct advice for future pregnancies is stressed.

In cases where the parents refuse necropsy, and after a definite refusal has been made, very often the parents will consent to a limited necropsy, or to a careful external examination with an X-ray and photography. Sometimes this can provide a diagnosis, and is always a worthwhile exercise.

Expertise in diagnosing birth defects and counselling affected families is available in the clinics of the Victorian Clinical Genetics Service at the Royal Children's Hospital, the Royal Women's Hospital, the Mercy Hospital for Women, the Monash Medical Centre, the Royal Melbourne Hospital, St Vincent's Hospital, the Royal Victorian Eye and Ear Hospital, the Geelong Hospital, and in Albury/Wodonga, Hamilton, Sale, Traralgon, and Warrnambool.

POSTNEONATAL INFANT AND CHILD DEATHS

This section reports on infant and child deaths which have occurred during the 1997 calendar year. Eight infant and nine child deaths have been excluded because the children lived outside Victoria and were referred for treatment of a serious illness, which was often a congenital cardiac malformation (11 of the 17 cases).

In 1997, there were 240 deaths in infants and children aged 29 days to 14 years. This is a continuing reduction from previous years where there were 257 in 1996, 291 in 1995 (figure 9). The number of postneonatal infant deaths continued to decline with 87 recorded in 1997, compared to 93 in 1996, 95 in 1995, and 106 in 1994. There were 11 fewer child deaths in 1997 (n=153) compared to the previous year.

The decline in infant and child deaths from 1996 was predominantly due to an ongoing reduction in the number of cot deaths (25 in 1997, 42 in 1996), and a small decline in the number of unintentional injury deaths (51 in 1997, 59 in 1996). Birth related causes of death remained steady at 90 for the year, and the acquired diseases/intentional injuries rose slightly, with 40 malignancy deaths compared to 36 in 1996.

The numbers of late infant and child deaths from 1985 to 1997 are shown by category of death in figure 9, and by age at death in figure 10.

RECOMMENDATIONS FROM THE COUNCIL ON INFANT AND CHILD DEATHS

Council wishes to emphasise the importance of the following recommendations, some of which have already appeared in previous annual reports.

Sudden Infant Death Syndrome (SIDS)

*** Reduced risk if child sleeps back down, parents do not smoke, infant's head remains uncovered during sleep**

The Council endorses the recommendations of The Sudden Infant Death Research Foundation (Victoria) and the National SIDS Council of Australia. It is suggested that the following measures are likely to reduce the incidence of a sudden infant death:

- Infants should be put to on the back to sleep, not on their side or face down.
- Cigarette smoking during pregnancy should be avoided and a smoke-free home should be maintained.
- The infant's head should remain uncovered during sleep.

Further information can be obtained from SIDS organisations in each state. In Victoria contact (03) 9822 9611 or 1800 240 400.

Drowning

*** Fence swimming pools, supervise toddlers, remember life jackets**

Drownings recur each year and the Council again emphasises the danger to toddlers of unprotected swimming pools and adult baths if children are young or disabled. **Even with protected pools and spas, parental vigilance and supervision is still required because protection may be inadequate or defective.** In rural areas, fencing the home and children's play areas is extremely important, as toddlers continue to drown in farm dams, creeks and rivers. As of July 1, 1997, regulations requiring the fencing of all swimming pools came into force in Victoria.

Life jackets and other personal flotation devices can prevent drowning, and the Council reiterates the Victorian regulations stating that all children must be provided with a personal flotation device whenever they are on board a water craft, and that children under 10 years must actually wear the device.

Poisoning

*** Remind new parents of risks, seek advice from the Poisons Information Centre**

Since the late 1970s, there has been a substantial reduction in infant and child deaths resulting from poisoning. Child-resistant packaging, publicity regarding prevention, and the availability of more effective treatment of most poisonings are among the factors contributing to this improvement.

Child and infant deaths from poisoning are now infrequent, but poisoning remains a common indication for hospital admission in children less than 5 years of age. The parents of each new generation of toddlers need to be reminded of the preventive measures that include:

- Buying products with child-resistant closures.
- Installing a child-resistant storage cupboard.
- Putting medications and poisons away immediately after use.
- Never leaving medications or poisons on a bench or table.

Practitioners are reminded that advice on the optimal management of children suspected of ingesting toxic substances is readily available from the Poisons Information Centre, telephone 13 11 26.

Dog-bites

*** Choose the right breed for the family**

Dog bites are a significant cause of injury in young children. It is important that families choose the breed of dog carefully to suit their lifestyle and environment. Certain breeds may not be appropriate if young children are in the household. **Young children should always be supervised around dogs and separated from them at feeding time.** Information on responsible dog ownership and dog-bite prevention is available through The Safety Centre, Royal Children's Hospital Melbourne, telephone (03) 9345 5085.

Nursery furniture

*** Cot design standard now mandated**

To prevent hazardous cots coming onto the market, as of mid-1998 the Australian/New Zealand Standard on the design and manufacture of infant domestic cots has been mandated. This means that all cots sold or supplied must now conform with the Standard. Injury, particularly asphyxiation, risk still exists if the cot is broken or the mattress ill-fitting. Parents of infants and toddlers must be warned of such dangers and advised about the appropriate sleeping environment for their children. Further information is available from Kidsafe (Child Accident Prevention Foundation) telephone (03) 9670 1819.

Depression or suicidal thoughts

*** Refer to a specialist**

Although suicide in children less than the age of 15 years is uncommon, it should be noted that a number of deaths occur in ambiguous circumstances, and may therefore be classified as accidental when they were, in fact, suicide. **In children, the possibility of depression should not be forgotten, and threats of suicide should not be ignored.** Such threats or suspected depression usually indicate the need for referral to a specialist.

Cigarette lighters, matches, and candles

*** Use child-resistant lighters**

Children playing with matches or cigarette lighters continue to cause injuries and fatalities. As of October 1, 1997, new laws on the sale of disposable cigarette lighters came into force. Such lighters are now required to have child-resistant features (that is, a device that impedes small children from operating the lighter) and warning labels. The Council also wishes to stress the danger of house fires if lit candles are left unattended.

Trailers and utilities

Council wishes to repeat its warning on the dangers of allowing children to travel in a trailer or in the tray of a utility, whether it be on or off road.

Referral for paediatric intensive care

There is strong evidence that critically ill children have a lower mortality if they are looked after in specialist paediatric intensive care units in tertiary hospitals, rather than mixed adult and paediatric units or units in nontertiary hospitals.

In Victoria, almost all children who need endotracheal intubation for more than 24 hours are referred to a paediatric intensive care unit. A recent study, after adjustment for severity of illness, has found that Victorian children in intensive care had a mortality rate that was only 57 per cent of the rate for children from the Trent region of England where intensive care services for children are decentralised (*Lancet* 1997;349:1213-1217).

Children less than 16 years of age should be referred to the Paediatric Emergency Transport Service (PETS) for transfer to a paediatric intensive care unit if they have:

- Any condition likely to need intubation for more than 24 hours (for example, severe croup, asthma or bronchiolitis).
- Shock or a need for inotropes (for example, severe sepsis).
- Coma (for example, due to head injury, prolonged convulsions, drowning or asphyxia).
- Meningitis in any child <2 years old.
- Diabetic ketoacidosis in any child <2 years old.

Signs of severe illness in infants

Several findings suggest an infant less than 6 months old may need admission to hospital (*Archives of Diseases in Childhood* 1990;65:750–56).

<i>CNS</i>	<ul style="list-style-type: none">• Sleepy—does not wake fully and cry strongly• Low activity—moves arms and legs less than normal*• Low intake—<50% of normal feeds in last 24 hours*
<i>Respiratory</i>	<ul style="list-style-type: none">• Retraction—moderate or severe chest retraction
<i>CVS</i>	<ul style="list-style-type: none">• Pallor—sudden onset of persistent generalised pallor
<i>Uncommon findings</i>	<ul style="list-style-type: none">• Bilious vomiting, grunting, apnoea, fits

* Information obtained from the history.

Signs of severe sepsis in children

The Council have reviewed the deaths of a number of children where the signs of developing severe sepsis have not been recognised by medical or nursing staff. In some children this failure of recognition has occurred at the time of presentation and in others during the course of hospitalisation.

The features of severe sepsis are non-specific and may include:

- Fever *or* hypothermia
- Pallor
- Poor peripheral perfusion (check colour, temperature and capillary refill of hands and feet)
- Tachycardia
- Tachypnoea
- Impaired consciousness
- Hypotension (this may only appear in the terminal stages of sepsis).

Practitioners should be alert for these features; be aware of the age-specific norms of heart rate, respiratory rate and blood pressure; and pay attention to trends in repeated observations (e.g. a rising heart rate).

Sudden death from asthma

*** Every child with asthma must have a crisis plan**

Children with unrecognised or undertreated persistent asthma are at risk of a sudden fatal episode. In addition, children with apparently trivial, infrequent asthma can develop (extremely rapidly) a severe episode of bronchospasm that may be fatal unless appropriate emergency measures are undertaken. It is thus

essential that **every patient with asthma should have a crisis plan to cope with a sudden severe episode**. If there is no response to one or two doses of the normal bronchodilator medication, urgent professional help should be sought and usually this should be an ambulance. While awaiting the arrival of this help, the patient should continue to take very frequent or continuous doses of inhaled sympathomimetic.

Good treatment for asthma requires excellent communication between the patient, the parents, and the medical practitioners involved. In several deaths in previous years, the Council was concerned that there appeared to be inadequate communication between specialist and family practitioner on the nature of the child's asthma and its treatment. Every effort must be made to ensure full information is transmitted between all doctors and the family involved in a particular patient's care.

Corticosteroids in children with severe sepsis

Children who have not yet started antibiotics may benefit from a single large dose of steroids (for example, methylprednisolone 10mg/kg, dexamethasone 2mg/kg, or hydrocortisone 50mg/kg) if this can be given 10 minutes before they receive their **first** dose of antibiotics.

Apart from this single dose of steroid to children who have not had antibiotics, children with meningitis are not routinely treated with steroids at the Royal Children's Hospital.

Meningitis

*** Avoid lumbar puncture if there is coma, prolonged fits or focal signs**

Fatal cerebral herniation (coning) may occur in children with meningitis following lumbar puncture. It is advised that lumbar puncture should not be performed in a child with an acute febrile illness if there is:

- Coma (with no purposeful response to pain).
- Prolonged fitting, or
- Focal neurological signs.

Parenteral antibiotic therapy should be commenced, after taking a blood culture where possible, in such children. Children with suspected meningitis who are comatose or have prolonged fitting should be referred to a paediatric intensive care unit (see the section on the Paediatric Emergency Transport Service).

Diabetic ketoacidosis

*** Give fluid 10–20 mL/kg if poor perfusion, then slow rehydration**

Some children with diabetic ketoacidosis develop subclinical cerebral oedema that is evident on a CT scan. About 1 per cent develop clinical signs of cerebral oedema with a high mortality; most are newly-diagnosed diabetics. The risk of cerebral oedema in diabetic ketoacidosis means that the fluid deficit should be replaced evenly over 48 to 72 hours (except that 10 to 20 mL/kg boluses of replacement fluid should be given immediately if there is hypotension or poor peripheral perfusion). In children over 12 months of age, the fluid given (replacement plus maintenance) should have a potassium concentration of 20 to 40 mmol/L and a sodium concentration of 125 mmol/L for the first 12 hours, and 75 mmol/L for the next 32 hours.

Dehydration

*** Consider dangers of sedation**

In dehydrated infants and children, consideration should be given to omitting or giving a much reduced dose of sedatives, narcotics and preoperative medications such as papaveratum (Omnopon).

Gastroenteritis

*** Continue breast feeds and/or solids; avoid high sugar fluids**

The need for hospitalisation for young children with gastroenteritis should be carefully assessed. If admission is not chosen, there is a need for repeated reviews of the child's condition as deterioration can occur quite rapidly.

Mortality from gastroenteritis has decreased since the dangers associated with the use of lemonade have been appreciated. **Dehydration can be prevented or treated by the oral administration of a solution containing 1 to 2 per cent glucose.** However, higher concentrations of glucose may exacerbate diarrhoea by an osmotic effect. Undiluted lemonade or fruit juices, which contain 8 to 10 per cent sugar, must never be used to treat gastroenteritis. Breast feeding and/or solids should be continued.

Mild diarrhoea can be treated by encouraging the child to drink extra normal fluids. Severe diarrhoea should be treated with a commercially available oral rehydrating fluid containing sodium, potassium, chloride, citrate, and 1 to 2 per cent glucose (such as Gastrolyte).

Urinary tract infection

*** May present as PUO, vomiting or failure to thrive**

Urinary tract infection in an infant often presents as pyrexia of unknown origin (PUO), unexplained vomiting and/or failure to thrive. It should always be suspected in such cases.

Paracetamol

Paracetamol provides useful relief of symptoms caused by minor acute infections, for postoperative pain, and after vaccination.

However, it is rarely sensible to use paracetamol to treat fever. Fever is part of the normal host immune response to infection. Treatment with paracetamol increases the duration of symptoms in chickenpox (*Journal of Pediatrics* 1989;114:1045-48) and measles (*Indian Journal of Pediatrics* 1981;18:49-52), decreases the antibody response to infection (*Journal of Paediatrics and Child Health* 1993;29:84-85), and increases mortality in severe infections (*Lancet* 1995;345:338). Paracetamol does not provide effective prophylaxis against febrile convulsions (*Journal of Pediatrics* 1995;126:991-995).

Paracetamol should be used sparingly to relieve discomfort in mild acute infections, but it should not be used to treat fever. There is a danger that children with serious illness will be treated at home with paracetamol, and that this will delay effective treatment for their illness.

Surgical emergencies

*** Consult a specialist paediatric surgeon**

In children with suspected appendicitis that is not confirmed at laparotomy, the patient should be carefully reviewed as there are other serious causes of abdominal pain to be excluded. Council's opinion is that paediatric specialists, surgical and resuscitatorial, should be involved in childhood surgical emergencies.

Immunisation

The importance of routine immunisation is again stressed. The National Health and Medical Research Council schedule is included in the section on vaccine-preventable diseases.

Very preterm babies

*** Recognise families need social and economic support**

Many extremely immature and very low birth-weight infants born in tertiary maternity hospitals are discharged to a regional or district hospital before finally going home. Support to ameliorate economic and social adversity is important to the preterm infant and the family after the infant is discharged. There is evidence to show this improves developmental outcome and leads to more appropriate utilisation of health services in infancy and later in childhood.

Parents should be made aware of the importance of regular follow-up assessments and appreciate that, in the first two years of life, more hospital admissions for medical and surgical indications may be necessary compared with infants born at term.

Snakebite

*** Discuss with the Royal Children's Hospital Intensive Care Unit**

Snakebite may be lethal or cause serious illness in children. The lethal species found in Victoria are Tiger, Brown, Copperhead and Red-belly Black snakes. If envenomation has occurred and the species of the snake is unknown, give one ampoule of Tiger snake antivenom (3,000 units) and one ampoule of Brown Snake antivenom (1,000 units) intravenously. The dose depends on the amount of venom injected, not the size of the patient. Higher doses of antivenom may be required depending on the child's clinical state and blood coagulation tests (prothrombin time, partial thromboplastin time, fibrinogen and platelet count). Any child with snakebite should be discussed with the Intensive Care Unit at the Royal Children's Hospital, telephone (03) 9345 5211.

Figure 9 Postneonatal infant and child deaths by major cause 1985–1997

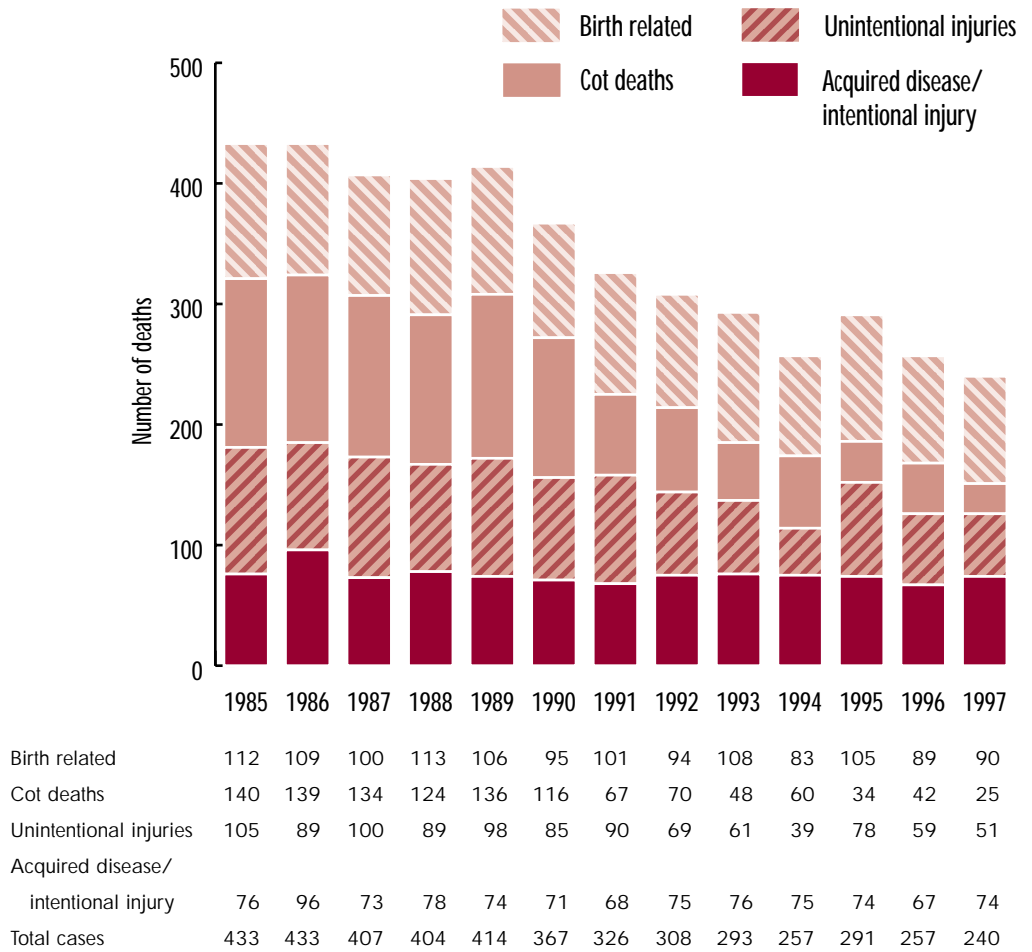
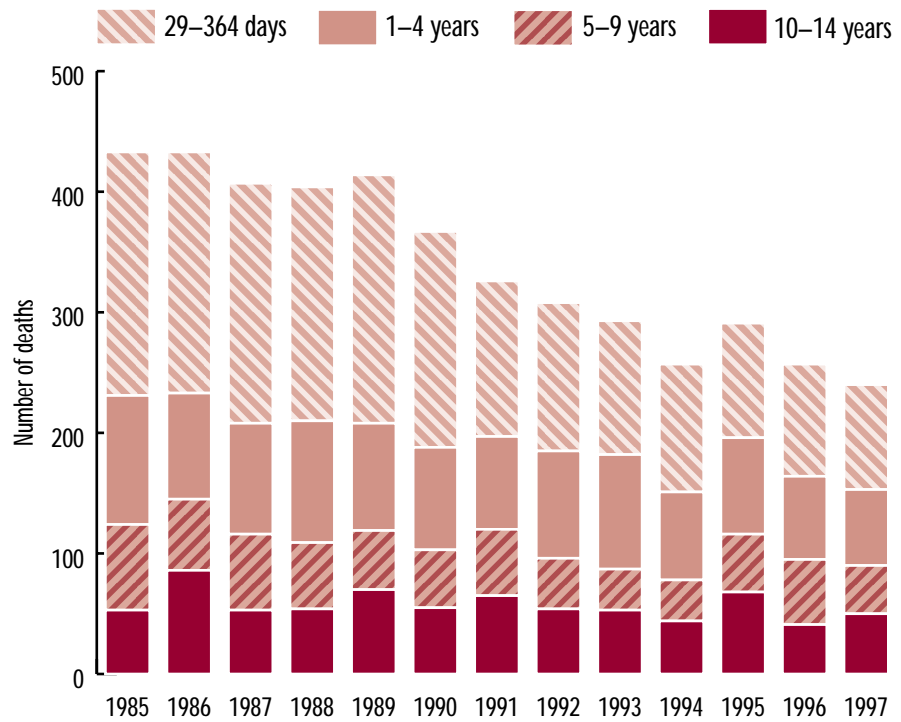


Figure 10 Postneonatal infant and child deaths by age group 1985–1997



	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
29–364 days	202	200	199	194	206	179	129	123	111	106	95	93	87
1–4 years	107	88	92	101	89	85	77	89	95	73	80	69	63
5–9 years	71	59	63	55	49	48	55	42	34	34	48	54	40
10–14 years	53	86	53	54	70	55	65	54	53	44	68	41	50
Total	433	433	407	404	414	367	326	308	293	257	291	257	240

Table 33 Cause of postneonatal infant and child deaths by age group

Category	Age				Total
	29–364 days	1–4 years	5–9 years	10–14 years	
Determined at birth					
1A Birth hypoxia/asphyxia	2	–	3	1	6
1B Malformation/birth defect	29	16	7	11	63
1C Prematurity	12	1	–	–	13
1D Other	2	3	2	1	8
Subtotal	45	20	12	13	90
Cot death					
2A Explained by other condition	–	–	–	–	–
2B Significant pathology	6	1	–	–	7
2C Minor condition	14	–	–	–	14
2D No significant abnormality detected	4	–	–	–	4
Subtotal	24	1	–	–	25
Unintentional injuries					
3A Motor vehicle	1	7	7	8	23
3B Drowning	1	7	–	–	8
3C Fire	1	2	1	1	5
3D Asphyxiation	3	2	2	–	7
3E Train	–	1	–	2	3
3F Other	–	–	1	4	5
Subtotal	6	19	11	15	51
Acquired disease/Intentional injury					
4A Infection	6	7	2	–	15
4B Malignancy	3	9	12	16	40
4C Other acquired disease*	2	5	1	4	12
4D Intentional trauma	1	2	2	1	6
4E Suicide	–	–	–	1	1
Subtotal	12	23	17	22	74
Total	87	63	40	50	240

* Includes undetermined cause

CAUSE OF DEATH DETERMINED AT BIRTH

1A Birth hypoxia/asphyxia

Of the six deaths resulting from severe perinatal hypoxia, two died in infancy, and the other 4 died in childhood from complications of severe cerebral palsy.

1B Congenital malformations/birth defects

There were 63 deaths due to congenital malformations in 1997 (table 34). Cardiovascular system malformations continue to be the largest group, with 19 cases, followed by chromosomal disorders. One severely disabled child with congenital hydrocephalus died from injuries following a fall.

Table 34 Fatal congenital malformations/birth defects

Type of anomaly	Age				Total
	29–364 days	1–4 years	5–9 years	10–14 years	
Cardiovascular system	11	5	1	2	19
Multiple malformations	2	1	1	–	4
Chromosomal/genetic disorder	5	2	–	3	10
Neural tube/CNS	1	3	2	1	7
Cystic fibrosis	–	–	1	3	4
Gastrointestinal system	3	–	–	1	4
Metabolic defects	6	2	2	1	11
Miscellaneous	1	3	–	–	4
Total	29	16	7	11	63

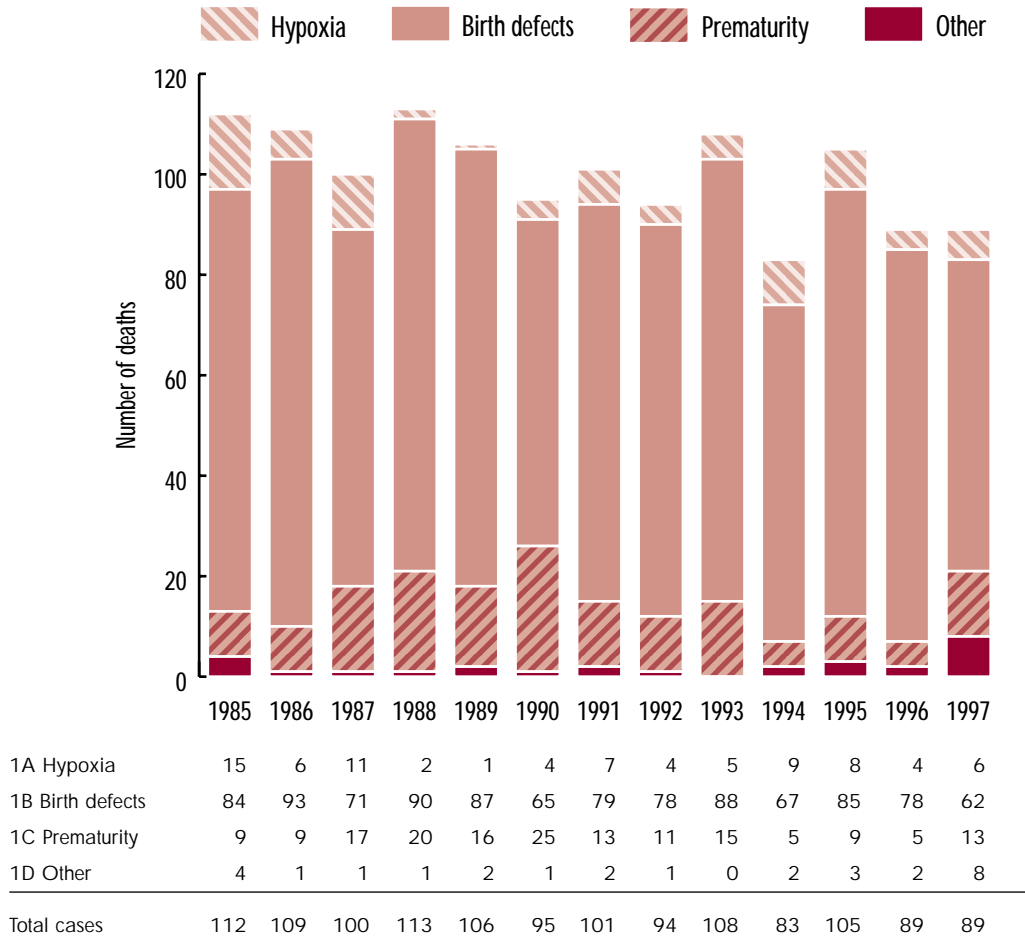
1C Prematurity

There were thirteen deaths due to consequences of prematurity compared to 5 in 1996. Seven infants had birth-weights under 850g, and the remaining six were between 850 and 1330g. Five died from the sequelae of necrotising enterocolitis, three from sepsis (Candida, Staphylococcus and Serratia), one from hypertrophic cardiomyopathy, and the remaining four from chronic lung disease.

1D Other causes determined at birth

There were eight children in this group. Four died from complications of cerebral palsy of undetermined cause; 2 from nonimmune hydrops; 1 with unspecified developmental delay and epilepsy; and the last with developmental delay of uncertain aetiology.

Figure 11 Causes of death determined at birth 1985–1997



COT DEATH

In 1997, there were 25 postneonatal infant and child cot deaths. This was a considerable decline on the 42 reported in 1996. In addition, there were 4 neonatal cot deaths (table 10), compared to 2 in 1996. This brings the total cot deaths in 1997 to 29.

Terminology and classification

The term *cot death* is used by Council to include all infants and very young children where the death is sudden and unexpected on the clinical history. As all cases must be referred to a coroner, a thorough necropsy is almost invariably performed. **Council restricts the term *Sudden Infant Death Syndrome (SIDS)* to those cases where a full necropsy fails to reveal an adequate cause of death.**

There are four subgroups of cot death recognised by Council, of which only groups 2B, 2C, and 2D are categorised as SIDS. These groups are generally determined after the postmortem examination. The groups are:

- 2A Death explained by a medical condition
- 2B Significant pathology identified, insufficient to cause death
- 2C Associated minor condition identified
- 2D No significant abnormality identified

A detailed discussion on classification and difficulties in deciding an 'adequate cause' for a cot death are in the Council's 1993 report. Copies may be obtained from the Executive Officer, telephone (03) 9637 4225.

Figure 12 shows the number of neonatal, late infant and child cot deaths in each category for the previous 13 years. There was a sharp decline in the number of cot deaths since 1990, which was associated with the extensive public education campaign carried out by the Sudden Infant Death Research Foundation. **The campaign highlighted the association between the face-down sleeping position and other risk factors with an increased incidence of cot deaths.**

2A Death explained

This category (where the cause of death can be explained by such conditions as acute myocarditis, septicaemia, accidental asphyxiation and some metabolic abnormalities) is retained by the Council; however, some readers may wish to reclassify them elsewhere. There were no cases in this category in 1997.

2B and 2C Significant or minor pathology identified

The majority of cases (84 per cent) fall into categories 2B or 2C where there are associated conditions. The principal pathological findings for these cases are listed in table 35. While conditions are listed as significant or minor, they were considered unlikely to have resulted in death. The most common conditions found at postmortem were respiratory infections. In many of these cases, other lesser abnormalities were also recorded.

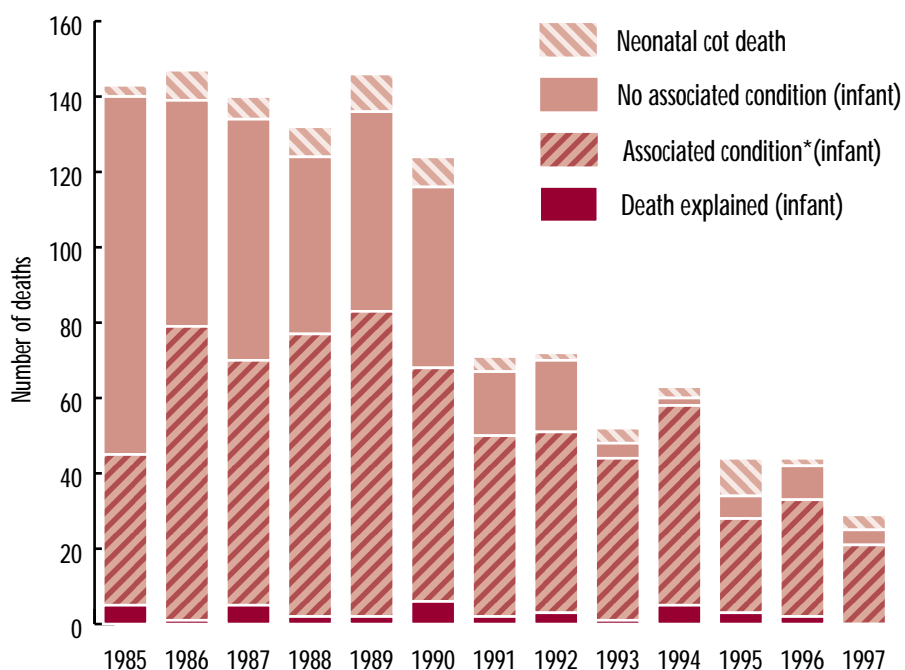
Table 35 Principal conditions associated with cot death

	Category	
	Minor pathology	Significant pathology
Respiratory tract infection	4	7
Otitis media	-	3
Renal infection	1	2
Cerebral anomalies	2	-
Gastrointestinal conditions	-	2
Total	7	14

2D No significant abnormality detected

In 1997, four cases (16 per cent) had no significant pathology detected.

Figure 12 Neonatal, infant and child cot deaths 1985–1997



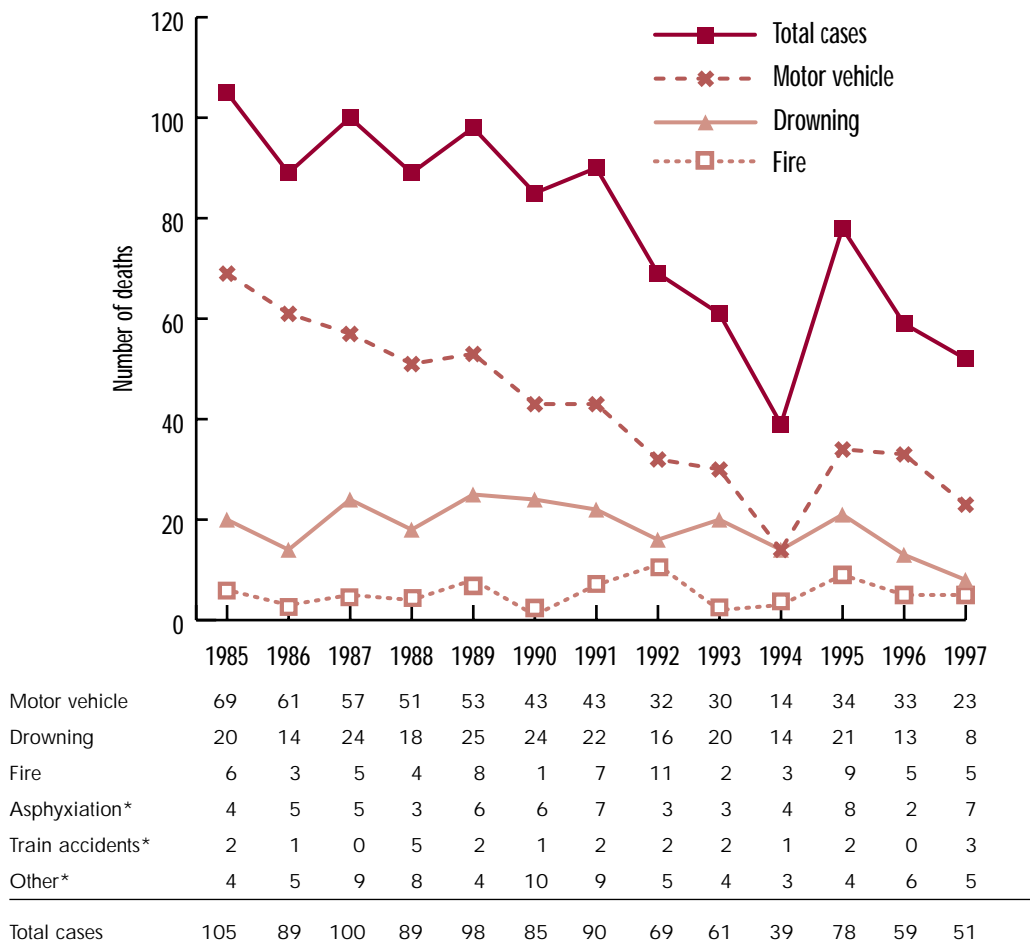
Infant/child cot deaths													
Death explained	5	1	5	2	2	6	2	3	1	5	3	2	-
Associated condition*	40	78	65	75	81	62	48	48	43	53	25	31	21
No associated condition	95	60	64	47	53	48	17	19	4	2	6	9	4
Subtotal infant/ child cases	140	139	134	124	136	116	67	70	48	60	34	42	25
Neonatal cot death	3	8	6	8	10	8	4	2	4	3	10	2	4
All age cases	143	147	140	132	146	124	71	72	52	63	44	44	29

* Includes categories 2B and 2C

UNINTENTIONAL INJURY DEATHS

There were 51 late infant and child deaths due to unintentional injury (figure 13). This is a reduction from 1996 where there were 59 deaths.

Figure 13 Unintentional injury deaths 1985–1997



* Not shown in figure

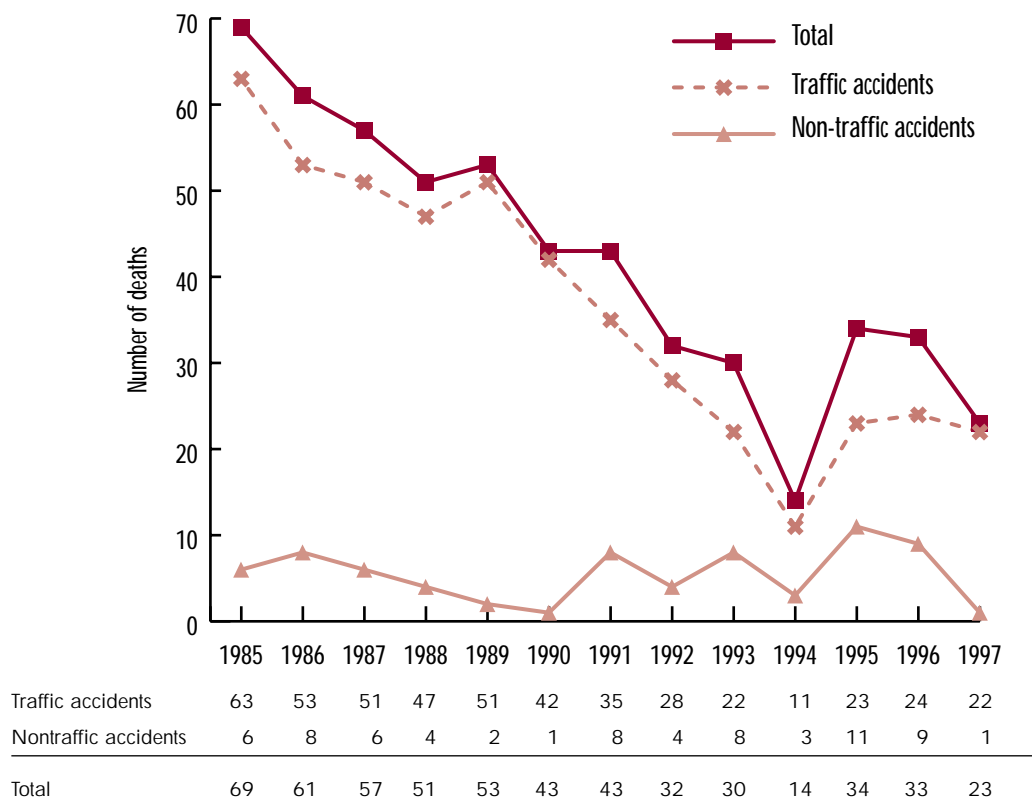
3A Motor vehicle

In 1997, the number of motor vehicle accident fatalities reduced to 23 (from 33 in 1996). The mode of travel is listed in table 36. In 78 per cent of these cases, at least one preventable factor was listed.

Table 36 Mode of travel in motor vehicle fatalities

Mode of travel	(n)
Passenger in motor vehicle	13
Pedestrian	6
Pedal cyclist	3
Child driving motor vehicle	1
Total	23

Figure 14 Motor vehicle fatalities 1985-1997



For the 13 motor vehicle passenger deaths, 8 involved drivers losing control of the vehicle, 2 drivers fell asleep at the wheel, one failed to give way at an intersection, and two were hit by other cars. **Of the five children killed crossing a road, three had just alighted from the school bus.** One child on a bicycle and another pedestrian were crushed by reversing trucks. The two other pedal cyclist fatalities involved attempts to cross busy roads.

Failure to wear a seat-belt, or wearing a faulty seat-belt was a factor in 3 cases. One cyclist was not wearing a protective helmet, and alcohol was a factor in one of the adult drivers.

3B Drowning

There were eight deaths due to drowning in 1997, a continuing reduction from 13 in 1996, and 21 in 1995. The age range was from 11 months to 4 years, with three of the children aged one year. Seven of the eight cases had preventable factors identified.

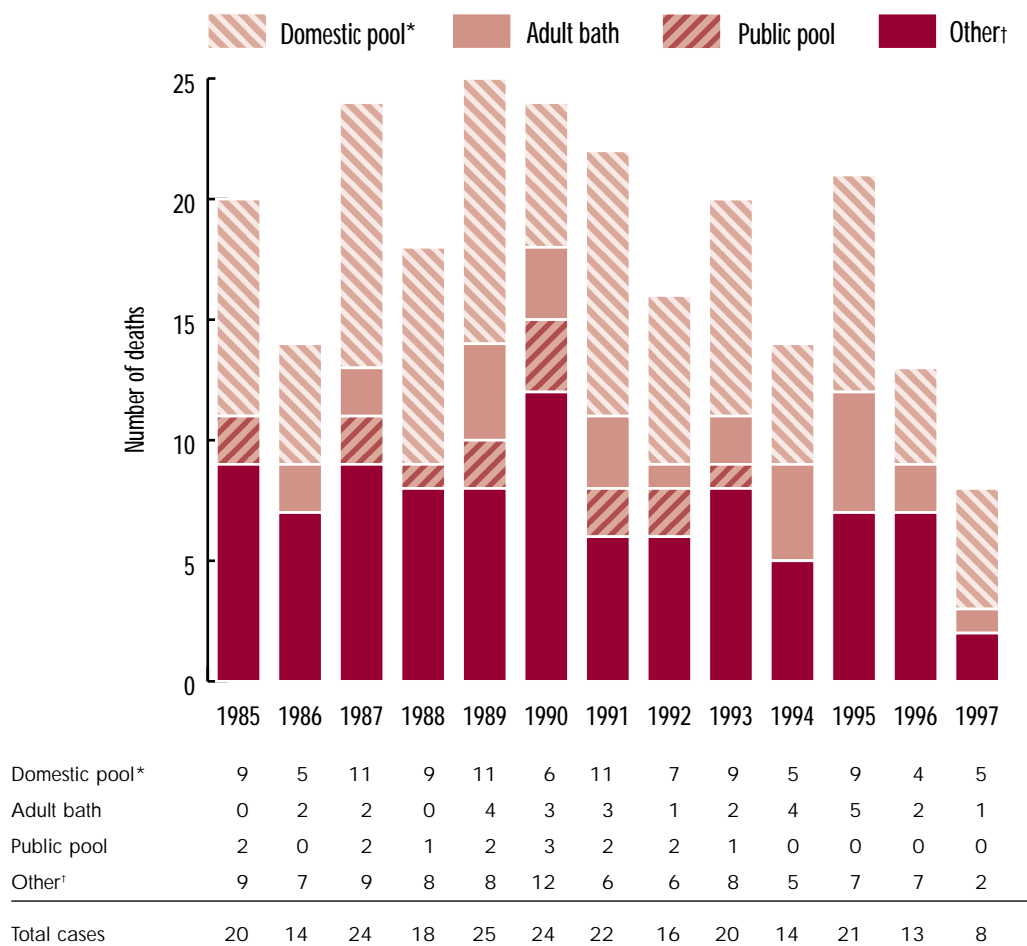
Table 37 Location of drowning fatalities

Location	(n)
Private pool	5
Adult bath	1
Dam	1
Creek	1
Total	8

For the five pool drownings, 3 were in fenced pools; however the gate was left open in one case, the gate latch was faulty in another, and the child was left unsupervised inside the fenced pool in the third case. For the other two pool drownings one pool was not fenced, and in the other case the child drowned whilst being 'supervised' by a parent.

One child was left unattended in a bath.

Figure 15 Drownings fatalities 1985–1997



* 'Domestic Pool' includes spa, wading pool. † 'Other' includes river, sea, dam, irrigation channel.

3C Fire

There were five deaths as a result of fire, the same number as in 1996. The children were aged 6 months to 13 years. Two died as a result of burns, and the other three from smoke inhalation. One fire started from a candle left beside the child’s cot, two children died in a house fire which started with cushions beside a gas heater, one child was playing with matches, and the last was playing with petrol. **There was no evidence of smoke detectors in three of the four house fires.**

3D Asphyxiation

There were seven deaths in 1997 due to nonintentional asphyxiation (compared to two in 1996). Four of these deaths featured nursery furniture. These cases involved asphyxiation in: a collapsed pusher, a collapsed portable cot, and a cot filled with soft toys. In the last case, the infant fell off an unattended change table.

There was one accidental hanging in a child playing with rope and two children asphyxiated on food. In one case a three month old infant was left feeding from a bottle whilst propped up in a cot. In the other case a seven year old child choked on marshmallows.

3E Trains

There were three deaths in this category in 1997. One 13 year old child was crossing the track on a bicycle and the other, 2 years of age, was playing on the railway line. In addition there were 2 homicides, and one suicide involving trains.

3F Other causes of unintentional injury death

There were five children who died from other types of injuries. Two were falls, one through an unlaminated window, and one was playing on a shade cloth/awning. There was one death from a drug overdose (believed to be not intentional), one from electrocution, and the last died as a result of dog-bite injuries.

Morbidity from dog bites

Whilst dog-bite injury is an uncommon cause of paediatric mortality, it is a significant cause of presentations to emergency departments and of hospital admissions.

The Victorian Emergency Minimum Dataset (VEMD) provides data on injury presentations of 25 Victorian public hospital emergency departments. This collection represents approximately 80% of state-wide emergency department presentations. In 1997, there were 493 case of dog bite injury in children 0–14 years recorded on VEMD. Two and three year old children were most commonly injured, representing 25.4% of all children with dog-bite injuries. Boys were more commonly bitten than girls and most bites occurred at home (61.3%). Of these children, 18.3% were admitted to the hospital ward. Over the 1996/1997 financial year there were 168 children 0–14 years admitted to Victorian public hospitals with dog-bite injuries (data from the Victorian Inpatient Minimum Dataset).

PREVENTABLE FACTORS IN FATAL INJURIES

The Council considered that at least 74 per cent (38 of 51) of unintentional injury deaths were potentially preventable. This opinion is based on positive evidence provided in coroner's, police and necropsy reports. In some instances, information was incomplete so the number of preventable cases may have been higher than stated. Sometimes, more than one preventable factor was coded; for example, with drowning in an unfenced pool, inadequate caretaker supervision was frequently also implicated.

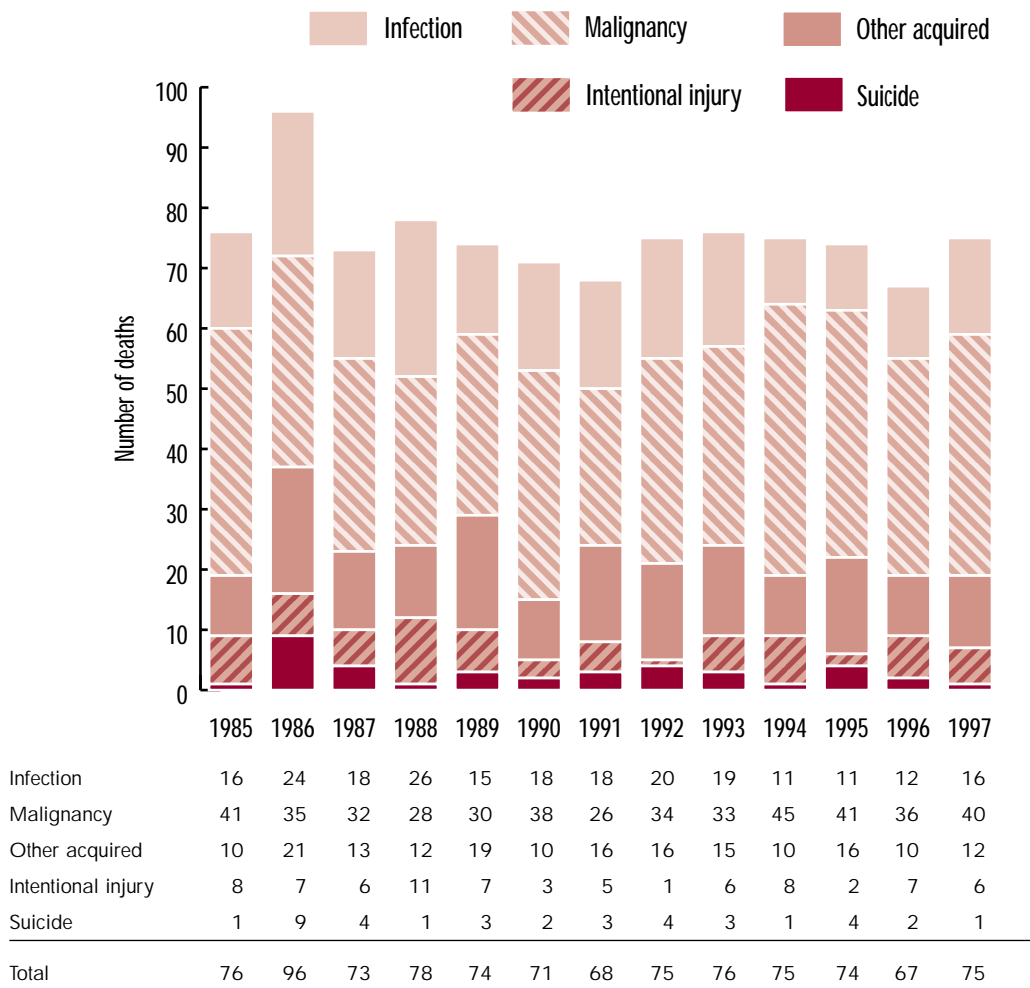
Table 38 Preventable factors in unintentional injury deaths

Preventable factor	Motor vehicle	Drowning	Fire	Asphyxiation	Train	Other	Total
Seat restraint not used or faulty	5	-	-	-	-	-	5
Excess speed	1	-	-	-	-	-	1
Alcohol	1	-	1	-	-	-	2
No helmet	1	-	-	-	-	-	1
Inadequate caretaker supervision	3	4	3	1	-	-	11
Driver falling asleep or inattention	6	-	-	-	-	-	6
Underage driver	1	-	-	-	-	-	1
Failure to give way at intersection	1	-	-	-	-	-	1
Poor equipment maintenance/product failure	-	-	-	2	-	-	2
Unfenced pool or spa	-	2	-	-	-	-	2
Failure of pool or house fence	-	3	-	-	-	-	3
Inadequate hazard protection (dam, firearm)	-	1	-	-	1	-	2
Playing with petrol	-	-	1	-	-	-	1
Cigarette lighter/matches/unattended candles	-	-	2	-	-	-	2
No smoke detector or failure	-	-	3	-	-	-	3
Smothering hazard	-	-	-	1	-	-	1
Unsafe feeding practice	-	-	-	1	-	-	1
Dangerous dog breed	-	-	-	-	-	1	1
Unlaminated window	-	-	-	-	-	1	1
Failure to attempt resuscitation	-	1	-	-	-	-	1
Total number of cases	23	8	5	7	3	5	51
Number (%) of cases with preventable factors identified	18 (78.3)	7 (87.5)	5 (100)	5 (71.4)	1 (33.3)	2 (40.6)	38 (74.5)

ACQUIRED DISEASE AND INTENTIONAL INJURY

There were 75 deaths due to acquired diseases and intentional injuries. The number of cases in each acquired disease category since 1985 is shown in figure 16.

Figure 16 Acquired conditions and intentional injuries 1985–1997



4A Infection

There were 15 infant and child deaths due to infection in 1997, outlined in table 39. **As in the previous 2 years, there was no fatality due to *Haemophilus influenzae*, which is now an important preventable (by immunisation) cause of mortality and morbidity.**

Table 39 Infections resulting in infant and child deaths

Type of infection	29-364 days	1-4 years	5-9 years	Total
Streptococcal meningitis	-	1	-	1
Herpes simplex encephalitis	1	-	-	1
HIV/AIDS	-	1	-	1
Subacute bacterial endocarditis	-	1	-	1
Klebsiella pneumonia	1	-	-	1
Acute laryngotracheobronchitis	-	1	-	1
Pneumonia unknown organism	-	1	-	1
Myocarditis	2	-	2	4
Gram negative sepsis	1	-	-	1
Pyelonephritis/meningitis	-	1	-	1
Peritonitis	1	1	-	2
Total	6	7	2	15

In two cases there were avoidable factors: in one case there was parental neglect of an unwell child; in the other the treating practitioners failed to recognise sepsis and shock.

4B Malignancy

There were 40 deaths due to malignancy, a similar number to previous years. The types of tumours are listed in table 40 by age group of child.

Table 40 Fatal malignancies

Type of tumour	Infant	1–4 years	5–9 years	10–14 years	Total
Central nervous system					
Medulloblastoma	1	2	–	–	3
Astrocytoma	–	–	3	–	3
Glioblastoma	–	–	2	1	3
Ependymoma	–	–	–	1	1
Nasopharyngeal/neuroectodermal	–	1	–	1	2
Leukaemia					
Acute myeloid leukaemia	1	–	–	1	2
Acute lymphatic leukaemia	–	1	1	5	7
Other leukaemia	–	–	–	1	1
Lymphoma					
Hodgkin	–	–	1	–	1
Burkitt	–	–	1	1	2
Neuroblastoma	1	3	1	1	6
Ewing sarcoma	–	1	–	2	3
Other sarcomas	–	1	3	2	6
Total	3	9	12	16	40

4C Other acquired diseases

There were 12 deaths due to other acquired diseases in 1997, which includes two deaths where the cause remained unascertained despite postmortem examination. There were three deaths as a result of asthma. The remaining deaths were mixed with one from each of the following conditions: epilepsy; cerebral haemorrhagic infarction; thrombotic thrombocytopenic purpura; acute encephalomyelitis; acute encephalitis; small bowel volvulus; and intraoperative complications.

4D Intentional injury

There were six deaths from intentional injury. Three young children died as a result of abuse, two siblings were involved in a murder-suicide, and the other child was a homicide victim.

4E Suicide

The one child suicide in 1997 was hit by a train.

IMMUNISATION AND VACCINE-PREVENTABLE DISEASES

In 1997, Victoria's immunisation programme continued and a universal service was provided by all local governments in Victoria.

New initiatives in immunisation funded by the Victorian Department of Human Services (DHS) included an enhanced surveillance programme for both measles and pertussis. The enhanced measles surveillance programme is being conducted by DHS in collaboration with the Victorian Infectious Diseases Reference Laboratory. All suspected cases of measles reported to DHS are intensively followed up and serology is requested. As measles may be confused with other viral rashes, individuals with suspected measles are also tested for recent rubella or parvovirus infection. The enhanced pertussis programme is being conducted in collaboration with the Microbiological Diagnostic Unit, University of Melbourne. Two nurses are funded by the Department of Human Services to actively follow up notified cases of pertussis and seek out secondary cases to ensure early detection and treatment. Such a surveillance programme is of particular importance in aiding DHS to clarify the epidemiology of pertussis, and to assist in the detection of any change in incidence of pertussis occurring after the introduction of DTPa (diphtheria/tetanus/acellular pertussis vaccine) on the 1996 Australian Standard Vaccination Schedule.

The mobile immunisation service continued to operate in the Western Metropolitan Region in 1997 targeting children under the age of the seventh birthday who were overdue for scheduled immunisations. A similar service commenced in early 1998 in three other Department of Human Services' regions—the Grampians, Southern and Hume.

As usual, the incidence of vaccine-preventable diseases was monitored through the Health (Infectious Diseases) Regulations 1990 and by supplementary surveillance activities. A detailed analysis will be published in the report *Surveillance of Notifiable Infectious Diseases in Victoria 1997, Public Health and Development Branch*, Department of Human Services, 1998.

Measles

The number of notified cases of measles remained low in 1997 with 91 cases, compared to 150 in 1995, and 96 in 1996. This corresponded to an annual incidence rate of 2.0 per 100,000 population. The highest incidence rate was in the 0–4 age group with a rate of 17.5 per 100,000, followed by the 5–9 year age group with a rate of 5.3 per 100,000.

Haemophilus influenzae type b (Hib)

The numbers of Hib infections notified to the Department fell to a record low of 9 in 1997. This included one case of epiglottitis, six cases of meningitis, and two other Hib infections (one septicaemia, one septicaemia/pneumonia). Six of these cases were in children less than 5 years of age. **The incidence of Hib disease in this age group has fallen from 71.7 per 100,000 in 1991, prior to the introduction of immunisation, to 1.9 per 100,000 in 1997.**

Pertussis

A widespread outbreak of pertussis was experienced in the latter half of 1996 and continued into 1997. A total of 1,679 notifications were received for the 1997 year compared to 1,344 in 1996 and 393 in 1995. The total population incidence rate was 36.5 per 100,000. The highest rates were in the 5–9 year age group and the 10–14 age group, with 103.2 and 94.2 cases per 100,000 respectively. The incidence rate in the under 0–4 year age group was 67.9 per 100,000. No deaths from pertussis were reported.

Rubella

In 1997, 371 notifications of acute rubella were received. This was a marked decrease from the numbers reported in 1996 (672). The total population incidence rate was 8.1 per 100,000, but the highest incidence continues to occur in the 15–19 year age group with a rate of 35.6 per 100,000. One hundred of the 112 notifications in this age group were males. For children aged 0–4 years, the incidence rate was 30.2 per 100,000. The incidence did not vary significantly between regions of the State.

Recommended childhood immunisation schedule

In 1998, the NHMRC updated the Australian Standard Immunisation Schedule (table 41). **The most significant change is the move forward of the second dose of measles-mumps-rubella vaccine (MMR) to be given prior to school entry, between the ages of 4–5 years.** The revised schedule also indicates that either DTPw (diphtheria/tetanus/whole cell pertussis vaccine) or DTPa (diphtheria/tetanus/acellular pertussis vaccine) can be used for the five scheduled DTP (diphtheria/tetanus/pertussis vaccine) doses.

Currently, government funding for DTPa applies only to the following circumstances: for the fourth and fifth scheduled doses of DTP; for children having any dose of DTP at, or over the age of 18 months; for those children who have had one or more of the following reactions to the first or second doses of DTPw: a convulsion with or without fever within three days; a hypotonic hyporesponsive episode (HHE) within 48 hours; a temperature greater than 40.5°C unexplained by any other cause; a severe local reaction (ie. swelling and erythema of the whole circumference of the leg); an abscess at the injection site; any reaction requiring hospitalisation.

The universal preadolescent hepatitis B immunisation programme commenced in Victorian schools at the beginning of the 1998 school year. Approximately 80% of Victorian year 7 children received Hepatitis B immunisation through the school programme in 1998, and a further unknown number were immunised privately. These are encouraging results for the first year of the programme. Victoria is the first State to implement such a widespread community Hepatitis B immunisation programme.

Implementation of universal infant hepatitis B immunisation has been deferred until the availability of further combination vaccines; however, parents who wish to have their infants vaccinated should be encouraged to proceed. Paediatric hepatitis B vaccine continues to be provided free for:

- Infants and children up to 10 years of age where there is a HBsAg carrier identified in the household;
- Infants and children up to 10 years of age who belong to ethnic groups with a HBsAg carrier rate above 2 per cent. These groups include: Australian Aboriginals, Torres Strait Islanders, Asians, Africans, central and south Americans, and eastern and southern Europeans, Maori New Zealanders, and Pacific Islanders; and
- Individuals in year 7 of secondary school.

Table 41 The NHMRC recommended immunisation schedule, 0–19 years (July 1998)

Age	Disease	Vaccine
2 months	Diphtheria, tetanus, pertussis Poliomyelitis <i>Haemophilus influenzae b</i>	DTPw:* or DTPa* OPV: Sabin vaccine Hib vaccine (HbOC or PRP - OMP)**
4 months	Diphtheria, tetanus, pertussis Poliomyelitis <i>Haemophilus influenzae b</i>	DTPw:* or DTPa* OPV: Sabin vaccine Hib vaccine (HbOC or PRP - OMP)**
6 months	Diphtheria, tetanus, pertussis Poliomyelitis <i>Haemophilus influenzae b</i> (HbOC schedule only)	DTPw:* or DTPa* OPV: Sabin vaccine Hib vaccine (HbOC)
12 months	Measles, mumps, rubella <i>Haemophilus influenzae b</i> (PRP - OMP schedule only)	MMR: measles mumps rubella vaccine Hib vaccine (PRP - OMP)
18 months	Diphtheria, tetanus, pertussis <i>Haemophilus influenzae b</i> (HbOC schedule only)	DTPa *or DTPw* Hib vaccine (HbOC)
Prior to school entry: (4–5 years)	Diphtheria, tetanus, pertussis Poliomyelitis Measles, mumps, rubella	DTPa *or DTPw* OPV: Sabin vaccine MMR: measles mumps rubella vaccine
10–16 yrs 1 month later 6 months after first dose	Hepatitis B (1st dose) Hepatitis B (2nd dose) Hepatitis B (3rd dose)	HBV: Hepatitis B vaccine HBV: Hepatitis B vaccine HBV: Hepatitis B vaccine
Prior to leaving school: (15–19 years)	Diphtheria and tetanus Poliomyelitis	ADT: Adult diphtheria, tetanus OPV: Sabin vaccine

* DTPw: Diphtheria, tetanus, whole cell pertussis vaccine

* DTPa: Diphtheria, tetanus, acellular pertussis vaccine

** HbOC (HibTITER) is given at 2, 4, 6 and 18 months

** PRP - OMP (PedvaxHIB) is given at 2, 4 and 12 months.

MATERNAL DEATHS IN VICTORIA

Table 42 Maternal deaths in Victoria 1953–1997

Year	Births			Maternal deaths	Deaths per 1,000 births
	Livebirths	Stillbirths	Total births		
1953	53,561	817	54,378	36	0.66
1954	54,660	794	55,454	35	0.63
1955	56,336	788	57,124	39	0.68
1956	58,393	819	59,212	17	0.29
1957	60,464	894	61,358	31	0.51
1958	61,269	826	62,095	29	0.47
1959	62,245	799	63,044	29	0.46
1960	64,025	850	64,875	28	0.43
1961	65,886	885	66,771	26	0.39
1962	65,890	775	66,665	17	0.25
1963	65,649	792	66,441	17	0.26
1964	64,990	771	65,761	22	0.33
1965	63,550	747	64,297	29	0.45
1966	64,008	780	64,788	20	0.31
1967	65,485	797	66,282	18	0.27
1968	70,228	768	70,996	21	0.30
1969	71,035	761	71,796	13	0.18
1970	73,019	782	73,801	29	0.39
1971	75,498	760	76,258	19	0.25
1972	71,807	842	72,649	12	0.17
1973	67,123	802	67,925	7	0.10
1974	66,201	787	66,988	9	0.13
1975	61,897	713	62,610	9	0.14
1976	60,667	616	61,283	12	0.19
1977	59,518	567	60,085	5	0.08
1978	58,861	575	59,436	11	0.18
1979	57,767	490	58,257	8	0.13
1980	58,206	447	58,653	10	0.17
1981	59,526	439	59,965	8	0.13
1982	59,965	490	60,455	6	0.09
1983	60,149	442	60,591	5	0.08
1984	60,278	426	60,704	8	0.13
1985	60,776	398	61,174	5	0.08

Table 42 Maternal deaths in Victoria 1953–1997—continued

Year	Births			Maternal deaths	Deaths per 1,000 births
	Livebirths	Stillbirths	Total births		
1986	60,863	390	61,253	10	0.16
1987	61,089	385	61,474	5	0.08
1988	63,126	416	63,542	11	0.17
1989	63,694	424	64,118	8	0.12
1990	66,350	376	66,726	12	0.18
1991	64,632	375	65,007	9	0.14
1992	65,815	323	66,140	4	0.06
1993	64,284	286	64,570	6	0.09
1994	64,376	329	64,705	7	0.11
1995	63,214	315	63,529	8	0.13
1996	62,429	291	62,720	3*	0.05*
1997	61,815	269	62,084	5	0.08

* Updated from the 1996 report.

A maternal death, as defined by the World Health Organisation, is the death of a woman during pregnancy, childbirth or in the 42 days of the puerperium, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management. This definition includes death from abortion and ectopic pregnancy, but excludes incidental deaths from unintentional injury, suicide, malignant tumours and so on. It should be noted that **in this and other reports on maternal deaths in Australia, these incidental deaths are included.**

Maternal deaths are subdivided into three groups:

- *Direct* maternal deaths due to a complication of the pregnancy itself.
- *Indirect* maternal deaths due to a complication not specific to pregnancy, but possibly aggravated by the physiological changes of pregnancy (for example, heart disease, diabetes).
- *Incidental* deaths (as defined above).

In 1997, there were five maternal deaths; two direct, two indirect, and one incidental.

Causes of the five maternal deaths

Direct deaths

1. A 36 year old gravida 4 para 2, weight 77kg, had a **history of left calf deep venous thrombosis** treated with heparin after emergency Caesarean section in her last pregnancy. She had **hyperemesis gravidarum** during this and previous pregnancies. In the present pregnancy Doppler and clinical examination of her legs showed no abnormality, and a haemostatic screen showed no underlying thrombotic reason for a thrombosis. As she was not keen to have further heparin injections, it was

decided not to give her this treatment during the pregnancy. At 29 weeks' gestation the woman presented to hospital because vomiting had become more persistent. Clinical examination was normal. Four hours later she was feeling much better but then collapsed in the toilet. She did not respond to resuscitative measures. The autopsy revealed **massive bilateral pulmonary thromboembolism** as the cause of death.

2. A 35 year old para 4, weight 86kg, had labour induced at 41.6 weeks' gestation by amniotomy and Syntocinon infusion. **Vaginal haemorrhage** then occurred, on account of which an **emergency Caesarean section** was implemented. There was **difficulty with intubation during induction of general anaesthesia**. This led to cardiovascular collapse and the woman died despite resuscitative efforts. The infant survived.

Indirect deaths

3. A 32 year old para 1 had preeclampsia in her first pregnancy. She had a history of **severe asthma, hypertension, cigarette smoking** and her weight was 119kg. At 24 weeks' gestation the woman became distressed and dyspnoeic at home in her bedroom and collapsed. Ambulance staff provided resuscitation and transfer to an intensive care unit but she could not be revived. Autopsy revealed **marked cardiomegaly**. The cause of death was considered to be severe asthma and cardiomegaly resulting in hypoxic arrhythmia in an obese woman, who had hypertension, and who was a heavy cigarette smoker.
4. A 32 year old para 2 with **hypertension** had Caesarean deliveries in her 2 previous pregnancies. She had regular antenatal visits to the obstetrician and a physician. At 34 weeks' gestation she collapsed suddenly when standing in the doctor's rooms. She remained unconscious and had craniotomy performed immediately following Caesarean section, 3 hours after the initial collapse. She had had a **subarachnoid haemorrhage** from **ruptured aneurysm**. The infant survived.

Incidental deaths

5. A 26 year old primigravida had a history of **glioma** first diagnosed 6 years previously and treated with radiotherapy 3 years previously. She was in remission but the **malignant glioma** recurred in both cerebral hemispheres at 24 weeks' gestation, and thereafter progressed rapidly. Her neurological status deteriorated and Caesarean section was performed at 27.5 weeks' gestation. The baby progressed well and survived. The mother failed to respond to chemotherapy and died 15 days after delivery.

Addendum

The following **direct maternal death was omitted from the 1996 annual report** due to delay in ascertainment.

A 33 year old para 1 had a laparoscopic tubal sterilisation and termination of pregnancy of about 14 weeks' gestation, by suction curettage, under general anaesthesia, as a day procedure. The woman smoked about 20 cigarettes per day and her weight was 45kg. Thirteen days after the operation the woman attended a meal at a friend's home, retired to bed in the spare room with her son and was found deceased the next day. The woman had no known symptoms or medical history of illness. In spite of a detailed autopsy examination **no cause of death was ascertained**.

ANTENATAL CARE

The standards of antenatal care and the definition of at-risk pregnancies that follow are adapted from the bulletins prepared by the National Health and Medical Research Council.

The aim of antenatal care (which is only a part of obstetric care) is to safeguard the health of mother and fetus by detection and treatment of maternal diseases (gestational diabetes, anaemia, hypertension, cardiac disease, renal insufficiency) and obstetric disorders (preeclampsia, fetal growth retardation, incompetent cervix, iso-immunisation, multiple pregnancy, breech presentation, polyhydramnios, cephalopelvic disproportion) by routine clinical observations and laboratory investigations.

1. The patient should consult her doctor during the first eight weeks of pregnancy.
2. First consultation:
 - (a) General medical, nutritional, and socioeconomic and demographic history.
 - (b) Past obstetric history, including previous contraception.
 - (c) A general physical examination of all systems including:
 - Record of height, weight and blood pressure.
 - Examination of varicose veins.
 - The teeth, gums, heart, lungs, breasts and nipples.
 - (d) Obstetric examination that includes:
 - Vaginal examination for detection of abnormalities such as vaginitis or an ovarian cyst. Cytological screening for cervical cancer is recommended.
 - Consideration of the size and shape of the bony pelvis.
 - Correlation of the size of the uterus with the period of amenorrhoea. To check the duration of pregnancy, ask patient to write down the date when she first notices fetal movements.
 - (e) Where duration of pregnancy is in doubt, arrange for ultrasonography to be performed as soon as possible. This procedure is most accurate in determining fetal maturity the earlier in the pregnancy it is performed. Ultrasonologists recommend 18 weeks as the preferable time for morphology of the various organ systems to be evaluated, and at this stage it also gives a reasonably accurate assessment of fetal maturity.
 - (f) Haematological investigations, including full blood examination, blood grouping with rhesus grouping, serological diagnostic test for syphilis, rubella antibodies, and an antibody test (indirect Coombs) in both Rh-D negative and positive women.
 - (g) Record the use of all therapeutic substances and significant nontherapeutic substances such as alcohol, tobacco and narcotic substances. Caution the patient regarding the use of drugs (other than iron and folic acid) in pregnancy.
 - (h) The emotional needs of the patient should be assessed.
Education is of great importance. This should include personal hygiene, dental care, nutrition and diet counselling, antenatal preparation for pregnancy and labour, lactation, parent-craft and contraceptive information.

3. Average intervals for subsequent consultation should be:
 - Each four weeks to 28 weeks; then
 - Each 2 weeks to 36 weeks; then
 - Weekly until delivery.
4. Routine examinations at each consultation to include the following:
 - Weight.
 - Blood pressure.
 - Abdominal examination.
 - Urine examination for protein and sugar. Presence of proteinuria warrants further investigation.
5. Women with an identified potential of a high-risk delivery (that is, previous Caesarean section, multiple pregnancy or breech presentation, or at risk of preterm delivery), should be considered for referral to an appropriate hospital for delivery.
6. Where there is inappropriate maternal weight gain or uterine growth, the following possibilities should be considered:
 - Polyhydramnios.
 - Intrauterine growth retardation.
 - Twinning or multiple pregnancy.
 - Congenital abnormalities.

Any one of these may be an indication for ultrasonography and/or other assessments of fetal well-being.
7. A screening test for *gestational diabetes* at 26–28 weeks' and for *fetoplacental function* at 30–34 weeks' should be considered in all women.
8. At 30 weeks:
 - Haemoglobin level should be repeated.
 - Where Rh negative, the indirect Coombs test should be repeated and again at 36 weeks' and 40 weeks'.
9. When complications are present or anticipated, consultation should be sought promptly and admission to hospital with appropriate facilities should be arranged.

AT-RISK PREGNANCIES

While obstetric complications may occur in any pregnancy at any time, certain categories of patient are particularly at risk. In these categories, maternal and perinatal mortality are substantially increased. The accompanying list is presented to remind all those practising obstetrics of these dangers. It is recommended that patients falling into these groups should be assessed carefully, and that if more than minor complications exist, consideration should be given to referral of the case to an obstetrician with special expertise.

1. General factors

Age (early teenage, later reproductive years)
Low socioeconomic status
Parity (primigravida and gravida 4+)
Height (short stature)
Weight (overweight and underweight)
Dietary aberrations
Drug dependency, and abuse of alcohol or tobacco
Mental illness

2. Maternal diseases

Cardiovascular disease, including hypertension
Diabetes mellitus
Anaemias (all types)
Chronic renal disease, including recurrent urinary infection
Past history of venous thrombosis and/or pulmonary embolism.

3. Family history of a genetic disorder

4. Poor obstetric history

Previous Caesarean section
Previous abortion, including habitual abortion
Previous perinatal mortality
Previous premature labour or placental insufficiency

5. Diseases peculiar to pregnancy

Preeclampsia
Rhesus and other blood group incompatibility

6. Bleeding in pregnancy

Threatened abortion
Abruptio placentae
Placenta praevia

7. Obstetric difficulties discovered antenatally

Malpresentation, especially breech presentation and transverse lie
Disproportion
Multiple pregnancy
Placental insufficiency and retarded intrauterine growth
Prolonged pregnancy (past 42 weeks)
Premature rupture of the membranes

8. Patients having inadequate antenatal care

Failure to attend for regular antenatal checks
Non-booked cases
Late booked cases

9. Difficulties discovered during labour

Failure to progress satisfactorily, including prolonged labour
Fetal distress
Malpresentation

EMERGENCY TRANSFER

TRANSFER OF HIGH-RISK MOTHERS

The Council emphasises the importance of the referral of certain high-risk mothers. The particular groups that require referral are patients with *multiple pregnancy, premature rupture of the membranes, severe preeclampsia, and cervical incompetence*. There is continued evidence that some perinatal deaths are avoidable, that perinatal deaths from some maternal complications such as twins have not declined in the past years as much as may now be possible, and that special obstetric hospitals have facilities for improving the outcome for these at-risk cases.

NEWBORN EMERGENCY TRANSPORT SERVICE (NETS)

During 1997 there were 1,267 transfers, the greatest number since the establishment of NETS in 1976. The continuing high level of return transfers has been facilitated by the increased availability of trained medical and nursing staff and appropriate facilities available for looking after moderately ill convalescent infants within Level 2 metropolitan and country hospitals.

Table 43 Transfers by NETS 1991–1997

	1991	1992	1993	1994	1995	1996	1997
Primary transfers, metropolitan	476	502	457	410	497	489	474
Primary transfers, country, road	119	104	123	103	114	111	99
Primary transfers, country, air ambulance	98	123	94	118	126	98	121
Return transfers	183	238	219	207	265	456	556
CT scans/echocardiography	10	6	10	4	9	17	17
Total	886	973	903	842	1,011	1,171	1,267

Selection of infants for transfer

The following are some suggested reasons for transport. It is vital to assess the time available and the staff and facilities present for managing such neonates. These will vary between different doctors and hospitals.

Transfer of critically ill infants should be directed to a neonatal intensive care unit (NICU) level 3, which will provide skilled medical and nursing care and diagnostic and other supportive services on a 24-hour basis. Less serious problems may only require transport to a hospital with specialist paediatric, medical and nursing facilities (high dependency level 2).

The requirement to transfer an infant is often obvious; however, the categories outlined below deserve emphasis.

1. Respiratory distress

An infant with an oxygen requirement of more than 40 per cent needs to be in a hospital with skilled personnel and facilities for monitoring arterial blood gases. An infant needing more than 60 per cent oxygen usually requires management in a neonatal intensive care unit.

An infant with respiratory distress associated with apnoea, suspected bacterial pneumonia or significant meconium aspiration should be discussed with a paediatric consultant and requires referral to a NICU.

2. Low birth-weight (less than 2,500g)

Infants of birth-weight less than 1,250g should have an initial period of management in a NICU. All other low birth-weight infants should be managed in hospitals with the facilities and staffing appropriate to the infants' requirements. Every hospital should have agreed guidelines for the weight and gestation of infants for which it can appropriately care.

Infants greater than 22 weeks' gestation are worthy of discussion with an intensive care consultant as to the advisability of transfer.

3. Birth asphyxia

Transfer to a high dependency level 2 or level 3 nursery should be considered whenever infants require intubation and assisted ventilation during resuscitation, or have persistent nervous system depression.

Arranging the transport

There are two ways of arranging transfer:

1. Telephone the NETS 'hot line' (03) 9347 7441.

The call will be received by the transport nurse, secretary or a paediatric registrar. NETS will then arrange the ambulance and notify the receiving unit of the impending admission. Telephone discussions with NETS staff may help in deciding whether or not transfer is the best option in a particular case. A consultant paediatrician is available at all times to discuss patient triage or stabilisation management prior to transfer.

2. Alternatively, the doctor may wish to discuss the patient with the receiving unit, in which case the receiving unit will then notify NETS to arrange the transfer. Intensive care units are situated at the Mercy Hospital for Women, Monash Medical Centre, Royal Children's Hospital and Royal Women's Hospital. A transport team will be dispatched to the referring hospital and will assume responsibility for the care of the baby on arrival or at such time after arrival as the referring doctor releases the infant.

In most instances NETS advises that the impulse to send the infant by local ambulance with the thought of saving time must be resisted. Results are much better if the baby is kept in the referring hospital and stabilised before transfer.

Stabilisation and Transport of Newborn Infants and At-Risk Pregnancies

This booklet is a manual to help staff of the referring maternity hospitals in:

- Deciding on appropriate transfer.
- Understanding basic stabilisation procedures.
- Being informed about specialised stabilisation of some specific problems.
- Obtaining the services of NETS.
- Managing some acute obstetric problems.

It is concise, well illustrated and informative, and has a number of useful appendices, including lists of resuscitation equipment and a resuscitation chart. Sections include notes on resuscitation of the newborn, medication commonly used in the newborn nursery, and neonatal jaundice.

Copies of the new 4th edition are available for \$20 (personal) and \$25 (institutional) from:

Newborn Emergency Transport Service Education Division.
132 Grattan Street, Carlton, Victoria, 3053.

NETS EDUCATION DIVISION

The NETS Education Division provides ongoing education programmes in neonatal care for nursing and medical staff in Melbourne metropolitan, outer suburban, and country hospitals throughout Victoria. During the 1997 calendar year, 156 direct contact hours were provided for over 1,350 health care professionals involved in perinatal care. These in-service education and study-day sessions were conducted using a variety of teaching-learning strategies including didactic, case discussion, and clinical skills workshop formats.

In-service sessions are generally for staff from Melbourne metropolitan and outer suburban hospitals; study days and seminars involving local staff and NETS Education personnel can be arranged, particularly for staff from country midwifery hospitals.

The NETS Education Division staff continues to coordinate the Continuing Education Program in Newborn Nursing Care in collaboration with staff from the four tertiary neonatal units.

The NETS Education Division has also developed a Distance Education Programme in Special Care of the Newborn in collaboration with Southern Cross University. This programme is designed for registered midwives in Victorian level 1 and level 2 midwifery hospitals. The programme, which consists of four professional development units, is designed to develop specific knowledge, skills, attitudes, values, and beliefs required to provide quality holistic perinatal nursing care for sick, premature and/or small for gestational age neonates. The units may be undertaken individually for professional development only, or to gain credit points toward the postgraduate awards Graduate Certificate, Graduate Diploma or Master of Health Science. Since May 1994, 93 registered midwives have successfully completed the first unit, and 19 have completed all units.

NETS Education staff are available to advise on equipment purchasing, developing nursing policies, and formulating nursing care standards and requirements for level 1 and level 2 midwifery hospitals.

Further details regarding the distance education programme in Special Care of the Newborn, and information and bookings for educational sessions, may be made by telephoning (03) 9344 2419 or (03) 9344 2355.

PAEDIATRIC EMERGENCY TRANSPORT SERVICE (PETS)

A statewide service for the transport of very ill children over 3 months old is provided by Paediatric Emergency Transport Service (PETS) run by the Intensive Care Unit at the Royal Children's Hospital. Consultation about the management of very ill children is also provided.

To contact the service, telephone ICU at the Royal Children's Hospital, (03) 9345 5211, and then identify your call as a PETS call. Advice about what to do before PETS arrives has previously been published (*Medical Journal of Australia* 1992;156:117-124).

Table 44 Transfers by PETS, 1990-1997

	1990	1991	1992	1993	1994	1995	1996	1997
Injuries:								
head injury	12	19	22	19	17	19	20	24
immersion	6	9	9	3	10	-	5	4
poisoning	7	5	-	6	4	7	5	6
other	9	6	5	15	9	6	5	7
Cardiovascular	4	8	10	9	3	10	2	1
Neurology:								
fits	18	18	18	24	16	19	19	22
meningitis	15	12	20	10	3	9	5	7
other	6	7	8	4	13	6	10	8
Respiratory:								
asthma	15	23	31	34	47	23	28	30
bronchiolitis	8	6	4	7	4	9	8	8
croup	50	34	53	27	44	18	24	19
epiglottitis	36	28	27	11	3	2	1	1
other	10	11	17	18	21	18	24	14
Miscellaneous:								
septic shock	4	3	2	4	5	13	9	8
other	1	5	5	10	8	1	15	10
Total	201	194	231	201	207	160	180	169

Common problems in the management of ill children

Croup and epiglottitis

- Confusion in diagnosis between epiglottitis and croup.
- Sudden airways obstruction in epiglottitis.
- Examination of the throat in epiglottitis.
- Intubation too late.
- Inappropriate size or length of endotracheal tube.
- Inadequate humidification and suction of tube.
- Failure to recognise endotracheal tube obstruction.

Asthma and bronchiolitis

- Submaximal medical treatment for asthma.
- Failure to provide 100 per cent oxygen.
- Ventilation too early, or too late.

Brain injuries (drowning, cot death, trauma, convulsions)

- Too much fluid.
- Failure to control fitting.
- Hypoventilation from fitting or anticonvulsants.
- Hypotension from hypovolaemia or failure to use dopamine.
- Failure to diagnose abdominal injuries after trauma.
- Poor airway and ventilatory management.
- Failure to decompress the stomach.
- Inappropriate lumbar puncture in very ill children with coma.

Septic and hypovolaemic shock

- Lack of adequate venous access.
- Inadequate volume replacement.
- Failure to use dopamine.
- Failure to monitor blood pressure adequately.
- Uncorrected acidosis or anaemia.
- Uncorrected hypoxia or hypoventilation.