
**THE CONSULTIVE COUNCIL
ON OBSTETRIC AND PAEDIATRIC
MORTALITY AND MORBIDITY**

**ANNUAL REPORT
FOR THE YEAR 1998**

**INCORPORATING THE 37TH SURVEY
OF PERINATAL DEATHS IN VICTORIA**

**Annual Report
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Incorporating the 37th Survey
of Perinatal Deaths in Victoria

**The Consultative Council on Obstetric
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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 formidable task of collecting, collating, and analysing data on all Victorian births and deaths, from 20 weeks' gestation up to, but not including, the 15th birthday, 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 1998, the **livebirth rate** continued to decline and reached 13.1 per 1,000 mean estimated population, the **lowest recorded rate since Council surveys commenced in 1962** (table 4). For comparison, the 1998 figures for average number of children per woman were: Brazil 2.3, Australia 1.8, Germany 1.3 and, the lowest, Italy 1.2.

In 1998 the **perinatal mortality rate** increased from 6.9 per 1,000 births in 1997 to 7.3 per 1,000. This result was mainly due to an increase in stillbirths from 4.3 in 1997 to 4.7 in 1998, with the neonatal death rate increasing slightly from 2.6 to 2.7 per 1,000 births. **Stillbirths** comprised 63.9 per cent (290 of 454) of perinatal deaths and remain first priority for prevention, especially since so many (31.7 per cent) were considered to be 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 (50 cases, 17 per cent of all stillbirths), and inappropriate management, usually failure of recognition, of the growth-restricted fetus (43 cases, 14.8 per cent of all stillbirths). Only 11.6 per cent (19 of 164) of **neonatal deaths** were found to have an avoidable factor. Improvement requires prevention of prematurity and major fetal malformations.

The **infant death rate** of 3.9 per 1,000 livebirths remained close to the lowest ever recorded in Victoria (table 2). **The number of postneonatal infant deaths was the lowest ever recorded in Victoria** (206 in 1989, 77 in 1998, table 1).

In 1998, the number of postneonatal and child deaths (children aged 29 days until the 15th birthday) was 227, the lowest ever recorded in Victoria. Figure 10 shows the continuous reduction from 433 in 1985 when the Infant and Child Death and Morbidity subcommittee commenced. Figure 9 shows that this improvement has been contributed to mainly by the reduction in **cot deaths** (140 to 24) and deaths from **unintentional injuries** (105 to 52), a lesser extent by reduction in birth-related deaths (112 to 73), and, not at all by deaths from **acquired disease/intentional injury** (76 to 78). However, the improvement from 1997 was mainly due to a reduction in the number of birth-related deaths (90 in 1997, 73 in 1998). Recommendations from the Council for prevention of infant and child deaths from sudden infant death syndrome, drowning, poisoning, dog-bites, suicide and appropriate referral for paediatric intensive care are well itemised and provide important information for readers. This section of the report also summarises signs of severe illness in infants, signs of severe sepsis in children, a crisis plan for every child with asthma, and key points on management of dehydration, gastroenteritis, diabetic ketoacidosis, meningitis, surgical emergencies and snakebite.

The recommended **childhood immunisation schedule** is included (table 41) to help dissemination of important information to health professionals and the public. 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. Also the **universal preadolescent hepatitis B immunisation programme** commenced in Victorian schools at the beginning of the 1998 school year.

In 1998 the total number of perinatal deaths due to **malformations** was 84 (97 in 1997), the prevalence per 1,000 births was 1.4, and the percentage of perinatal deaths caused by malformations was 18.5% (22.6% in 1997). **All of these results were record low values for Victoria** (tables 7–9). The explanation for these changes is not apparent, and was **not** accounted for by more **terminations of pregnancy** for a malformation before 20 weeks' gestation. In 1998 there were 269 (287 in 1997) such terminations, a rate of 4.3 per 1,000 births. The anomalies listed in tables 30 and 32, not all of which necessarily cause perinatal

death, allow an estimation of the impact of screening for malformations on the perinatal mortality rate of infants with birth-weight >500g (7.3 per 1,000 births in 1998).

Many screening programmes aim to identify the fetus with **Down syndrome**. In 1998 the total number of pregnancies known to be associated with a fetus with Down syndrome was 131; there were 71 terminations (table 32), 7 perinatal deaths and 53 surviving infants.

The importance of **intrapartum fetal surveillance** is indicated by the fact that in 17.2% (50 of 290) of stillbirths, fetal death occurred in labour (table 15); 24 of these infants had birth-weights \geq 2,500g.

Maternal age. In the past 15 years the proportion of women aged over 35 years or more at delivery increased from 7.7% to 17.6%. Mothers aged 30–34 years had the lowest perinatal mortality rate, 5.8 per 1,000 births (table 21).

The Caesarean section rate was 21.0 per cent, the highest recorded in Victoria.

In terms of perinatal mortality and morbidity (mainly prematurity, its costs and complications), **multiple pregnancy** continues to have an importance out of proportion to its incidence, which was 3.2% of all births with birth-weight of 500g or more. The perinatal mortality rate for all multiple births of birth-weight >500g was 26.3 per 1,000 births, compared with 6.7 for singleton births (table 29). **Multiple births accounted for 11.5% of all perinatal deaths.** Many high-risk multiple pregnancies and their disproportionate contribution to extreme prematurity and neonatal intensive care, are preventable, by adjustment of reproductive technology regimens, especially IVF-embryo transfer and GIFT. This problem requires regulation by teaching hospital boards, College of Obstetricians and/or by State Government decree.

The length of stay in hospital after confinement continues to decline (figure 8). During the past 13 years the percentage of mothers staying in hospital for 5 or more days has fallen from 84.2% to 37.7%. The percentage of those staying for 3–4 days has increased from 12.0% to 42.5% and those staying for 1–2 days has increased from 3.8% to 19.8%. These results illustrate the extra pressure imposed on hospital staff and resources to promote early discharge. It is not a patient-driven trend. More research is required to establish if this pattern of care is cost-effective, by calculation of the extra community resources required by the early discharged mothers and babies.

The number of maternal deaths, 2 in 61,924 births, was the lowest ever recorded in Victoria (table 42). Both were considered to be direct deaths. All pregnant women, indeed all women, should be informed about the risks of significant **morbidity** in pregnancy. This information is documented, and in fact is used as the basis of remuneration to hospitals by Government, and should be readily available (published annually). A maternal mortality rate of 1 in 30,000 pregnancies can lead to complacency. A postpartum haemorrhage (>600ml) rate of 1 in 25, leading to a brush with death, requiring blood transfusion in 1 in 200 mothers, even in those having a normal delivery, is another matter.

This annual report concludes with recommendations for **antenatal care**, identification of at-risk pregnancies, and emergency **transfer of high-risk mothers** (severe preeclampsia, premature rupture of the membranes, multiple pregnancy). The results of the **Newborn Emergency Transfer Service** (NETS) summarises the reasons for the 1,433 transfers in 1998, **the highest number on record** (table 43). Information is also provided for selection of infants for transfer. Finally, the reasons for transfer of very ill children aged more than 3 months by the **Paediatric Emergency Transport Service** (PETS) for 1998 are presented (table 44).

Professor Norman A. Beischer

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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 (up to, but not including, their 15th birthday), 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 requests for data. 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 of research projects, 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 National *Statement on Ethical Conduct in Research Involving Humans 1999*. Before the project can begin, a properly constituted Humans Research 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.

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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 14th Annual Survey of Deaths in Infancy and Childhood and the 37th 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 1998 was 7.3 per 1,000 births, an increase from 6.9 per 1,000 births in 1997. There was an increase in the stillbirth rate from 4.3 in 1997 to 4.7 in 1998, with the neonatal death rate increasing slightly from 2.6 in 1997 to 2.7 in 1998.

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.
<i>Child death</i>	A death of a child occurring after and including their first birthday and up to, but not including, their 15th birthday.

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 (1998) 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.

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. 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. **The infant and child mortality section reports on all deaths occurring in Victoria from 29 days of age up to, but not including, the 15th birthday.**

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 were first reported in 1965 and 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 by the PDCU.

SURVEY OF PERINATAL DEATHS

PERINATAL AND INFANT DEATHS

The denominator of perinatal mortality rates is based on all births in Victoria in 1998 (61,924). Neonates who died in Victoria but were born elsewhere were excluded. In 1998 there were 290 stillbirths and 164 neonatal deaths, giving a total of 454 deaths and a perinatal mortality rate of 7.3 per 1,000 births (tables 1 and 2). Excluded perinatal deaths are recorded in table 5.

Table 1 Perinatal and postneonatal infant deaths 1989–1998

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Livebirths	63,694	66,350	64,632	65,815	64,284	64,376	63,214	62,429	61,815*	61,634
Stillbirths	424	376	375	325	286	329	315	291	269	290
Neonatal deaths	240	273	224	191	165	184	193	157	160	164
Perinatal deaths	664	649	599	516	451	513	508	448	429	454
Postneonatal infant deaths	206	175	123	120	96	102	94	82	87	77
Total infant deaths#	446	448	347	311	261	286	287	239	247	241

Neonatal and postneonatal infant deaths.

* Amended figure since 1997 report

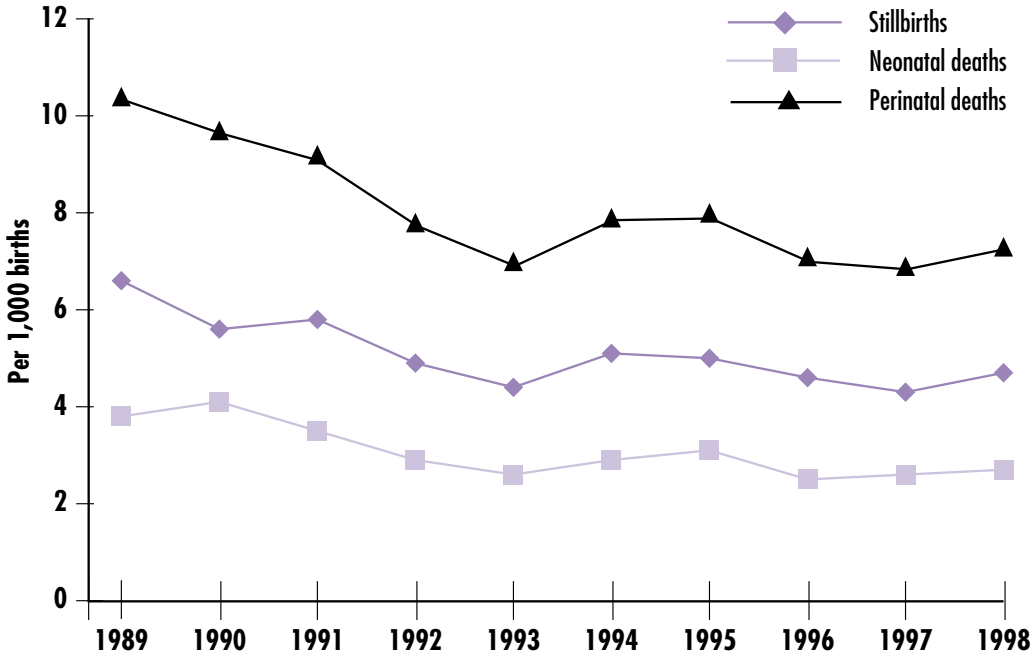
Table 2 Perinatal and postneonatal infant deaths* 1989–1998

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Stillbirths	6.6	5.6	5.8	4.9	4.4	5.1	5.0	4.6	4.3	4.7
Neonatal deaths	3.8	4.1	3.5	2.9	2.6	2.9	3.1	2.5	2.6	2.7
Perinatal deaths	10.4	9.7	9.2	7.8	7.0	7.9	8.0	7.1	6.9	7.3
Infant deaths#	7.0	6.8	5.4	4.7	4.1	4.4	4.5	3.8	4.0	3.9

* Rate per 1,000 births.

Neonatal and postneonatal infant death rate.

Figure 1 Perinatal mortality rates 1989–1998



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.

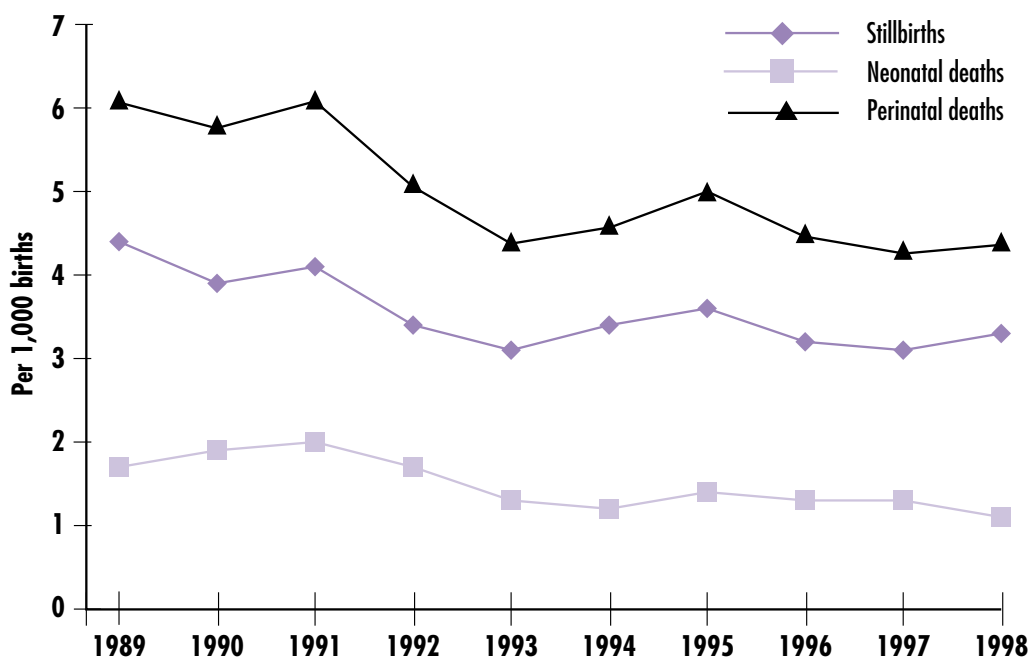
Neonatal death A death occurring in an infant whose birth-weight was at least 1,000g (or if the birth-weight is not known, an infant born after at least 28 weeks gestation) who dies within seven days of birth. Victorian data using the above definitions are presented in table 3 and figure 2.

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 1989–1998

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Stillbirths	4.4	3.9	4.1	3.4	3.1	3.4	3.6	3.2	3.1	3.3
Neonatal deaths	1.7	1.9	2.0	1.7	1.3	1.2	1.4	1.3	1.3	1.1
Perinatal deaths	6.1	5.8	6.1	5.1	4.4	4.6	5.0	4.5	4.3	4.4

Figure 2 Perinatal mortality rates for international comparison 1989–1998



VICTORIAN BIRTH RATES

In 1998, the number of births fell slightly to 61,924. The livebirth rate is the number of livebirths per 1,000 of the estimated mean resident population for the year indicated. In 1998, the livebirth rate showed a continuing decline (rate 13.1) since the Council surveys commenced in 1962.

Table 4 Total births in Victoria 1962–1998*

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	13.5
1998	61,634	61,924	4,689,776	13.1

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

PERINATAL DEATHS REGISTERED, BUT EXCLUDED FROM THIS SURVEY

There were 176 perinatal deaths legally required to be registered in Victoria in 1998 (see page 3) which, because of Council's definitions, have been excluded from all other tables in this report. These included 116 stillbirths and 53 neonatal deaths that were registered because they occurred at 20 weeks' gestation or later, but had a birth-weight under 500g (or gestation under 22 weeks' if birth-weight is unknown.) Sixty-five (38 per cent) had congenital malformations and the pregnancy was terminated in 61 of these cases.

In addition there were 7 neonatal deaths in infants born interstate and referred to Victoria for treatment (in particular cardiac surgery)

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

Cause of death	<200		200-299		Birth-weight (g) 300-399		400-499		Unknown		Total
	SB	NND	SB	NND	SB	NND	SB	NND	SB	NND	
Malformation	3	1	11	5	20	7	11	7	-	-	65
Infection	-	-	-	-	-	1	3	1	-	-	5
Other	14	1	12	3	24	10	18	17	-	-	99
Total	17	2	23	8	44	18	32	25	-	-	169

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, 75.5 per cent (219 of 290) of the 1998 stillbirths were presented to the Stillbirth Committee. Of these, 127 (43.8 per cent of all stillbirths) were considered to be unavoidable. In the remaining 92 cases (31.7 per cent of all stillbirths) there were 'avoidable' factors identified (table 6). There were a total of 184 avoidable factors in these 92 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 (50 cases, 17.2 per cent of all stillbirths). Misinterpretation of, or undue reliance on, the test occurred in 10 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-restricted fetus

A growth-restricted fetus has a birth-weight under the 10th percentile according to gestational age. Inadequate management of such cases was found in 43 (14.8 per cent) of the 290 stillbirths.

The Council wishes to repeat its warning that **leaving in utero a fetus who is growth restricted 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 eight cases. A Caesarean section was performed too late in two cases, or not at all when factors indicated the need to do so in four further cases. It was considered that surgical induction was too late in two cases, and there was failure to expedite delivery in three cases.

4. Inadequate management of preeclampsia, eclampsia and maternal hypertension

There were seven stillbirths (five in 1997) 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

Three 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 and delay in reporting decreased movements

Family neglect or ignorance featured in nine cases. There was delay in reporting decreased fetal movements in seven cases.

7. Inadequate management of a diabetic mother

Only one stillbirth was identified in association with inadequate management of maternal diabetes, a decrease from 8 in 1997.

8. Inadequate management of a prolonged pregnancy or malpresentation

Inadequate management of a prolonged pregnancy of over 42 weeks' gestation was implicated in three stillbirths. There were five cases where a breech or other malpresentation was inadequately managed.

9. Maternal smoking and inappropriate maternal drug use

Maternal smoking was identified as a contributing factor in 14 stillbirths, and inappropriate maternal drug use in 2 cases.

Neonatal deaths

Of the 164 neonatal deaths, 58 (35.4 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, 39 (23.8 per cent) were thought to be unavoidable. Avoidable factors were considered to be present in the remaining 19 cases (11.6 per cent of all neonatal deaths).

About two-thirds of these factors were obstetrical, and one-third related to paediatric care (table 6). Inadequate resuscitation was identified in six neonatal deaths, inadequate paediatric management in one case, and delays, difficulties or failure to transfer an infant in one case.

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 preeclampsia and macrosomia 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:		
Delay/no consultation in high-risk pregnancy	2	–
Inadequate management of:		
Multiple pregnancy	3	3
Diabetic mother	1	1
Hypertension, preeclampsia	7	3
Prolonged pregnancy	3	2
Growth-restricted fetus	43	–
Macrosomia	3	2
Inappropriate maternal drugs		
Maternal smoking	4	–
Family neglect/ignorance	9	2
Failure/delay reporting decreased movements	7	–
Inadequate antenatal monitoring:		
Clinical need apparent	50	1
Misinterpretation/undue reliance on test	10	–
Intrapartum care:		
Unsuitable hospital for delivery	1	4
Failure to perform Caesarean section	4	1
Caesarean section too late	2	2
Surgical induction too late	2	–
Inadequate intrapartum monitoring	8	3
Failure to expedite delivery	3	–
Inadequate management of:		
Breech/malpresentation	5	2
Fetal distress	–	2
Forceps delivery	–	1
Preterm delivery	1	–
Other maternal factor	4	3
Infant and fetus		
Delay/failure to transfer infant	–	1
Inadequate:		
Resuscitation	–	6
Paediatric management	–	2
Total number of cases	290	164
Cases presented to specialist review committee	219 (75.5%)	58 (35.4%)
Cases reviewed with avoidable factors identified	92 (31.7%)	19 (11.6%)

*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 1998, and in previous years, leads the Council to make some observations and suggestions.

The ratio of stillbirths to neonatal deaths was 1.8 to 1 (290 to 164), yet the ratio of avoidable factors was 4.8 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.**

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:

- Poor 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 restriction) 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:

Corticosteroid therapy given to the mother before the birth is undoubtedly beneficial.

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.

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 restriction 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 multiparas

The use of an oxytocin infusion to initiate or augment labour in a multipara 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 all 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 1998, 12.1 per cent of perinatal deaths were from multiple pregnancies, and the multiple pregnancy was believed to be the primary cause of death in 10.5 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.

Availability of an anaesthetist

It is recommended that availability of an anaesthetist and access to a theatre should be a priority in the management of high risk deliveries such as multiple pregnancies.

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 restriction, 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 XXXX).

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 1998, congenital malformations accounted for 18.5 per cent (84 of 454) of perinatal deaths. Of the remaining heterogeneous group of 'non-malformation' deaths, 17 (3.8 per cent) were attributable to infections. 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

Cause of death	Birth-weight (g)								Total	(%)
	500–999		1,000–2,499		≥2,500		Unknown			
	SB	NND	SB	NND	SB	NND	SB	NND		
Malformation	12	7	12	29	2	22	–	–	84	(18.5)
Non-malformation										
Infection	2	4	2	5	2	2	–	–	17	(3.8)
Cot death	–	–	–	1	–	3	–	–	4	(0.9)
Erythroblastosis	1	–	–	1	–	–	–	–	2	(0.4)
Other	64*	49	97	11	95	30	–	1	347	(76.4)
Total	79	60	111	47	99	57	–	1	454	(100)

Table 8 Perinatal deaths by major cause, proportion of yearly total, 1989–1998

Cause of death	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
	%	%	%	%	%	%	%	%	%	%
Malformation	20.3	21.4	20.7	22.9	22.9	20.5	22.0	20.1	22.6	18.5
Non-malformation										
Infection	4.6	4.0	4.0	1.7	5.8	4.5	4.9	3.3	4.2	3.8
Erythroblastosis	0.6	0.5	0.2	0.6	0.9	0.8	0.4	0.4	–	0.4
Other	74.6	74.1	75.1	74.8	70.4	74.2	72.7	76.2	73.2	78.8

Table 9 Causes of perinatal death, incidence per 1,000 births, 1989–1998

Cause of death	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Malformation	2.1	2.1	1.9	1.8	1.6	1.6	1.8	1.4	1.6	1.4
Non-malformation										
Infection	0.5	0.4	0.4	0.1	0.4	0.4	0.4	0.2	0.3	0.3
Erythroblastosis	0.1	0.1	–	–	–	–	–	–	–	–
Other	7.7	7.2	6.9	5.8	4.9	5.9	5.8	5.4	5.0	5.6

Details of perinatal deaths in the 'non-malformation' group (n=369) are provided in table 10. Antepartum haemorrhage/placental abruption remains the predominant principal maternal cause of perinatal deaths (54 cases). Other important conditions were:

- Multiple pregnancy (39 cases).
- Premature rupture of the membranes (18 cases).
- Preeclampsia/eclampsia (10 cases).
- Placental infarction/insufficiency (14 cases).
- Cord around neck/true knot (19 cases).

Antepartum hypoxia was the largest fetal contributor to death and accounted for 69 stillbirths. It should be noted, however, where no cause for a stillbirth could be determined antepartum hypoxia was ascribed as the cause.

In 1998, there were 28 unexplained fetal deaths after 36 weeks' gestation. These stillbirths were neither growth restricted 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 two neonatal deaths, and six stillbirths, and 10 further neonatal deaths were as a result of severe birth asphyxia.

There were four neonatal cot deaths in 1998.

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			
		SB	NND	SB	NND	SB	NND		
760.0	Preeclampsia and eclampsia	4	-	4	1	1	-	10	2.7
760.1	Maternal renal/UT tract disorders	-	-	1	-	-	-	1	0.3
760.2	Maternal infections	-	-	1	-	-	-	1	0.3
	Chronic maternal circulatory/ respiratory disease	1	-	-	-	-	-	1	0.3
760.7	Fetus/newborn affected by drug	1	-	-	-	1	-	2	0.5
760.8	Other maternal disorders	2	-	-	-	1	1	4	1.1
761.0	Incompetent cervix	2	4	-	-	-	-	6	1.6
761.1	Premature rupture of membranes	3	9	2	3	1	-	18	4.9
761.5	Multiple pregnancy	8	11	14	4	2	-	39	10.6
761.7	Malpresentation before labour	-	-	-	-	1	-	1	0.3
761.8	Other maternal complications	1	-	1	1	-	-	3	0.8
762.0	Placenta praevia	-	1	1	-	-	-	2	0.5

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			
		SB	NND	SB	NND	SB	NND		
762.1	Antepartum haemorrhage	16	8	19	–	7	4	54	14.7
762.2	Placental infarction/insufficiency	3	–	9	–	2	–	14	3.8
762.5	Cord around neck, true knot	5	–	2	–	11	1	19	5.2
762.6	Other cord conditions	–	–	–	–	3	–	3	0.8
762.7	Chorioamnionitis	2	3	1	–	2	–	8	2.2
763.0	Breech delivery	–	–	1	–	–	2	3	0.8
763.1.	Malpresentation/disproportion	–	–	1	–	–	–	1	0.3
763.2	Difficult forceps	–	–	–	–	1	3	4	1.1
764.0	Fetal growth restriction	3	–	16	1	12	–	32	8.7
765.0	Extreme immaturity	3	14	–	–	–	–	17	4.6
766.0	Macrosomia	–	–	–	–	7	1	8	2.2
766.2	Postterm	–	–	–	–	3	–	3	0.8
768.0	Hypoxia, antepartum	11	–	22	1	35	–	69	18.7
768.1	Hypoxia, intrapartum	–	–	–	–	6	2	8	2.2
768.5	Severe birth asphyxia	–	1	–	–	–	9	10	2.7
768.9	Other birth asphyxia in liveborn	–	–	–	–	–	1	1	0.3
771.2	Congenital herpes/Listeriosis/ Toxoplasmosis	–	1	–	4	–	–	5	1.4
771.7	Neonatal candida infection	–	–	–	1	–	–	1	0.3
771.8	Bronchopneumonia/septicaemia	–	–	–	–	–	2	2	0.5
772.0	Fetal haemorrhage (includes donor twin-twin transfusion)	1	–	2	–	2	1	6	1.6
	Haemolytic disease due to Rh isoimmunization	1	–	–	1	–	–	2	0.5
777.6	Perinatal intestinal perforation	–	1	–	–	–	–	1	0.3
778.0	Nonimmune hydrops	–	–	1	–	–	2	3	0.8
798.0	Cot death	–	–	–	1	–	3	4	1.1
994.7	Asphyxiation and strangulation	–	–	–	–	–	2	2	0.5
Total		67	53	98	19	98	33	369	100

PERINATAL DEATHS DUE TO CONGENITAL MALFORMATIONS

There were 84 perinatal deaths due to congenital malformations or birth defects (table 11). Congenital malformations of the cardiovascular system accounted for 14, multisystem malformations for 23, and chromosomal abnormalities for 18 deaths.

The proportion of all perinatal deaths due to malformations was 18.5 per cent. Of the 84 perinatal deaths with a malformation, the pregnancy had been terminated in 16 (19 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	
335.0	Werdnig-Hoffman disease	–	–	–	–	–	1	1
359.2	Myotonic disorders	–	–	–	–	–	1	1
740	Anencephalus and similar conditions	–	1	1	–	–	1	3
740.2	Iniencephaly	–	–	1	–	–	–	1
742.0	Encephalocele	–	–	1	–	–	–	1
742.3	Hydrocephalus	–	–	1	–	–	–	1
742.9	Unspecified anomaly of CNS	–	–	–	1	–	–	1
745–747	Cardiovascular anomalies	1	1	–	6	–	6	14
748	Respiratory system anomalies	–	1	–	1	–	1	3
753	Urinary system anomalies	–	–	–	1	–	1	2
754.8	Arthrogryposis multiplex congenita	–	–	–	2	–	–	2
755	Limb anomaly	–	–	1	–	–	–	1
756.4	Chondrodystrophy	–	–	–	1	–	1	2
756.6	Diaphragmatic hernia	1	–	–	2	–	2	5
756.7	Gastroschisis/exomphalos	–	–	1	–	–	–	1
758.0	Trisomy 21	3	–	2	1	1	–	7
758.1	Trisomy 13	–	1	–	1	–	1	3
758.2	Trisomy 18	1	–	1	1	–	–	3
758.5–9	Other chromosomal anomalies	1	–	1	1	–	2	5
759.8	Multiple malformations	4	1	1	11	–	6	23
–	Other and unspecified	–	1	1	1	–	1	4
Total		11	6	12	30	1	24	84

INFECTION INVOLVED IN PERINATAL DEATHS

Amongst the perinatal deaths there was evidence of infection in 49 cases, with 17 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	1	–	2	–	8
Congenital infections	–	1	1	4	–	–	6
Perinatal sepsis	–	–	–	–	–	2	2
Maternal infection	–	–	1	–	–	–	1
Total	2	4	3	4	2	2	17

In 32 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	3	7	10
Incompetent cervix	–	1	1
Multiple pregnancy	1	8	9
Hypoxia	4	–	4
Placental abruption/APH	–	3	3
Breech delivery	–	1	1
Malpresentation before labour	1	–	1
Extreme immaturity	–	1	1
Maternal renal disease	1	–	1
Congenital malformations	–	1	1
Total	10	23	32

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	3	5	8
Other Streptococcus group	–	2	2
Staphylococcus aureus	2	7	9
E. coli	1	1	2
Candida albicans	–	1	1
Listeria monocytogenes	1	1	2
Proteus	–	1	1
Klebsiella	–	1	1
Pseudomonas	–	1	1
Ureaplasma urealyticum	1	1	2
Toxoplasmosis	–	1	1
Herpes simplex	–	1	1
Enterovirus	1	1	2
Gram negative	–	3	3
Gram positive	1	–	1
Mixed organisms	3	4	7
None identified	4	1	5
Total	17	32	49

There were eight documented cases with group B streptococcal infection (compared to six in 1997 and 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 17.2 per cent of stillbirths in 1998, which was a slightly lower proportion than in 1997 (18.6 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	20	14	11	9	3	1	1	1	14	5	79
1,000-1,499	3	8	8	7	3	-	-	-	14	2	45
1,500-1,999	1	9	8	5	1	1	-	-	9	1	35
2,000-2,499	2	5	15	3	2	1	-	-	3	-	31
2,500-2,999	9	10	13	6	-	-	-	-	3	-	41
3,000-3,499	7	10	12	1	-	-	-	-	3	2	35
3,500-3,999	4	2	2	-	-	-	-	-	3	1	12
≥4,000	4	1	4	1	-	-	-	-	-	1	11
Total (%)	50 (17.2)	60 (20.7)	73 (25.2)	32 (11.1)	9 (3.1)	3 (1.0)	1 (0.3)	1 (0.3)	50 (17.2)	11 (3.9)	290 (100)

TIME OF NEONATAL DEATH

Approximately one quarter of deaths occurred within six hours of birth.

Table 16 Age at time of death for neonates

Birth-weight (g)	< 6 hours	6-11 hours	12-23 hours	2nd-3rd day	4th-7th day	1-<2 weeks	2-<3 weeks	3-<4 weeks	Total
500-999	15	2	3	16	11	5	6	2	60
1,000-1,499	5	3	2	2	-	3	4	2	21
1,500-1,999	2	-	2	5	-	2	2	-	13
2,000-2,499	5	-	1	1	2	1	2	1	13
2,500-2,999	5	-	1	7	-	2	2	2	19
3,000-3,499	3	-	3	5	3	3	3	2	22
3,500-3,999	2	1	-	3	2	2	-	-	10
≥4,000	2	1	-	-	-	2	-	1	6
Total (%)	39 (23.8)	7 (4.3)	12 (7.3)	39 (23.8)	18 (10.9)	20 (12.2)	19 (11.6)	10 (6.1)	164 (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:

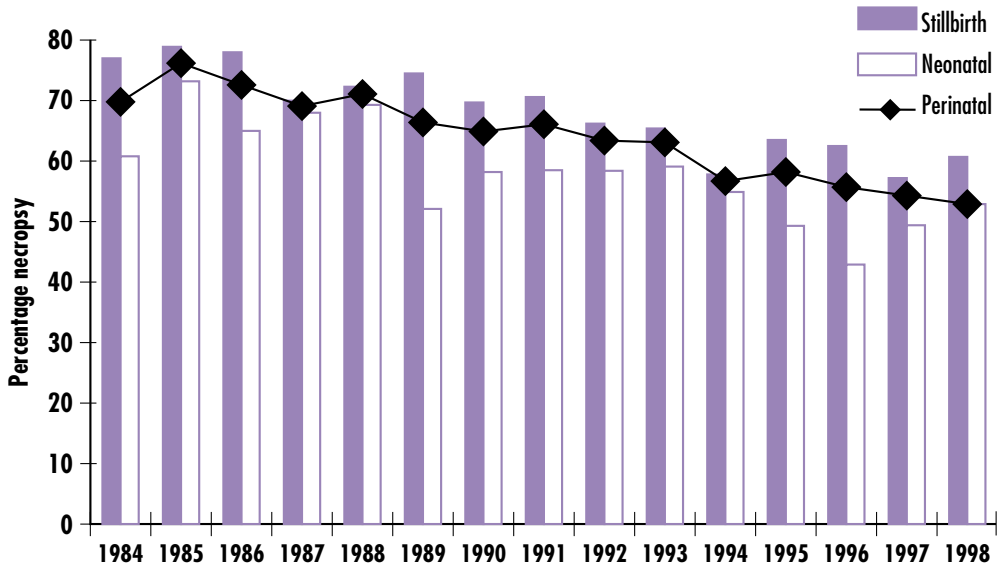
The Executive Officer
Consultative Council on Obstetric and Paediatric Mortality and Morbidity
GPO Box 4923
Melbourne 3001

In 1998, a necropsy was performed on 60.7 per cent (176 of 290) of stillbirths, and on 45.1 per cent (74 of 164) 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 perinatal necropsy rate, although the proportion of stillbirths receiving a necropsy has shown a small increase in 1998.

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 1984–1998



Stillbirth	77.0	78.9	78.0	70.0	72.3	74.5	69.7	70.6	66.2	65.4	57.8	63.5	62.5	57.2	60.7
Neonatal	60.8	73.2	65.0	68.0	69.3	52.1	58.2	58.5	58.4	59.1	54.9	49.3	42.9	49.4	45.1
Perinatal	69.8	76.2	72.6	69.1	71.1	66.4	64.9	66.1	63.4	63.1	56.7	58.2	55.7	54.3	52.9

VICTORIAN BIRTH DATA 1998

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 1998 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	31,954	51.6	139	98	7.4
Female	29,969	48.4	151	66	7.2
Indeterminate or unknown	1	–	–	–	–
Total	61,924	100.0	290	164	7.3

Table 18 Previous births – confinements

Previous births	Confinements	
	(n)	(%)
None	24,443	40.1
1	21,430	35.2
2	9,858	16.2
3	3,388	5.6
4	1,043	1.7
≥ 5	756	1.2
Unknown	2	–
Total	60,920	100.0

Table 19 Previous pregnancies – confinements

Previous pregnancies	Confinements	
	(n)	(%)
None	18,597	30.5
1	19,266	31.6
2	12,005	19.7
3	5,824	9.6
4	2,729	4.5
≥5	2,495	4.1
Unknown	4	–
Total	60,920	100.0

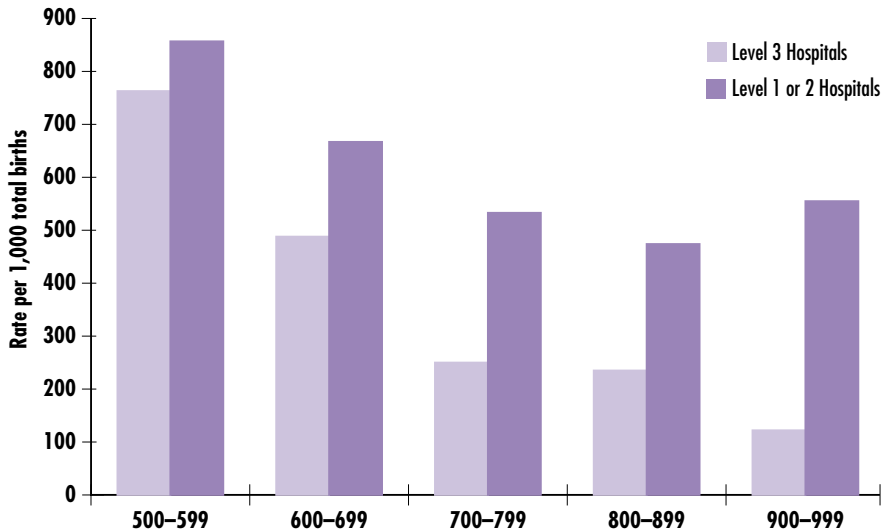
Table 20 Birth-weight distribution and perinatal mortality rate

Birth-weight (g)	Births		Stillbirths (n)	Neonatal deaths (n)	Perinatal mortality rate
	(n)	(%)			
500–999	321	0.5	81	60	439.3
1,000–1,499	426	0.7	44	21	152.6
1,500–1,999	805	1.3	35	13	59.6
2,000–2,499	2,477	4.0	31	13	17.8
2,500–2,999	9,519	15.4	41	19	6.3
3,000–3,499	22,073	35.7	35	20	2.5
3,500–3,999	18,905	30.5	12	11	1.2
4,000–4,499	6,274	10.1	10	3	2.1
4,500–4,999	1003	1.6	–	3	3.0
≥5,000	111	0.2	–	–	–
Not known	10	–	1	1	–
Total	61,924	100.0	290	164	7.3

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 31.1 per cent of perinatal deaths (141 of 454, table 20). 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*	763	488	250	235	122
Alive (n)	7	19	30	37	43
Infant death (n)	2	2	3	2	–
Neonatal death (n)	15	11	8	7	4
Stillbirth (n)	14	9	3	5	2

Levels 1 and 2 hospital births

Perinatal mortality rate	857	667	533	474	555
Alive (n)	4	6	7	10	7
Infant death (n)	–	–	–	–	1
Neonatal death (n)	7	3	2	1	2
Stillbirth (n)	17	9	6	8	8

* Mortality rate per 1,000 births.

Table 21 Maternal age for confinements

Age (years)	Confinements		Stillbirths (n)	Neonatal deaths (n)	Perinatal mortality rate
	(n)	(%)			
<15	11	–	–	1	90.9
15–19	2,063	3.4	13	3	7.8
20–24	8,034	13.2	51	23	9.2
25–29	19,715	32.4	98	46	7.3
30–34	20,402	33.5	74	44	5.8
35–39	9,188	15.1	45	41	9.4
40–44	1,453	2.4	9	4	8.9
>44	51	0.1	–	–	–
Over 50 years	1	–	–	–	–
Unknown	2	–	–	2	–
Total	60,920	100.0	290	164	7.5

Note: the denominator for the perinatal mortality rate by maternal age is the number of confinements. This is slightly higher than perinatal mortality rate for births.

The increase in the proportion of births to women older than 29 years, and the corresponding decrease in those in younger age groups, are shown for the past 15 years in figure 5.

Figure 5 Maternal age at confinement 1984–1998

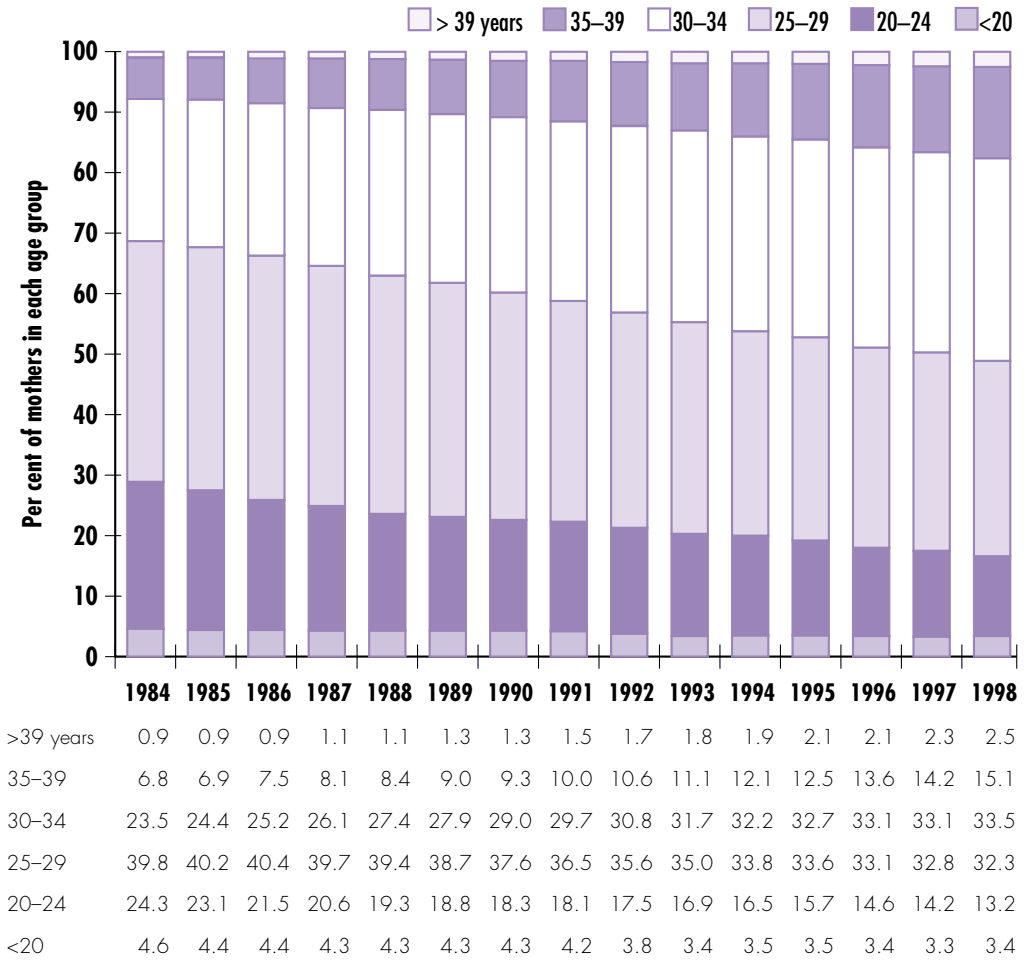


Table 22 Maternal country of birth

Place	Confinements	
	(n)	(%)
Australia	46,535	76.4
Oceania (including New Zealand)	1,405	2.3
UK (including Eire)	2,279	3.7
Europe	2,328	3.8
Asia (including Middle East)	6,844	11.2
South America	329	0.5
North America	339	0.6
Africa	754	1.2
At sea	1	-
Unknown	106	0.2
Total	60,920	100.0

Table 23 Maternal marital status

Category	Confinements	
	(n)	(%)
Married	46,384	76.1
Defacto	6,974	11.4
Single	6,736	11.1
Divorced	266	0.4
Separated	445	0.7
Widowed	27	-
Not known	88	0.1
Total	60,920	100.0

PERINATAL MORTALITY AND GESTATION

Table 24 Gestation at delivery

Weeks	Confinements	
	(n)	(%)
20–21 *	11	–
22–27	232	0.4
28–31	440	0.7
32–36	3,277	5.4
37–41	55,891	91.7
>41	1,058	1.7
Unknown	11	–
Total	60,920	100.0

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

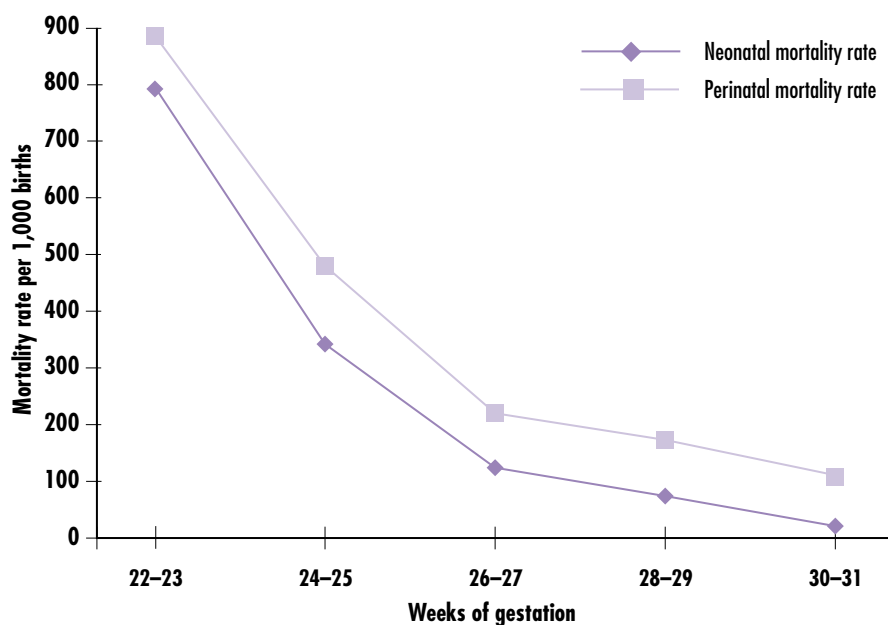
Figure 6 shows the neonatal, stillbirth and perinatal mortality rates (per 1,000 births) for the gestational age range of 22 to 31 weeks. Council considers this information will be useful to obstetricians caring for mothers who are likely to deliver an extremely immature infant, and where the fetal weight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

In 1998, of the infants born at 22–23 weeks 11.4 per cent (5 of 44) survived into infancy. This infancy survival rate rose to 52 per cent at 24–25 weeks' and 78 per cent for those born at 26–27 weeks' gestation.

There were 11 infants born weighing $\geq 500\text{g}$ at a gestation under 22 weeks', 9 were stillborn and two were neonatal deaths.

In addition, there were 169 infants registered with the Perinatal Data Collection Unit who were under 500g (or under 22 weeks' gestation if the birth-weight was unknown) (see Table 5). Of these infants, there were 2 who survived beyond 28 days.

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



Survivor >28 days (n)*	5	52	92	162	281
Neonatal deaths (n)	19	27	13	13	6
Stillbirths (n)	20	21	13	21	28
Neonatal mortality rate	792	342	124	74	21
Perinatal mortality rate	886	480	220	173	108

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

Table 25 Onset of labour

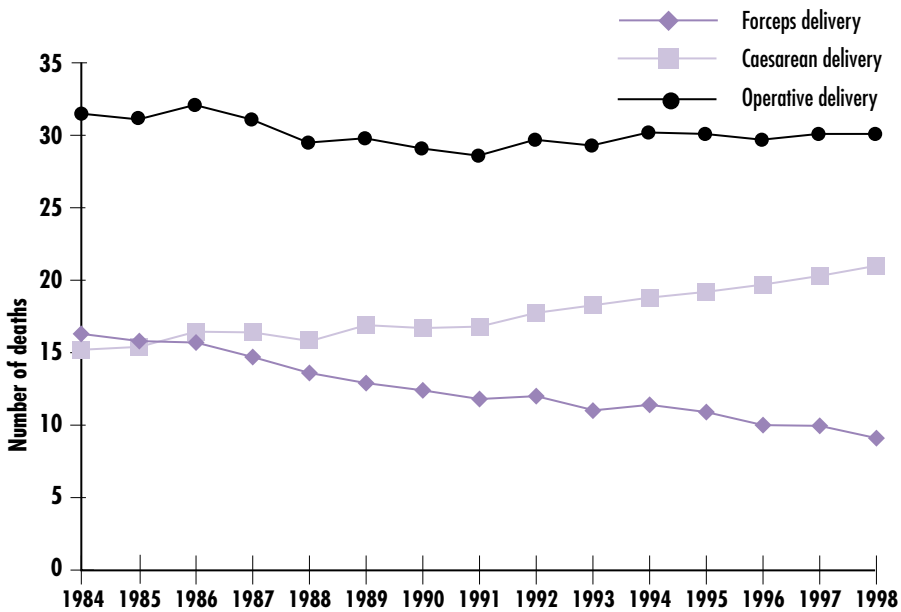
Category	Confinements	
	(n)	(%)
Spontaneous	30,009	49.3
Induced (medical and/or surgical)	16,319	26.8
Spontaneous and augmented	7,200	11.8
No labour	7,392	12.1
Total	60,920	100.0

Table 26 Method of delivery

Category	Confinements	
	(n)	(%)
Spontaneous vaginal (cephalic)	39,753	65.3
Forceps	5,529	9.1
Elective Caesarean	7,392	12.1
Emergency Caesarean	5,426	8.9
Other	2,358	3.9
Vaginal breech	457	0.8
Not known	5	–
Total	60,920	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 1984–1998



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	9.1
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	21.0
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	30.1

BIRTHS BY CAESAREAN SECTION

In 1998, there were 12,818 Caesarean sections resulting in the birth of 13,371 infants. This represents 21 per cent of all confinements. In 1998, the perinatal mortality rate for infants delivered by Caesarean section was 7.4 per 1,000 births, compared with 7.5 in 1997, 6.9 in 1996, and 8.5 in 1995.

Table 27 Caesarean section, incidence and perinatal mortality

Gestation (weeks)	Births (n)	Stillbirths (n)	Neonatal deaths (n)	Perinatal mortality rate
22–25	28	1	6	250.0
26–27	65	1	7	123.1
28–29	124	3	9	96.8
30–31	181	2	3	27.6
32–33	293	8	9	58.0
34–35	557	5	3	14.4
36–37	1,980	9	8	8.6
38–41	9,925	14	9	2.3
>41	216	1	–	4.6
Not known	1	–	–	
Total	13,370*	45	54	7.4

*One baby was >500g, but <22 weeks

A Caesarean section before a maturity of 26 weeks was associated with a perinatal mortality rate of 250 per 1,000 births. At this gestation in 1998 there were 22 neonatal survivors compared to 20 in 1997, 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 (%)	22-25 (%)	26-27 (%)	28-29 (%)	30-31 (%)	32-33 (%)	34-35 (%)	36-37 (%)	38-41 (%)	>41 (%)	
Failure to progress/disproportion	-	-	-	-	1	1	4	15	40	60	33
Previous Caesarean section	-	11	8	5	7	5	8	31	32	9	30
Malpresentation	-	46	38	27	25	22	20	19	18	6	18
Fetal distress	-	-	23	31	31	31	25	14	15	29	17
Hypertension/preeclampsia	-	11	15	26	18	20	20	8	1	1	4
Antepartum haemorrhage	-	14	18	13	13	19	14	9	2	1	4
Preterm labour/PROM	-	64	25	17	12	8	6	2	*	1	1
Failed induction	-	11	2	-	3	3	3	3	3	8	3
Other medical disorders	-	-	-	1	*	-	1	2	3	*	1
Multiple pregnancy	-	21	3	11	18	14	18	12	1	-	4
Other	100	7	8	7	3	3	6	3	2	2	2
Not reported	-	-	2	-	*	*	2	2	*	2	

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

* Less than 1 per cent.

MULTIPLE BIRTHS

In 1998, there were 1,984 multiple births (938 sets of twins, 36 sets of triplets, and no quadruplets). The comparable figures for sets of twins were 936 in 1997, 870 in 1996, 915 in 1995 and 898 in 1994.

Multiple births comprised 3.2 per cent of all births ≥ 500 g, but contributed 11.5 per cent of perinatal deaths. For very low birth-weight infants (500–1,499g), 25.6 per cent were from multiple pregnancies, and they contributed 18.4 per cent of the deaths in this weight group.

The perinatal mortality rate for multiple births of birth-weight ≥ 500 g was 26.3 per 1,000 births compared with 6.7 for singleton births in this weight group.

Table 29 Multiple births mortality rate and birth-weight distribution, 1998

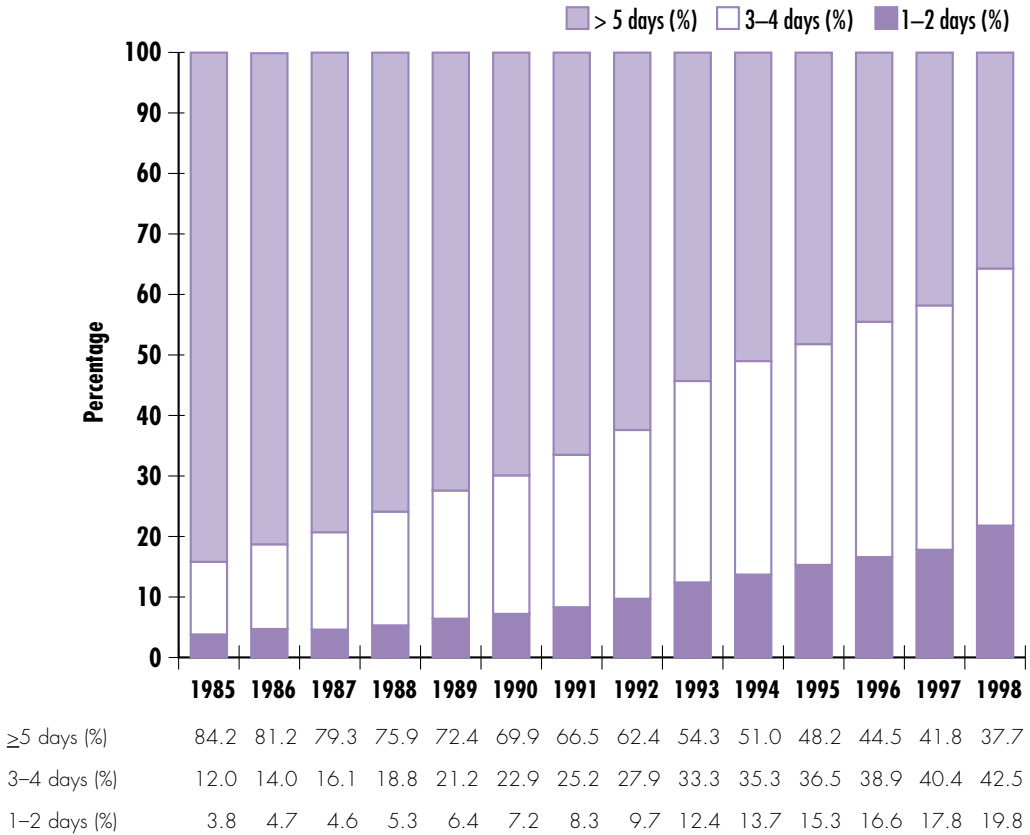
Birth-weight (g)	Multiple births		Stillbirths	Neonatal deaths	Perinatal mortality rate
	(n)	(%)			
400–499*	7	0.4	3	4	1000.0
500–999	69	3.5	9	14	333.3
1,000–1,499	122	6.1	7	8	123.0
1,500–1,999	241	12.1	6	1	29.0
2,000–2,499	571	28.8	2	2	7.0
2,500–2,999	708	35.7	2	1	4.2
3,000–3,499	241	12.1	–	–	–
3,500–3,999	25	1.3	–	–	–
$\geq 4,000$	–	–	–	–	–
Total	1,984	100.0	29	30	29.7

* There were seven multiple birth infants (all twin pregnancies) of birth-weight < 500 g who had a heavier (≥ 500 g) co-twin. The inclusion of these 7 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 4 registered multiple births (2 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 1985–1998



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 1998 (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.).

Table 30 shows the overall number and proportion of congenital malformations in 1998. These figures fluctuate from year to year and in 1998 there was a slight decrease across almost all categories compared with 1997. The one increase was in notifications of urogenital malformations. The frequency of fetuses or newborn babies with recognised congenital malformations was 4% (39.8/1,000) in 1998.

Among chromosomal disorders, Down syndrome was the most common. There were 71 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 95 infants surviving with a chromosome abnormality, 53 had Down syndrome.

Table 30 Notifications to the Congenital Malformations Register for infants born in 1998

Category	Induced <20 weeks (n)	SB (n)	NND (n)	Infant/child death (n)	Alive (n)	Total (n)	Estimated rate (per 1,000 births)
Multiple	21	20	25	2	100	168	2.7
Chromosomal	151	30	20	2	95	298	4.8
Neurosystem	50	9	10	1	43	113	1.8
Cardiovascular	12	5	15	3	249	284	4.6
Gastrointestinal	2	3	1	1	135	142	2.3
Urogenital	4	6	5	1	679	695	11.2
Respiratory	2	2	2	1	18	25	0.4
Musculoskeletal/limb	14	11	9	2	481	517	8.3
Genetic/metabolic	3	–	–	–	45	48	0.8
Other**	10	5	5	2	150	172	2.8
Total	269	91*	92*	15	1,995	2,462	
(rate per 1,000 births)	(4.3)	(1.5)	(1.5)	(0.2)	(3.2)	(39.8)	

* 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	1995		1996		1997		1998	
	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)
Perinatal (birth) forms	1,672	45.8	1,698	48.8	1,768	51.7	1,838	58.2
Death certificates	183	5.0	182	5.2	189	5.5	175	5.5
Autopsy reports	127	3.5	126	3.6	134	3.9	103	3.3
Cytogenetic reports	241	6.6	233	6.7	247	7.2	233	7.4
Hospitals	1,147	31.4	972	27.9	848	24.9	590	18.7
Maternal, child health services	272	7.5	260	7.5	218	6.4	200	6.3
Paediatricians private practice	2	0.1	3	0.1	2	0.1	14	0.1
Other	4	0.1	4	0.1	12	0.4	15	0.5
Total	3,648	100.0	3,478	100.0	3,418	100.0	3,158	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. There has been an improvement in reporting of congenital malformations on the perinatal forms so that in 1998 almost 60% of notifications were obtained from these forms, which are completed by midwives during, or at completion of, the mother's postnatal hospital stay. 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' gestation.

Table 32 Termination of pregnancy under 20 weeks for a malformation

Anomaly	(n)
Chromosome anomalies	
Down syndrome	71
Trisomy 13	7
Trisomy 18	26
Other autosomal anomalies	7
Triploidy	9
Turner syndrome	14
Klinefelter syndrome	8
Other sex chromosome anomalies	7
Other chromosome anomalies	2

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

Anomaly	(n)
Nervous system	
Anencephalus	25
Spina bifida with/without hydrocephalus	14
Encephalocele	1
Congenital hydrocephalus	9
Other nervous system defect	1
Cardiac system	
Hypoplastic left heart syndrome	2
Falot's pentalogy	2
Other cardiac system defect	8
Respiratory system	
Cystic lung	2
Urogenital system	
Potter syndrome	3
Cystic kidney disease	1
Musculoskeletal system	
Arthrogryposis multiplex congenita	1
Skeletal dysplasias	3
Exomphalos	2
Gastroschisis	2
Other multiple musculoskeletal system defect	4
Other musculoskeletal system defect	2
Gastrointestinal system	
Cleft lip and palate	2
Genetic/metabolic	
Thalassaemia	2
Cystic fibrosis	1
Hydrops/effusions	2
Cystic hygroma	1
Muscular dystrophy	1
Multiple system defects	21
Other unspecified congenital anomaly	6
Total	269

Overall in 1998 there was a decline in the number of reported terminations of pregnancy for malformation, from 287 in 1997 to 269 in 1998. This decline was not evident in the chromosomal abnormality group, where there were fewer fetuses with Down syndrome but more with Trisomy 18 and sex chromosome abnormalities. The decline occurred mainly in the nervous system category.

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: 134 (1989), 139 (1990), 138 (1991), 154 (1992), 213 (1993), 250 (1994), and 259 (1995), 260 (1996) 287 (1997), 269 (1998). Prenatal diagnosis by amniocentesis, by chorionic villus sampling (CVS), and occasionally by fetoscopy or fetal blood sampling is well established in Victoria. The public hospital and private cytogenetic laboratories who analyse the fetal samples provide their data to the Murdoch Institute or Perinatal Data Collection Unit so that an annual report can be compiled for distribution to service providers. (Available from Jane Halliday at PDCU). 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. Each year there are more younger women utilising these diagnostic services as a result of an increasing uptake of first trimester ultrasound and second trimester maternal serum screening.

It is important for doctors to inform women of advanced maternal age of the availability, and safety of, amniocentesis and CVS. 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 Austin and Repatriation Hospital, Birralee, the Alfred 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, and centres in Albury/Wodonga, Ballarat, Bendigo, Frankston, Geelong, Mildura, Sale, Shepparton, Traralgon, Warragul and Warrnambool. The Victorian Clinical Genetics Service can be contacted on 8341 6201.

POSTNEONATAL INFANT AND CHILD DEATHS

This section reports on infant and child deaths which have occurred during the 1998 calendar year. Five infant and eight child deaths have been excluded because the children lived outside Victoria and were referred for treatment of a serious illness, such as a congenital cardiac malformation (6 of the 13 cases).

In 1998, there were 227 deaths in infants and children aged 29 days to 14 years (until the 15th birthday). This is a continuing reduction from previous years where there were 240 in 1997, and 257 in 1996 (figure 9). The number of postneonatal infant deaths continued to decline with 77 recorded in 1998, compared to 87 in 1997, 93 in 1996, and 95 in 1995. There were 3 fewer child deaths in 1998 (n=150) compared to the previous year.

The decline in infant and child deaths from 1997 was predominantly due to a reduction in the number of birth related deaths (73 in 1998, 90 in 1997, 89 in 1996). Cot deaths (24 in 1998, 25 in 1997), unintentional injuries (52 in 1998, 51 in 1997) and acquired diseases/intentional injuries (78 in 1997, 8 and 74 in 1997) show smaller variations. There were 43 malignancy deaths compared to 40 in 1997.

The numbers of late infant and child deaths from 1985 to 1998 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, in mid-1998 the Australian/New Zealand Standard on the design and manufacture of infant domestic cots was 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. In 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.

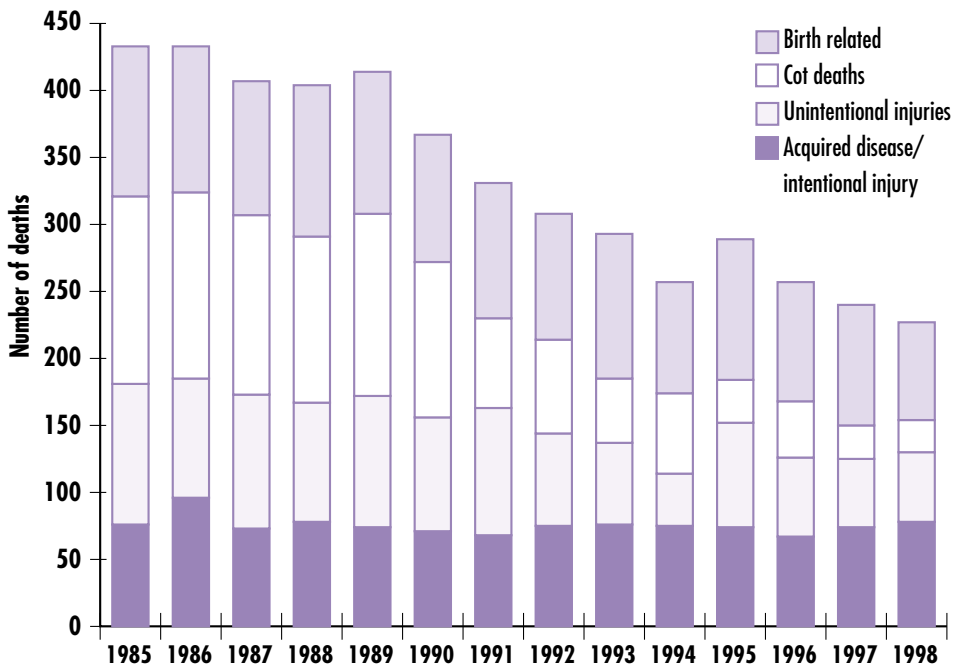
Parents should be made aware of the importance of regular follow-up assessments and appreciate that, in the first two years of life, more hospital admissions for medical and surgical indications may be necessary compared with infants born at term.

Snakebite

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

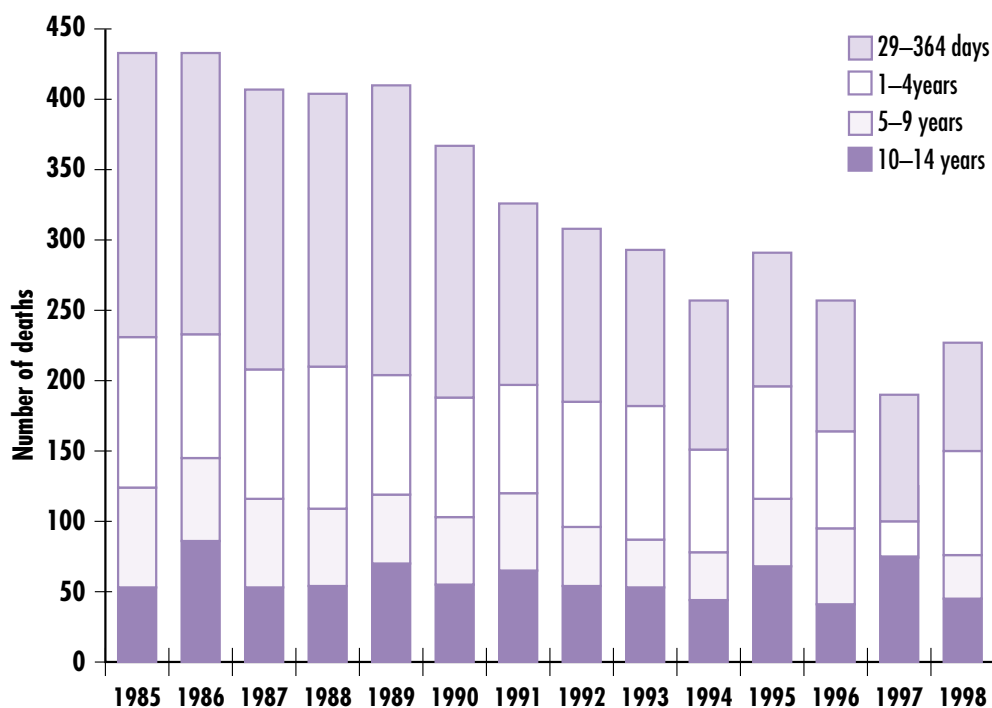
Snakebite may be lethal or cause serious illness in children. The lethal species found in Victoria are Tiger, Brown, Copperhead and Red-belly Black snakes. If envenomation has occurred and the species of the snake is unknown, give one ampoule of Tiger snake antivenom (3,000 units) and one ampoule of 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 1985–1998.



Birth related	112	109	100	113	106	95	101	94	108	83	105	89	90	73
Cot deaths	140	139	134	124	136	116	67	70	48	60	34	42	25	24
Unintentional injuries	105	89	100	89	98	85	90	69	61	39	78	59	51	52
Acquired disease/ intentional injury	76	96	73	78	74	71	68	75	76	75	74	67	74	78
Total cases	433	433	407	404	414	367	326	308	293	257	291	257	240	227

Figure 10 Postneonatal infant and child deaths by age group 1985–1998



	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
29-364 days	202	200	199	194	206	179	129	123	111	106	95	93	90	77
1-4 years	107	88	92	101	89	85	77	89	95	73	80	69	25	74
5-9 years	71	59	63	55	49	48	55	42	34	34	48	54	51	31
10-14 years	53	86	53	54	70	55	65	54	53	44	68	41	74	45
Total	433	433	407	404	414	367	326	308	293	257	291	257	240	227

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	7	1	1	–	9
1B Malformation/birth defect	23	21	2	4	50
1C Prematurity	7	1	–	–	8
1D Other	–	1	2	3	6
Subtotal	37	24	5	7	73
Cot death					
2A Explained by other condition	–	–	–	–	–
2B Significant pathology	5	–	–	–	5
2C Minor condition	11	2	–	–	13
2D No significant abnormality detected	6	–	–	–	6
Subtotal	22	2	–	–	24
Unintentional injuries					
3A Motor vehicle	3	5	6	14	28
3B Drowning	–	9	1	1	11
3C Fire	–	2	1	–	3
3D Asphyxiation	4	2	1	1	8
3E Train	–	–	–	–	0
3F Other	–	–	–	2	2
Subtotal	7	18	9	18	52
Acquired disease / Intentional injury					
4A Infection	5	5	1	3	14
4B Malignancy	2	19	14	9	44
4C Other acquired disease*	1	5	2	6	14
4D Intentional trauma	3	1	–	–	4
4E Suicide	–	–	–	2	2
Subtotal	11	30	17	20	78
Total	77	74	31	45	227

*Includes undetermined cause

CAUSE OF DEATH DETERMINED AT BIRTH

1A Birth hypoxia/asphyxia

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

1B Congenital malformations/birth defects

There were 50 deaths due to congenital malformations in 1998 (table 34). In 1997 cardiovascular system malformations were the largest group, with 19 cases, but in 1998 only 8 deaths were attributed to malformations of the cardiovascular system.

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	3	4	1	–	8
Multiple malformations	1	3	–	–	4
Chromosomal/genetic disorder	6	2	–	–	8
Neural tube/CNS	1	5	–	1	7
Spinal muscular atrophy	4	1	–	–	5
Respiratory/diaphragmatic defects	2	–	–	–	2
Cystic fibrosis	–	–	–	3	3
Gastrointestinal/liver	2	1	–	–	3
Skeletal dysplasias	2	–	–	–	2
Metabolic disorders	1	3	1	–	5
Miscellaneous	1	2	–	–	3
Total	23	21	2	4	50

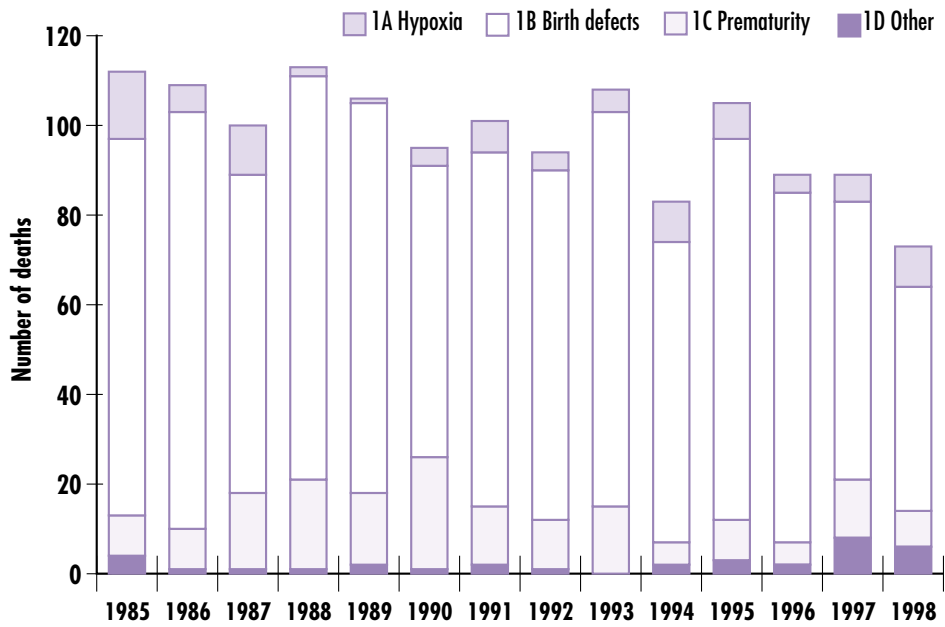
1C Prematurity

There were eight deaths due to consequences of prematurity compared to thirteen in 1997 and five in 1996. Seven infants had birth-weights under 850g, and one had a birthweight of 905 g. Three died from the sequelae of necrotising enterocolitis, one from sepsis (*Candida* and *Staphylococcus*), three from chronic lung disease, and one from multiorgan failure.

1D Other causes determined at birth

There were six children in this group. Three died from complications of cerebral palsy of undetermined cause; one from cerebral palsy and epilepsy related to congenital toxoplasmosis, and two with developmental delay and epilepsy of uncertain aetiology.

Figure 11 Causes of death determined at birth 1985–1998



1A Hypoxia	15	6	11	2	1	4	7	4	5	9	8	4	6	9
1B Birth defects	84	93	71	90	87	65	79	78	88	67	85	78	62	50
1C Prematurity	9	9	17	20	16	25	13	11	15	5	9	5	13	8
1D Other	4	1	1	1	2	1	2	1	0	2	3	2	8	6
Total cases	112	109	100	113	106	95	101	94	108	83	105	89	89	73

COT DEATH

In 1998, there were 24 postneonatal infant and child cot deaths. This is comparable to the 25 cases recorded in 1997, which was a considerable decline on the 42 reported in 1996. In addition, there were 4 neonatal cot deaths (table 10), and the same number were reported in 1997. This brings the total number of cot deaths in 1998 to 28.

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 1998.

2B and 2C Significant or minor pathology identified

The majority of cases (75 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.

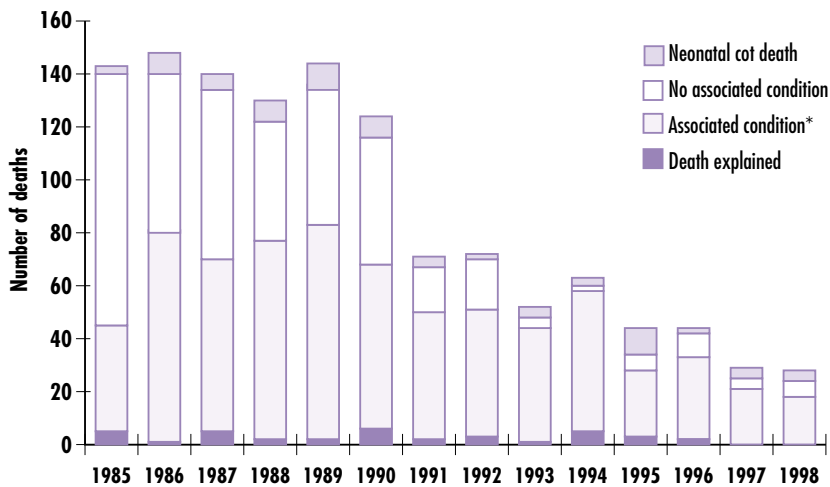
Table 35 Principal conditions associated with cot death

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

2D No significant abnormality detected

In 1998, seven cases (25 per cent) had no significant pathology detected.

Figure 12 Neonatal, infant and child cot deaths 1985–1998



Infant/child cot deaths

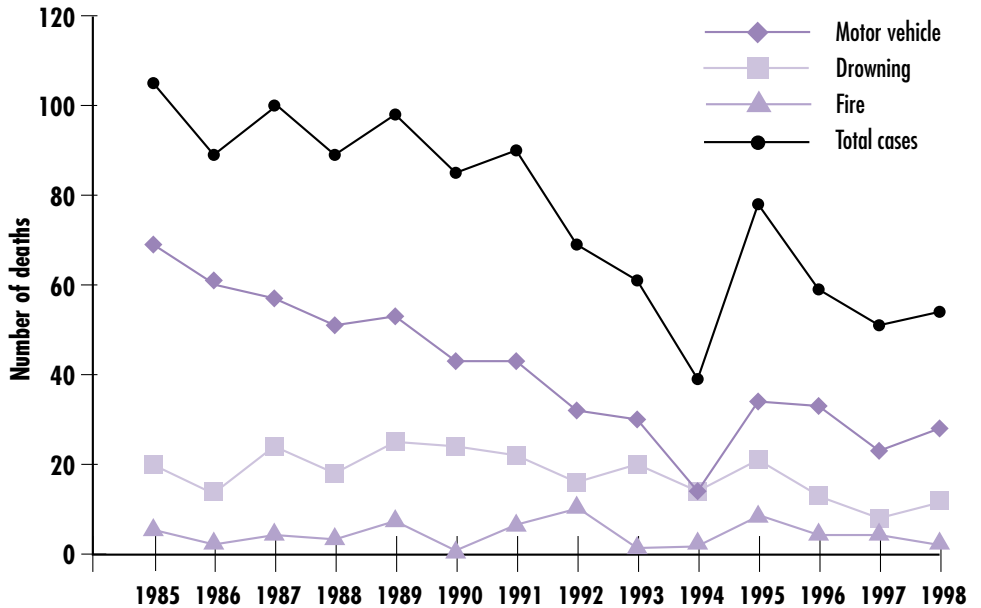
Death explained	5	1	5	2	2	6	2	3	1	5	3	2	–	–
Associated condition*	40	78	65	75	81	62	48	48	43	53	25	31	21	18
No associated condition	95	60	64	47	53	48	17	19	4	2	6	9	4	6
Subtotal infant/child cases	140	139	134	124	136	116	67	70	48	60	34	42	25	
Neonatal cot death	3	8	6	8	10	8	4	2	4	3	10	2	4	4
All age cases	143	147	140	132	146	124	71	72	52	63	44	44	29	28

* Includes categories 2B and 2C

UNINTENTIONAL INJURY DEATHS

There were 54 late infant and child deaths due to unintentional injury (figure 13). There were 51 deaths in 1997.

Figure 13 Unintentional injury deaths 1985–1998



Motor vehicle	69	61	57	51	53	43	43	32	30	14	34	33	23	28
Drowning	20	14	24	18	25	24	22	16	20	14	21	13	8	12
Fire	6	3	5	4	8	1	7	11	2	3	9	5	5	3
Asphyxiation*	4	5	5	3	6	6	7	3	3	4	8	2	7	9
Train accidents*	2	1	0	5	2	1	2	2	2	1	2	0	3	0
Other*	4	5	9	8	4	10	9	5	4	3	4	6	5	2
Total cases	105	89	100	89	98	85	90	69	61	39	78	59	51	54

* Not shown in figure

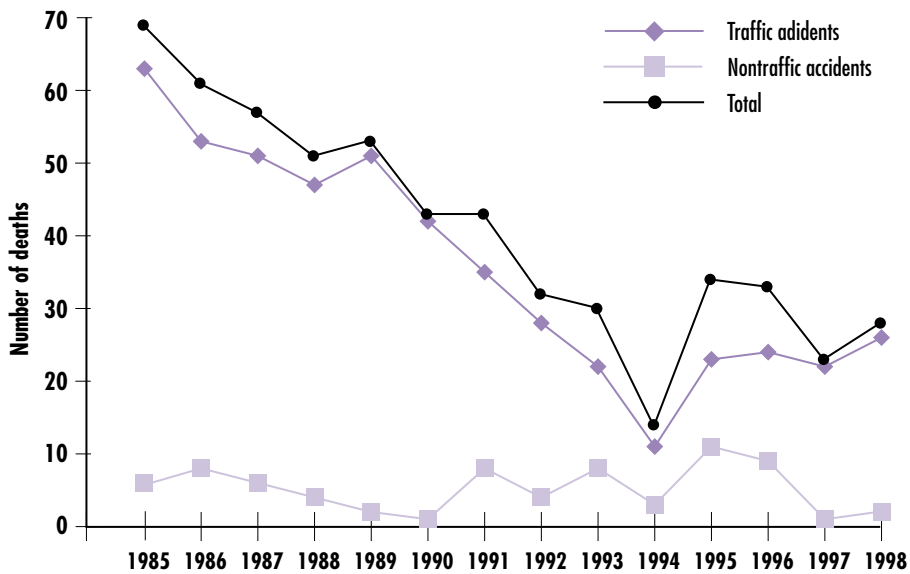
3A Motor vehicle

In 1998, the number of motor vehicle accident fatalities increased to 28 (from 23 in 1997). The mode of travel is listed in table 36. In 68 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	15
Pedestrian	7
Pedal cyclist	5
Child riding motor bike	1
Total	28

Figure 14 Motor vehicle fatalities 1985–1998



Traffic accidents	63	53	51	47	51	42	35	28	22	11	23	24	22	26
Nontraffic accidents	6	8	6	4	2	1	8	4	8	3	11	9	1	2
Total	69	61	57	51	53	43	43	32	30	14	34	33	23	28

For the 15 motor vehicle passenger deaths, 10 involved drivers losing control of the vehicle, including one underage driver, one driver fell asleep at the wheel, 2 were hit by speeding cars failing to stop at intersections, and two were hit by other cars. Three cyclists were hit by cars when failing to obey road rules, and two crossed into the path of an oncoming car. Three pedestrians were hit by cars whilst standing at the side of the road, one was attempting to cross a busy road, one ran onto road between parked cars, one was run over in a driveway, and one crushed in a driveway by a car driven by an underage driver. One child was riding an off-road motorbike too fast.

Failure to wear a seat-belt, or failure to have adequate child restraint was a factor in 2 cases. Alcohol was a factor in three of the adult drivers, and illicit drug use in one case. Two cyclists were not wearing helmets, and one of these was listening to a Walkman.

3B Drowning

There were twelve deaths due to drowning in 1998, compared to 8 in 1997, and 13 in 1996. The age range was from 18 months to 10 years, with three of the children aged one year. Eleven of the twelve cases had preventable factors identified.

Table 37 Location of drowning fatalities

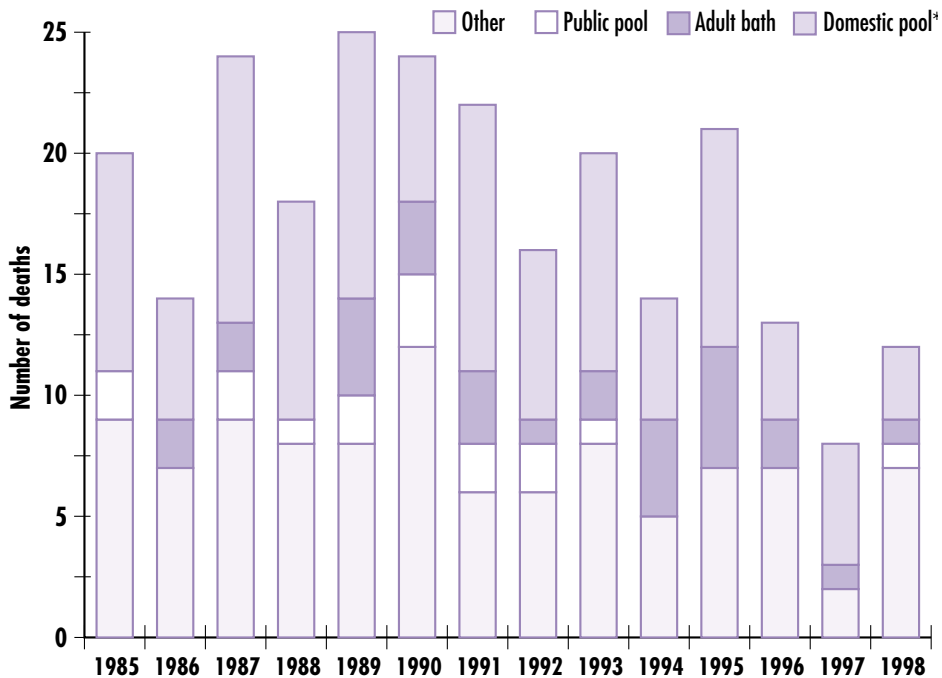
Location	(n)
Private pool	3
Wave pool	1
River/Sea	4
Ornamental pond	2
Adult bath	1
Dam	1
Total	12

For the three pool drownings, one pool fence and gate was not compliant with standards and one pool was incomplete and unfenced. In the other case the unsupervised child gained access to a fenced pool.

Three of the four drownings in the sea or a river and the two drownings in ornamental pools occurred when there was not adequate adult supervision.

One child was left in a bath with older siblings.

Figure 15 Drownings fatalities 1985–1998



Domestic pool*	9	5	11	9	11	6	11	7	9	5	9	4	5	3
Adult bath	0	2	2	0	4	3	3	1	2	4	5	2	1	1
Public pool	2	0	2	1	2	3	2	2	1	0	0	0	0	1
Other†	9	7	9	8	8	12	6	6	8	5	7	7	2	7
Total cases	20	14	24	18	25	24	22	16	20	14	21	13	8	12

* 'Domestic Pool' includes spa, wading pool.

† 'Other' includes river, sea, dam, irrigation channel.

3C Fire

There were three deaths as a result of fire, two less than in 1997. The children were aged 3, 4 and 8 years. Two died as a result of smoke inhalation, and the third from burns and smoke inhalation. In all three cases the fires were started as a result of siblings playing with matches and lighters, or lighters and fuel. **There was no smoke detector in at least one of the two house fires.**

3D Asphyxiation

There were nine deaths in 1998 due to nonintentional asphyxiation (compared to seven in 1997). One of these deaths involved an overturned bassinette, one involved a child left asleep in a pusher without a restraining harness, and one a child with inadequate sleeping arrangements in a car. Two deaths were attributed to co-sleeping with parents and overlying.

There was one strangulation in an infant left in a cot near a Venetian blind cord, one child trapped beneath a fallen packing case, one trapped under a fallen hay bale, and one trapped under a motor bike which he had been riding unsupervised.

3F Other causes of unintentional injury death

There were two children who died from other types of injuries. One died after falling from a horse, and one was crushed by a falling tree branch whilst sleeping in a tent.

PREVENTABLE FACTORS IN FATAL INJURIES

The Council considered that at least 74 per cent (40 of 54) 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.

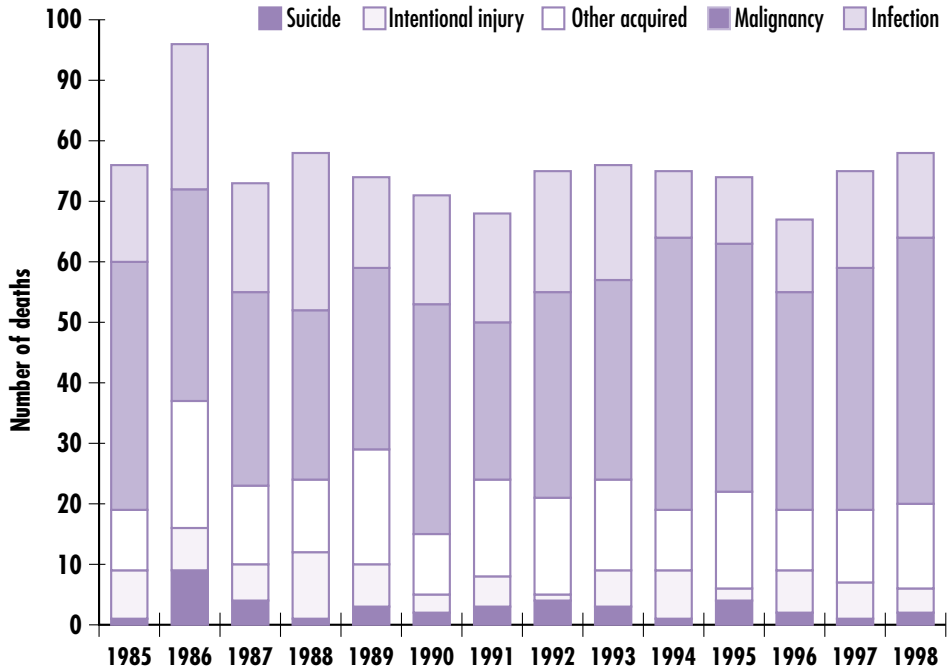
Table 38 Preventable factors in unintentional injury deaths

Preventable factor	Motor vehicle	Drowning	Fire	Asphyxiation	Other	Total
Seat restraint not used or faulty	2	–	–	–	–	2
Excess speed	6	–	–	–	–	6
Alcohol/drugs	4	–	–	–	–	4
No helmet	2	–	–	–	–	2
Inadequate caretaker supervision	2	9	1	2	–	14
Driver falling asleep or inattention	1	–	–	–	–	1
Underage driver	2	–	–	–	–	2
Failure to give way at intersection	2	–	–	–	–	2
Poor equipment maintenance/product failure	–	–	–	1	–	1
Unfenced pool or spa	–	2	–	–	–	2
Failure of pool or house fence	–	1	–	–	–	1
Playing with petrol/flammable liquids	–	–	1	–	–	1
Cigarette lighter/matches/unattended candles	–	–	3	–	–	3
No smoke detector or failure	–	–	1	–	–	1
Smothering hazard	–	–	–	2	–	2
Unsuitable sleeping environment	–	–	–	2	–	2
Total number of cases	28	12	3	9	2	54
Number (%) of cases with preventable factors identified	21 (75)	11 (91.7)	3 (100)	6 (75)	0 (0)	40 (74.1)

ACQUIRED DISEASE AND INTENTIONAL INJURY

There were 78 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 1985–1998



Infection	16	24	18	26	15	18	18	20	19	11	11	12	16	14
Malignancy	41	35	32	28	30	38	26	34	33	45	41	36	40	44
Other acquired	10	21	13	12	19	10	16	16	15	10	16	10	12	14
Intentional injury	8	7	6	11	7	3	5	1	6	8	2	7	6	4
Suicide	1	9	4	1	3	2	3	4	3	1	4	2	1	2
Total	76	96	73	78	74	71	68	75	76	75	74	67	75	78

4A Infection

There were 14 infant and child deaths due to infection in 1998, outlined in table 39. **This year there was one 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	10–14 years	Total
Streptococcal septicaemia/meningitis	1	1	–	–	2
Meningococcal septicaemia/meningitis	2	1	–	–	3
Haemophilus influenzae B meningitis	–	–	1	–	1
Pneumococcal meningitis	–	1	–	1	2
Coxsackie B encephalitis	–	–	–	1	1
Acute laryngotracheobronchitis	–	1	–	–	1
Pneumonia – streptococcal	1	–	–	–	1
Pneumonia – unknown organism	–	–	–	1	1
Viral encephalitis unknown organism	1	–	–	–	1
Myocarditis	–	1	–	–	1
Total	5	5	1	3	14

In one case of septicaemia Council considered there was parental neglect of an unwell child.

4B Malignancy

There were 44 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	–	2	–	–	2
Astrocytoma	–	4	–	–	4
Brain stem glioma	–	–	2	–	2
Ependymoma	1	2	–	–	3
Nasopharyngeal/neuroectodermal	–	1	–	–	1
Leukaemia					
Acute myeloid leukaemia	–	1	2	2	5
Acute lymphatic leukaemia	–	3	7	6	16
Lymphoma					
Burkitt	–	–	–	1	1
Lymphohistiocytosis	1	–	–	–	1
Neuroblastoma	–	4	–	–	4
Rhabdomyosarcoma	–	1	1	–	2
Renal tumours					
Wilm’s tumour	–	–	1	–	1
Clear cell carcinoma	–	1	–	–	1
Hepatoblastoma	–	–	1	–	1
Total2	19	14	9	44	

4C Other acquired diseases

There were 14 deaths due to other acquired diseases in 1998, which includes one death from aspiration where the exact cause remained unascertained despite postmortem examination. There were two deaths as a result of asthma, and five deaths related to epilepsy. The remaining deaths were mixed with one from each of the following conditions: encephalopathy, primary pulmonary hypertension, cardiomyopathy, chronic juvenile arthritis, blockage of a shunt for hydrocephalus, and one death related to alcohol ingestion.

4D Intentional injury

There were four deaths in young children as a result of abuse.

4E Suicide

There were two child suicides in 1998, one by hanging asphyxiation, and one from a gunshot wound.

IMMUNISATION AND VACCINE-PREVENTABLE DISEASES

In 1999, Victoria's immunisation programme continued with universal service provided by all local governments and over 2000 general practices in Victoria.

The enhanced measles surveillance programme, funded by the Victorian Department of Human Services, in collaboration with the Victorian Infectious Diseases Reference Laboratory continued in 1999. 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 contract to operate in the Western Metropolitan Region targeting children under the age of the seventh birthday who were overdue for scheduled immunisations concluded in mid 1999. Similar services which commenced in early 1998 in three other Department of Human Services' regions - the Grampians, Southern and Hume continued to operate throughout 1999. Performance evaluation processes of these three mobile immunisation services commenced in late 1999.

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 1998*, Public Health Division, Department of Human Services, 2000.

Measles

The number of notified cases of measles was low in 1998 with 36 cases, compared to 86 in 1997. This corresponded to an annual notification rate of 0.8 cases per 100,000 population. The highest age-specific rate was in the 0–4 age group with a rate of 6.1 per 100,000 population, followed by the 15–19 year age group with a rate of 1.3 per 100,000.

Haemophilus influenzae type b (Hib)

The numbers of Hib infections notified to the Department continues to decrease, and only five notifications were received in 1998. This included two cases of epiglottitis, and three cases of meningitis. Two of these notifications were for children under the age of five years. **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 0.6 per 100,000 in 1998.**

Pertussis

The outbreak that Victoria experienced during the years of 1996 and 1997 waned in 1998. A total of 1,141 notifications were received for the 1998 year compared to 1,665 in 1997. The total notification rate was 24.5 cases per 100,000 population. The highest rates were in the 10–14 year age group and the 5–9 year age group, with 65.0 and 50.1 cases per 100,000 respectively. The age-specific rate in the under 0–4 year age group was 43.7 per 100,000 population. No deaths from pertussis were reported.

Rubella

In 1998, 188 notifications of acute rubella were received. This was a decrease from the numbers reported in 1997 (371). The total notification rate was 4.0 per 100,000, but the highest age specific rate was in the 0–4 year age group with a rate of 26.0 per 100,000 population. One hundred and thirty (69.1%) of the 188 notifications were in males.

Recommended childhood immunisation schedule

In early 1999 government funding was released to make DTPa (diphtheria/tetanus/acellular pertussis vaccine) available for all scheduled doses of DTP. The revised schedule hence indicated that either DTPw (diphtheria/tetanus/whole cell pertussis vaccine) or DTPa can be used for the five scheduled DTP (diphtheria/tetanus/pertussis vaccine) doses.

Originally, government funding for DTPa applied 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 40.50 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 its second year in Victorian secondary schools. Approximately 80% of Victorian year 7 children received Hepatitis B immunisation through the school programme in 1999, 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.

In late 1999 the National Health and Medical Research Council indicated that the implementation of universal infant hepatitis B immunisation would commence in approximately May 2000. Meanwhile 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.

Interim Hepatitis B Schedule for Infants

The NHMRC has endorsed the use of hepatitis B vaccine (HBV) for all infants. HBV should be administered at birth, 1 month, and 6–12 months of age.

Hepatitis B vaccine has not yet been included in the standard infant schedule because it is only available as an additional injection. Parent who express an interest in infant HBV should be encouraged to have their children vaccinated, as long as compliance with schedule vaccines is not jeopardised.

The NHMRC strongly recommends that HBV be offered to all infants born to HbsAg+ mothers and to all infants and young children from groups with a hepatitis B carrier rate of over 2%. Further detail is provided in the Australian Immunisation Handbook (6th edition)

MATERNAL DEATHS IN VICTORIA

Table 42 Maternal deaths in Victoria 1953–1998

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

Table 42 Maternal deaths in Victoria 1953–1998 – continued

Year	Births			Maternal deaths	Deaths per 1,000 births
	Livebirths	Stillbirths	Total births		
1985	60,776	398	61,174	5	0.08
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
1998	61,634	290	61,924	2	0.03

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 1998, there were two maternal deaths; both direct deaths.

Causes of the two maternal deaths

Direct deaths

1. A 28-year-old para 3 was found deceased in a 'cubby house' at the rear of her residence, with a large amount of blood present on and about the pelvic region. A normal-formed, term infant (also deceased), with umbilical cord still attached, was situated adjacent to the mother. The placenta was undelivered. The cause of death was **postpartum haemorrhage**. Autopsy revealed partial placental separation and no evidence of other pathology, other than blood loss. The deceased apparently was intending to keep the birth secret.
2. A 21-year-old nullipara had labour induced at 37 weeks' gestation with vaginal Prostin because of **preeclampsia**. Cardiotocographic evidence of fetal distress developed a few hours later and an uneventful Caesarean section was performed, resulting in a surviving infant. The woman developed oliguria 12 hours after delivery and this responded to administration of intravenous fluids. The woman complained of a headache 46 hours after delivery and examination revealed a blood pressure of 160/80 and no other abnormal findings; two hours later the woman was found deceased and all resuscitative measures failed. Autopsy failed to ascertain the cause of death.

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 restriction, 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-Dnegative 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 restriction.
 - 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 1998 there were 1,433 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	1992	1993	1994	1995	1996	1997	1998
Primary transfers, metropolitan	476	502	457	410	497	489	474	502
Primary transfers, country, road	119	104	123	103	114	111	99	125
Primary transfers, country, air ambulance	98	123	94	118	126	98	121	134
Return transfers	183	238	219	207	265	456	556	658
Special investigations	10	6	10	4	9	17	17	14
Total	886	973	903	842	1,011	1,171	1,267	1,433

Selection of infants for transfer

For comprehensive information on the Newborn Emergency Transport Service visit the NETS website: <http://www.rch.unimelb.edu.au/NETS/>

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.

Other categories of infants worthy of consideration for transfer:

- Infants with convulsions
- Jaundiced infants in potential or immediate need of exchange transfusion.
- Infants bleeding from any site
- Infants of diabetic mothers
- Infants in need of surgery
- Infants with severe or multiple congenital anomalies.
- "Unwell" infants manifested by lethargy, poor feeding, weak cry, cyanosis, jitteriness or vomiting.
- Any infant in need of special diagnostic and/or therapeutic services.

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 latest edition are available 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.

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 – Centre for Professional Development in Health Sciences and can be undertaken for professional development only or may be used for direct credit towards a Graduate Certificate in Health Science (Special Care of the Newborn).

Material is largely print-based, self-directed, self-paced, theoretical and clinical skills orientated and consists of 4 units of study. Unit 1, the core unit is recommended for completion by all students. The remaining 3 may be taken as individual units or to complete the program. The program is available for registered midwives from Level 1 and Level 2 (High and Low Dependency) midwifery hospitals throughout Victoria.

Information and bookings for educational sessions, may be made by telephoning (03) 9344 2419 or (03) 9344 2355, or visit the NETS website: www.rch.unimelb.edu.au/NETS.

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 7007 or (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). A pamphlet on preparation of severely ill children for inter-hospital transport can be obtained by contacting PETS on (03) 9345 7007, or by email: henningr@cryptic.rch.unimelb.edu.au, or from the PETS website: www.rchpets.org.

Table 44 Transfers by PETS, 1990–1998

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Injuries:									
head injury	12	19	22	19	17	19	20	24	18
immersion	6	9	9	3	10	–	5	4	4
poisoning	7	5	–	6	4	7	5	6	6
other	9	6	5	15	9	6	5	7	7
Cardiovascular	4	8	10	9	3	10	2	1	3
Neurology:									
fits	18	18	18	24	16	19	19	22	42
meningitis	15	12	20	10	3	9	5	7	10
other	6	7	8	4	13	6	10	8	6
Respiratory:									
asthma	15	23	31	34	47	23	28	30	33
bronchiolitis	8	6	4	7	4	9	8	8	9
croup	50	34	53	27	44	18	24	19	15
epiglottitis	36	28	27	11	3	2	1	1	1
other	10	11	17	18	21	18	24	14	16
Miscellaneous:									
septic shock	4	3	2	4	5	13	9	8	6
other	1	5	5	10	8	1	15	10	10
Total	201	194	231	201	207	160	180	169	186

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.

**CONSULTIVE COUNCIL
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