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

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**ANNUAL REPORT  
FOR THE YEAR 2000**

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**INCORPORATING THE 39TH SURVEY  
OF PERINATAL DEATHS IN VICTORIA**

**Annual Report  
for the Year 2000**  
Incorporating the 39th Survey  
of Perinatal Deaths in Victoria

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

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## ACKNOWLEDGEMENTS

The production of this report was made possible by the generous assistance of many individuals.

Members of the Consultative Council on Obstetric and Paediatric Mortality and Morbidity, and of its sub-committees, have diverse areas of expertise, and their contributions to the consideration and classification of maternal, perinatal, infant and paediatric deaths form the basis of this report.

Midwives provide detailed information concerning every birth in Victoria to the Perinatal Data Collection Unit of the Council. The Birth Defects Register relies upon 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 autopsy 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 relevant cases investigated by Coroners in Victoria.

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

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

The Department of Human Services contributes 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 of gestation up to, but not including, the 15th birthday, is 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.

This report is available on the CCOPMM/PDCU website:  
<http://www.dhs.vic.gov.au/phd/perinatal/index.htm>

# EXECUTIVE SUMMARY

## PERINATAL

- In Victoria in 2000, there were 62,354 births of infants with birthweight of 500g or greater.
- The Victorian birth rate was 13.0 per 1,000 mean estimated population.
- Of the 62,354 births, 262 were stillborn and 134 infants died within the first month of life.
- The perinatal mortality rate was 6.4 per 1,000 births of birthweight 500g or greater. This is the lowest perinatal mortality rate ever recorded in Victoria. One out of approximately every 157 babies with a birthweight 500g or more, was either stillborn or died in the first month of life. This is regardless of gestational age or presence of birth defect.
- The commonest cause of stillbirth (birthweight of 400g or greater) was unexplained antepartum death accounting for 32.7% of stillbirths, followed by birth defects, which accounted for 22.4% of stillbirths.
- Of the stillbirths reviewed by committee, approximately one in ten were considered to have suspected preventable factors. These included inadequate antenatal monitoring and inadequate detection and management of the growth-restricted fetus.
- The commonest cause of neonatal death (birthweight of 400g or greater) was spontaneous preterm accounting for 36.8% of neonatal deaths, followed by birth defects, which accounted for 34.6% of neonatal deaths.
- Of the neonatal deaths reviewed by committee, nearly one in five were considered to have suspected preventable factors. These included inadequate intrapartum management, inadequate resuscitation and inadequate paediatric management.
- Multiple births accounted for 3.1% of births  $\geq 500$ g and 11.1% of all perinatal deaths.
- The perinatal mortality rate for multiple births of birthweight  $\geq 500$ g was 22.9 per 1,000 births compared with 5.8 for singleton births.

## **POSTNEONATAL INFANTS AND CHILDREN**

- 208 infants who were born in 2000 died in the first year of life, giving an infant mortality rate of 3.3 deaths per 1,000 live births in 2000, the lowest rate ever recorded in Victoria.
- 136 of infant deaths occurred in the first month of life, and 72 between one month of age and the first birthday.
- The commonest cause of infant mortality was birth defects (29 deaths).
- 23.6 per cent of postneonatal infant deaths were attributable to Sudden Infant Death Syndrome (21 deaths).
- The number of postneonatal infant and child deaths (children aged 29 days until the 15th birthday) in 2000 was 233.
- 144 children died between one year of age and their fifteenth birthday.
- The commonest causes of death of children were birth defects and malignancy, 27 deaths and 22 deaths respectively.
- One postneonatal infant and nineteen children (aged 29 days until the 15th birthday) died as a result of motor vehicle accidents.
- One postneonatal infant and fifteen children (aged 29 days until the 15th birthday) died as result of drowning.

## **MATERNAL**

- There were five maternal deaths, but in expert review, none of the cases were found to have deficiencies of care to such an extent that the death was classified as avoidable.

## CHAIRMAN'S REPORT

Since the inception of the Consultative Council on Obstetric and Paediatric Mortality and Morbidity in 1962 (firstly as a neonatal mortality committee), until the year 2000, there has been an impressive reduction in maternal, infant and perinatal mortality. It is gratifying to report that in the year 2000, the rates of perinatal and infant mortality are the lowest level yet recorded for Victoria. Much of this steady reduction in mortality is attributable to improvements in overall health and advances in socio-economic wellbeing and family planning, but there is no doubt that advances in clinical care have also made a substantial contribution to the reduction in death and disability from pregnancy and childbirth.

The Council has two functions in regard to considering mortality. The first is a public health monitoring function, where trend analyses are able to be presented. The second function relates to cases being subjected to confidential enquiry, so that non-judgemental recommendations can be made about how practices may be improved and the burden of avoidable and morbidity be reduced.

Despite the improvements in outcomes referred to above, in reviewing individual cases, it is not unusual for deficiencies in management to be identified. It is often not possible to judge with confidence that such a perceived deficiency caused the death, but it is probable that there is still considerable room for improvement in antenatal, intrapartum and postnatal care as well as in care of the newborn infant and child. These practice deficiencies are addressed in the recommendations of the report.

The Council expresses its gratitude to Victoria's medical practitioners who willingly provide confidential clinical information which assists the Council and the subcommittees in their deliberations. Any information provided to the Council is privileged by legislation, and is not accessible by any third party, including the Courts.

The triennium of the current Council expires in February 2003. The pathologist to Council and its maternal, stillbirth and neonatal death committees, Dr Denys Fortune, has indicated his intention to retire from Council at the end of this triennium, after an association of nearly 30 years. The Council extends its appreciation to Dr Fortune and best wishes for the future.

I would like also to sincerely thank all the current Council members and the members of the subcommittees for their support, advice and expertise during the tenure of this Council.

The Council is supported by two part-time administrative assistants, Luli Zyka and Aida Magtoto, whose contributions to the running of the Council and its subcommittees are much appreciated. The assistance of Dr Cathie Rose in coding of paediatric and malformation cases is also gratefully acknowledged.

Again I would like to pay special tribute to the dedication of the research officer to the Council, Rosemary Warren, who skilfully maintains the functioning of the Council and its subcommittees as well as being instrumental in the production of this report.

Respectfully submitted,

James Forrester King, MB, MPH, FRCSC, FRCOG, FRANZCOG

Chairman, Victorian Consultative Council on Obstetric and Paediatric Mortality and Morbidity.

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Mrs Sonia Palma	Health Information Manager
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Mrs Linda Botham	Administrative assistant
Mrs Marina Forte	Administrative assistant
Mrs Jillian Wheatley	Administrative assistant
Dr Catherine Rose	Consultant Medical Officer

## 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 of gestation since 1982. The Unit also maintains the Birth Defects Register for Victorian children born from 1982. The Council also undertakes extensive data collection on perinatal, infant, child deaths (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 research projects requesting information from PDCU. If access to individual case records is requested, stringent conditions apply to safeguard the security and confidentiality of any data released by the Council. In all instances, a Council nominee must be one of the project supervisors.

Formal research proposals must conform to the National Health and Medical Research Council *National Statement on Ethical Conduct in Research Involving Humans 1999*. Before any 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.

All correspondence should be addressed to:

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

# PERINATAL MORTALITY REVIEW

## INTRODUCTION

This report is the 39th consecutive Survey of Perinatal Deaths in Victoria.

As has been the practice since 1980, Council continues to report on perinatal deaths of infants with a **birthweight of 500g or more**, or if the birthweight is unknown, infants of **≥22 weeks gestation**. This definition has certain advantages as a public health perinatal indicator, because it excludes from the calculation those pre-viable live births of <500g and also the majority of cases where the pregnancy was terminated for fetal or maternal indications. This Report also maintains this definition to facilitate trend analyses.

In addition, in this Report, in order to align Council's reports with those of other States and Territories and comply with national reporting practices (National Perinatal Statistics Unit and Australian Bureau of Statistics), Council includes for the first time, data on perinatal deaths of infants with a **birthweight of 400g or of gestation 20 weeks or more**.

**Using the ≥500g/22 weeks definition**, there were 396 perinatal deaths in Victoria in 2000, giving a perinatal mortality rate (PMR) of 6.4 per 1,000 births, the lowest rate ever recorded in Victoria. This was as a result of a decline in both the stillbirth rate and the neonatal death rate. The stillbirth rate was 4.2 per 1,000 total births, and the neonatal death rate 2.2 per 1,000 live births.

**Using the ≥400g/20 weeks definition**, there were 598 perinatal deaths in Victoria in 2000, giving a perinatal mortality rate (PMR) of 9.6 per 1,000 births. The stillbirth rate was 6.6 per 1,000 total births, and the neonatal death rate 2.9 per 1,000 live births.

### **Modus operandi of the Council's review of perinatal deaths:**

The Council compiles a case file on every perinatal death and the cases are individually considered by the Chair of the Council and the Research Officer, and triaged into those requiring consideration by the sub-committees because of potential avoidability (e.g. term perinatal death from intrapartum asphyxia) or those which are considered likely to be completely unavoidable (eg multiple fetal abnormalities) and which are not considered by the sub-committees. All cases are classified and coded according to the agreed classifications of the Perinatal Society of Australia and New Zealand (ANZACPM and ANZNDC).

## DEFINITIONS

Unless otherwise stated, the following definitions apply:

**Stillbirth 500** The birth of an infant weighing at least 500g or, if the weight was not known, of at least 22 weeks gestation, which shows no signs of life after birth.

**Stillbirth 400** The birth of an infant weighing at least 400g or of at least 20 weeks gestation, which shows no signs of life after birth.

**Neonatal death 500** The death of a liveborn infant, within 28 days of birth, whose birthweight was at least 500g or, if the weight was not known, of at least 22 weeks gestation.

**Neonatal death 400** The death of a liveborn infant, within 28 days of birth, whose birthweight was at least 400g or of at least 20 weeks gestation

**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)

$$= \frac{(\text{number of neonatal deaths} + \text{stillbirths}) \times 1,000}{\text{total livebirths} + \text{stillbirths}}$$

## PERINATAL MORTALITY 2000

The denominator for the perinatal mortality rate is based on all births in Victoria in 2000 (62,354) of birthweight  $\geq 500\text{g}$  or  $\geq 22$  weeks gestation, if the birthweight was unknown. Nine neonates who died in Victoria but were born elsewhere have been excluded from this report.

Using this definition, in 2000 there were 262 stillbirths and 134 neonatal deaths, giving a total of 396 deaths and a perinatal mortality rate of 6.4 per 1,000 births (Tables 1 and 3).

Using the definition of  $\geq 400\text{g}$  or  $\geq 20$  weeks, in 2000 there were 62,562 births, 416 stillbirths and 182 neonatal deaths, giving a total of 598 deaths and a perinatal mortality rate of 9.6 per 1,000 births (Tables 2 and 4).

Those perinatal deaths that occurred at 20 weeks gestation or later but had a birthweight less than 400g, are separately reported in Table 14.

**Table 1 Perinatal deaths in Victoria, 1991–2000 (birthweight  $\geq 500\text{g}$  or  $\geq 22$  weeks gestation if birthweight unknown)**

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Livebirths	64,632	65,815	64,284	64,376	63,214	62,429	61,815	61,634	62,149	62,092
Stillbirths	375	325	286	329	315	291	269	290	293	262
Neonatal deaths	224	191	165	184	193	157	160	164	171	134
Perinatal deaths	599	516	451	513	508	448	429	454	464	396

**Table 2 Perinatal deaths in Victoria, 2000 (birthweight  $\geq 400\text{g}$  or  $\geq 20$  weeks gestation)**

	2000
Livebirths	62,146
Stillbirths	416
Neonatal deaths	182
Perinatal deaths	598

**Table 3 Perinatal death rates in Victoria, 1991–2000 (birthweight  $\geq 500\text{g}$  or  $\geq 22$  weeks gestation if birthweight unknown)**

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Stillbirth rate*	5.8	4.9	4.4	5.1	5.0	4.6	4.3	4.7	4.7	4.2
Neonatal death rate**	3.5	2.9	2.6	2.9	3.1	2.5	2.6	2.7	2.7	2.2
Perinatal mortality rate*	9.2	7.8	7.0	7.9	8.0	7.1	6.9	7.3	7.4	6.4

\* Rate per 1,000 births.

\*\* Rate per 1,000 live births

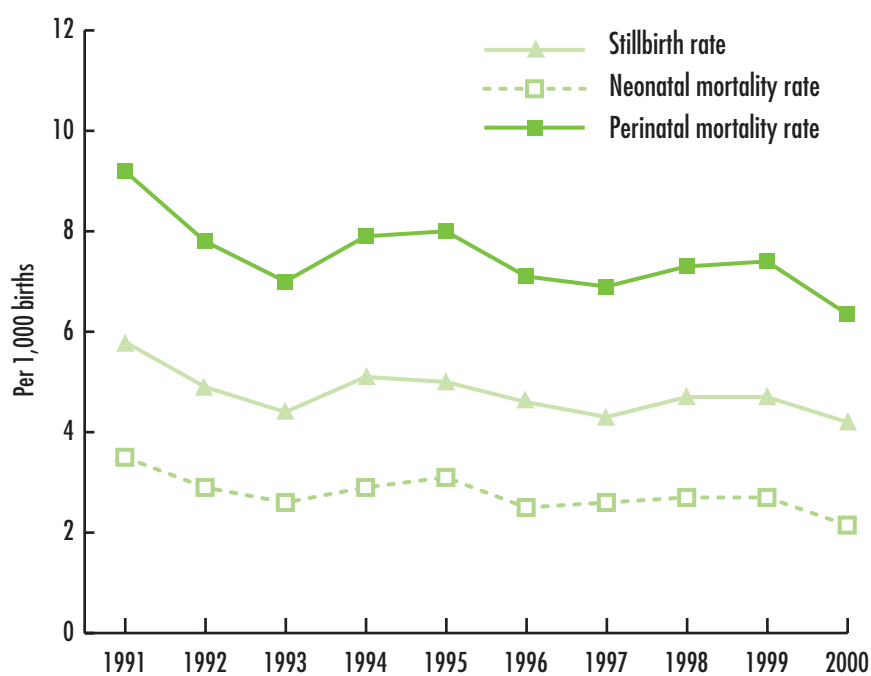
**Table 4 Perinatal death rates in Victoria, 2000 (birthweight  $\geq 400\text{g}$  or  $\geq 20$  weeks gestation)**

	2000
Stillbirth rate*	6.6
Neonatal death rate**	2.9
Perinatal mortality rate*	9.6

\* Rate per 1,000 births.

\*\* Rate per 1,000 live births

**Figure 1 Perinatal mortality rates in Victoria, 1991–2000 (birthweight  $\geq 500\text{g}$  or  $\geq 22$  weeks gestation if birthweight unknown)**



## CAUSES OF PERINATAL DEATHS, 2000

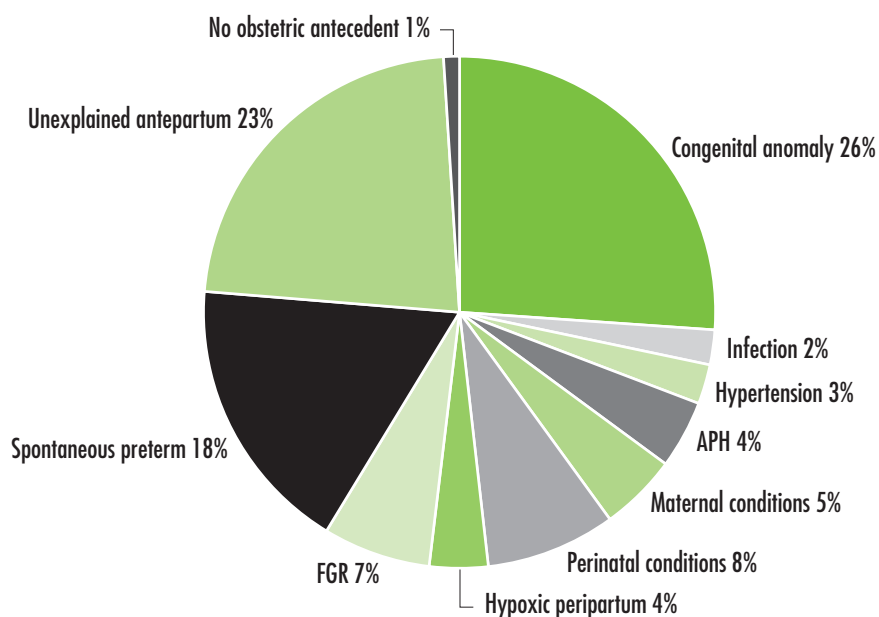
For perinatal deaths from 2000 onwards, Council is applying the new perinatal classification systems developed by the perinatal mortality classification working party of the Perinatal Society of Australia and New Zealand (ANZACPM classification – see Appendix A), which are now being used by all States and Territories.

**Table 5 Perinatal deaths in Victoria in 2000, by cause (ANZACPM classification) and type (birthweight  $\geq$ 400g or  $\geq$ 20 weeks gestation)**

Cause of death (ANZACPM)	Type of perinatal death				Total	
	Stillbirths (Fetal death)		Neonatal death		n	%
	n	%	n	%		
Congenital anomaly	93	22.4	63	34.6	156	26.1
Infection	7	1.7	6	3.3	13	2.2
Hypertension	10	2.4	5	2.7	15	2.5
Antepartum haemorrhage	23	5.5	3	1.7	26	4.3
Maternal conditions*	26*	6.3	3	1.7	29	4.9
Specific perinatal conditions	38	9.1	11	6.0	49	8.2
Hypoxic peripartum death	7	1.7	15	8.2	22	3.7
Fetal growth restriction	38	9.1	3	1.7	41	6.8
Spontaneous preterm	38	9.1	67	36.8	105	17.6
Unexplained antepartum death	136	32.7	–	–	136	22.7
No obstetric antecedent	–	–	6	3.3	6	1.0
<b>Total</b>	<b>416</b>	<b>100</b>	<b>182</b>	<b>100</b>	<b>598</b>	<b>100.0</b>

Note: Maternal conditions\* includes terminations  $\geq$ 20 weeks for psychosocial indications. There were 14 stillbirths classified under this category.

**Figure 2 Causes of perinatal deaths, ANZACPM classification, Victoria, 2000 (birthweight  $\geq 400\text{g}$  or  $\geq 20$  weeks gestation)**



**Table 6 Perinatal deaths in Victoria in 2000, by cause (ANZACPM classification) and birthweight (birthweight  $\geq 400\text{g}$  or  $\geq 20$  weeks gestation)**

Cause of death (ANZACPM)	Birthweight (g)						Total	
	<1,000		1,000–2,499		$\geq 2,500$		n	%
Congenital anomaly	105	30.1	28	21.9	23	17.4	156	26.1
Infection	6	1.8	3	2.3	4	3.0	13	2.2
Hypertension	10	2.9	4	3.1	1	0.8	15	2.5
Antepartum haemorrhage	9	2.7	14	10.9	3	2.3	26	4.3
Maternal conditions*	17	5.0	5	3.9	7	5.3	29	4.8
Specific perinatal conditions	30	8.9	11	8.6	8	6.1	49	8.2
Hypoxic peripartum death	–	–	1	0.8	21	15.9	22	3.7
Fetal growth restriction	24	7.1	15	11.7	2	1.5	41	6.9
Spontaneous preterm	96	28.4	9	7.0	–	–	105	17.6
Unexplained antepartum death	41	12.1	38	29.8	57	43.2	136	22.7
No obstetric antecedent	–	–	–	–	6	4.5	6	1.0
<b>Total</b>	<b>338</b>	<b>100.0</b>	<b>128</b>	<b>100.0</b>	<b>132</b>	<b>100.0</b>	<b>598</b>	<b>100.0</b>

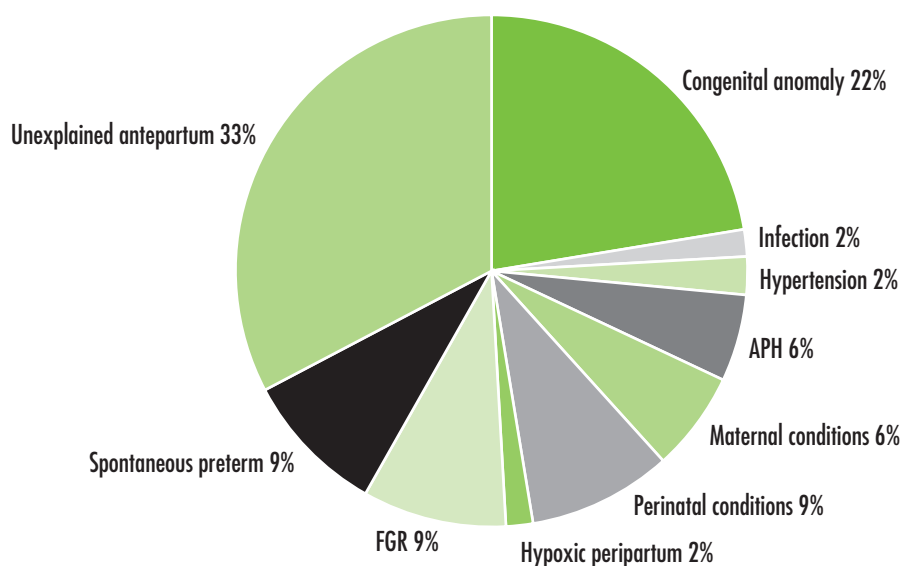
Note: Maternal conditions\* includes terminations  $\geq 20$  weeks for psychosocial indications. There were 14 stillbirths classified under this category.

**Table 7 Stillbirths (fetal deaths) in Victoria in 2000, by cause (ANZACPM classification) and birthweight (birthweight  $\geq 400\text{g}$  or  $\geq 20$  weeks gestation)**

Cause of death (ANZACPM)	Birthweight (g)						Total	
	<1,000		1,000–2,499		$\geq 2,500$		n	%
Congenital anomaly	77	32.9	13	13.0	3	3.7	93	22.4
Infection	4	1.7	2	2.0	1	1.2	7	1.7
Hypertension	6	2.6	4	4.0	–	–	10	2.4
Antepartum haemorrhage	7	2.9	13	13.0	3	3.7	23	5.5
Maternal conditions	17*	7.3	4	4.0	5	6.1	26	6.3
Specific perinatal conditions	25	10.7	9	9.0	4	4.9	38	9.1
Hypoxic peripartum death	–	–	–	–	7	8.5	7	1.7
Fetal growth restriction	21	8.9	15	15.0	2	2.4	38	9.1
Spontaneous preterm	36	15.4	2	2.0	–	–	38	9.1
Unexplained antepartum death	41	17.5	38	38.0	57	69.5	136	32.7
No obstetric antecedent	–	–	–	–	–	–	–	–
<b>Total</b>	<b>234</b>	<b>100.0</b>	<b>100</b>	<b>100.0</b>	<b>82</b>	<b>100.0</b>	<b>416</b>	<b>100.0</b>

Note: Maternal conditions\* includes terminations  $\geq 20$  weeks for psychosocial indications. There were 14 stillbirths classified under this category.

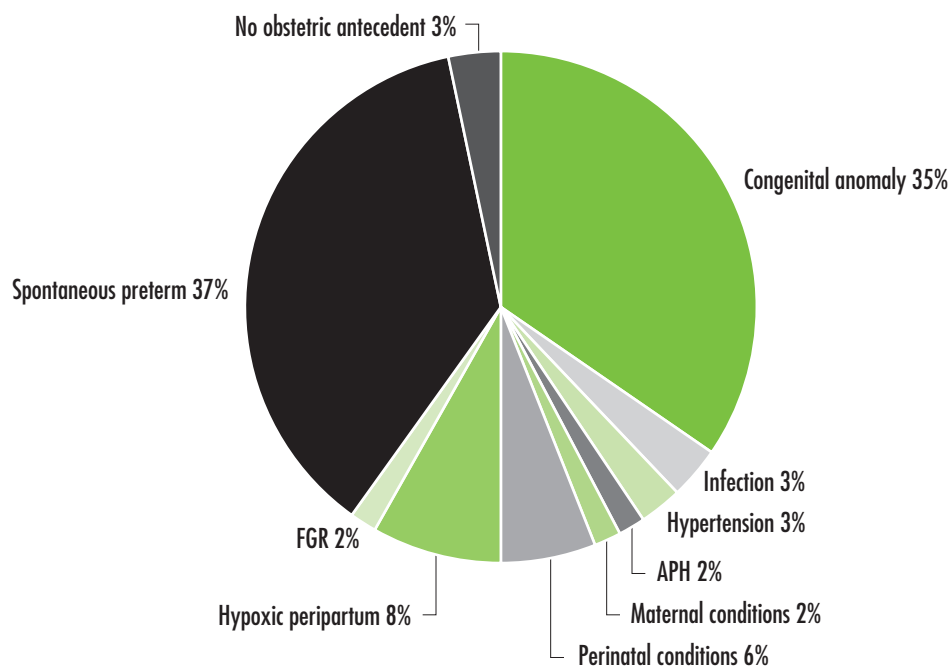
**Figure 3 Causes of stillbirth (fetal death), ANZACPM classification, Victoria, 2000 (birthweight  $\geq 400\text{g}$  or  $\geq 20$  weeks gestation)**



**Table 8 Neonatal deaths in Victoria in 2000, by cause (ANZACPM classification) and birthweight (birthweight  $\geq 400\text{g}$  or  $\geq 20$  weeks gestation)**

Cause of death (ANZACPM)	Birthweight (g)						Total	
	<1,000		1,000–2,499		$\geq 2,500$		n	%
Congenital anomaly	28	26.9	15	53.6	20	40.0	63	34.6
Infection	2	1.9	1	3.6	3	6.0	6	3.3
Hypertension	4	3.8	–	–	1	2.0	5	2.7
Antepartum haemorrhage	2	1.9	1	3.6	–	–	3	1.7
Maternal conditions	–	–	1	3.6	2	4.0	3	1.7
Specific perinatal conditions	5	4.8	2	7.1	4	8.0	11	6.0
Hypoxic peripartum death	–	–	1	3.6	14	28.0	15	8.2
Fetal growth restriction	3	2.9	–	–	–	–	3	1.7
Spontaneous preterm	60	57.7	7	25.0	–	–	67	36.8
Unexplained antepartum death	–	–	–	–	–	–	–	–
No obstetric antecedent	–	–	–	–	6	12.0	6	3.3
<b>Total</b>	<b>104</b>	<b>100.0</b>	<b>28</b>	<b>100.0</b>	<b>50</b>	<b>100.0</b>	<b>182</b>	<b>100.0</b>

**Figure 4 Causes of neonatal deaths, ANZACPM classification, Victoria, 2000 (birthweight  $\geq 400\text{g}$  or  $\geq 20$  weeks gestation)**

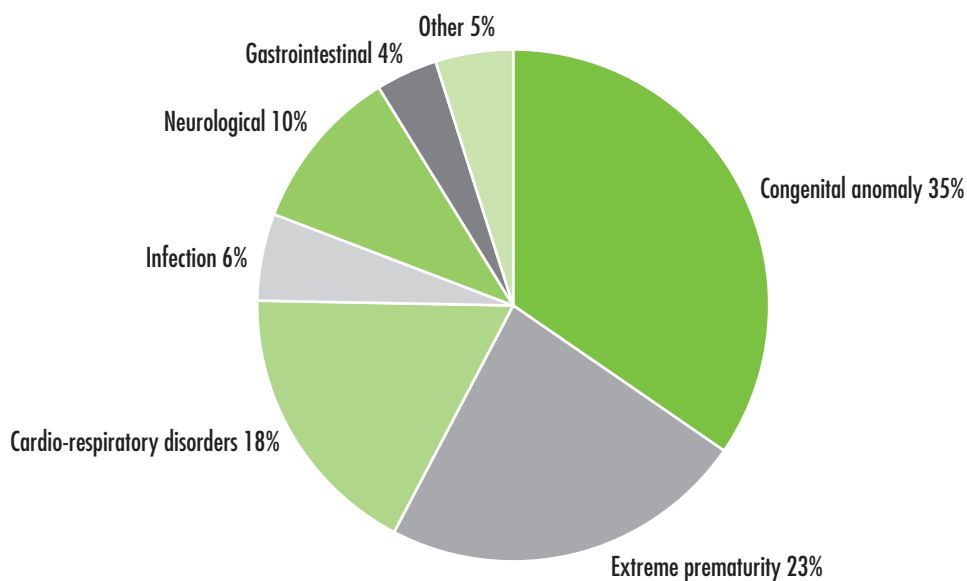


Note that there were 14 cases of neonatal death in infants weighing  $\geq 2500\text{g}$ , where the death was ascribed to peripartum hypoxic insult. In most of these cases, deficiencies were identified in intrapartum management and/or neonatal resuscitation.

**Table 9 Neonatal deaths in Victoria in 2000, by cause (ANZNDC classification, major categories) and birthweight (birthweight  $\geq 400\text{g}$  or  $\geq 20$  weeks gestation)**

Cause of death (ANZACPM)	Birthweight (g)						Total	
	<1,000		1,000–2,499		$\geq 2,500$		n	%
Congenital anomaly	28	26.9	15	53.6	20	40.0	63	34.6
Extreme prematurity	39	37.5	3	10.7	–	–	42	23.1
Cardio-respiratory disorders	25	24.1	5	17.9	2	4.0	32	17.6
Infection	5	4.8	2	7.1	3	6.0	10	5.5
Neurological	–	–	2	7.1	17	34.0	19	10.4
Gastrointestinal	7	6.7	–	–	–	–	7	3.9
Other	–	–	1	3.6	8	16.0	9	4.9
Total	104	100.0	28	100.0	50	100.0	182	100.0

**Figure 5 Causes of neonatal deaths, ANZNDC classification, Victoria, 2000 (birthweight  $\geq 400\text{g}$  or  $\geq 20$  weeks gestation)**



**Table 10 Neonatal deaths in Victoria in 2000, by cause (ANZND classification, expanded categories) and birthweight (birthweight  $\geq 400\text{g}$  or  $\geq 20$  weeks gestation)**

Cause of death (ANZACPM)	Birthweight (g)						Total	
	<1,000		1,000–2,499		$\geq 2,500$		n	%
Congenital anomaly	28	26.9	15	53.6	20	40.0	63	34.6
Extreme prematurity	39	37.5	3	10.7	–	–	42	23.1
Cardio-respiratory disease								
Hyaline membrane disease/ Respiratory disease syndrome	18	17.3	1	3.6	–	–	19	10.5
Meconium aspiration	–	–	–	–	1	2.0	1	0.6
Pulmonary hypoplasia	4	3.9	3	10.7	–	–	7	3.8
Chronic neonatal lung disease	1	0.96	–	–	–	–	1	0.6
Other cardio-respiratory	2	1.9	1	3.6	1	2.0	4	2.2
Infection								
Congenital bacterial	2	1.9	1	3.6	1	2.0	4	2.2
Acquired bacterial	1	0.96	1	3.6	–	–	2	1.1
Congenital bacterial	–	–	–	–	2	4.0	2	1.1
Fungal	1	0.96	–	–	–	–	1	0.6
Unspecified organism	1	0.96	–	–	–	–	1	0.6
Neurological								
Hypoxic ischemic encephalopathy/ perinatal asphyxia	–	–	2	7.1	16	32.0	18	9.9
Intracranial haemorrhage	–	–	–	–	1	2.0	1	0.6
Gastrointestinal								
Necrotising enterocolitis	7	6.7	–	–	–	–	7	3.8
Other								
SIDS	–	–	–	–	3	6.0	3	1.6
Trauma	–	–	–	–	3	6.0	3	1.6
Other	–	–	1	3.6	2	4.0	3	1.6
<b>Total</b>	<b>104</b>	<b>100.0</b>	<b>28</b>	<b>100.0</b>	<b>50</b>	<b>100.0</b>	<b>182</b>	<b>100.0</b>

## ***Perinatal infection***

Cases are included in this category when the fetal or neonatal death is attributed to primary infection. Perinatal deaths occurring with chorio-amnionitis secondary to preterm rupture of membranes are excluded from this category and counted under “spontaneous preterm”.

**Table 11 Perinatal infection in Victoria, 2000 (ANZACPM classification)**

Perinatal Infection (ANZACPM)	Perinatal death (Birthweight $\geq$ 400g or $\geq$ 20 weeks gestation)					
	Stillbirths (Fetal death)		Neonatal death		Total	
	n	%	n	%	n	%
<b>Bacterial</b>						
Group B Streptococcus	1	14.3	1	16.7	2	15.4
E coli	1	14.3	1	16.7	2	15.4
Listeria monocytogenes	–	–	1	16.7	1	7.7
Unspecified bacterial	–	–	1	16.7	1	7.7
<b>Viral</b>						
Cytomegalovirus	2	28.5	–	–	2	15.4
Parovirus	1	14.3	–	–	1	7.7
Other viral	1	14.3	2	33.3	3	23.1
Protozoal eg Toxoplasma	1	14.3	–	–	1	7.7
<b>Total</b>	<b>7</b>	<b>100.0</b>	<b>6</b>	<b>100.0</b>	<b>13</b>	<b>100.0</b>

\* Note percentages rounded, total may not add up to 100

There is likely to be significant underestimation of the true incidence of perinatal death caused by perinatally acquired fetal or neonatal GBS sepsis. Council is addressing this by undertaking a population based survey of positive isolates for GBS.

All maternity units should have a written protocol outlining the institution’s approach to prevent GBS infection by either maternal antenatal screening and intrapartum treatment of GBS positive women or intrapartum prophylaxis on the basis of risk factors, and also a protocol for the management of the newborn at risk of developing early onset sepsis.

The low number of staphylococcus aureus and coagulase negative staphylococcus infections reported as the primary cause of death also significantly understates the contribution of these organisms to mortality and morbidity in neonatal intensive care. In premature infants or other infants with multi-system disease it may be difficult to attribute a single primary cause of death. These organisms are the commonest cause of nosocomial bacteraemia in neonatal intensive care and are major contributors to mortality. In light of the growing emergence of resistant organisms, best practice in antibiotic administration and infection control is going to become progressively more important in the coming years.

### ***Perinatal deaths due to birth defects***

There were 156 perinatal deaths due to birth defects (Table 12) in infants who had a birthweight  $\geq 400\text{g}$  or were  $\geq 20$  weeks gestation (26.1%). Chromosomal abnormalities accounted for 37 deaths, multiple malformations for 29 deaths and defects of the cardiovascular system for 23 deaths.

For perinatal deaths of infants with a birthweight  $\geq 500\text{g}$  or were  $\geq 22$  weeks gestation ( $n = 396$ ), there were 80 perinatal deaths due to birth defects, and the pregnancy was terminated in 26 cases (32.5%).

Of the 156 perinatal deaths of infants with a birth defect, of birthweight  $\geq 400\text{g}$  or  $\geq 20$  weeks gestation, the pregnancy was terminated in 99 cases (63.5%).

**Table 12 Perinatal deaths in Victoria in 2000 due to birth defects (birthweight  $\geq 400\text{g}$  or  $\geq 20$  weeks gestation, including terminations of pregnancy)**

ICD code	Conditions	Stillbirths	Neonatal deaths	Total
C76.0	Immature teratoma (neck)	1	–	1
D18	Haemangioma	–	2	2
D38.3	Mediastinal teratoma	1	–	1
E70-90	Metabolic disorders	–	3	3
Q00.0	Anencephalus	–	1	1
Q01	Encephalocele	1	–	1
Q02	Microcephaly	–	–	–
Q03	Hydrocephalus	7	3	10
Q04	Other brain anomaly	1	2	3
Q05	Spina bifida	2	3	5
Q07	Other nervous system anomaly	1	–	1
Q20–Q28	Cardiovascular anomalies	12	11	23
Q30–Q34	Respiratory system anomalies	1	2	3
Q36	Cleft lip	1	–	1
Q39	Oesophageal anomaly	1	–	1
Q41	Duodenal anomaly	1	–	1
Q60–Q64	Urinary system anomalies	6	4	10
Q74.3	Arthrogryposis multiplex congenita	1	1	2
Q74.8	Larsens syndrome	–	1	1
Q76.4	Kyphomelia dysplasia	–	1	1
Q77–Q78	Osteochondrodysplasia	6	1	7
Q79.0	Diaphragmatic hernia	–	2	2
Q79.2	Exomphalos/Omphalocele	2	–	2
Q79.3	Gastroschisis	–	1	1
Q80	Ichthyosis	–	1	1
Q82.8	Restrictive dermatopathy	–	1	1
Q87	Multiple system defects	14	3	17

**Table 12 Perinatal deaths in Victoria in 2000 due to birth defects (birthweight  $\geq$ 400g or  $\geq$ 20 weeks gestation, including terminations of pregnancy) – continued**

ICD code	Conditions	Stillbirths	Neonatal deaths	Total
Q89.4	Conjoined twins	2	–	2
Q89.7	Multiple malformations	9	3	12
Q89.8	Other specified malformations	–	3	3
Q90	Trisomy 21	2	4	6
Q91.4–.7	Trisomy 13	–	3	3
Q91.0–.3	Trisomy 18	8	3	11
Q92	Other triploidy	2	1	3
Q96	Turner's syndrome	4	–	4
Q93, 97, 99	Other chromosomal anomalies	7	3	10
Total		93	63	156

### *Time of fetal death in stillbirths*

Death occurred during labour in 12.2 per cent of stillbirths (birthweight  $\geq$ 500g or  $\geq$ 22 weeks gestation if birthweight unknown) in 2000. Of 82 stillbirths with a birthweight  $\geq$ 2500 grams, nine (11%) were intrapartum deaths (see Table 13). Most of these have avoidable factors related to intrapartum management.

**Table 13 Time of fetal death in stillbirths in Victoria, 2000 (birthweight  $\geq$ 500g or  $\geq$ 22 weeks gestation if birthweight unknown)**

Birthweight (g)	Prior to labour	During labour	Unknown before or during labour	Total
500–999	51	18	10	79
1,000–1,499	39	–	1	40
1,500–1,999	23	2	1	26
2,000–2,499	28	3	3	34
2,500–2,999	30	2	1	33
3,000–3,499	29	3	2	34
3,500–3,999	9	4	–	13
$\geq$ 4,000	2	–	–	2
Unknown	–	–	1	1
Total	211	32	19	262
(%)	80.5	12.2	7.3	

### ***Time of neonatal death***

Over 29% of neonatal deaths of infants whose birthweight was  $\geq 500\text{g}$  or were  $\geq 22$  weeks gestation occurred within six hours of birth.

**Table 14 Age at time of death for neonates, Victoria, 2000 (birthweight  $\geq 500\text{g}$  or  $\geq 22$  weeks gestation if birthweight unknown)**

Birthweight (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	22	5	6	10	2	5	4	2	56
1,000–1,499	4	2	1	3	–	–	1	–	11
1,500–1,999	2	1	1	2	1	–	1	1	9
2,000–2,499	3	1	1	–	2	–	–	1	8
2,500–2,999	4	–	3	2	1	1	4	3	18
3,000–3,499	2	1	2	4	4	4	3	1	21
3,500–3,999	1	–	1	1	–	–	1	–	4
$\geq 4,000$	1	1	–	2	2	–	1	–	7
Total	39	11	15	24	12	10	15	8	134
(%)	29.1	8.2	11.2	12.9	8.9	7.5	11.2	5.9	

## COMPARISON OF COUNCIL DATA WITH OTHER SOURCES

There is considerable variation between regions and countries in the way perinatal deaths are defined, ascertained and reported. Caution must always be exercised in comparing published mortality rates.

The following information is relevant to those undertaking the potentially confusing task of comparing perinatal mortality data from other sources within Australia and from other countries.

There are three main problem areas:

### ***1. Birthweight and gestational age criteria for inclusion of cases***

To enable consistency for trend analysis, Council continues to present data according to the '≥500g' definition used since 1980, and in this report, for the first time also includes data and classifications for fetuses and newborns from 400g.

It is also noted that there are increasing registrations of neonatal deaths of pre-viable infants (<20 weeks gestation) who exhibit transient signs of life after birth. Many of these pre-viable live births are the result of terminations of pregnancy using vaginal misoprostol.

### ***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 occur in the year following the birth. In contrast, the Australian Bureau of Statistics (ABS) publishes statistics according to ***the year when the death is registered***, not the year of birth or death. Council is collaborating with ABS in investigating discrepancies between the two databases.

### ***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 refer to deaths occurring in Victoria, irrespective of the State, Territory, or country of birth.

**These definitional differences give rise to slight differences in rates reported by various agencies.**

## INTERNATIONAL COMPARISONS OF PERINATAL MORTALITY

For the purposes of international comparison, World Health Organisation (WHO) also recommends publication of mortality rates in which numerator and denominator are restricted to fetuses and infants of birthweight 1,000g or over, or if birthweight is unavailable, 28 weeks' gestation and over. The definitions are:

*Stillbirth* A stillborn infant weighing at least **1,000g** or, if the birthweight is not known, born after at least **28 weeks** gestation.

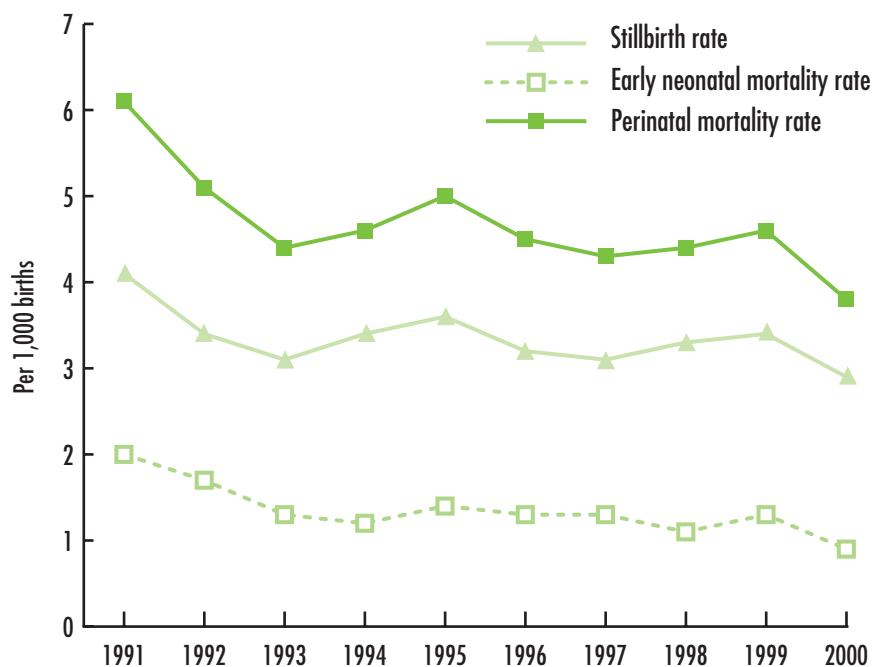
*Early neonatal death* A death occurring in an infant whose birthweight was at least 1,000g (or if the birthweight is not known, an infant born after at least 28 weeks gestation) who dies within **seven days** of birth.

**Table 15 Perinatal mortality rates for international comparison, Victoria, 1991–2000**

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Stillbirth rate	4.1	3.4	3.1	3.4	3.6	3.2	3.1	3.3	3.4	2.9
Early neonatal mortality rate	2.0	1.7	1.3	1.2	1.4	1.3	1.3	1.1	1.3	0.9
Perinatal mortality rate	6.1	5.1	4.4	4.6	5.0	4.5	4.3	4.4	4.6	3.8

\* Rate per 1,000 births (birthweight  $\geq 1,000\text{g}$  or gestation  $\geq 28$  weeks. Neonatal deaths within seven days of birth)

**Figure 6 Perinatal mortality rates for international comparison, Victoria, 1991–2000**



The latest perinatal mortality rates (birthweight  $\geq 1,000\text{g}$ ) per 1,000 births, available from WHO, are for 1995: Western Europe 7, North America 9, South America 39, South-East Asia (not including Australia) 37, and Africa 75 (source: WHO, 1996).

## PERINATAL DEATHS REGISTERED, BUT EXCLUDED FROM THIS SURVEY

There were 202 perinatal deaths legally required to be registered in Victoria in 2000, which, because of Council's definitions, have been excluded from some tables in this report. These included 154 stillbirths and 48 neonatal deaths that were registered because they occurred at 20 weeks gestation or later, but had a birthweight under 500g (see Table 16). Seventy six of these infants (37.6 per cent) had birth defects and the pregnancy was terminated in all but three of these cases.

There were nine neonatal deaths of infants who were born interstate and referred to Victoria for treatment. These are not included in the statistical calculations.

**Table 16 Perinatal deaths of infants of birthweight under 500g, Victoria, 2000**

Cause of death	Birthweight (g)								Total
	<200		200–299		300–399		400–499		
	SB	NND	SB	NND	SB	NND	SB	NND	
Total	25	–	27	4	53	10	49	34	202

There were 83 perinatal deaths of infants whose birthweight was 400–499g. Information on these infants is presented in the Table 17.

**Table 17 Perinatal deaths, by cause (ANZACPM classification) and type (birthweight 400–499g), Victoria, 2000**

Cause of death (ANZACPM)	Type of perinatal death					
	Stillbirths (Fetal death)		Neonatal death		Total	
	n	%	n	%	n	%
Spontaneous preterm	9	18.4	17	50.0	26	31.3
Termination for congenital anomaly	14	28.6	12	35.3	26	31.3
Terminations other than for congenital anomaly	11	22.4	–	–	11	13.3
Unexplained antepartum death	8	16.3	–	–	8	9.6
Fetal growth restriction	4	8.2	2	5.9	6	7.2
Specific perinatal conditions	1	2.0	1	2.9	2	2.4
Congenital anomaly	1	2.0	–	–	1	1.2
Perinatal Infection	–	–	1	2.9	1	1.2
Hypertension	1	2.0	–	–	1	1.2
Antepartum haemorrhage	–	–	1	2.9	1	1.2
Total	49	100.0	34	100.0	83	100.0

There were nine deaths of pre-viable infants of less than 20 weeks gestation, but who showed signs of life after birth and who were therefore registered as livebirths and neonatal deaths. Two had birth defects and the pregnancy was terminated in both cases.

## SOURCES OF INFORMATION

Council relies on the co-operation of obstetricians, neonatologists, paediatricians, midwives, general practitioners and medical records personnel to assist with providing the maximum amount of relevant information on each case. One of the most important documents is the Confidential Medical Report on Perinatal Death (CMR). The Council wishes to thank medical staff who complete these forms.

However, the information in this document is often incomplete. For stillbirths, results of antenatal tests for fetal well-being are often not included (for example, glucose tolerance test, cardiotocography, and ultrasound assessment). For neonatal deaths, where the Confidential Medical Report has been completed by a member of the paediatric staff, obstetrical information is rarely adequate for full consideration of the clinical circumstances surrounding the death, and a separate obstetrical summary should be provided.

**Council recognises that there is often room for improvement in the completion and submission of this information and requests that the Perinatal Death Certificate and the Confidential Medical Report be reviewed for completeness and be countersigned by the most senior clinician involved.**

**The Council advises practitioners that all information provided to the Council is handled with strict confidentiality, and is not able to be accessed by any third party, including the courts. The Council does not reveal in any of its reports the identity of any individual person or practitioner.**

In cases where circumstances are suspicious or where there are suspected serious deficiencies in care, the Coroner should be consulted.

**Institutions should ensure that they are using current Medical Certificate of Cause of Perinatal Death and Confidential Medical Report on Perinatal Death forms. These can be obtained from the Registry of Births, deaths and Marriages (GPO Box 4322, Melbourne 3001)**

## LEGAL REQUIREMENTS FOR REGISTRATION OF PERINATAL DEATHS

The Registry of Births, Deaths, and Marriages notifies Council of all perinatal deaths registered in Victoria. The legal requirements for registration are stipulated in the Health Act.

**For the purpose of Registration**, the *Registration of Births, Deaths and Marriages Act*, dictates that a **'stillborn child'** is any child born at a gestation of at least 20 weeks gestation, who did not, at any time after being born, breathe or show any signs of life. Where the duration of pregnancy is not reliably ascertainable this applies to any fetus weighing 400g or more.

The same Act dictates that a **livebirth** is the birth of an infant, regardless of maturity or birthweight, who breathes or shows any other signs of life after being born. **All such infants must be registered**, and if death subsequently occurs within 28 days, the Act dictates that a Perinatal Death Certificate is also required. However for statistical purposes, live born infants <20weeks' gestation are not included in perinatal mortality calculations.

In this and future Reports, Council will also present data according to the National definition, reporting on births and perinatal deaths where the gestational age is 20 weeks or more or the birthweight is 400g or more.

## PERINATAL AUTOPSY SERVICE

In circumstances where there is uncertainty about the precise cause of death, an expert perinatal autopsy and pathological examination of the placenta will often provide helpful information for the parents as well as for clinicians.

In seeking consent for a perinatal or infant postmortem examination, the understandable reluctance of parents to subject their infant to such a procedure must be respected and dealt with sensitively. Many parents in retrospect regret not having the answers that a postmortem examination may provide, whether they be positive or negative. Furthermore, the results of a postmortem examination may be helpful in the management of a subsequent pregnancy. In approximately one third of “unexplained” stillbirths, an expert postmortem examination reveals an explanation for the death.

**When performed, autopsy information and placental pathology should be forwarded to the Council for all perinatal deaths, by the pathology department undertaking the examinations.**

In view of the recent adverse publicity surrounding infant autopsies, the Department of Human Services has issued guidelines for hospitals with respect to gaining consent and other aspects of the retention, use and disposal of tissue obtained at autopsy. These guidelines are available on the internet ([www.dhs.vic.gov.au/phd/postmortem/index.htm](http://www.dhs.vic.gov.au/phd/postmortem/index.htm)).

It is vital to the accuracy of the Council's surveys that full advantage be taken of the free autopsy service available for perinatal deaths occurring in Victoria. To use the service, the attending doctor, following the obtaining of consent, should contact the *pathology department of the nearest teaching hospital* and arrange with a funeral director to transport the infant and the placenta to the pathology centre. The Consultative Council meets costs associated with the autopsy 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

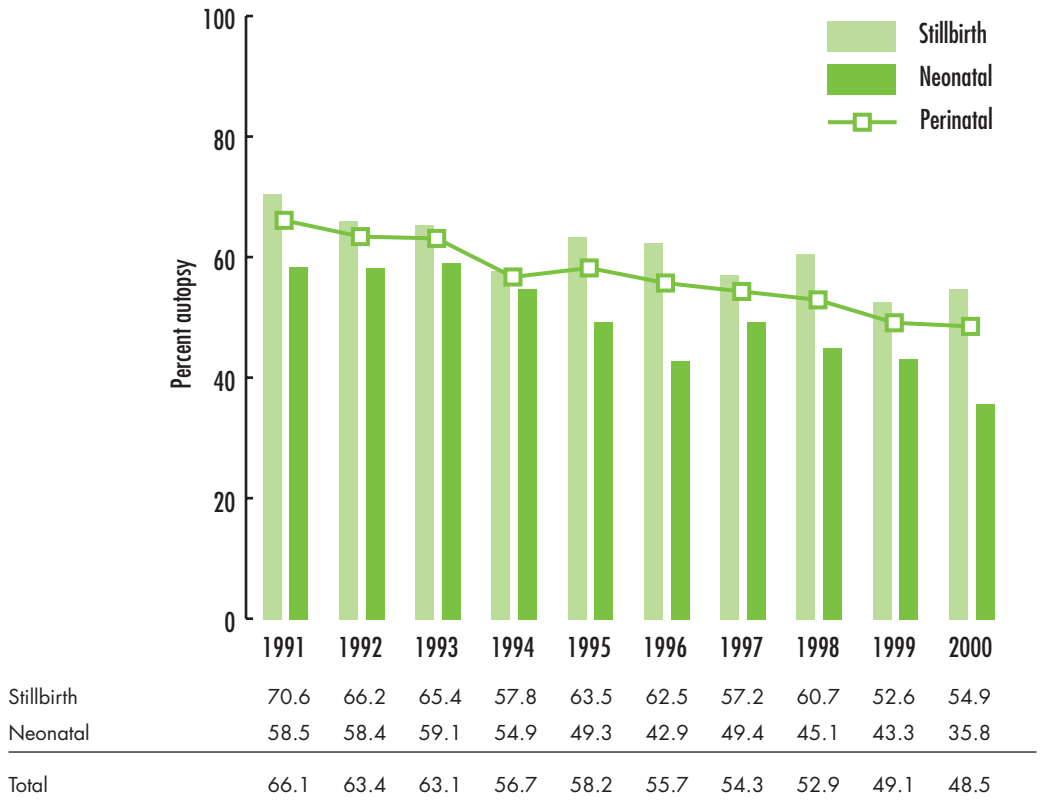
### **Autopsy rates for infants $\geq 500\text{g}$ or $\geq 22$ weeks gestation if birthweight unknown**

In 2000, an autopsy was performed on 54.9 per cent (144 of 262) of stillbirths, and on 35.8 per cent (48 of 134) of neonatal deaths. The proportion of perinatal deaths that have had a autopsy over the past 10 years is shown in Figure 7, which illustrates that there is a progressive decline in the perinatal autopsy rate from 66.1 per cent in 1991 to 48.5 per cent in 2000.

### **Autopsy rates for infants $\geq 400\text{g}$ or $\geq 20$ weeks gestation**

In 2000, an autopsy was performed on 56.0 per cent (233 of 416) of stillbirths, and on 36.8 per cent (67 of 182) of neonatal deaths. The perinatal autopsy rate for infants ( $n = 598$ ) with a birthweight  $\geq 400\text{g}$  or  $\geq 20$  weeks gestation, was 50.2 per cent.

**Figure 7 Perinatal autopsy rates, Victoria, 1991–2000 (birthweight  $\geq 500\text{g}$  or  $\geq 22$  weeks gestation if birthweight unknown)**



### ***Placental Pathology***

As above stated, the placenta should be sent for pathological examination in all cases of fetal death (except in the case of major congenital malformation), and where possible for all early neonatal deaths. Cultures should be taken from the fetal surface of the placenta in cases of actual or suspected infection. The placenta should be sent for pathological examination in the following additional circumstances:

- Neonatal hypoxic ischaemic encephalopathy
- Small for gestational age
- Preterm delivery  $<34$  weeks
- Antepartum haemorrhage
- Suspected chorioamnionitis
- Diabetes
- Preeclampsia
- Macroscopic placental abnormalities

## SUSPECTED PREVENTABLE FACTORS IN PERINATAL DEATHS

The Stillbirth and Neonatal Committees of the Council consider selected cases after information is collated. On the basis of this information, a judgement is made about suspected preventable factors.

In deciding that a suspected preventable factor was present, the determination is not that death was certainly preventable, but that if a preferable course of action had been followed, the risk of death would be likely to have been reduced.

Stillbirths: After consideration, of 262 cases (birthweight  $\geq 500\text{g}$  or  $\geq 22$  weeks gestation), 29 cases (11%) were classified as having preventable factors.

Neonatal deaths: Of the 134 cases (birthweight  $\geq 500\text{g}$  or  $\geq 22$  weeks gestation), there were 26 cases (19%) in which suspected preventable factors were identified.

**The proportion of deaths considered to have avoidable factors is considerably lower than that reported previously for the stillbirth component. This may be due to a real reduction in the number of avoidable deaths, but is more likely to be the result of the committees using stringent, evidence based criteria for deciding whether avoidable factors were present.**

The following categories of avoidable factors were identified:

### Obstetric factors

- Inadequate detection and management of the growth restricted fetus
- Maternal smoking and inappropriate maternal drug use
- Caesarean section performed too late
- Insufficient antenatal care
- Inadequate antenatal monitoring (clinical need apparent)
- Patient/family non-compliance
- Inadequate intrapartum management of fetal distress
- Inadequate intrapartum management of forceps delivery
- Inadequate management of prolonged pregnancy
- Inadequate management of diabetes
- Inadequate management of preeclampsia, eclampsia and maternal hypertension
- Failure to perform Caesarean section
- Inadequate intrapartum management of previous classical Caesarean section
- Failure to expedite delivery
- Inadequate management of suspected macrosomia
- Inadequate management of obstructed labour

### Paediatric factors

- Inadequate resuscitation
- Inadequate paediatric management
- Patient/family non-compliance
- Delay/failure to transfer infant
- Inadequate nursery care
- Delay in recognition/treatment of neonatal haemorrhage
- Inadequate management of respiratory distress

With respect to antenatal care, practitioners are reminded of the guidelines developed by the three tertiary centres in Melbourne, *The Three Centres Guidelines for Antenatal Care*, available at [www.3centres.com.au](http://www.3centres.com.au)

**Table 18 Suspected preventable factors in perinatal deaths ( $\geq 500\text{g}$  or  $\geq 22$  weeks gestation if birthweight unknown), Victoria, 2000**

Suspected preventable factor	Number of cases with this factor*		Total
	SB	NND	
<b>Mother</b>			
Antenatal care:			
Insufficient antenatal care	5	–	5
Delay/no consultation in high-risk pregnancy	1	1	2
Inadequate antenatal management of:			
Prelabour rupture of membranes (term)	1	–	1
Multiple pregnancy	–	–	–
Diabetes	2	1	3
Hypertension, preeclampsia	1	–	1
Prolonged pregnancy	3	–	3
Growth restricted fetus	9	1	10
Macrosomia	–	1	1
Narcotics	3	3	6
Smoking	5	–	5
Patient/family non-compliance	3	3	6
Inadequate antenatal monitoring:			
Clinical need apparent	1	1	2
Intrapartum care:			
Failure to perform Caesarean section	–	1	1
Caesarean section too late	1	6	7
Induction too late	–	1	1
Inadequate intrapartum monitoring	2	2	4
Failure to expedite delivery – other	–	1	1

**Table 18 Suspected preventable factors in perinatal deaths ( $\geq 500\text{g}$  or  $\geq 22$  weeks gestation if birthweight unknown) – continued**

Suspected preventable factor	Number of cases with this factor*		
	SB	NND	Total
Inadequate intrapartum management of:			
Obstructed labour	–	1	1
Fetal distress	2	2	4
Forceps delivery	–	4	4
Prolonged labour	–	–	–
Previous classical Caesarean section	–	1	1
<b>Infant and fetus</b>			
Delay/failure to transfer infant	–	1	1
Inadequate Resuscitation	–	4	4
Inadequate Paediatric management	–	3	3
Inadequate Nursery care	–	1	1
Delay in recognition/treatment of haemorrhage	–	1	1
Inadequate management of respiratory distress	–	1	1
Family neglect of ignorance	–	2	2
Total number of preventable factors identified	39	43	82
Total number of cases	262	134	
Cases with one or more suspected preventable factors (% of total)	29 (11.1%)	26 (19.4%)	

\* Note: cases may have more than one suspected preventable factor present

## RECOMMENDATIONS FROM THE COUNCIL ON PERINATAL DEATHS

The consideration of suspected preventable factors in obstetric and paediatric care enables the Council to make some observations and suggestions.

**Further reduction in perinatal mortality depends on preventing some of the stillbirths, many of whom were not low birthweight, and many of which were “unexplained”. Careful consideration and documentation of the circumstances and thorough and appropriate maternal, fetal and placental investigation is required for all unexplained stillbirths.**

A suspected preventable factor is considered to be present when aspects of management of the mother or infant were considered to be deficient or inconsistent with best practice.

### ***Tests of fetal well-being***

Council recommends that tests of fetal well-being such as ultrasound imaging, (for growth and biophysical profile, and amniotic fluid volume estimation) and/or cardiotocography be used in all cases where there is suspected fetal compromise. These conditions include:

- Medical disorders including hypertension, preeclampsia, and diabetes mellitus;
- Suspected delay in fetal growth;
- Oligohydramnios;
- Polyhydramnios;
- Reduced fetal movements;
- Multiple pregnancy;
- Maternal age <20, or >35 years;
- Obesity;
- Pregnancy as the result of assisted reproduction;
- Previous perinatal death;
- Poor attendance;
- Suspected macrosomia;
- Deprived socio-economic circumstances;
- Drugs or alcohol misuse;
- Heavy smoking.

### ***Encourage prompt reporting of reduced fetal movements***

Council recommends that women be encouraged to report when fetal movements are perceived to be reduced for more than 12 hours. Cardiotocography may be useful in the management of this problem. Reduced fetal movements are an indication for consideration of delivery, even when cardiotocographic findings are normal. The gestation, presentation, station of the presenting part, and state of the cervix need to be considered in reaching a management decision in this situation.

### ***Consider tocolysis, corticosteroids, Level 3 centre, surfactant – for extreme immaturity***

Extreme immaturity continues to contribute heavily to the perinatal mortality rate. Clinicians may be able to improve the outcome for the infant in several ways:

1. A single course of corticosteroid therapy given to the mother >24 hours prior to birth (betamethasone 11.8mg, 12hrly for two doses) is strongly supported by evidence, up to and including 33 weeks gestation.
2. If there are no contra-indications, short term tocolysis should be considered, in consultation with the referral centre, for women in pre-term labour <34 weeks gestation, to enable steroids to take effect and to provide time for in-utero transfer to a centre with neonatal intensive care facilities. Oral nifedipine has been shown to be more effective than betamimetics, with far fewer adverse maternal effects. (For administration protocol, contact perinatal referral centre).
3. Transfer of the mother to a Level 3 hospital for the delivery should be considered; extremely immature infants have lower mortality and morbidity rates if born in Level 3 centres (ie centres with Neonatal Intensive Care units).

### ***Initiate management of obstetric patients prior to transfer***

When transfer of obstetrical patients is being considered, it is the responsibility of the referring doctor, **following consultation with the receiving unit**, to initiate appropriate management before the transfer. Severe preeclampsia warrants anticonvulsant prophylaxis with magnesium sulphate and control of hypertension for the mother before transfer.

A course of antenatal corticosteroids should be commenced prior to in-utero transfer, if delivery is anticipated prior to 34 weeks.

### ***Exercise care when using prostaglandins***

Fetal deaths have been associated with attempts to ripen the unfavourable cervix with vaginal prostaglandins. When prostaglandins are used, the fetal heart should be monitored electronically before and after insertion. Prostaglandins can be used for induction of labour when the cervix is unfavourable, however the indication should be pressing and continuous fetal monitoring under such circumstances is recommended.

Council is also aware of cases of rupture of the uterus following the use of prostaglandins, particularly when combined with oxytocin infusion. Careful surveillance of patients in labour under such circumstances is required particularly if nulliparous or if there has been a previous caesarean section.

### ***Exercise care when using oxytocin infusions, especially in multiparas***

The use of oxytocin infusion to initiate or augment labour in a multiparous woman carries increased risk of fetal and maternal complications, and should be administered very judiciously, in accordance with a written protocol. All such patients should have an initial vaginal examination and continuous electronic fetal monitoring while the infusion is running.

***Infertility patients are at increased risk of adverse outcome***

Infertility patients particularly when the pregnancy is a result of assisted reproductive technology/ovulation induction, should have the pregnancy closely monitored including serial assessment of fetal growth by ultrasound.

***Monitor hypertensive mothers***

In pregnancies complicated by hypertension, increased maternal and fetal surveillance in pregnancy and labour is required, in collaboration with a specialist obstetrician.

***Be aware that multiple pregnancy increases the risk of perinatal death***

Council recommends the management of multiple pregnancy should be undertaken in collaboration with a specialist obstetrician.

***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, and for planned vaginal birth for women with prior caesarean section.

***Take swabs when pre labour rupture of the membranes occurs***

When pre labour rupture of the membranes occurs prior to 37 weeks gestation, it is recommended that cervical swabs be taken for microscopy and bacterial culture, and prophylactic antibiotic treatment be commenced. Unless already taken, swabs for GBS should be taken from the lower one third of the vagina and the ano-rectum, and placed in transport medium. If a cervical suture is present and the membranes have ruptured, the suture should be removed.

***Consider a Kleihauer test***

Fetomaternal haemorrhage is a cause of unexpected intrauterine death near term and Kleihauer testing should be performed in this situation prior to induction of labour. A haemoglobin estimation should be performed immediately on any pale or shocked neonate since a timely blood transfusion may be lifesaving.

When Rhesus anti-D immunoglobulin is required, a Kleihauer test should be performed to check that sufficient Rh anti-D gamma globulin has been given.

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). 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. Such pregnancies should be managed in consultation with 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 pre-pregnancy diabetes mellitus should be managed in consultation with a specialist obstetrician.

### ***Check fetal maturity in obese women***

Early confirmation of gestational age by ultrasound is particularly important in obese women who have an increased risk of antepartum fetal death.

### ***Investigate pruritus in pregnancy***

The occurrence of pruritus and obstetric cholestasis carries an increased risk of perinatal mortality and morbidity. When pruritus occurs in pregnancy, tests of maternal liver function and fetal well-being should be performed, together with obstetrical consultation.

### ***Avoid surgery***

Elective surgery should be avoided during pregnancy.

### ***Use antibiotics early for neonates with suspected sepsis***

Council has noted several instances of deaths in newborn infants caused by bacterial infections where antibiotic therapy has been delayed. 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 Gentamycin (intramuscularly if there is no venous access) are 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 regard to group B streptococcal (GBS) infection, evidence suggests that mortality is reduced by about 90 per cent if an appropriate preventive strategy is in place. Antenatal screening (at 35–36 weeks) by low vaginal and ano-rectal culture) and intrapartum penicillin antibiotic prophylaxis for GBS carriers is the preferred approach. An alternative approach is to identify intrapartum risk factors and treatment with appropriate antibiotics. These risk factors include: birth prior to 35 weeks; intrapartum fever  $\geq 38^{\circ}\text{C}$ ; and duration of membrane rupture  $>18$  hours. Each maternity service should have in place a written protocol for the prevention and treatment of early onset GBS neonatal infection, and for management of the newborn at risk of sepsis.

### ***Ensure appropriate transfer of mature infants with severe respiratory distress***

In the case of an infant of birthweight greater than 2500g with respiratory distress the NETS consultative services should be contacted (phone 9347 7441), and consideration should be given to transferring the infant directly to a Neonatal Intensive Care Unit.

### ***Continue respiratory support in significantly asphyxiated infants***

Infants with cardio-respiratory depression requiring 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 78).

### ***Discourage smoking in pregnancy***

Maternal substance abuse, including heavy cigarette smoking, continues to be an important contributing factor in adverse perinatal outcomes. Smoking cessation intervention has been shown to be effective in reducing smoking in pregnancy, and improves perinatal outcomes.

## VICTORIAN BIRTH RATES

In 2000, the number of births was 62,354\*. The livebirth rate is the number of livebirths per 1,000 of the estimated mean resident population for the year indicated. In 2000, the livebirth rate was 13.0. The birth rate in Victoria has been slowly but steadily declining since 1971.

**Table 19 Total births in Victoria, 1962–2000\***

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	62,429	62,084	4,605,148	13.5
1998	61,634	61,924	4,689,776	13.1
1999	62,149	62,442	4,707,590	13.2
2000	62,092	62,354	4,765,856	13.0

\* All births  $\geq 500\text{g}$ , or  $\geq 22$  weeks' gestation if the birthweight is unknown.

## VICTORIAN BIRTH DATA 2000

The Victorian Perinatal Data Collection Unit (PDCU), 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, in this section, only infants of birthweight  $\geq 500\text{g}$ , or of 22 weeks gestation if the birthweight is unknown, are included.**

For this report, only tables referring to perinatal mortality are included. For details of all birth data, refer to publications from the PDCU (website: <http://www.dhs.vic.gov.au/phd/perinatal/index.htm>), or contact the PDCU on 03 9616 2696.

**Table 20 Gender of infants, Victoria, 2000 (birthweight  $\geq 500\text{g}$  or  $\geq 22$  weeks gestation if birthweight unknown)**

	Births		Stillbirths (n)	Neonatal deaths (n)	Perinatal deaths (n)	Stillbirth rate	Neonatal mortality rate	Perinatal mortality rate
	(n)	(%)						
Sex								
Male	31,973	51.3	129	80	209	4.0	2.5	6.5
Female	30,390	48.7	132	53	185	4.3	1.7	6.1
Indeterminate or unknown	5	–	1	–	1	–	–	–
Total	62,368	100.0	262	133	395	4.2	2.1	6.3

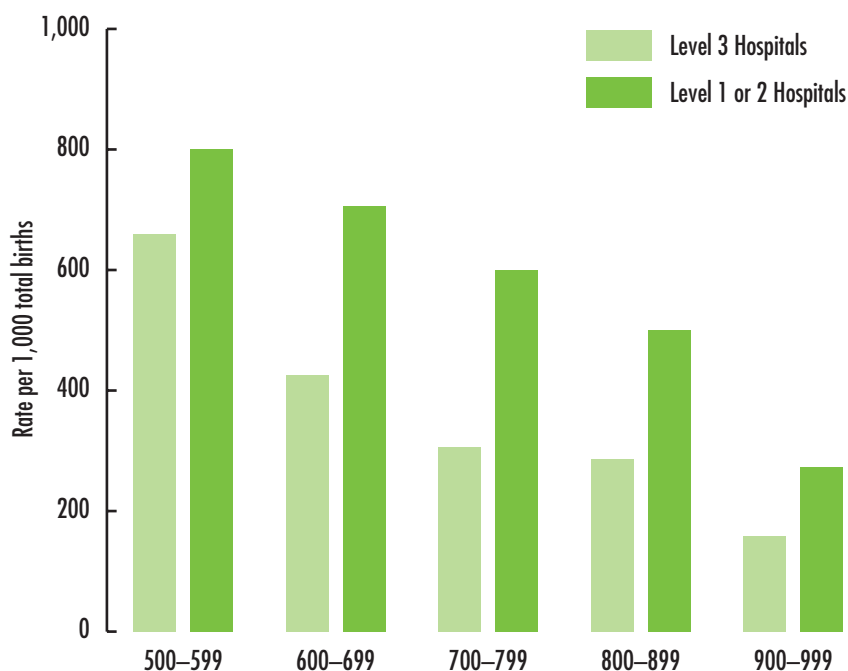
**Table 21 Birthweight distribution and perinatal mortality rate, Victoria, 2000 (birthweight  $\geq 500\text{g}$  or  $\geq 22$  weeks gestation if birthweight unknown)**

Birthweight (g)	Births		Stillbirths		Neonatal deaths		Perinatal mortality rate
	n	%	n	%	n	%	
500–599	302	0.5	78	29.8	56	42.1	443.7
1,000–1,499	404	0.6	40	15.3	11	8.3	126.2
1,500–1,999	842	1.4	26	9.9	9	6.8	41.6
2,000–2,499	2,418	3.9	34	12.9	8	6.0	17.4
2,500–2,999	9,626	15.4	33	12.6	18	13.5	5.3
3,000–3,499	22,584	36.2	34	12.9	20	15.0	2.4
3,500–3,999	18,832	30.2	13	5.0	4	3.0	0.9
4,000–4,499	6,202	9.9	2	0.8	5	3.8	1.1
4,500–4,999	1,033	1.7	–	–	2	1.5	1.9
$\geq 5,000$	102	0.2	–	–	–	–	–
Not known	9	–	2	0.8	–	–	–
Total	62,354	100.0	262	100.0	133	100.0	6.3

## 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 34 per cent of perinatal deaths (134 of 395, Table 21). Council emphasises that **infants of birthweight <1000g have better prospects for survival if delivered in a Level 3 centre** (a hospital with fetal/maternal and neonatal specialists and a neonatal intensive care unit). The infant mortality at such centres compared to all other hospitals, for each 100g weight group under 1,000g, is shown in Figure 8.

**Figure 8 Extremely low birthweight infant mortality rate\*, by hospital level at delivery, Victoria, 2000**



### Level 3 hospital births

Alive (n)	16	23	23	27	35
Infant death (n)	2	4	2	3	2
Neonatal death (n)	18	9	6	6	1
Stillbirth (n)	17	11	5	6	6
Perinatal mortality rate	660	426	306	286	159

### Levels 1 and 2 hospital births

Alive (n)	3	4	6	6	8
Infant death (n)	1	1	2	-	-
Neonatal death (n)	6	7	2	1	-
Stillbirth (n)	10	5	10	5	3
Perinatal mortality rate	800	706	600	500	273

\* Mortality rate per 1,000 births, during first year of life.

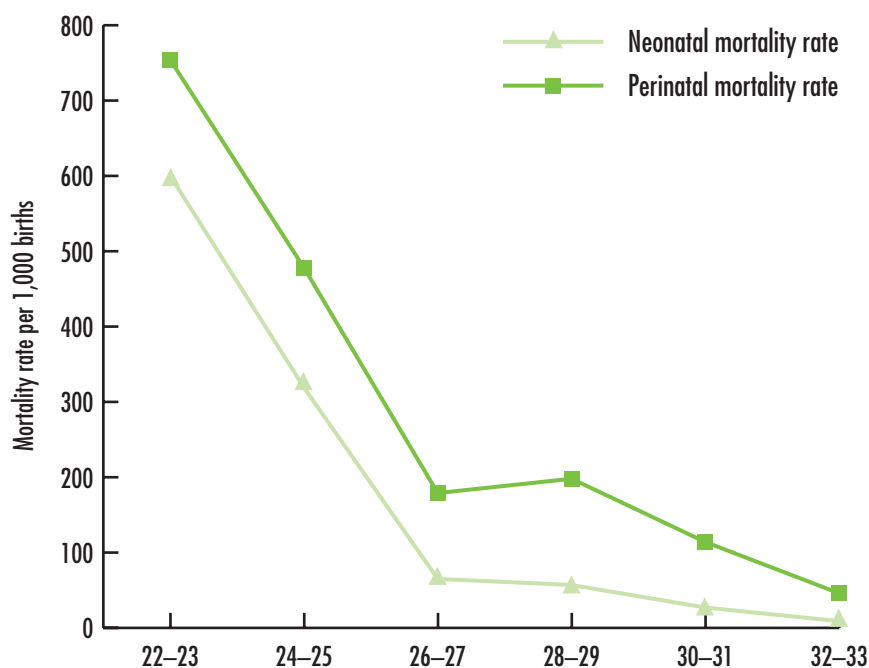
Figure 9 shows the neonatal, stillbirth and perinatal mortality rates (per 1,000 births) for the gestational age range of 22 to 33 weeks. Council considers this information will be useful to obstetricians caring for mothers who are likely to deliver an extremely immature infant, and where the fetal weight is not known with certainty.

In 2000 18.9 per cent (10 of 53) of the infants born at 22–23 weeks survived >28 days. This survival rate rose to 50 per cent at 24–25 weeks and 81 per cent for those born at 26–27 weeks gestation.

There were five infants born weighing  $\geq 500\text{g}$  at a gestation under 22 weeks; three were stillborn and two were neonatal deaths.

In addition, there were 210 infants registered with the Perinatal Data Collection Unit with birthweight <500g (or under 22 weeks gestation if the birthweight was unknown) who survived beyond 28 days.

**Figure 9 Perinatal mortality rates, 22–33 weeks gestation, Victoria, 2000**



Survivor >28 days (n)*	14	47	115	150	257	560
Neonatal deaths (n)	21	22	8	9	7	5
Stillbirths (n)	22	21	17	28	26	22
Neonatal mortality rate	600	319	65	57	27	9
Perinatal mortality rate	754	478	179	198	114	46

*Note:* The estimates are sometimes uncertain for the gestational age groups shown in Figure 9.

## MULTIPLE BIRTHS

In 2000, there were 1,939 infants born from multiple pregnancies (941 sets of twins and one twin born in 1999 whose sibling was born in 2000; and 19 sets of triplets). The comparable figures for sets of twins were 1017 in 1999, 938 in 1998, 936 in 1997, and 870 in 1996.

Multiple births comprised 3.1 per cent of all births  $\geq 500\text{g}$ , but contributed 11.1 per cent of perinatal deaths. For very low birthweight infants (500–1,499g), 27.8 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 birthweight  $\geq 500\text{g}$  was 22.9 per 1,000 births compared with 5.8 for singleton births.

**Table 22 Multiple births mortality rate and birthweight distribution, Victoria, 2000**

Birthweight (g)	Multiple births		Stillbirths	Neonatal deaths	Perinatal mortality rate
	(n)	(%)			
<500*	14	0.7	13	–	928.6
500–999	80	4.1	15	16	387.5
1,000–1,499	116	6.0	3	–	25.9
1,500–1,999	286	14.7	2	1	10.5
2,000–2,499	547	28.2	3	2	9.1
2,500–2,999	636	32.8	–	1	1.6
3,000–3,499	230	11.9	–	–	–
3,500–3,999	28	1.4	–	–	–
$\geq 4,000$	–	0.1	–	–	–
Unknown	2	0.0	1	–	–
<b>Total</b>	<b>1,939</b>	<b>100.0</b>	<b>37</b>	<b>20</b>	<b>29.4</b>

\* There were fourteen multiple birth infants (11 twins and 3 triplets) of birthweight <500g who had a heavier ( $\geq 500\text{g}$ ) co-twin. The inclusion of these 14 infants of birthweight under 500g is a possible source of confusion. These infants 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 fifteen registered multiple births (six sets of twins and one set of triplets) not included in the report, as all sets of multiples weighed under 500g.

## BIRTH DEFECTS

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

For details of all birth defects data, refer to publications from the PDCU:

<http://www.dhs.vic.gov.au/phd/perinatal/index.htm>,

or contact the Births Defects Register on 03 9616 2696.

### IMPORTANCE OF BIRTH DEFECTS 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 in this way that a comprehensive register of relevant conditions can 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 birth defects. These functions require full and reliable information on birth defects.**

Notification forms can be obtained by contacting the Birth Defects Register

GPO Box 4003, Melbourne 3001, (03) 9616 2696 or 1300 858 505.

**A birth defect recognised in a child up to 15 years of age should be notified to the register**

**Table 23 Notifications to the Birth Defects Register for infants born in 2000**

Category	Induced <20 weeks (n)	SB (n)	NND (n)	Infant*/child death (n)	Alive (n)	Total (n)	Estimated rate* (per 1,000 births)
Multiple	19	35	24	13	153	244	3.9
Chromosomal	162	25	14	7	121	329	5.3
Neurosystem	47	11	7	1	60	126	2.0
Cardiovascular	11	9	18	4	395	437	7.0
Gastrointestinal	2	1	1	1	143	148	2.4
Urogenital	6	7	4	0	653	670	10.7
Respiratory	0	0	1	0	23	24	0.4
Musculoskeletal/limb	10	9	5	1	439	464	7.4
Genetic/metabolic	7	0	2	1	53	63	1.0
Other**	11	6	3	1	60	81	1.3
<b>Total</b>	<b>275</b>	<b>103</b>	<b>79</b>	<b>29</b>	<b>2100</b>	<b>2586</b>	
<b>(rate per 1,000 births)</b>	<b>(4.4)</b>	<b>(1.6)</b>	<b>(1.3)</b>	<b>(0.5)</b>	<b>(33.6)</b>	<b>(41.3)</b>	

\* Includes infants of birthweight at least 400g or if the birthweight is unknown, at least 20 weeks gestation

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

These data include notifications made to the register in 2002 and are therefore different from earlier publications relating to the year 2000.

**Table 24 Sources of notifications to the Birth Defects Register, 1999–2000**

Notification Source	Number	Percent (%)
Perinatal (PDCU birth) forms	3,762	52.5
Hospital listings	1,945	27.1
Perinatal Death Certificates	375	5.2
Autopsy reports	210	2.9
Cytogenetic reports	491	6.7
Maternal and Child Health Nurse	340	4.7
Other Professional	38	0.5
Other (eg parent)	7	0.1
Unknown	1	0.0
<b>Total</b>	<b>7,169</b>	<b>100.0</b>

(Source: Riley & Halliday, *Birth Defects in Victoria 1999–2000*, p.12, Table 1.1 Sources of Notification, 1999–2000)

Table 24 summarises the sources of notifications received for 1999–2000. 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. Over half of notifications were obtained from the perinatal 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.**

## PRENATAL DIAGNOSIS AND GENETIC COUNSELLING IN RELATION TO BIRTH DEFECTS

The increasing role of prenatal screening and diagnosis can be seen by comparing terminations for birth defects in the past 10 years, 1991–2000:

**Table 25 Terminations for birth defects (<20 weeks gestation) 1991–2000**

Year	Terminations for birth defects (<20 weeks gestation)
1991	140
1992	152
1993	204
1994	250
1995	255
1996	272
1997	298
1998	278
1999	295
2000	283

(Source: Riley & Halliday, *Birth Defects in Victoria 1999–2000*, p.17, Table 2.1: Birth Defects by Year, 1983–2000)

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 data to the Murdoch Childrens Research Institute or the Perinatal Data Collection Unit so that an annual report can be compiled for distribution to service providers.

(<http://www.dhs.vic.gov.au/phd/perinatal/index.htm> website) 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. However, each year more younger women are utilising these diagnostic services as a result of an increasing uptake of first trimester ultrasound and both first and second trimester maternal serum screening.

It is important for clinicians to inform all women about prenatal screening. Second trimester maternal serum screening is widely available and this testing option should be offered to pregnant women of all ages. Advice should be offered in a way that respects the rights of women who do not want screening or diagnosis.

Recommended best practice guidelines for prenatal screening [developed jointly by the Royal Australia New Zealand College of Obstetricians and Gynaecologists, (RANZCOG), and the Human Genetics Society of Australasia, (HGSA)] and a policy on prenatal diagnosis are available on the HGSA website: [www.hgsa.com.au](http://www.hgsa.com.au)

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 family history or a previous child with a birth defect. This applies to prenatal diagnosis of neural tube defects, inborn errors of metabolism, thalassaemia, and to couples who already have a child with a chromosomal abnormality.

The availability of prenatal diagnosis has increased the importance of making a precise diagnosis in any baby with a birth defect, and in offering skilled genetic counselling to the parents of all such babies.

Expertise in diagnosing birth defects and counselling families is available in the clinics of the Genetic Health Services Victoria at the Royal Children's Hospital, the Royal Women's Hospital, the Mercy Hospital for Women and Monash Medical Centre. Services are also available at the Royal Melbourne Hospital, St Vincent's Hospital, and centres in Albury/Wodonga, Ballarat, Bendigo, Frankston, Geelong, Mildura, Sale, Shepparton, Traralgon, Warragul and Warrnambool. Genetic Health Services Victoria can be contacted on (03) 8341 6201.

## POSTNEONATAL INFANT AND CHILD DEATH REVIEW

This section reports on postneonatal infant and child deaths which occurred during the 2000 calendar year.

The Consultative Council wishes to thank medical practitioners who provide additional information on infant and child deaths, and stresses the importance of accurate data collection in these age groups. Such assistance with data provision to the Council is encouraged and greatly appreciated.

### DEFINITIONS

*Infant death* A death, occurring within one year of birth in an index year in a liveborn infant (whose birthweight was at least 500g or at least 22 weeks gestation if the birthweight was not known).

*Neonatal death* The death of a liveborn infant (whose birthweight was at least 500g or at least 22 weeks gestation if the birthweight was not known) within 28 days of birth.

*Postneonatal infant death* The death of a liveborn infant (whose birthweight was at least 500g or at least 22 weeks gestation if the birthweight was not known) between 29 and 364 days.

*Livebirth* Note that for Council purposes, only those infants who weighed 500g or more are included.

*Child death* A death of a child occurring after and including the first birthday and up to, but not including, the 15th birthday.

*Infant mortality rate* (per 1,000 live births of infants at least 500g or at least 22 weeks gestation if the birthweight was not known)

$$= \frac{\text{(number of neonatal deaths + postneonatal infant deaths)} \times 1,000}{\text{total livebirths}}$$

**INFANT MORTALITY RATE** (Birthweight  $\geq$ 500g or  $\geq$ 22 weeks gestation if birthweight unknown)

**Table 26 Neonatal and postneonatal deaths, Victoria, 1991–2000 (birthweight  $\geq$ 500g or  $\geq$ 22 weeks if birthweight unknown)**

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Livebirths	64,632	65,815	64,284	64,376	63,214	62,429	61,815	61,634	62,149	62,092
Neonatal deaths	224	191	165	184	193	157	160	164	171	136
Postneonatal deaths	123	120	96	102	94	82	87	77	90*	72
Total infant deaths#	347	311	261	286	287	239	247	241	261*	208
Infant mortality rate (per 1,000 livebirths)	5.4	4.7	4.1	4.4	4.5	3.8	4.0	3.9	4.2	3.3

\* Amended figure from 1999 Report

# Neonatal and postneonatal infant deaths.

**INFANT MORTALITY RATE** (including all livebirths regardless of birthweight or gestation)

The legal definition of livebirths includes any infant, regardless of weight or gestation, which shows signs of life after separation from its mother, such as a heart beat.

Because of this definitional variation, Council this year also reports on infant mortality including deaths of infants who weighed less than 500g or were less than 22 weeks gestation. Most infants under 500g or 22 weeks gestation are nonviable or the result of termination of pregnancy. Council considers the first definition to be the more reliable public health indicator, but presents the second category for completeness.

There were 56 infant deaths with birthweight less than 500 grams. If these infants are included, this increases the infant mortality rate to 4.2 per 1,000 live births.

**Table 27 Neonatal and postneonatal deaths, infant mortality rate 2000 (regardless of birthweight and gestation)**

	2000
Livebirths	62154
Neonatal deaths	191
Postneonatal deaths	73
Total infant deaths#	264
Infant mortality rate (per 1,000 livebirths)	4.2

# Neonatal and postneonatal infant deaths.

## **POSTNEONATAL INFANT AND CHILD DEATHS EXCLUDED FROM THIS REPORT**

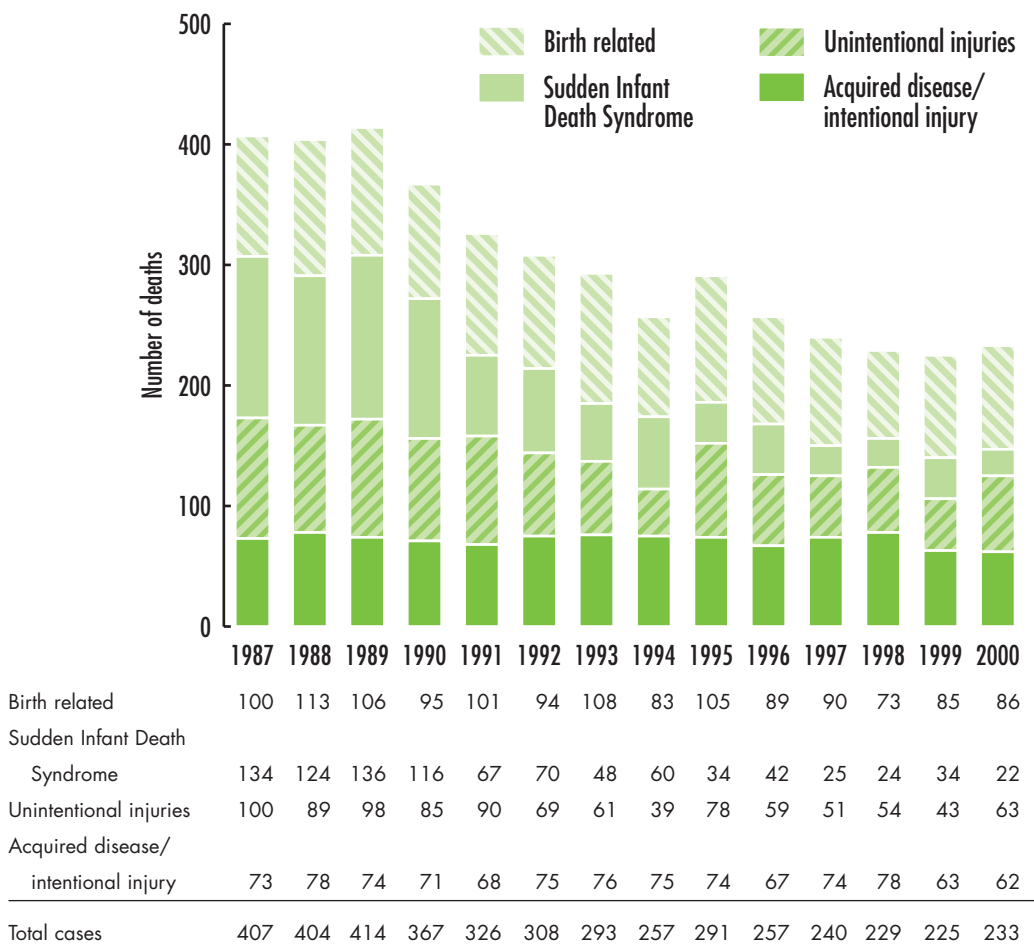
10 postneonatal infants and 6 children have been excluded because they lived outside Victoria and died in Victoria. There were sixteen deaths that occurred in postneonatal infants and children who resided in other states or territories, or overseas, having been referred for treatment of a serious illness:

- 8 deaths from congenital cardiac malformations;
- 4 deaths from other complex congenital malformations;
- 2 deaths from infectious disease (pneumococcal meningitis, meningococcal septicaemia);
- 1 death from a motor bike accident;
- 1 death from accidental asphyxiation.

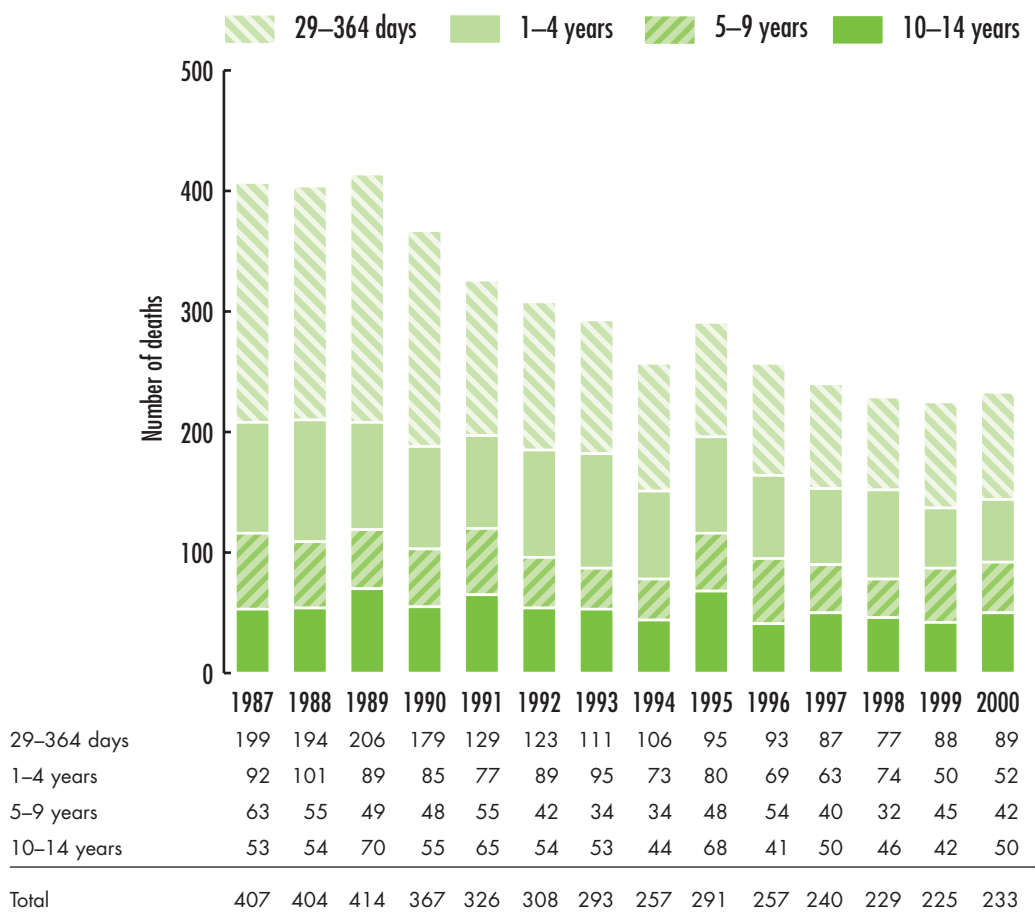
## MAJOR CAUSE OF DEATH IN POSTNEONATAL INFANT AND CHILD DEATHS IN VICTORIA 1987–2000

In 2000, there were 233 deaths in infants and children aged 29 days to 14 years (until the 15th birthday), comprising 89 postneonatal infant deaths and 144 child deaths. The numbers of postneonatal infant and child deaths from 1987 to 2000 are shown by category of death in Figure 10, and by age at death in Figure 11.

**Figure 10 Postneonatal infant and child deaths by major cause, Victoria, 1987–2000**



**Figure 11 Postneonatal infant and child deaths by age group, Victoria, 1987–2000**



## CAUSE OF DEATH IN POSTNEONATAL INFANT AND CHILD DEATHS IN VICTORIA IN 2000

**Table 28 Cause of postneonatal infant and child deaths by age group, Victoria, 2000**

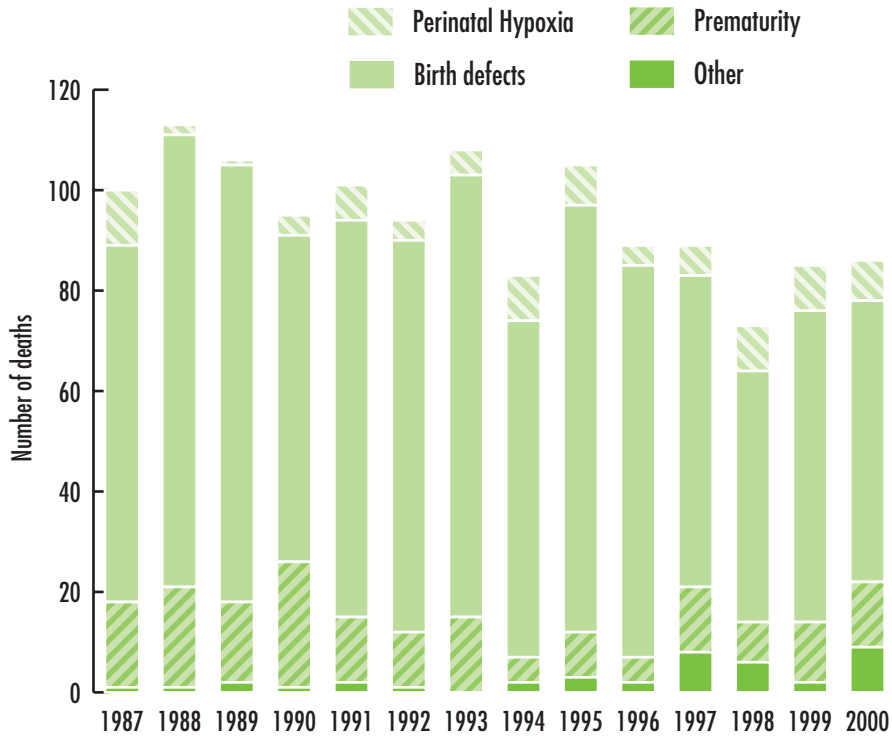
Category	Age				Total
	29–364 days	1–4 years	5–9 years	10–14 years	
<b>Determined at birth</b>					
Birth hypoxia/asphyxia	4	1	1	2	8
Malformation/birth defect	29	11	9	7	56
Prematurity	13	–	–	–	13
Other	1	3	2	3	9
Subtotal	47	15	12	12	86
<b>Sudden Infant Death Syndrome (SIDS)</b>					
Significant pathology (insufficient to explain death)	2	–	–	–	2
Minor condition	13	–	–	–	13
No significant abnormality detected	6	1	–	–	7
Subtotal	21	1	–	–	22
<b>Unintentional injuries</b>					
Motor vehicle	1	3	3	13	20
Drowning	1	13	1	1	16
Fire	2	–	4	1	7
Asphyxiation	2	1	–	–	3
Train	–	1	–	–	1
Other	1	7	4	4	16
Subtotal	7	25	12	19	63
<b>Acquired disease/Intentional injury</b>					
Infection	6	7	5	3	21
Malignancy	2	1	10	11	24
Other acquired disease*	3	2	3	2	10
Intentional trauma	3	1	–	1	5
Suicide	–	–	–	2	2
Subtotal	14	11	18	19	62
Total	89	52	42	50	233

\* Includes underdetermined cause

## CAUSES OF POSTNEONATAL INFANT AND CHILD DEATH DETERMINED AT BIRTH

In 2000 there were 86 deaths in postneonatal infants and children from perinatally acquired hypoxia/asphyxia, birth defects, prematurity or other conditions arising from the perinatal period. Figure 12 shows the causes of death determined at birth for the years 1987–2000.

**Figure 12 Causes of death determined at birth, postneonatal infants and children, Victoria, 1987–2000**



Perinatal hypoxia	11	2	1	4	7	4	5	9	8	4	6	9	9	8
Birth defects	71	90	87	65	79	78	88	67	85	78	62	50	62	56
Prematurity	17	20	16	25	13	11	15	5	9	5	13	8	12	13
Other	1	1	2	1	2	1	0	2	3	2	8	6	2	9
<b>Total cases</b>	<b>100</b>	<b>113</b>	<b>106</b>	<b>95</b>	<b>101</b>	<b>94</b>	<b>108</b>	<b>83</b>	<b>105</b>	<b>89</b>	<b>89</b>	<b>73</b>	<b>85</b>	<b>86</b>

### ***Perinately acquired hypoxia/asphyxia***

Of the eight deaths resulting from severe perinatal hypoxia, four died in infancy, and four died in childhood.

### ***Birth defects and genetically determined causes***

There were 56 postneonatal infant and child deaths due to birth defects (Table 29). Birth defects are the major cause of postneonatal infant death, accounting for 33% of deaths in this age group. Cardiovascular system malformations were the largest group for postneonatal infant and child deaths due to birth defects with 14 cases, followed by chromosomal and genetic disorders with 9 cases.

**Table 29 Deaths from birth defects, postneonatal infants and children, Victoria, 2000**

Type of anomaly	Age				Total
	29–364 days	1–4 years	5–9 years	10–14 years	
Cardiovascular system	8	4	2	–	14
Chromosomal/genetic disorder	5	3	1	–	9
Metabolic disorders	4	1	–	–	5
Multiple malformations	3	1	1	1	6
Spinal muscular atrophy	4	–	–	–	4
Cystic fibrosis	–	–	2	2	4
Muscular dystrophy	–	–	–	2	2
Neonatal haemochromatosis	2	–	–	–	2
CNS anomaly	–	–	2	–	2
Respiratory/diaphragmatic defects	2	–	–	–	2
Neural tube defect	–	–	–	1	1
Neuro degenerative disorder	1	–	–	–	1
Skeletal anomaly	–	–	–	1	1
MCAD	–	1	–	–	1
Congenital teratoma	–	1	–	–	1
Miscellaneous	–	1	1	–	2
Total	29	11	9	7	56

### ***Prematurity***

There were thirteen postneonatal infant and child deaths in 2000 due to consequences of prematurity (twelve in 1999 and eight in 1998). All postneonatal infants had birthweights under 850g. Six died from chronic lung disease, three from sepsis, two from necrotising enterocolitis and two from possible mishaps in NICU management.

### ***Other causes determined at birth***

There were nine deaths in this group: one postneonatal infant and eight children. Seven children died from the complications of cerebral palsy, one died on day 69 from unexplained cardiorespiratory collapse which occurred on day 3, and one infant from congenital cytomegalovirus infection.

## SUDDEN INFANT DEATH SYNDROME (SIDS)

**Council uses the definition recommended by the National Institute of Child Health and Human Development (NICHD) 1991 for SIDS:**

**‘The sudden death of an infant under one year of age which remains unexplained after a thorough case investigation, including death scene investigation, performance of a complete autopsy, and review of the clinical history’.<sup>1</sup>**

The term SIDS remains therefore, one of exclusion and should not be used if there is evidence of possible accidental asphyxiation, or if inflicted injuries or significant organic diseases are present. (personal communication, Byard, 2001).

When arbitrary cut-off points are established for pathological events such as SIDS, definitional problems inevitably arise, such as when a case meets all the other definitional criteria but the death occurs after the first birthday. Such cases are considered and reported on, but are excluded from the strict definition.

Another definitional problem arises in the circumstance when the Coroner upholds parents’ objection (on religious grounds) to a postmortem examination. Even though the death scene investigation and the clinical history might indicate that this is a SIDS case, under the constraints of the above definition, it cannot be classified as SIDS. In cases such as this Council uses the category ‘Unascertained’.

Despite the apparent unambiguity of the definition, it is not uncommon to find cases which are difficult to classify with absolute confidence, and for which Council also uses the category ‘Unascertained’.

For example, there can be debate about the significance of postmortem findings. Haemosiderin in the lungs is thought to be a clue to possible asphyxiation, and the unexpected finding of such deposits may warrant exclusion from classification under SIDS, and yet be insufficient to justify categorisation under asphyxiation. Likewise, evidence of previous trauma might raise suspicion of intentional injury as the cause of death, but without direct evidence, the case would be classified as ‘unascertained’.

Similar difficulties arise with regard to findings related to infection. A sudden infant death where autopsy reveals clear evidence of bronchopneumonia would require classification under ‘Infection’, but a sudden infant death where autopsy revealed mild tracheitis would be classified as SIDS. Between these examples there exists cases where there is evidence of either early or resolving infection, the significance of which may be debatable, and consensus is sometimes difficult to reach.

For these reasons, it is important to see SIDS as a sub-group within the broader category of Sudden Unexpected Deaths in Infancy (SUDI) so that changes in classification practices or variations within Coronial approaches to autopsy do not obscure the broader public health picture of sudden and unexpected infant mortality. **Any unexpected death of an infant requires reporting to the Coroner** with full investigation and consideration of avoidable factors, and all such cases are considered and reported on by Council, under the category of Sudden Unexpected Deaths in Infants and Children.

<sup>1</sup> Willinger, James, Catz. ‘Defining the sudden infant death syndrome (SIDS): deliberations of an expert panel convened by the National Institute of Child Health and Human Development’. *Pediatric Pathology*, 1991;11:677–784.

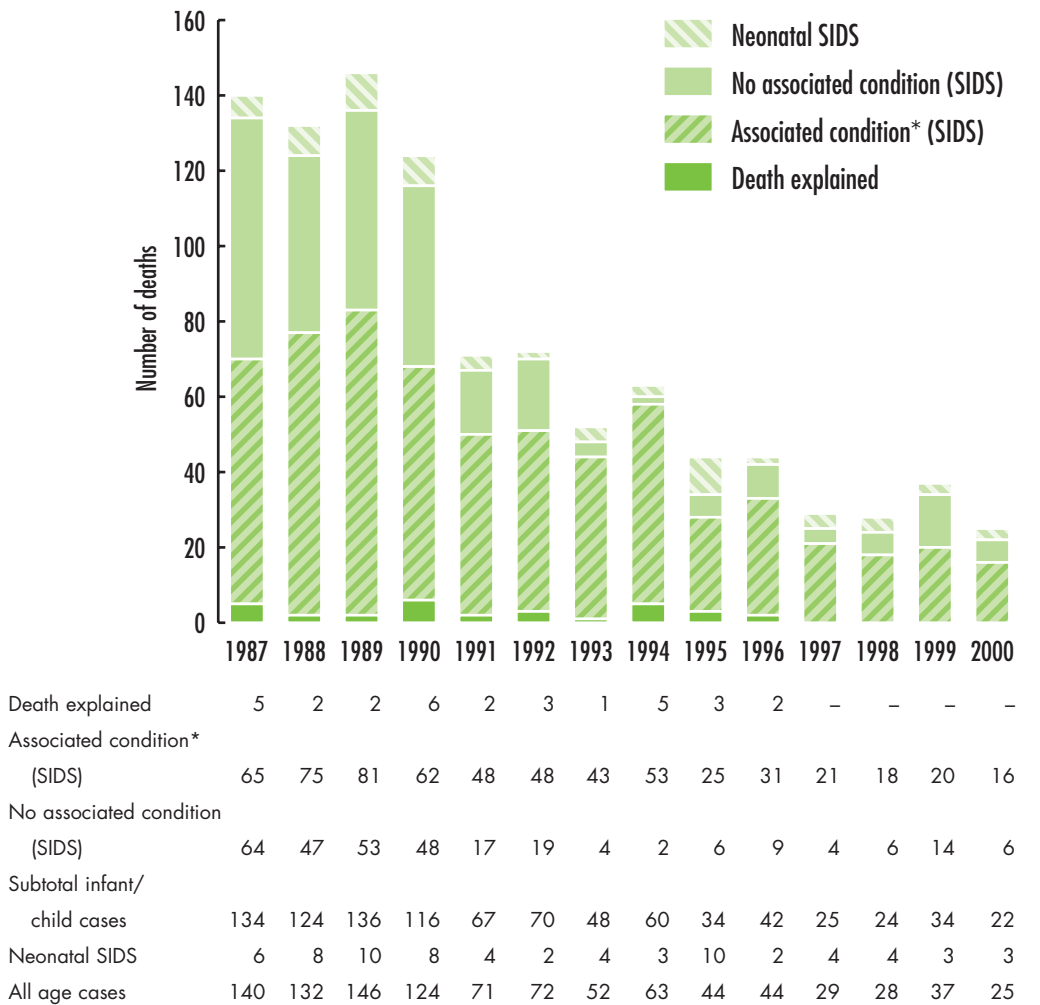
There are three groups recognised by Council which are categorised as SIDS and are determined after autopsy. The groups are:

- Significant pathology identified, insufficient to explain death
- Associated minor condition identified
- No significant abnormality identified

Figure 13 shows the number of SIDS of neonates, infants and children in each category for the previous 13 years. There was a sharp decline in the number of SIDS 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 SIDS.**

**Figure 13 Sudden infant death syndrome, Victoria, 1987–2000**



\* Includes 'Significant pathology insufficient to cause death' category and 'minor pathology identified' category

In 2000 there were 22 postneonatal infant (and child) deaths considered under this category, compared with 34 cases in 1999 and 24 cases in 1998. In addition, three neonatal deaths were considered and reviewed in this category. This brings the total number of SIDS in 2000 to 25 cases.

***SIDS: Significant or minor pathology identified***

There were fourteen deaths where there was minor pathology detected at autopsy (one neonatal death, thirteen infant deaths). In addition there were two postneonatal infant deaths where significant pathology was detected but was insufficient to explain the death. The principal pathological findings for these 16 cases are listed in Table 30. The most common conditions found at autopsy were respiratory infections and otitis media.

***SIDS: No significant abnormality detected***

In 2000 there were two neonatal deaths, six postneonatal deaths and one child death where there was no significant pathology detected at autopsy.

**Table 30 Principal conditions associated with sudden infant death syndrome, Victoria, 2000**

	Category	
	Minor pathology	Significant pathology
Respiratory tract/pulmonary infection	5	2
Otitis media	5	0
Pulmonary haemorrhage	1	0
Infantile larynx	1	0
Other	2	0
Total	14	2

(One neonatal death is included where minor pathology was identified).

The age range of the 25 infants who died from SIDS was from 9 days of age to 14 months of age. There were more males (n = 15) than females (n = 10).

**Table 31 SIDS by sex and age at death, Victoria, 2000**

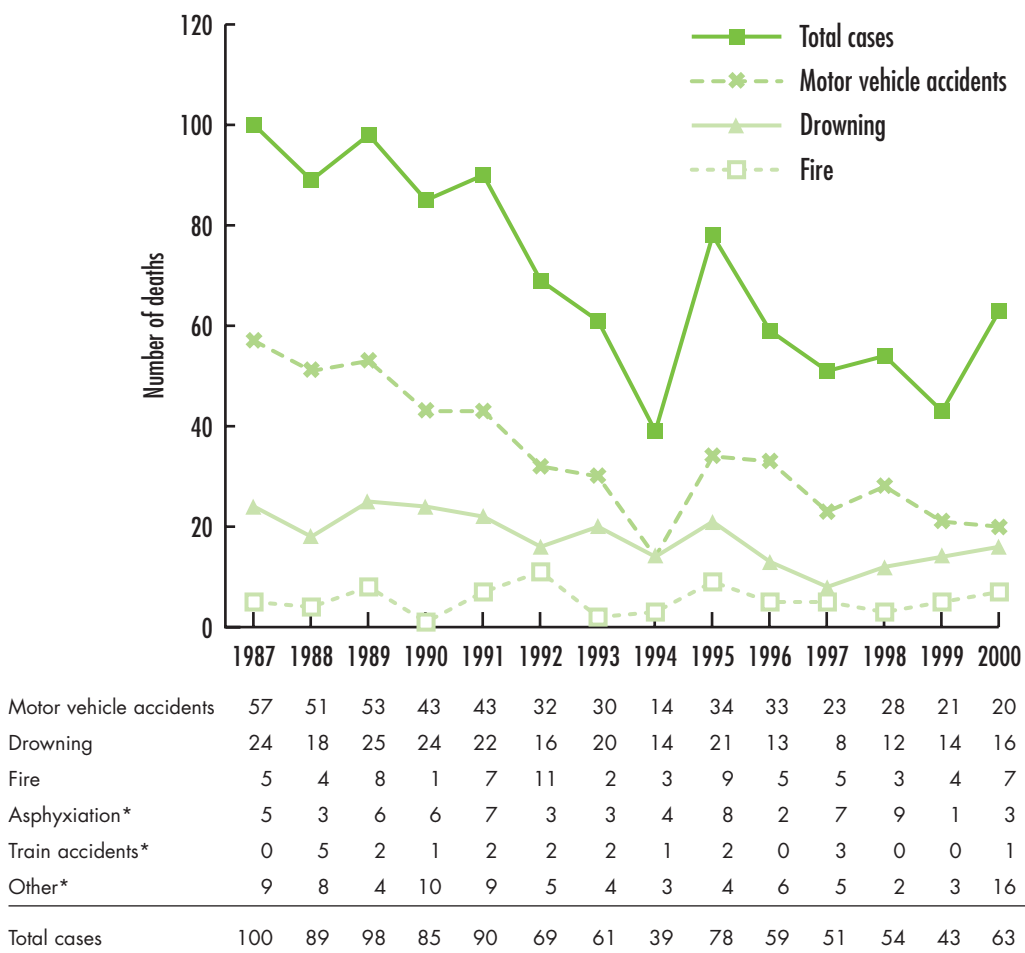
Age at death	Females (n)	Males (n)	Total (n)
<1 month	–	3	3
1 month	2	2	4
2 months	3	1	4
3 months	1	4	5
4 months	1	2	3
5 months	–	1	1
6 months	1	1	2
7 months	1	1	2
>12 months	1	–	1
Total	10	15	25

Eleven of the 25 infants (44% of deaths) were co-sleeping (or bed sharing). In three families there was a history of an infant who had died from SIDS.

## UNINTENTIONAL INJURY DEATHS

There were 63 postneonatal infant and child deaths due to unintentional injury in 2000 (Figure 14), compared to 43 deaths in 1999 and 54 deaths in 1998.

**Figure 14 Unintentional injury deaths, postneonatal infants and children, Victoria, 1987–2000**



\* Note: Deaths from asphyxiation, train accidents and other unintentional injuries are not shown in Figure 14

### **Motor Vehicle Accidents**

In 2000 there were 20 deaths due to motor vehicle accidents, one less than in 1999. The mode of travel is listed in Table 32.

**Table 32 Mode of travel in motor vehicle fatalities by age groups, postneonatal infants and children, Victoria, 2000**

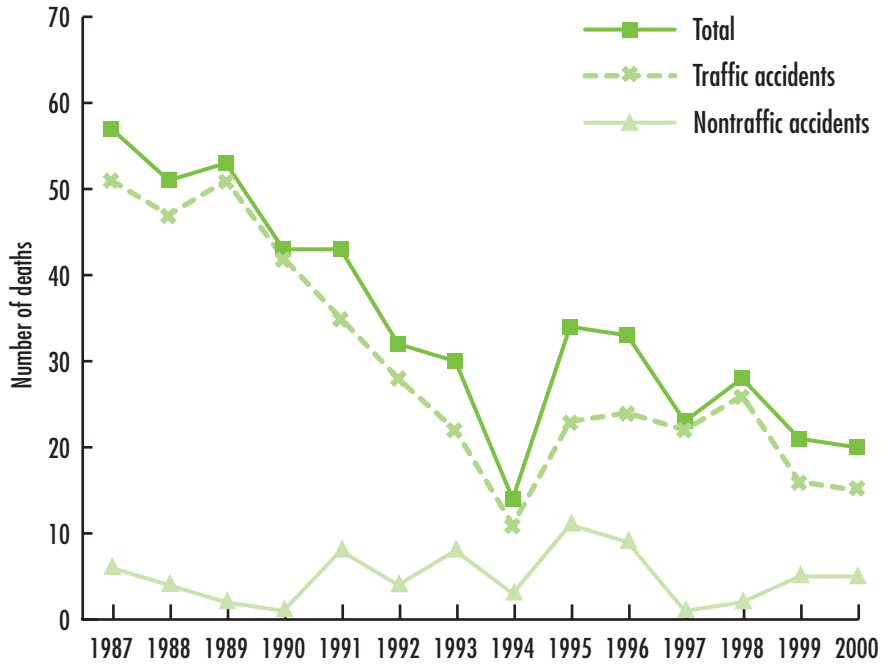
Mode of travel	Age				Total
	29–364 days	1–4 years	5–9 years	10–14 years	
Passenger in motor vehicle	1	–	1	7	9
Pedestrian	–	3	1	2	6
Pedal cyclist	–	–	–	2	2
Motor cyclist	–	–	–	1	1
Four wheel motor cyclist	–	–	–	1	1
Motorised scooter rider	–	–	1	–	1
Total	1	3	3	13	20

For the nine motor vehicle passenger deaths, four involved drivers losing control of the vehicle, and five were hit by another car or truck.

For the six pedestrian deaths, two were run over in a driveway, two were attempting to cross a busy road, and two young children ran onto a road.

Two cyclists crossed into the path of an oncoming car. Two motorcyclists, one riding a conventional motor bike and the other riding a four wheel motor bike lost control of their bikes, while the rider of a motorised scooter collided with a truck.

Figure 15 Motor vehicle fatalities, postneonatal infants and children, Victoria, 1987–2000



Traffic accidents	51	47	51	42	35	28	22	11	23	24	22	26	16	15
Nontraffic accidents	6	4	2	1	8	4	8	3	11	9	1	2	5	5
Total	57	51	53	43	43	32	30	14	34	33	23	28	21	20

## ***Drowning***

**There were sixteen deaths due to drowning in 2000, compared to 14 in 1999, and 12 in 1998.** The age range was from eight months to 14 years, with 14 of the 16 deaths occurring in children aged three years or younger. Private pools and dams were the most common locations of drownings in 2000.

**Table 33 Location of drowning fatalities by age groups, postneonatal infants and children, Victoria, 2000**

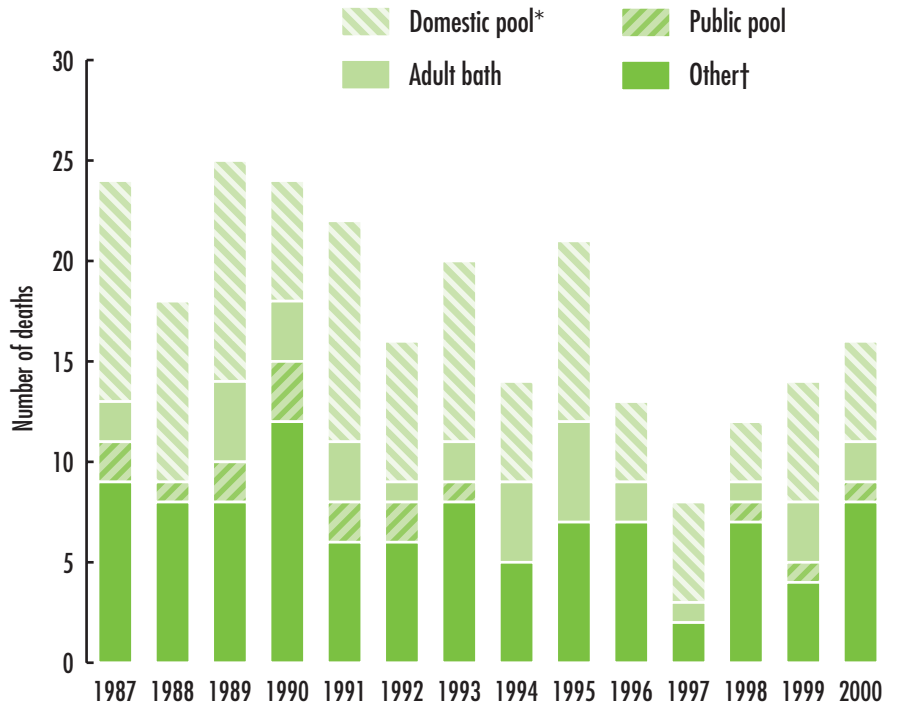
Location of drowning	Age				Total
	29–364 days	1–4 years	5–9 years	10–14 years	
Private pool/spa	1	4	–	–	5
Dam	–	5	–	–	5
Adult bath	–	2	–	–	2
Public Pool	–	1	–	–	1
Reservoir	–	–	1	–	1
Creek	–	1	–	–	1
Storm water drain	–	–	–	1	1
Total	1	13	1	1	16

For the five cases of drownings in a private pool, two were in fenced pools. A section of fencing was missing in one case, and in another case an infant gained access to a fenced pool. One infant and one young child gained access through a sliding door to the spa/pool area.

Two children (both aged one year) drowned after being left in a bath with older siblings.

Five children (aged between 1 and 3 years of age) drowned in dams, and another child drowned in a creek. Other drownings occurred in a storm water drain, a reservoir and a public pool.

**Figure 16 Drowning fatalities, postneonatal infants and children, Victoria, 1987–2000**



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

\* 'Domestic Pool' includes spa, wading pool.

† 'Other' includes river, sea, dam, irrigation channel, reservoir, storm drain, creek.

## ***Fire***

There were seven deaths as a result of fire, (compared to four deaths in 1999 and three deaths in 1998). The children were aged from 6 months up to 11 years of age. Two died as a result of smoke inhalation and one infant from burns, and three from burns and smoke inhalation.

**Table 34 Deaths as a result of fire by age groups, postneonatal infants and children, Victoria, 2000**

	Age				Total
	29–364 days	1–4 years	5–9 years	10–14 years	
House fire	2	–	3	1	6
Other	–	–	1	–	1
Total	2	–	–	–	7

## ***Asphyxiation***

There were three deaths in 2000 due to non-intentional (accidental) asphyxiation (compared to one death in 1999 and nine deaths in 1998). The children were aged from one month up to 22 months of age. One infant was asphyxiated co-sleeping with parents, while another infant was asphyxiated in a faulty cot. Another child was asphyxiated after being entrapped between a cot and a wall.

### ***Other causes of unintentional injury death***

There were 16 deaths (1 postneonatal infant and 15 children) from other types of injuries, compared to three deaths in 1999.

**Table 35 Deaths due to other types of unintentional injuries by age groups, postneonatal infants and children, Victoria, 2000**

Type of injury	Age				Total
	29-364 days	1-4 years	5-9 years	10-14 years	
Fall	-	1	1	-	2
Electrocution	-	-	1	-	1
Snake bite	-	1	-	-	1
Poisoning	1	-	-	-	1
Dog Attack	-	1	-	-	1
Heat stroke	-	1	-	-	1
Hot water scald	-	1	-	-	1
Gunshot wound	-	-	-	1	1
Crush injury	-	-	1	-	1
Carbon monoxide toxicity	-	-	-	1	1
Propane toxicity	-	-	-	1	1
Struck by falling tree	-	-	1	-	1
Concussive injury	-	1	-	-	1
Compression injury	-	1	-	-	1
Farm accident	-	-	1	-	1
<b>Total</b>	<b>1</b>	<b>7</b>	<b>5</b>	<b>3</b>	<b>16</b>

### ***Preventable factors in fatal injuries***

**The Council considered that at least some of unintentional/accidental injury deaths were potentially preventable.** This opinion is based on evidence provided in Coroner's, police and autopsy 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 present.

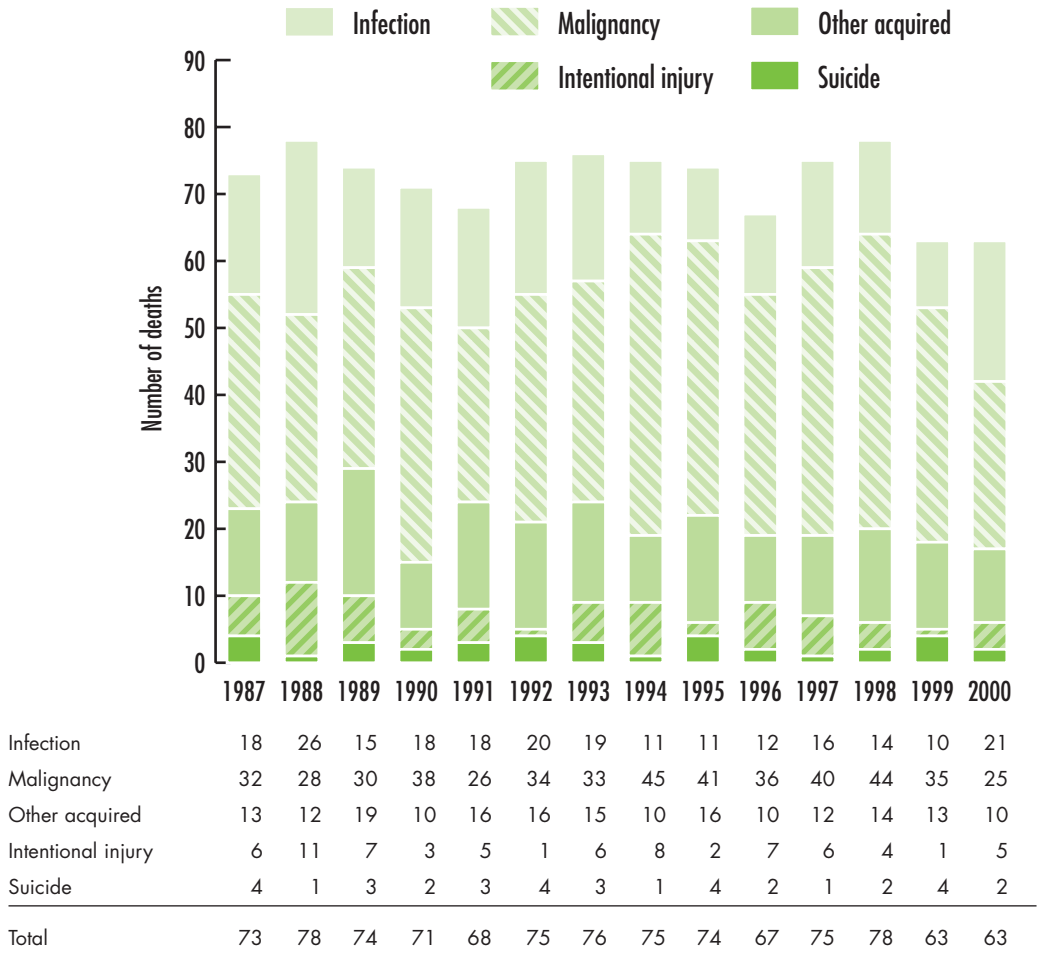
**Table 36 Preventable factors identified in unintentional injury deaths, postneonatal infants and children, Victoria, 2000**

Seat restraint not used or not available  
Excess speed  
Alcohol/drugs  
No helmet  
Lack of median barrier  
Poor road condition  
In-line skater on public road  
Inadequate caretaker supervision  
Underage driver  
Unfenced pool or spa  
Failure of pool or house fence  
Inadequate hazard protection  
No smoke detector or failure  
Exposed venetian blind cord  
Substandard equipment  
Inappropriate work environment

## ACQUIRED DISEASE AND INTENTIONAL INJURY

There were 63 postneonatal infant and child deaths due to acquired diseases and intentional injuries in 2000, compared to 63 deaths in 1999 and 78 deaths in 1998. The number of cases in each acquired disease category since 1987 is shown in Figure 17.

**Figure 17 Acquired conditions and intentional injuries, postneonatal infant and child deaths, Victoria, 1987–2000**



## ***Infection***

There were 21 postneonatal infant and child deaths due to infection in 2000, compared to 10 deaths in 1999. These deaths are outlined in Table 37.

**Table 37 Infections resulting in postneonatal infant and child deaths by age groups, Victoria, 2000**

Type of infection	29–364 days	1–4 years	5–9 years	10–14 years	Total
Meningococcal septicaemia/meningitis	2	–	2	1	5
Pneumococcal meningitis	1	–	1	–	2
Adenoviral meningitis	–	1	–	1	2
Meningitis (unknown organism)	–	1	1	1	3
Influenza A virus	–	1	–	–	1
Pneumonia: Varicella-zoster virus	–	1	–	–	1
Pneumonia: Enterovirus	1	–	–	–	1
Tracheobronchitis	1	–	–	–	1
Encephalitis	–	–	1	–	1
Meningoencephalitis	–	1	–	–	1
Septicaemia	1	–	–	–	1
Cerebral oedema	–	–	1	–	1
Bronchilitis	–	–	1	–	1
Total	6	5	7	3	21

There were five deaths due to meningococcal infection in 2000 (three from serogroup B and two from serogroup C) compared to one death in 1999.

## ***Malignancy***

There were 24 postneonatal infant and child deaths due to malignancy, compared to 35 deaths in 1999 and 44 deaths in 1998. The types of tumours by age group are listed in Table 38.

**Table 38 Deaths from malignancies, postneonatal infants and children, by age groups, Victoria, 2000**

Type of tumour	Infant	1–4 years	5–9 years	10–14 years	Total
Central nervous system					
Medulloblastoma	–	–	1	3	4
Brain stem glioma	–	–	1	–	1
Ependymoma	–	–	2	1	3
Glioblastoma	–	1	2	–	3
Leukaemia					
Acute myeloid leukaemia	–	–	–	1	1
Acute lymphatic leukaemia	2	–	2	2	6
Chronic lymphatic leukaemia	–	–	–	–	–
Chronic myeloid leukaemia	–	–	–	1	1
Lymphoma	–	–	1	1	2
Neuroblastoma	–	–	1	–	1
Sarcoma					
Ewing's sarcoma	–	–	–	1	1
Multiple Endocrine neoplasia	–	–	–	1	1
<b>Total</b>	<b>2</b>	<b>1</b>	<b>10</b>	<b>11</b>	<b>24</b>

### ***Other acquired diseases***

There were 10 deaths (3 postneonatal infants and 7 children) due to other acquired diseases in 2000, compared to 13 deaths in 1999. Three deaths were as a result of asthma and one death was related to epilepsy.

**Table 39 Other acquired diseases by age groups, postneonatal infants and children, Victoria, 2000**

	Age				Total
	29–364 days	1–4 years	5–9 years	10–14 years	
Asthma			3		3
Unascertained	1	1	–	1	3
Epilepsy		1			1
Malnutrition	1	–	–	–	1
Post operative haemorrhage		–	–	1	1
Haemolytic uraemic syndrome	1	–	–	–	1
Total	3	2	3	2	10

### ***Intentional injury***

In 2000 there were five deaths as a result of abuse (3 infants ranging from 1 month to 10 months of age, and two children aged 3 and 10 years), compared to one death in 1999 and four deaths in 1998.

### ***Suicide***

There were two teenagers, both aged 14 years, whose deaths were attributed to suicide, by hanging.

## RECOMMENDATIONS FROM THE COUNCIL ON INFANT AND CHILD DEATHS

### ***Sudden Infant Death Syndrome (SIDS)***

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 sudden infant death:

- Infants should be put to sleep on the back (supine), not on the side or face down (prone).
- 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, or visit the SIDS website: [www.sidsaustralia.org.au](http://www.sidsaustralia.org.au)

### ***Drowning***

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

***Deaths of infants and children from drowning is a continuing public health concern each year and the Council again emphasises the danger to toddlers of unprotected swimming pools and adult baths, particularly if children are 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 watercraft, and that children under 10 years must actually wear the device.

### ***Poisoning***

**Since the late 1970s, there has been a substantial reduction in infant and child deaths resulting from poisoning.**

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

Child-resistant packaging, publicity regarding prevention, and the availability of more effective treatment of most poisonings are among the factors contributing to this improvement.

Infant and child 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.

**Advice on the optimal management of children suspected of ingesting toxic substances is readily available from the Poisons Information Centre, telephone 13 11 26.**

### ***Dog-bites***

#### **\* Choose the right breed for the family**

Dog bites are a significant cause of injury in young children. It is important that families choose the breed of dog carefully to suit their lifestyle and environment. Certain breeds may not be appropriate if young children are in the household.

#### **Young children should always be supervised around dogs and separated from them at feeding time.**

Information on responsible dog ownership and dog-bite prevention is available through The Safety Centre, Royal Children's Hospital Melbourne, telephone (03) 9345 5085.

### ***Nursery furniture***

#### **\* Cot design standard now mandated**

To prevent hazardous cots coming onto the market, as of mid-1998, the Australian/New Zealand Standard on the design and manufacture of infant domestic cots has been mandated. This means that all cots sold or supplied must now conform with the Standard. The risk of injury, particularly asphyxiation, still exists if the cot is broken or the mattress ill-fitting. Parents of infants and toddlers must be aware of such dangers and advised about the appropriate sleeping environment for their children. Further information is available from Kidsafe Victoria (Child Accident Prevention Foundation of Australia) telephone (03) 9427 1008 or visit the Kidsafe Victoria website: [www.kidsafe.com.au](http://www.kidsafe.com.au).

### ***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 overlooked, and threats of suicide should not be ignored.** Such threats or suspected depression usually indicate the need for referral to a specialist.

Children subjected to bullying are particularly vulnerable, and bullying should be promptly reported to appropriate authorities.

## ***Cigarette lighters, matches, and candles***

### **\* Use child-resistant lighters**

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

## ***Trailers and utilities***

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

## ***Referral for paediatric intensive care***

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

All children who need endotracheal intubation for more than 24 hours should be referred to a paediatric intensive care unit, and the Unit should be advised well in advance if this is considered a possibility. A 1997 study, after adjustment for severity of illness, 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.

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***

### **CNS**

- 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\*

\* Information obtained from the history.

### **Respiratory**

- Retraction – moderate or severe chest retraction

## CVS

- Pallor – sudden onset of persistent generalised pallor

## Uncommon findings

- Bilious vomiting, grunting, apnoea, fits

## *Recognising serious illness in babies*

**The Child Health Record** is given to new parents of babies born in Victoria. A Child Health Information booklet within the kit contains a guide for parents on **Recognising Serious Illness** in babies (p3).

## *Signs of severe sepsis in children*

The Council has 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 or may only be evident as postural hypotension).

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 under-treated 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 an asthma management 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, hydrocortisone 50mg/kg, maximum 1 gram) if this can be given 10 minutes before they receive the **first** dose of antibiotics.

### ***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, page 82).

### ***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 pyrexia of unknown origin 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 appropriate 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 and measles, decreases the antibody response to infection and increases mortality in severe infections. Paracetamol does not provide effective prophylaxis against febrile convulsions

There is a danger that if children with serious illness are treated at home with paracetamol, this will delay emergency referral and 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. Paediatric specialists, surgical and resuscitatory, should be involved in childhood surgical emergencies.

### ***Immunisation***

The importance of routine immunisation is again stressed. The schedule is included in the section on vaccine-preventable diseases (page 68).

### ***Very preterm babies***

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

Many extremely immature and very low birthweight infants born in or transferred to 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). The treatment of a child with snakebite should be discussed with the Intensive Care Unit at the Royal Children's Hospital, telephone (03) 9345 5211.

## IMMUNISATION AND VACCINE-PREVENTABLE DISEASES

In 2000, Victoria's immunisation programme continued with universal service provided by all local governments, over 2000 general practices and Aboriginal Medical Services in Victoria. Vaccines on the NHMRC Australian Standard Vaccination Schedule (ASVS) are distributed free of charge to all immunisation providers. Immunisation coverage for children up to the age of 7 years is assessed by the Australian Childhood Immunisation Register, administered by the Health Insurance Commission.

Some of the key influences on increasing coverage have undoubtedly been both parent and provider incentives for immunisation and for submission of data, pilot activities on "data cleaning" to reduce duplications and errors in the data stored on ACIR, and targeted outreach program to offer immunisation to those identified as truly overdue for some missed dose(s). An evaluation of the ACIR recommended that additional effort be directed towards data cleaning activities.

To assist with this, the Health Insurance Commission, which administers the ACIR, assigned short-term field officers in each state to work with providers on local data issues. The Victorian government announced the provision of \$500,000 annually for Regional Data Quality Officers to work with providers at a regional level to correct any data errors, then ensure that those children who are truly overdue for dose(s) be followed up individually.

Several years after the NHMRC first recommended universal infant immunisation with hepatitis B, this program was implemented in May 2000. The NHMRC recommended that a monovalent hepatitis B vaccine be administered at birth by maternity hospital staff, followed by three further doses in a combination vaccine. Concurrent with the implementation of this program, a formulation of vaccine without the preservative thiomersal became available, which was considered more appropriate for young babies. This formulation is now used in the neonatal program.

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 was published in the report *Surveillance of Notifiable Infectious Diseases in Victoria 2000*, Public Health Division, Department of Human Services, 2001.

### ***Vaccine Preventable Diseases***

#### ***Measles***

There were 133 notifications of measles in 2000, 67 females and 66 males. Those under the age of one year continued to be over-represented in notified cases (34 out of 133). Clinical symptoms were obtained for 132 (99 per cent) of the notified cases. Only 19 (14 per cent) of these met the NHMRC clinical case definition for suspected measles (that is, a morbilliform rash, cough, and fever at rash onset). Of these, notification rates were highest for those aged 0–4 years. Three cases (14 per cent) were infants aged less than one year, and 10 cases (57 per cent) were young adults aged 16–29 years.

Serological testing was performed on 27 (79 per cent) of these infants, with one being positive for measles specific IgM; an unvaccinated 12-month old child whose father was also a laboratory confirmed case. Of the 15 laboratory confirmed cases, three (20 per cent) reported a history of previous measles vaccination (aged

16, 23 and 24 years); none of these were able to provide documentation to validate the history. Of the 99 laboratory rejected cases, 66 (67 per cent) reported previous vaccination and, of these, 60 (91 per cent) were immune to measles (IgG positive)

The epidemiology of measles in Victoria during 2000 continued the previously observed pattern of clusters of infection following importation of disease. Fourteen laboratory-confirmed cases were associated with four clusters where the index case had acquired infection either interstate or overseas, including Sri Lanka, New Zealand, Western Australia and Sydney. The source of infection was unknown for one laboratory confirmed case.

The enhanced surveillance system for measles in Victoria continues to facilitate the early identification and improved management of measles clusters in the community. The majority of cases notified were young adults. Measles-mumps-rubella vaccine is now available free of charge to 18–30 year olds and should be encouraged in high-risk groups such as health care workers and travellers.

### ***Haemophilus influenzae Type b (Hib) Infection***

In 2000 the Department received three notifications of invasive Hib infection: one child aged six months with Hib meningitis, one six-year-old child with Hib epiglottitis, and one older adult with Hib septicaemia. Both children were age appropriately vaccinated with HibTITER. The number of Hib infections notified to the Department remains very low.

### ***Pertussis***

There were 734 notifications of pertussis in 2000, of which 384 (52 per cent) were female. The median age of cases was 20 years (range 0–88years). The age distribution varied according to gender, with female cases (median 25 years) being generally older than male cases (median 16 years). The crude notification rate was 16 per 100,000 population. Age specific notification rates were highest in children aged 10–14 years (66 per 100,000 population) but were lower in the 5–9 year age group (14 per 100,000 population).

Notification rates continue to be high for infants aged less than one year (52 per 100,000 population). Eleven hospital admissions of an average length of stay of eight days (range 2–14 days) were identified. Ten of these were less than one year of age, although only three were too young to have commenced an immunisation programme.

### ***Mumps***

There were 43 notifications of mumps in 2000, of which 14 (33 per cent) were female and 29 (67 per cent) were male. Seventy-two per cent of notifications were for children and young adults aged less than 20 years, the highest notification rate was for males aged 0–4 years. Seven cases (16 per cent) were laboratory confirmed, the remainder were based on clinical diagnosis alone. Notifications were received throughout the year, with peaks in July and September.

### ***Rubella***

There were 66 notifications of rubella in 2000, of which 37 (56 per cent) were male and 29 (44 per cent) were female. Notification rates were highest for children aged 0–4 years. In children less than five years notifications were similar for males and females; in the age group 15–44 years, 13 notifications were for males compared with six in females. Thirteen cases (19 per cent) were laboratory confirmed, while a clinical diagnosis was the basis of the remainder of cases. The greatest number of notifications occurred in September. There were no notifications of congenital rubella during 2000.

## ***Immunisation coverage***

At December 2000, full immunisation coverage at 12 months of age was 92.1%. Coverage with three doses of diphtheria tetanus pertussis (DTP) vaccine was 92.5%, three doses of Haemophilus influenzae type b (Hib) vaccine 92.3% and three doses of oral polio vaccine 92.4%. All of these estimates are slightly above the national average, which was 91.3% for full immunisation coverage at 12 months of age. At two years of age, 93.5% of children had received the first dose of measles mumps rubella (MMR) vaccine; 90.4% had received the fourth dose of DTP vaccine, and 86.3% of children were fully immunised. Again, Victoria was above the national average, with 85.1% of children across Australia recorded as fully immunised. It is recognised that these are minimum estimates of coverage, and subsequent intensive efforts to correct data errors and follow up those children who are truly overdue for one or more doses have resulted in higher demonstrated immunisation coverage.

The current immunisation schedule endorsed by the Department of Human Services Victoria is shown in Table 40.

**Table 40 Recommended immunisation schedule, 0–19 years**

Age	Immunisation
Birth	Hepatitis B Vaccine
2 months	Diphtheria/Tetanus/Pertussis Vaccine Oral Polio Vaccine Hib (Haemophilus influenzae type b)/Hepatitis B Vaccine
4 months	Diphtheria/Tetanus/Pertussis Vaccine Oral Polio Vaccine Hib (Haemophilus influenzae type b)/Hepatitis B Vaccine
6 months	Diphtheria/Tetanus/Pertussis Vaccine Oral Polio Vaccine
12 months	Measles/Mumps/Rubella Vaccine Hib (Haemophilus influenzae type b)/Hepatitis B Vaccine
18 months	Diphtheria/Tetanus/Pertussis Vaccine
4 years	Diphtheria/Tetanus/Pertussis Vaccine Oral Polio Vaccine Measles/Mumps/Rubella Vaccine
Year 7 at school	Hepatitis B Vaccine (1st dose)
4–6 months later	Hepatitis B Vaccine (2nd dose)
Prior to leaving school	Adult Diphtheria/Tetanus Vaccine
15–19 years	

# MATERNAL DEATHS IN VICTORIA

## *Definitional issues*

Council uses the definition of maternal death recommended by the most recent revision of the International Classification of Diseases (ICD-10):

**“the death of a woman while pregnant or within 42 days of the termination of the pregnancy irrespective of the cause of death.”**

This definition is broader than that used by the World Health Organisation (WHO), which defines maternal death as “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 WHO definition includes death from abortion and ectopic pregnancy, but **excludes incidental deaths** from causes unrelated to pregnancy, such as death from injury or malignancy. In this and other reports on maternal deaths in Australia, incidental deaths are included. Council also reviews those deaths which fall into the category of ‘late maternal death’, i.e. when death occurs within a year of the birth or termination of the pregnancy when the death is from direct or indirect causes, although these occurrences are very rare.

Because of varying definitions and ascertainment practices, it is difficult to make valid comparisons with international data, and variations in ascertainment may occur within Australia. Council is endeavouring to ensure maximum ascertainment of deaths by establishing formal notification mechanisms with the Australian Bureau of Statistics and with the office of the State Coroner. If, as appears to be the case in other jurisdictions, there has been under-ascertainment of maternal deaths, improvement in reporting will result in an apparent increase in the number and rates of deaths. This will need to be taken into account when interpreting trends.

The Report on Maternal Deaths in Australia 1994–1996 (Australian Institute of Health and Welfare) was released in 2001. One hundred deaths were reported in this triennium, an increase of 16 deaths over the previous triennium, which reversed the continuing downward trend observed over the previous 15 years. The ratio for the triennium was 13.0/100,000 confinements. The National Maternal Mortality Triennial Reports may be accessed through: [www.health.gov.au/nhmrc/publications](http://www.health.gov.au/nhmrc/publications).

The National report for the triennium 1997–1999 is awaited with interest to determine whether the increase seen in 1994–6 is a trend or a chance fluctuation. As can be seen from the table, there is no suggestion from Victorian data to indicate any upward trend in maternal mortality.

## ***Classification***

Maternal deaths are classified into three groups:

- *Direct* maternal deaths, where the death is considered to be due to a complication of the pregnancy itself (for example, haemorrhage from placenta praevia).
- *Indirect* maternal deaths where the death is considered to be due to a pre-existing condition aggravated by the physiological changes of pregnancy (for example, deterioration in pre-existing heart disease or diabetes).
- *Incidental* deaths, where death is considered unrelated to pregnancy (for example, motor vehicle accident).

It should be noted that sometimes it is not easy to distinguish with certainty whether a death was directly or indirectly related to pregnancy or its management, or was totally unrelated. For example, it maybe difficult to determine that deaths from apparent suicide or a from homicide are related to the pregnancy or incidental. This is an important reason for including “incidental” deaths in maternal mortality analyses.

## ***Maternal mortality ratios***

The Maternal Mortality ratio is defined as follows:

$$\text{Maternal mortality ratio} = \frac{\text{number of maternal deaths (all categories)} \times 100,000}{\text{(number of confinements)}}$$

*Confinement definition* = The number of pregnancies of 20 weeks gestation or more resulting in a livebirth or stillbirth.

The term *ratio* is used rather than rate in acknowledgement that the true denominator (ie actual numbers of women pregnant in a given year) cannot be accurately determined.

## ***Trends in Maternal Deaths***

In the 47 years of systematic analysis of maternal deaths in Victoria, there has been a steady and impressive decline in their numbers. The ratio has fallen from 66 per 100,000 in 1953, to just under 10 in 1993. Since 1993 the ratio has been relatively constant, averaging just over 9 per 100,000 with minor fluctuations. The members of the maternal mortality committee agree that continued surveillance of these deaths should continue, and that an irreducible minimum incidence of maternal deaths has not been reached. It should be noted that when numerators are very small and denominators very large, as is the case with the Maternal Mortality Ratio, year-to-year fluctuations in rates need to be interpreted with caution.

**Table 41 Maternal deaths in Victoria 1953–2000**

Year	Births			Maternal deaths	Maternal Mortality ratio (per 100,000 total births)*
	Livebirths	Stillbirths	Total births		
1953	53,561	817	54,378	36	66.0
1954	54,660	794	55,454	35	63.1
1955	56,336	788	57,124	39	68.3
1956	58,393	819	59,212	17	28.7
1957	60,464	894	61,358	31	50.5
1958	61,269	826	62,095	29	46.7
1959	62,245	799	63,044	29	46.0
1960	64,025	850	64,875	28	43.2
1961	65,886	885	66,771	26	38.9
1962	65,890	775	66,665	17	25.5
1963	65,649	792	66,441	17	25.6
1964	64,990	771	65,761	22	33.4
1965	63,550	747	64,297	29	45.1
1966	64,008	780	64,788	20	30.9
1967	65,485	797	66,282	18	27.2
1968	70,228	768	70,996	21	29.6
1969	71,035	761	71,796	13	18.1
1970	73,019	782	73,801	29	39.3
1971	75,498	760	76,258	19	24.9
1972	71,807	842	72,649	12	16.5
1973	67,123	802	67,925	7	10.3
1974	66,201	787	66,988	9	13.4
1975	61,897	713	62,610	9	14.4
1976	60,667	616	61,283	12	19.6
1977	59,518	567	60,085	5	8.3
1978	58,861	575	59,436	11	18.5
1979	57,767	490	58,257	8	13.7
1980	58,206	447	58,653	10	17.0
1981	59,526	439	59,965	8	13.3
1982	59,965	490	60,455	6	9.9
1983	60,149	442	60,591	5	8.2
1984	60,278	426	60,704	8	13.2
1985	60,776	398	61,174	5	8.2
1986	60,863	390	61,253	10	16.3
1987	61,089	385	61,474	5	8.1
1988	63,126	416	63,542	11	17.3
1989	63,694	424	64,118	8	12.5

**Table 41 Maternal deaths in Victoria 1953–2000 – continued**

Year	Births			Maternal deaths	Maternal Mortality ratio (per 100,000 total births)*
	Livebirths	Stillbirths	Total births		
1990	66,350	376	66,726	12	17.9
1990	66,350	376	66,726	12	17.9
1991	64,632	375	65,007	9	13.8
1992	65,815	323	66,140	4	6.0
1993	64,284	286	64,570	6	9.3
1994	64,376	329	64,705	7	10.8
1995	63,214	315	63,529	8	12.6
1996	62,429	291	62,720	3	4.8
1997	61,815	269	62,084	5	8.1
1998*	61,634	290	61,924	3	4.8
1999	62,149	293	62,442	9	14.4
2000	62,092	262	62,354	5	8.0

\* Note Deaths per 100,000 total births.

### ***Maternal Deaths in Victoria for 2000***

In Victoria in 2000 there were 5 maternal deaths identified: 2 direct, 2 indirect and 1 incidental death, and 61,569 confinements, giving a maternal mortality ratio of 8.1 per 100, 000 confinements.

#### **Avoidable factors**

The review of these 5 cases serves as a reminder that most maternal the deaths are consequent on rare and unpredictable occurrences, in which there are very limited opportunities to apply preventive interventions.

In consideration of the management of the direct and indirect cases, the Committee was of the view that in none of them were there factors involved in the medical care which would have prevented the death.

**The committee recommended that clinicians be reminded that in the management of patients with severe cardio-pulmonary failure in advanced pregnancy, immediate caesarean section may facilitate resuscitation and that early placement of central venous catheter monitoring facilitates distinction between pulmonary embolus and concealed haemorrhage.**

### ***Details of the five maternal deaths***

#### **Direct deaths**

- Multiparous woman, hospitalised with placenta praevia at 34 weeks. Emergency caesarean section for antepartum haemorrhage. No intra-operative problems. Primary postpartum haemorrhage ensued with coagulopathy, managed with transfusion of blood and fresh frozen plasma, laparotomy, and hysterectomy. Suspected amniotic fluid embolism. Bleeding unable to be controlled, leading to cardiac arrest. Patient transferred to ICU, for extracorporeal membrane oxygenation, without avail.

Coroner's investigation found no avoidable factors.

Post mortem – confirmed amniotic fluid embolism.

Diagnosis – Postpartum haemorrhage, secondary to coagulopathy from amniotic fluid embolism.

Classification – Direct

- Fetal death in utero at 35 weeks gestation, following placental abruption. Labour was induced. Religious status as Jehovah's witness was given careful consideration and patient categorically refused any blood transfusion, under any circumstances. Primary postpartum haemorrhage ensued with intractable coagulopathy leading to progressive deterioration and eventual cardiac arrest, despite hyperbaric oxygen therapy.

Coroner's findings: Nothing in medical management was other than appropriate in the circumstances

Cause of death: Postpartum haemorrhage secondary to coagulopathy following placental abruption.

Classification – Direct

### **Indirect deaths**

- Admitted unconscious to ICU after a suicide attempt at 28 weeks gestation. Emergency Caesarean section resulted in a live born infant. Progressive deterioration of the woman despite extra corporeal membrane oxygenation. Died 18 days after admission. In reviewing the Coroner's findings, the committee judged that the death should be classified as indirect rather than incidental, as the pregnancy probably exacerbated a pre-existing depression.

Cause of death – Suicide

Classification – Indirect

- Nullipara, uncomplicated pregnancy until 38 weeks gestation, when she presented at emergency department with chest pain. All investigations negative, but patient declined an X-ray. Transferred by ambulance to another hospital for VQ scan. Collapsed in transit, unable to be resuscitated.

Coroner's postmortem examination revealed massive intrathoracic haemorrhage from spontaneous dissection of subclavian artery.

Cause of death – Spontaneous dissection of presumed intimal/medial defect in subclavian artery.

Classification – Indirect

### **Incidental deaths**

- 26 weeks pregnant. Coroner's findings: Homicide.

Cause of death – Homicide

Classification – Incidental

### **Addendum**

One direct death for 1999 was reclassified as indirect, following receipt of the Coroner's Report.

# AT-RISK PREGNANCIES

While obstetric complications may occur in any pregnancy at any time, Council reminds practitioners that certain categories of patient are at increased risk of adverse maternal and perinatal death, and morbidity. The accompanying list is presented to remind all those practising obstetrics of these conditions. It is recommended that patients falling into these groups should be monitored carefully, and that if more than minor complications exist, consideration should be given to referral to obtain appropriate specialist consultation.

## ***1. General factors***

Age (younger than 20 years, or older than 35 years)  
Nulliparity and Parity greater than 3  
Weight (overweight or underweight)  
Dietary aberrations  
Previous Caesarean section  
Cigarette smoking  
Other drug dependency, or use of alcohol  
Mental illness

## ***2. Maternal diseases***

Cardiovascular disease, including hypertension  
Diabetes mellitus (Gestational)  
Diabetes mellitus (Pre-existing)  
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***

Consider referral for genetic counselling

## ***4. Adverse obstetric history***

History of recurrent miscarriage  
Previous perinatal mortality  
Previous preterm birth  
Previous infant with growth restriction

## ***5. Diseases peculiar to pregnancy***

Preeclampsia  
Rhesus or other blood group incompatibility

### ***6. Bleeding in pregnancy***

Threatened abortion

Abruptio placentae

Placenta praevia

### ***7. Obstetric conditions detected antenatally***

Malpresentation, especially breech presentation and transverse lie

Multiple pregnancy

Suspected fetal growth restriction

Prolonged pregnancy (>41 weeks)

Contractions prior to 35 weeks gestation

Pre labour 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

Maternal pyrexia

Malpresentation

# EMERGENCY TRANSFER

## IN UTERO TRANSFER

Direct communication at Consultant Obstetrician level is encouraged in order to ensure the transfer is appropriate and safe. Problems with finding a bed in a perinatal centre should not delay initiation of the transfer nor should they undermine efforts to ensure appropriate stabilization measures are in place, and that the transfer is safe for both mother and baby. Where decisions about mode of transfer or need for a medical escort are unclear NETS can provide important information about the logistics of the various options (phone 9347 7441).

When birth outside perinatal centres is anticipated for babies at less than 33 weeks or for any other indication in which neonatal intensive care is anticipated, consultation with the Newborn Emergency Transport Service (NETS) is strongly recommended. In circumstances where in utero transfer is deemed inappropriate and delivery is imminent, NETS will mobilize a retrieval team with the aim of supporting the local team at or soon after the delivery of a high risk newborn.

## NEWBORN EMERGENCY TRANSPORT SERVICE (NETS)

During 2000 there were 1537 transfers. Both primary and return transfers have increased significantly compared to the 1405 transfers undertaken in 1999. 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 term and preterm babies within Level 2 metropolitan and country hospitals.

**Table 42 Transfers by NETS, Victoria, 1991–2000**

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Primary transfers,										
metropolitan	476	502	457	410	497	489	474	502	499	572
Primary transfers,										
country, road	119	104	123	103	114	111	99	125	147	137
Return transfers, country,										
air ambulance	98	123	94	118	126	98	121	134	115	106
Return transfers	183	238	219	207	265	456	556	658	628	701
Special investigations	10	6	10	4	9	17	17	14	16	21
Total	886	973	903	842	1011	1171	1267	1433	1405	1537

## ***Selection of infants for transfer***

**For comprehensive information on the Newborn Emergency Transport Service visit the NETS website: <http://www.netsvic.org.au>**

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

Critically ill infants should be transferred to a hospital with a neonatal intensive care unit (NICU), resourced to provide skilled medical and nursing care, and diagnostic and other supportive services on a 24-hour basis. Infants who are less seriously ill 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.

### ***Respiratory distress***

An infant with an oxygen requirement of more than 40 per cent needs to be under the direct care of a Consultant Paediatrician or Neonatologist in a hospital with specialist neonatal nurses and facilities for monitoring arterial blood gases. An infant needing more than 60 per cent oxygen 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 Consultant Paediatrician and requires referral to a NICU.

### ***Low birthweight (less than 2,500g)***

All low birthweight 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 of birthweight less than 1,250 grams should have an initial period of management in a NICU.

*The management of infants with a gestation age of 22–33 weeks should be discussed with a Neonatologist including the advisability of and arrangement for transfer.*

### ***Cardio respiratory depression***

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. *All* intubated infants who have not established regular breathing by 5 minutes of age should remain intubated and require transfer to a NICU.

### ***Other categories of infants requiring 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:

- **Telephone the NETS ‘hot line’ (03) 9347 7441**

The call will be received by the transport nurse or NETS consultant. Telephone discussions with NETS staff may help in deciding whether or not transfer is the best option in a particular case. All calls are conferenced so that the referring doctor only has to provide information once to the NETS team.

Conferencing allows all parties to contribute to discussions about stabilization and transfer arrangements. If it is decided that the baby requires transfer NETS staff will arrange the ambulance and notify the receiving unit of the impending admission.

Clinical consultation with a Neonatologist is strongly encouraged whenever the referring doctor is uncertain about the management of a baby, irrespective of whether transfer is involved.

- **Discuss the patient with the receiving unit**

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. Neonatal intensive care units are situated at the Mercy Hospital for Women, Monash Medical Centre, Royal Children’s Hospital and Royal Women’s Hospital.

**In most instances NETS advises that the impulse to immediately 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***

There 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:

NETS Education  
132 Grattan Street  
Carlton, Victoria 3053.

### ***NETS Education***

NETS Education 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 hospitals.

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

In collaboration with the School of Nursing and Midwifery at Latrobe University NETS Education has developed a Distance Education Programme in Emergency and Special Care of the Newborn. The course can be undertaken for professional development only or may be used for direct credit towards a Graduate Certificate in Emergency and Special Care of the Newborn.

Material is largely print-based and learning is self-directed and self-paced. The course consists of 4 subjects. Subject 1, the core subject, is recommended for completion by all students. The remaining 3 may be taken as individual subjects 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 visit the NETS website: [www.netsvic.org.au](http://www.netsvic.org.au)**

## 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](mailto:henningr@cryptic.rch.unimelb.edu.au), or from the PETS website: [www.rchpets.org](http://www.rchpets.org).

**Table 43 Transfers by PETS, Victoria, 1991–2000**

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Injuries										
head injury	19	22	19	17	19	20	24	18	20	26
chest injury*										4
immersion	9	9	3	10	–	5	4	4	9	5
poisoning	5	–	6	4	7	5	6	6	4	13
other	6	5	15	9	6	5	7	7	25	13
Cardiovascular	8	10	9	3	10	2	1	3	1	6
Neurology:										
fits	18	18	24	16	19	19	22	42	36	34
meningitis	12	20	10	3	9	5	7	10	10	1
encephalitis*										5
other	7	8	4	13	6	10	8	6	9	23
Respiratory:										
asthma	23	31	34	47	23	28	30	33	37	45
bronchiolitis	6	4	7	4	9	8	8	9	17	10
croup	34	53	27	44	18	24	19	15	19	18
epiglottitis	28	27	11	3	2	1	1	1	–	1
other	11	17	18	21	18	24	14	16	16	20
Miscellaneous:										
septic shock	3	2	4	5	13	9	8	6	14	2
diabetic ketoacidosis*										3
other	5	5	10	8	1	15	10	10	20	27
Total	194	231	201	207	160	180	169	186	237	256

\* denotes new category, not used in previous reports.

## ***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***

- Suboptimal medical treatment for asthma.
- Failure to provide 100 per cent oxygen.
- Ventilation too late.

### ***Brain injuries (drowning, trauma, convulsions)***

- Too much fluid.
- Use of fluids other than 0.9% saline
- Failure to control seizures.
- Hypoventilation from seizures 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 by orogastric tube
- 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.

## APPENDIX A

Two classification systems have been developed by a working party of Perinatal Society of Australia and New Zealand (PSANZ) and endorsed by the National Perinatal Data Development Committee (NPDDC) for perinatal mortality by antecedent cause and for neonatal deaths, by conditions in the neonatal period, or prior to discharge home, leading to the death. The classification systems, the Australian and New Zealand Antecedent Classification of Perinatal Mortality (ANZACPM), and the Australian and New Zealand Neonatal Death Classification (ANZNDC), await endorsement by the National Centre for Classification of Death (NCCD), in accordance with WHO/ICD requirements.

### AUSTRALIA AND NEW ZEALAND ANTECEDENT CLASSIFICATION OF PERINATAL MORTALITY (ANZACPM)

#### 1. CONGENITAL ABNORMALITY (including terminations for congenital abnormalities)

- 1.1 Central nervous system
- 1.2 Cardiovascular system
- 1.3 Urinary tract
- 1.4 Gastrointestinal tract
- 1.5 Chromosomal
- 1.6 Metabolic
- 1.7 Multiple
- 1.8 Other congenital abnormality
  - 1.81 Musculoskeletal
  - 1.82 Respiratory
  - 1.83 Diaphragmatic hernia
  - 1.88 Other
- 1.9 Unspecified congenital abnormality

#### 2. PERINATAL INFECTION

- 2.1 Bacterial
  - 2.11 Group B Streptococcus
  - 2.12 E coli
  - 2.13 Listeria monocytogenes
  - 2.18 Other bacterial
  - 2.19 Unspecified bacterial
- 2.2 Viral
  - 2.21 Cytomegalovirus
  - 2.22 Parvovirus
  - 2.23 Herpes simplex virus
  - 2.24 Rubella virus
  - 2.28 Other viral
  - 2.29 Unspecified viral
- 2.3 Protozoal eg Toxoplasma
- 2.4 Spirochaetal eg Syphilis
- 2.5 Fungal
- 2.8 Other
- 2.9 Unspecified organism

### **3. HYPERTENSION**

- 3.1 Chronic hypertension: essential
- 3.2 Chronic hypertension: secondary, eg renal disease
- 3.3 Chronic hypertension: unspecified
- 3.4 Gestational hypertension
- 3.5 Pre-eclampsia
- 3.6 Pre-eclampsia superimposed on chronic hypertension
- 3.9 Unspecified hypertension

### **4. ANTEPARTUM HAEMORRHAGE (APH)**

- 4.1 Placental abruption
- 4.2 Placenta praevia
- 4.3 Vasa praevia
- 4.8 Other APH
- 4.9 APH of undetermined origin

### **5. MATERNAL CONDITIONS**

- 5.1 Termination of pregnancy (other than for congenital (fetal) abnormality)
- 5.2 Diabetes/Gestational diabetes
- 5.3 Maternal injury
  - 5.31 Accidental
  - 5.32 Non-Accidental
- 5.4 Maternal sepsis
- 5.8 Other maternal conditions, eg Lupus obstetric syndrome.

### **6. SPECIFIC PERINATAL CONDITIONS**

- 6.1 Twin-to-twin transfusion
- 6.2 Fetomaternal haemorrhage
- 6.3 Antepartum cord complications (eg cord haemorrhage; true knot with evidence of occlusion)
- 6.4 Uterine abnormalities, eg bicornuate uterus, cervical incompetence.
- 6.5 Birth trauma (typically infants of >24 weeks gestation or >600g birthweight)
- 6.6 Haemolytic disease
- 6.7 Idiopathic hydrops
- 6.8 Other specific perinatal conditions (includes iatrogenic conditions such as rupture of membranes after amniocentesis, termination of pregnancy for suspected but unconfirmed congenital abnormality.)

### **7. HYPOXIC PERIPARTUM DEATH (typically infants of >24 weeks gestation or >600g birthweight)**

- 7.1 With intrapartum complications
  - 7.11 Uterine rupture
  - 7.12 Cord prolapse
  - 7.13 Shoulder dystocia
  - 7.18 Other
- 7.2 No intrapartum complications
- 7.9 Unspecified hypoxic peripartum death

## **8. FETAL GROWTH RESTRICTION (FGR)**

- 8.1 With evidence of uteroplacental insufficiency eg significant infarction, acute atherosclerosis, maternal vascular thrombosis or maternal floor infarction
- 8.2 With chronic villitis
- 8.3 Without the above placental pathology
- 8.4 No examination of placenta
- 8.5 Unspecified FGR or not known whether placenta examined

## **9. SPONTANEOUS PRETERM (<37 weeks gestation)**

- 9.1 Spontaneous preterm with intact membranes, or membrane rupture <24 hours before delivery,
  - 9.11 with chorioamnionitis,
  - 9.12 without chorioamnionitis,
  - 9.13 no examination of placenta
  - 9.19 unspecified or not known whether placenta examined
- 9.2 Spontaneous preterm with membrane rupture  $\geq$ 24 hours before delivery,
  - 9.21 with chorioamnionitis,
  - 9.22 without chorioamnionitis,
  - 9.23 no examination of placenta
  - 9.29 unspecified or not known whether placenta examined
- 9.3 Spontaneous preterm with membrane rupture of unknown duration before delivery,
  - 9.31 with chorioamnionitis,
  - 9.32 without chorioamnionitis,
  - 9.33 no examination of placenta
  - 9.39 unspecified or not known whether placenta examined

## **10. UNEXPLAINED ANTEPARTUM DEATH**

- 10.1 With evidence of uteroplacental insufficiency, eg significant infarction, acute atherosclerosis, maternal vascular thrombosis or maternal floor infarction
- 10.2 With chronic villitis
- 10.3 Without the above placental pathology
- 10.4 No examination of placenta
- 10.9 Unspecified unexplained antepartum death or not known whether placenta examined.

## **11. NO OBSTETRIC ANTECEDENT**

- 11.1 SIDS
  - 11.11 Consistent with SIDS
  - 11.12 Possible SIDS
- 11.2 Postnatally acquired infection
- 11.3 Accidental asphyxiation
- 11.4 Other accident, poisoning or violence (postnatal)
- 11.8 Other
- 11.9 Unknown/Unexplained

## **AUSTRALIA AND NEW ZEALAND NEONATAL DEATH CLASSIFICATION (ANZNDC)**

### **1. CONGENITAL ABNORMALITY**

- 1.1 Central nervous system
- 1.2 Cardiovascular system
- 1.3 Urinary tract
- 1.4 Gastrointestinal tract
- 1.5 Chromosomal
- 1.6 Metabolic
- 1.7 Multiple
- 1.8 Other congenital abnormality
  - 1.81 Musculoskeletal
  - 1.82 Respiratory
  - 1.83 Diaphragmatic hernia
  - 1.88 Other
- 1.9 Unspecified congenital abnormality

### **2. EXTREME PREMATURITY**

(typically infants of  $\leq 24$  weeks gestation or  $\leq 600$ g birthweight)

- 2.1 Not resuscitated
- 2.2 Unsuccessful resuscitation
- 2.9 Unspecified or not known whether resuscitation attempted

### **3. CARDIO-RESPIRATORY DISORDERS**

- 3.1 Hyaline membrane disease/Respiratory distress syndrome (RDS)
- 3.2 Meconium aspiration syndrome
- 3.3 Primary persistent pulmonary hypertension
- 3.4 Pulmonary hypoplasia
- 3.5 Chronic neonatal lung disease (typically, bronchopulmonary dysplasia)
- 3.8 Other

### **4. INFECTION**

- 4.1 Bacterial
  - 4.11 Congenital bacterial
  - 4.12 Acquired bacterial
- 4.2 Viral
  - 4.21 Congenital viral
  - 4.22 Acquired viral
- 4.3 Protozoal eg Toxoplasma
- 4.4 Spirochaetal eg Syphilis
- 4.5 Fungal
- 4.8 Other
- 4.9 Unspecified organism

## **5. NEUROLOGICAL**

- 5.1 Hypoxic ischaemic encephalopathy/Perinatal asphyxia (typically infants of >24 weeks gestation or >600g birthweight)
- 5.2 Intracranial haemorrhage
- 5.8 Other

## **6. GASTROINTESTINAL**

- 6.1 Necrotising enterocolitis
- 6.8 Other

## **7. OTHER**

- 7.1 SIDS
  - 7.11 Consistent with SIDS
  - 7.12 Possible SIDS
- 7.2 Multisystem failure-only if unknown primary cause or trigger event
- 7.3 Trauma
- 7.8 Other
- 7.9 Undetermined/Unknown

## APPENDIX B

### USEFUL WEBSITES

#### ***Consultative Council on Obstetric and Paediatric Mortality and Morbidity (CCOPMM)***

Information on CCOPMM, the Perinatal Data Collection Unit (PDCU) and Birth Defects Registry (BDR) is available at [www.dhs.vic.gov.au/phd/perinatal/index.htm](http://www.dhs.vic.gov.au/phd/perinatal/index.htm)

#### ***Antenatal Care***

With respect to antenatal care, practitioners are reminded of the guidelines developed by the three tertiary centres in Melbourne, *The Three Centres Guidelines for Antenatal Care*, available at [www.3centres.com.au](http://www.3centres.com.au)

#### ***Examination of the Newborn***

Health professionals are reminded of the guidelines developed by the Paediatrics & Child Health Division of The Royal Australasian College of Physicians, *Examination of the Newborn*, available at [www.racp.edu.au/hpu/paed/examination](http://www.racp.edu.au/hpu/paed/examination)

#### ***Postmortem Examination***

The Department of Human Services has issued guidelines for hospitals with respect to gaining consent and other aspects of the retention, use and disposal of tissue obtained at autopsy. These guidelines are available on the internet at [www.dhs.vic.gov.au/phd/postmortem/index.htm](http://www.dhs.vic.gov.au/phd/postmortem/index.htm)

#### ***Newborn Emergency Transport Service (NETS)***

For comprehensive information on NETS and bookings for educational sessions

Telephone: (03) 9344 2567

Website: [www.netsvic.org.au](http://www.netsvic.org.au)

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